CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: **February 2003**	
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**			R-1 ITEM NOMENCLATURE **PE 0101221N Strategic Sub & Wpns Sys Spt**					
COST ($ in Millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Total PE Cost	**43.0**	**39.3**	**104.8**	**139.6**	**141.9**	**111.0**	**114.1**	**114.9**
J0951 TRIDENT II	9.1		29.6	30.3	30.4			
S0004 TRIDENT Submarine System Improvement	0.5	5.3	3.0	2.6	3.5	3.4	3.4	3.5
J2228 Technology Applications Program	33.4	34.0	72.2	106.7	108.0	107.6	110.7	111.4

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

The TRIDENT II (D5) Submarine Launched Ballistic Missile (SLBM) provides the U.S. a weapon system with greater accuracy and payload capability as compared to the TRIDENT I (C4) system. TRIDENT II enhances U.S. strategic deterrence providing a survivable sea-based system capable of engaging the full spectrum of potential targets with fewer submarines. This Program Element supports investigations into new technologies which would help mitigate the program impact due to component obsolescence and a rapidly decreasing manufacturing support base. These efforts include Reentry System Applications and Guidance System Applications, Radiation Hardened Electronics Applications, and Strategic Propulsion Applications. Also included in this program element are efforts associated with the three year Enhanced Effectiveness (E2) Demonstration which is intended to demonstrate a near-term capability to steer a SLBM warhead to Global Positioning Satellite (GPS)-like accuracy. Finally, the TRIDENT Submarine System Improvement Program develops and integrates command and control Improvements needed to maintain TRIDENT Submarine operational capability through the life cycle of this vital strategic asset. The program conducts efforts needed to maintain strategic connectivity, ensure platform invulnerability, and reduce lifecycle costs through Obsolete Equipment Replacement (OER) and commonality.

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B. (U) Program Change Summary:

	FY 2002	FY 2003	FY 2004	FY2005
Previous President's Budget: FY 2003 President's Controls):	45.5	40.3	41.4	41.8
Current President's Budget (FY 2004 President's Controls):	43.0	39.3	104.8	139.6
Total Adjustments:	-2.5	-0.7	63.4	97.8
Summary of Adjustments:				
Congressional Undistributed Reductions			-0.8	-0.5
Reprogrammings	-1.2		-0.5	-1.2
SBIR Transfer	-0.9			
Management Reform	-0.3	-0.1		
Economic Assumptions/various	-0.1	-0.6	-3.0	-3.0
Nuclear Posture Review Program Add			67.7	102.5

C. (U) Other Program Funding Summary: See enclosed R-2a for each individual project data.

D. (U) Acquisition Strategy: See enclosed R-2a for each individual project data.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification	DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**	PROJECT NUMBER AND NAME **TRIDENT II J0951**

COST ($ in Millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project Cost J0951 TRIDENT II	**9.1**	**0.0**	**29.6**	**30.3**	**30.4**	**0.0**	**0.0**	**0.0**
RDT&E Articles Qty								

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

This project supports an Effectiveness Enhancement (E2) Demonstration, starting in FY 2004, which is intended to demonstrate a near-term capability to steer a SLBM warhead to Global Positioning Satellite (GPS)-like accuracy. There will be no redesign of internal navigation components, optimization of packaging, or warhead development. Existing electronics and instrumentation will be packaged in the aft-extension portion of the reentry body (RB). This minimizes demonstration costs, and provides a point of departure for a potential follow-on SDD (System Design and Development) that would optimize for production of similar but smaller components develop appropriate payloads. In addition, modifications to the Missile, Guidance & Fire Control sections would be required to provide the necessary inertial measurement unit (IMU) alignment required for this application. Although the technology being developed applies to ballistic missiles in general, this demonstration is targeted to use TRIDENT II (D5). The demonstration is structured to use the existing D5 design to the maximum extent, and also use instrumentation already developed for reentry bodies (integrating it with control flaps for this new purpose. The demonstration will culminate in flight tests and will provide a final demonstration assessment report and recommended transition plan to the NAVY and STRATCOM in early FY 2007.

EXHIBIT R-2a, RDT&E Project Justification	DATE: February 2003
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**	PROJECT NUMBER AND NAME **TRIDENT II J0951**

B. (U) Accomplishments/Planned Program

	FY 02	FY 03	FY 04	FY 05
SLBM Retargeting System(SRS)	9.1			
RDT&E Articles Quantity				

(U) FY 2002 PLAN

(U) ($9.1) SRS: Efforts continued to complete phase three development required for deployment and final implementation of the SLBM Retargeting System Program in October 2003. Full obligation is complete.

	FY 02	FY 03	FY 04	FY 05
Enhanced Effectiveness (E2) Demonstration			29.6	30.3
RDT&E Articles Quantity				

(U) FY 2004 PLAN

(U) ($29.6) E2 Demonstration: Efforts begin in support of the three year program. Full obligation is projected by the 3rd quarter of the 1st year.
FY 2004 efforts include:

(U) Initiate and complete system design concepts and trades.
(U) Finalize system level requirements and demonstration test objectives
(U) Initiate and complete program plans and acquisition documentation
(U) Initiate and complete design trade studies and system specifications and initiate detail design of:
- o Fire Control software modifications
- o Missile electronics modifications
- o GPS preset data transfer
- o Reentry body extension, heat shield, flaps, and cabling.

(U) Finalize all hardware and software detail designs.
(U) Identify GFE/GFI and long lead item procurement required.

(U) FY 2005 PLAN

(U) ($30.3) E2 Demonstration: Efforts continue in support of the three year program. Full obligation is projected by the 3rd quarter of the 1st year.
FY 2004 efforts include:

(U) Procure, fabricate, and assemble hardware.
(U) Complete Fire Control software build, test, and validation
(U) Integrate guidance and reentry body components
(U) Complete hardware component ground testing
(U) Conduct interface testing
(U) Conduct Flight Test Readiness Review

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EXHIBIT R-2a, RDT&E Project Justification	DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**	PROJECT NUMBER AND NAME **TRIDENT II J0951**

C. (U) Other Program Funding Summary: (Dollars in Thousands)

FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Total Complete	Total Cost
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

D. (U) Acquisition Strategy:

Contracts will be awarded to those sources who were engaged in the TRIDENT II (D5) development program and are currently engaged in the production and/or operational support of the deployed D5 Strategic Weapons Systems on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (C) (1) and (3) implemented by FAR 6.302.-1, 3 4.

E. (U) Major Performers:

Naval Surface Weapons Center, Dahlgren, VA. Efforts in support of Phase three development of SRS.
Naval Surface Weapons Center, Dahlgren, VA. Efforts in support of E2 Demonstration
General Dynamics Defense Systems, Pittsfield, Ma. Efforts in support E2 Demonstration
Lockheed Martin Missile & Space, Sunnyvale, Ca. Efforts in support of E2 Demonstration
Charles Stark Draper Lab, Cambridge Ma. Efforts in support of E2 Demonstration

CLASSIFICATION:

Exhibit R-3 Cost Analysis		DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	**PE 0101221N Strategic Sub & Wpns Sys Spt**	**TRIDENT II J0951**

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 03 Cost	FY 03 Award Date	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Ancillary Hardware Development	SS / CPFF	GDDS / MA	31.2							Cont.	Cont.	TBD
Ancillary Hardware Development	WR	NSWC / VA	69.3							Cont.	Cont.	TBD
SSBN SWS MOD & Test Support	WR	NSWC / VA				2.0	10/03	3.3	10/04	Cont.	Cont.	TBD
SSBN SWS MOD & Test Support	SS / CPFF	GDDS / MA				2.3	10/03	3.1	10/04	Cont.	Cont.	TBD
SSBN SWS MOD & Test Support	SS / CPFF	LNMESS/VA				2.0	10/03	2.0	10/04	Cont.	Cont.	TBD
Test Missile Mods	SS / CPFF	LMMS/CA				5.3	10/03	2.4	10/04	Cont.	Cont.	TBD
E2 Development System	WR	NSWC / VA				1.0	10/03	1.5	10/04	Cont.	Cont.	TBD
E2 Development System	SS/CPIF	LMMS/CA				16.0	10/03	16.5	10/04	Cont.	Cont.	TBD
E2 Development System	SS / CPFF	CSDL/MA				1.0	10/03	1.5	10/04	Cont.	Cont.	TBD
Subtotal Product Development			100.5	0.0		29.6		30.3				

Remarks: All Contract types and individual costs per activity have not been determined yet.

Total Cost			100.5	0.0		29.6		30.3		Cont.	Cont.	TBD

Remarks:

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EXHIBIT R-2a, RDT&E Project Justification	DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**	PROJECT NUMBER AND NAME **Technology Applications J2228**

COST ($ in Millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project Cost J2228 Technology Applications	**33.4**	**34.0**	**72.2**	**106.7**	**108.0**	**107.6**	**110.7**	**111.4**
RDT&E Articles Qty								

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

This project supports implementation of a coordinated Navy/Air Force Reentry System Applications Program (RSAP), a coordinated Navy/Air Force Strategic Guidance Applications Program (GAP), a coordinated Navy/Air Force Strategic Propulsion Applications Program (SPAP), and a coordinated Department of Defense Radiation Hardened Applications Program (RHAP). Reentry vehicle and guidance technology is rapidly eroding beyond the point of being capable to respond to increasing aging phenomena and future requirements. Beginning in FY 2004, SPAP will demonstrate and validate technologies unique to strategic missile applications. Also beginning in FY 2004, the RHAP program will address production, qualification and manufacturing issues associated with strategic and space radiation hardened electronics. The December 2001 DOD Nuclear Posture Review determined that infrastructure is a critical part of the new triad and these efforts form part of the infrastructure that supports the nuclear force structure.

• The RSAP program through sustainment of the reentry vehicle technology base, confidence in the dependability and reliability of strategic SLBM and ICBM weapon systems will be maintained over the long term when no new systems will be in development. Critical and unique attributes necessary for the design, development and in-service support of current and modernized SLBM reentry systems have been defined and will be maintained to insure a functioning readiness application technical capability in reentry is preserved. Working closely with the Air Force, Navy requirements have been integrated with the Air Force requirements into a comprehensive program. The program maintains close coordination with the DOD Science and Technology (S&T) community through the reliance process in order to: leverage S&T programs, ensure system driven technology base requirements are considered in contract awards, eliminate duplication of effort and provide an opportunity to demonstrate appropriate emerging technologies through a reentry flight test evaluation process.

• The GAP program provides a minimum strategic guidance core technology development capability consistent with the Strategic Advisory Group (SAG) recommendations to COMSTRATCOM. The SAG recommended that SSP establish a program which preserves this critical design and development core. It is a basic bridge program which develops critical guidance technology applicable to any of the existing Air Force/Navy strategic missiles. The objective is to transition from current capability to a long term readiness status required to support deployed systems. Air Force and Navy guidance technology requirements are integrated and needs prioritized. Efforts are focused on alternatives to currently utilize technologies identified as system "weak links." Current system accuracy and functionality depends upon key technologies which provide radiation hardened velocity, attitude and stellar sensing capabilities. As the underlying technologies that currently provide these capabilities age and are no longer technically supportable, modern alternatives must be made available in order to allow for orderly replacement. There is no commercial market for these technologies and their viability depends on the strategic community.

• The SPAP program, commencing in FY 2004, will be a coordinated Navy/Air Force effort and addresses infrastructure needs by exercising critical developmental skills culminating in annual large-scale rocket motor test firings. A sound base of demonstrated technologies suitable for Strategic Missile applications will be maintained and will provide the nation a talent base and source of technologies suitable for a follow-on development program. Boost propulsion (missile stages), post boost propulsion (missile payload delivery vehicle) and Ordnance (separation events and flight termination events) are all integral parts of missile propulsion application efforts.

• The RHAP program, commencing in FY 2004, will sustain critical skills in radiation hardened electronics by advancing radiation hardened simulation technologies to reflect the processes in future systems. These efforts become of greater importance because of the shrinking industrial base for radiation hardened electronics, the unavailability of underground testing resources, and the loss of radiation hardened expertise. These efforts are coordinated by the Radiation Hardened Oversight Council (RHOC) chaired by the Director, Defense Research & Engineering (DDR&E). The RHAP program would focus on a coordinated Productization & Qualification Program which provides a transition between Science and Technology (S&T) and production by efficient utilization of limited resources, sharing of information to eliminate redundancy, increased use of common part/technologies, coordinating into the RHOC technology road map and implementation of the USD (AT&L) investment strategy. The RHAP will compliment the GAP electronic part activities by specifically focusing on those tasks required to ensure producability of radiation hardened parts.

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APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**	PROJECT NUMBER AND NAME **Technology Applications J2228**

B. (U) Accomplishments/Planned Program

	FY 02	FY 03	FY 04	FY 05
Reentry Systems Application Program (RSAP)	17.7	19.3	27.4	27.2
RDT&E Articles Quantity				

(U) FY 2002 PLAN
- (U) ($17.7) Continue Reentry System Applications Program. Full obligation is complete.
  FY 2002 efforts include:
  - (U) Continue development and ground testing of reentry vehicle candidate heatshield, nosetip, and aft closure materials including those available from Science & Technology (S&T).
  - (U) Evaluate low-cost replacement heatshield flight test demonstration.
  - (U) Establish flight confidence in Poly Acrylo Nitrile (PAN) fiber alternate heatshield material candidate for the FY 2005 flight test demonstration.
  - (U) Develop an updated ground and flight test program to assess performance of reentry components exposed to operational environments beyond their design life; develop and test risk mitigation concepts for known aging mechanisms.
  - (U) Continue evaluation of low-cost design approaches and components for arming and fuzing applications.
  - (U) Continue evaluation of low-cost inertial sensor technology for reentry body flight test instrumentation.
  - (U) Maintain RSAP technical program plan, conduct system assessments and continue vulnerability & hardening certification process in absence of nuclear under ground testing (UGT) facilities.

(U) FY 2003 PLAN
- (U) ($19.3) Continue Reentry System Applications Program. Full obligation is projected by the 3rd quarter of the first year.
  FY 2003 efforts include:
  - (U) Continue development and ground testing of reentry vehicle candidate heatshield, nosetip and aft closure materials including those available from Science & Technology (S&T).
  - (U) Identify and evaluate next generation low-cost heatshield material candidates.
  - (U) Conduct an updated ground and flight test program to assess performance of reentry components exposed to operational environments beyond their design life; evaluate risk mitigation concepts for known aging mechanisms.
  - (U) Downselect low-cost design approach and components for Arming and Fuzing applications.
  - (U) Downselect a low-cost inertial sensor technology for Reentry Body (RB) flight test instrumentation.
  - (U) Maintain RSAP technical program plan, conduct system assessments and continue Vulnerability & Hardening certification process in absence of Nuclear Under Ground Testing (UGT) facilities.

(U) FY 2004 PLAN
- (U) ($27.4) Continue Reentry System Applications Program. Full obligation is projected by the 3rd quarter of the first year.
  FY 2004 efforts include:
  - (U) Continue development and ground testing of reentry vehicle candidate heatshield, nosetip and aft closure materials including those available from Science & Technology (S&T).
  - (U) Characterize next generation low-cost heatshield material candidates.
  - (U) Conduct a ground and flight test program to assess performance of reentry components exposed to operational environments beyond their design life; evaluate initial ground test results; evaluate risk mitigation techniques for known aging mechanisms.
  - (U) Document low-cost design approach and components for Arming and Fuzing applications.
  - (U) Define packaging and interface designs for Reentry Body (RB) flight test instrumentation inertial sensor technology.
  - (U) Maintain RSAP technical program plan, conduct system assessments and conduct Vulnerability & Hardening certification process development in absence of Nuclear Under Ground Testing (UGT) facilities.
  - (U) Expand Advanced Reentry Body Nosetip development activities
  - (U) Resume low cost Reentry Body heatshield replacement development activities.
  - (U) Initiate development of GPS simulator for twelve channel receiver.
  - (U) Ground test advanced reentry material systems.
  - (U) Develop sensors/test methods for studying accelerated aging of Reentry Bodies.
  - (U) Initiate development of advanced flight test instrumentation systems
  - (U) Develop plan for certification of vulnerability and hardness processes in the absence of underground nuclear testing

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APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**	PROJECT NUMBER AND NAME **Technology Applications J2228**

B. (U) Accomplishments/Planned Program (Continued)

(U) FY 2005 PLAN

•(U) ($27.2) Continue Reentry System Applications Program. Full obligation is projected by the 3rd quarter of the first year.

FY 2005 efforts include:

(U) Continue development and ground testing of reentry vehicle candidate heatshield and nosetip materials including those available from Science & Technology (S&T).

(U) Characterize and flight test alternate low-cost heatshield and replacement nosetip material.

(U) Conduct a ground and flight test program to assess performance of reentry components exposed to operational environments beyond their design life; complete evaluation of ground test results; flight test repackaged components for risk mitigation.

(U) Initiate fabrication of RB inertial sensor flight test instrumentation for FY 2006 flight test.

(U) Maintain RSAP technical program plan, conduct system assessments and continue Vulnerability & Hardening certification process development in absence of Nuclear Under Ground Testing (UGT) facilities.

(U) Continue Reentry Body material development and advanced flight test instrumentation activities

(U) Continue development of GPS simulator for twelve channel receiver

(U) Initiate feasibility study of the use of Terminal Fix Sensors (TFS) for target area trajectory correction

(U) Ground test advanced reentry material systems

(U) Initiate development of low cost replacement In Flight Disconnect (IFD) connector for the MK4A Reentry system

(U) Initiate development of optimized Reentry Body separation system

	FY 2002	FY 2003	FY 2004	FY 2005
Guidance Application Program (GAP)	15.7	14.7	16,8	19.5
RDT&E Articles Quantity				

(U) FY 2002 PLAN

• (U) ($15.7) Continue Strategic Guidance Applications Programs (GAP). Full obligation is complete.

FY 2002 efforts include:

(U) Initiate Integrated Engineering Environment (IEE) virtual implementation validation. Complete IEE/Strategic Inertial Guidance Hardware Technology Synthesizer (SIGHTS) integration to evaluate alternate system architectures. Initiate incorporation of alternate sensor technologies, Pendulous Integrated Gyro Accelerometer (PIGA) and system circumvention methodology into SIGHTS.

(U) Complete the prototype Interferometic Fiber Optic Gyro (IFOG) fabrication and initiate testing. Initiate alternate stellar subsystem design based on current sensor technology. Survey emergent technologies for alternate gyro and PIGA. Perform radiation testing of current electronics technology.

(U) Continue test of Hemispherical Resonator Gyro (HRG) prototype hardware. Testing will assess the best approach to attain Strategic performance.

(U) Semiconductor process complexity has been increasing steadily and doubling in density every eighteen to twenty four months. Radiation hardened electronics have typically lagged commercial state-of-the art electronics by two to three generations. Every new generation of electronics has introduced a unique set of radiation response problems. A radiation hardened program is required to address these production, qualification and manufacturing issues. The tasks funded under the GAP program have established the framework for addressing Rad Hard electronics, but do not include the detailed tasking required to fully address all the Rad Hard issues. The Radiation Hardened Application efforts herein will compliment the Gap electronic part activities by specifically focusing on those tasks required to ensure producibility of Rad Hard parts.

Funding provides for:

- o Enhance existing commercial Technology Computer Aided design tools to include radiation and reliability mechanisms
- o Develop physical models for these mechanisms
- o Validate simulations against actual devices produced with a controlled process
- o Maintain commercial software licenses

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RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7	**Technology Applications J2228**	

B. (U) Accomplishments/Planned Program (Continued)

(U) FY 2003 PLAN

- (U) ($14.7) Continue Strategic Guidance Applications Programs (GAP). Full obligation is projected by the 3rd quarter of the 1st year.
  FY 2003 efforts include:
  - (U) Continue to develop advance sensor models for incorporation in IEE. Integrate IFOG, the HRG, and the Alternate PIGA into SIGHTS. Utilize IEE/SIGHTS capability to perform system architecture/design tradeoffs in support of technology downselect in FY 2006 for D5 Life Extension.
  - (U) Continue to evaluate high risk/high payoff sensor technology, (accelerometer, gyro, stellar) for application in the D5 Life Extension Guidance system. Begin prototype radiation-hard sensor build and test.

(U) FY 2004 PLAN

- (U) ($16.8) Continue Strategic Guidance Applications Programs (GAP). Full obligation is projected by the 3rd quarter of the 1st year.
  FY 2004 efforts include:
  - (U) Continue to develop alternate models for incorporation in IEE and Hardware in the Loop (HWIL). Incorporate alternate sensor technologies into virtual system and HWIL. Utilize IEE/HWIL capability to perform system architecture/design tradeoffs in support of technology down select in FY 2006 for D5 Life Extension.
  - (U) Continue to evaluate high risk/high payoff sensor technologies (accelerometer, gyro, and stellar) and proximity electronics for application in the D5 Life Extension Guidance system and/or replacement of system weak links. Continue prototype radiation-hard sensor build and test.
  - (U) (Rad-Hard electronics) Invest in Gigantic Magneto-Resistive Memory (GMR) system to meet MK6LE memory goals (presently feasibility funded). Continue radiation hard electronics technology development (processors, memory, timers, oscillators), and circuit design alternatives.
  - (U) (Sensors) Design, build, and evaluate Silicon Oscillator Accelerometer (SOA) support electronics and improved build processes. Prove SOA capability to meet Rad-hard strategic goals
  - (U) (GYRO) Build 6-10 gyros focused on improved IFOG dynamic and radiation margin.
  - (U) (GYRO) Develop IFOG hardenable electronic circuits.
  - (U) (Stellar) Invest in Electron Bombarded (intensified) Charge Couple Device (CCD) and Active Pixel sensors for advanced system concepts.

(U) FY 2005 PLAN

- (U) ($19.5) Continue Strategic Guidance Applications Programs (GAP). Full obligation is projected by the 3rd quarter of the 1st year.
  FY 2005 efforts include:
  - (U) Utilize alternate models for incorporation in IEE and HWIL. Exercise alternate sensor technologies in the virtual system and the HWIL experiments. Finalize IEE/HWIL capability to an increased fidelity for system architecture/design tradeoffs in support of technology downselect by FY 2006 for D5 Life Extension.
  - (U) Continue to evaluate alternate sensor technologies, (accelerometer, gyro, and stellar) and proximity electronics for application in the D5 Life Extension Guidance system and/or replacement of system weak links. Evaluate prototype radiation-hard sensor build and test results for appropriate applications.
  - (U) (Rad-Hard electronics) Invest in Gigantic Magneto-Resistive Memory (GMR) system to meet MK6LE memory goals (presently feasibility funded). Continue radiation hard electronics technology development (processors, memory, timers, oscillators), and circuit design alternatives.
  - (U) (Sensors) Design, build, and evaluate SOA support electronics and improved build processes. Prove SOA capability to meet Rad-hard strategic goals
  - (U) (GYRO) Build 6-10 gyros focused on improved IFOG dynamic and radiation margin.
  - (U) (GYRO) Develop IFOG hardenable electronic circuits.
  - (U) (Stellar) Invest in Electron Bombarded (intensified) CCD and Active Pixel sensors for advanced system concepts.

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B. (U) Accomplishments/Planned Program

	FY 02	FY 03	FY 04	FY 05
Strategic Propulsion Applications Program (SPAP)	0.0	0.0	8.0	40.0
RDT&E Articles Quantity				

(U) FY 2002 PLAN N/A

(U) FY 2003 PLAN N/A

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(U) FY 2004 PLAN

- (U) ($8.0) Initiate SPAP program. Full obligation is projected by the 3rd quarter of the first year.
  FY 2004 efforts include:
  - (U) Initiate and complete Industrial Base Assessment.
  - (U) Identify, evaluate and down select suitable technologies for Boost Rocket motor test.
  - (U) Identify and evaluate suitable technologies for Post Boost propulsion technologies test.
  - (U) Identify and evaluate suitable Ordnance technologies for missile flight function tests.
  - (U) Identify fabrication of Boost Rocket Motor test hardware.

(U) FY 2005 PLAN

- (U) ($40.0) Continue SPAP program. Full obligation is projected by the 3rd quarter of the first year.
  FY 2005 efforts include:
  - (U) Continue down select process of Boost Rocket Motor components by testing and prepare for a Boost Rocket motor test demonstration.
  - (U) Initiate component tests for identified Post Boost Control technologies.
  - (U) Initiate component tests for identified Missile Ordnance technologies.
  - (U) Complete fabrication of Boost Rocket Motor test hardware.

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B. (U) Accomplishments/Planned Program

	FY 02	FY 03	FY 04	FY 05
Radiation Hardened Applications Program (RHAP)	0.0	0.0	20.0	20.0
RDT&E Articles Quantity				

(U) FY 2002 PLAN N/A

(U) FY 2003 PLAN N/A

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(U) FY 2004 PLAN

- (U) ($20.0) Initiate RHAP program. Full obligation is projected by the 3rd quarter of the first year.
  FY 2004 efforts include:
  - (U) Start productization and qualification of .35 micron digital Silicon-0n-Insulator (SOI) technology
  - (U) Start productization and qualification of .7 micron mixed signal SOI technology.
  - (U) Start evaluation of an Electromagnetic Pulse/Electromagnetic Interference (EMP/EMI) cable coupling model.
  - (U) Start evaluation of system circuit models incorporating Built-in Self Test and effects of dose rate, total ionizing dose and single event effects.
  - (U) Start evaluation of post radiation SPICE models for dose rate, total ionizing dose, and single event effects.

U) FY 2005 PLAN

- (U) ($20.0) Continue RHAP program. Full obligation is projected by the 3rd quarter of the first year.
  FY 2005 efforts include:
  - (U) Continue productization and qualification of .35 micron digital SOI technology.
  - (U) Continue productization and qualification of .7 micron mixed signal SOI technology.
  - (U) Continue evaluation of an EMP/EMI cable coupling model.
  - (U) Continue evaluation of system circuit models incorporating Built-in Self Test and effects of dose rate, total ionizing dose and single event effect.
  - (U) Continue evaluation and validation of post radiation SPICE models for dose rate, total ionizing dose, and single event effects.

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C. (U) Other Program Funding Summary: (Dollars in Thousands)

FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Total Complete	Total Cost
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

D. (U) Acquisition Strategy:

Contracts will continue to be awarded to those sources who were engaged in the TRIDENT II (D5) development program and are currently engaged in the production and/or operational support of the deployed D5/C4 Strategic Weapons Systems on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3 4.

E. (U) Major Performers:

- LMMS / CA - Reentry Body Systems integration (RSAP)
- NSWC / VA - Heatshield Nosetip materials development (RSAP)
- ITT / CO - Vulnerability and hardness technologies (RSAP)
- CNSW / IN - Electronics and hardness testing (RSAP)
- CSDL / MA - Reentry Systems flight test instrumentation (RSAP)
- CSDL / MA - Guidance Application program support (GAP)
- DOE / NM - Advanced fuzing technology (RSAP)
- LMMS/CA- Missile radiation hardened electronics integration (RHAP)
- CSDL/MA- Guidance radiation hardened electronics integration(RHAP)
- LMMS/CA - Missile systems integration (SPAP)
- NAWC - Rocket motor testing & integration(SPAP)

CLASSIFICATION:

Exhibit R-3 Cost Analysis		DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	**PE 0101221N Strategic Sub & Wpns Sys Spt**	**Technology Applications J2228**

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 03 Cost	FY 03 Award Date	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Support & Management												
Technology Applications	SS - CPFF	LMMS / CA	49.0	8.9	10-02	13.9	10-03	13.5	10-04	Cont.	Cont.	TBD
Technology Applications	WR	NSWC / CA	35.8	4.7	10-02	10.0	10-03	9.2	10-04	Cont.	Cont.	TBD
Technology Applications	MIPR	DOE / NM	12.6	4.5	10-02	0.9	10-03	2.1	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	CSDL / MA	5.5	0.1	10-02	1.2	10-03	1.2	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	KAMAN / CO	4.5	0.0	10-02	0.0	10-03	0.0	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	ITT / CO	N/A	1.0	10-02	1.4	10-03	1.1	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	CSDL / MA	106.1	14.7	10-02	16.8	10-03	19.5	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	CNSW / IN	0.1	0.1	10-02	0.1	10-03	0.1	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	LMMS / CA	N/A			3.4	10-03	3.4	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	CSDL / MA	N/A			16.4	10-03	16.6	10-04	Cont.	Cont.	TBD
Technology Applications	SS - CPFF	LMMS/CA	N/A			6.8	10-03	34.2	10-04	Cont.	Cont.	TBD
Technology Applications	WR	NAWC/CA	N/A			0.9	10-03	3.0	10-04	Cont.	Cont.	TBD
	VARIOUS	VARIOUS	N/A			0.4	10-03	2.8	10-04	Cont.	Cont.	TBD
Subtotal Product Development			213.6	34.0		72.2		106.7		Cont.	Cont.	TBD
Total Cost			213.6	34.0		72.2		106.7		Cont.	Cont.	

Remarks:

Remarks:

CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification						DATE: **February 2003**		
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-7**					R-1 ITEM NOMENCLATURE **PE 0101221N Strategic Sub & Wpns Sys Spt**			
COST ($ in Millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Total PE Cost	**0.547**	**5.269**	**3.012**	**2.560**	**3.471**	**3.356**	**3.440**	**3.526**

Defense Emergency Response Funds (DERF) : Not Applicable.

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The TRIDENT operational systems development program results in improvements to the baseline TRIDENT Combat System. Current TRIDENT Combat Systems were first developed in the early 1970s and are becoming increasingly difficult to maintain and offer comparitively less performance than more recently designed systems. Previous efforts to upgrade portions of the TRIDENT Combat System include improvements via sonar and combat control hardware and software (e.g., QE2 programs), feasibility of increased countermeasure capability and a concept evaluation of an Submarine Fleet Mission Program Library (SFMPL) interface. Due to the sensitivity of TRIDENT programs it is assessed that international technology will not have a major impact or be a recipient of the benefits derived from this effort. Development strategies will significantly enhance the sustainability and operability of the sonar, communications and Combat Control Systems on TRIDENTs by evaluating both Obsolete Equipment Replacement (OER) possibilities and potential improvements.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2003**	
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA7**	PROGRAM ELEMENT NUMBER AND NAME **PE 0101221N Strategic Sub & Wpns Sys Spt**				PROJECT NUMBER AND NAME **S0004**			
COST ($ in Millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project Cost	**0.547**	**5.269**	**3.012**	**2.560**	**3.471**	**3.356**	**3.440**	**3.526**
RDT&E Articles Qty								

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The TRIDENT operational systems development program results in improvements to the baseline TRIDENT Combat System. Current TRIDENT Combat Systems were first developed in the early 1970s and are becoming increasingly difficult to maintain and offer comparitively less performance than more recently designed systems. Previous efforts to upgrade portions of the TRIDENT Combat System include improvements via sonar and combat control hardware and software (e.g., QE2 programs), feasibility of increased countermeasure capability and a concept evaluation of an Submarine Fleet Mission Program Library (SFMPL) interface. Due to the sensitivity of TRIDENT programs it is assessed that international technology will not have a major impact or be a recipient of the benefits derived from this effort. Development strategies will significantly enhance the sustainability and operability of the sonar, communications and Combat Control Systems on TRIDENTs by evaluating both Obsolete Equipment Replacement (OER) possibilities and potential improvements.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	**PE 0101221N Strategic Sub & Wpns Sys Spt**	**S0004**

B. Accomplishments/Planned Program

	FY 02	FY 03	FY 04	FY 05
Valve Regulated Lead Acid (VRLA) Batteries		4.000	2.500	
RDT&E Articles Quantity				

Valve Regulated Lead Acid (VRLA) Batteries are sealed state-of-the-art technology that significantly reduces the maintenance involved with traditional flooded lead acid submarine batteries. VRLA eliminates the need for air agitation systems, battery make-up water additions, flash arrestors and charcoal filters. VRLA enables convenience charging, requires no special ventilation lineups, requires fewer environmental concerns and offers increased life up to 8 years. Most importantly, VRLA batteries also have many workload (quality of life) and cost reduction benefits. FY03-FY04 funds will be used to perform the initial VRLA cell design, battery well assessment studies, install and operate prototype battery cells, and develop ship alteration packages for all classes.

	FY 02	FY 03	FY 04	FY 05
Ship Control Station Obsolete Equipment Upgrade			0.325	2.020
RDT&E Articles Quantity				

In order to support the expected 42-year operational cycle for a TRIDENT submarine a Ship Control Station (SCS) and Obsolete Equipment Replacement programs needs to be instituted. The OER program will attempt to utilize the design changes that are being developed for the VIRGINIA Class SCS Hull, Mechanical and Electrical (HM&E) interfaces. The replacement SCS will utilize commercial off the shelf components and will replace existing hardware wired displays and indications with flat panel displays and indications.

	FY 02	FY 03	FY 04	FY 05
Architecture Model Maintenance & COTS	0.547	0.480	0.187	0.540
RDT&E Articles Quantity				

Conduct COTS/emergent technology and CCS performance requirements evaluations supporting Trident modernization program/plans. Research and evaluate effectiveness of proposed new technology over the ships' life cycle. Analyze impacts on platform performance with proposed new technology changes using architecture models and tests. Study and identify options in selecting and installing new technology improvements. Evaluate Navigation data interface requirements to meet ECDIS-N compliance on Trident hulls. Complete CCC CONOPS study to accommodate Revision 7.3 (MK2 ECP4) installation. Provide arrangement layouts GFI to Electric Boat (EB) Ship Design Agent (SDA).

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	**PE 0101221N Strategic Sub & Wpns Sys Spt**	**S0004**

B. Accomplishments/Planned Program (Cont.)

	FY 02	FY 03	FY 04	FY 05
Data Processing System Development		0.789		
RDT&E Articles Quantity				

To evaulate potential areas of renovation and to identify a phased approach that facilitiates the replacement of the TRIDENT CCS/DPS legacy subsystems:

Continue analysis of the physical requirements and characteristics of OER items, including the satisfaction of redundancy, survivability and maintainability requirements. Analyze and recommend applicable COTS hardware and software items, and the identification of any developmental items required for the development of the final product. Identify design options for centralized CCS anomaly, fault and failure data gathering and analysis. Identify DPS Workstation to meet high availability requirements levied by the processing of mission critical data as well as total CCS statusing and alarming in a networked environment, including the provision for a remote workstation display capability in critical spaces to provide complete CCS status monitoring and fault isolation capabilities. Prototype development is also included. Analyze networked architectures embraced by non-TRIDENT platforms for applicability. Analyze design component capture potential from the Submarine Warfare System Design and maximize commonality with proposed SSGN architecture.

Conduct system engineering working group meetings to facilitate a plan to migrate away from the DPS AN/UYK-43 computer. Analyze existing legacy AN/UYK-43 subsystem requirements and determine applicability to future CCS design with Revision 9.0 as the target revision. Identify CCS legacy functionality that may be accommodated by the DPS Workstatioin design. Analyze signals processing currently performed by the DPS (TSDC) for the Ship Control Subsystem (SCS) and for reassignment to the SCS.

DPS Rev 7.3 Modifications In Support of MK2 ECP-004 NAV Interface:

In lieu of TIDS availability, modifications are necessary to the DPS to provide RLGN-like services for SSBN platforms by implementing a Network Data Processor/Server/Client capability at the DPS Mission Critical Workstation (MCW) to satisfy MK2 and ARCI needs for CCS Revision 7.3. DPS modifications in support of this capability include the serving of Nav Data to TIDS or directly to MK2/ARCI via VA Class IDL using CORBA interfaces and NTP data received from the UYK-43 to MK2/ARCI, also via VA Class IDL. Processing will also be implemented for the DPS MCW to receive health status information from MK2/ARCI for both internal DPS MCW interface statusing as well as to satisfy UYK-43 legacy subsystem user requirements. DPS AOBT processing will also be modified to accept data from ARCI via a TBD CORBA structure.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	**PE 0101221N Strategic Sub & Wpns Sys Spt**	**S0004**

C. PROGRAM CHANGE SUMMARY:

Funding:	FY 2002	FY 2003	FY 2004	FY 2005
Previous President's Budget: (FY 03 Pres Controls)	0.561	5.399	4.412	4.312
Current BES/President's Budget (FY04 Presidents Controls)	0.547	5.269	3.012	2.560
Total Adjustments	-0.014	-0.130	-1.400	-1.752
Summary of Adjustments				
Congressional undistributed reductions	-0.003	-0.062	-0.781	-0.450
Reprogrammings			-0.500	-1.200
FY02 Actuals	-0.011			
PBD203			-0.052	-0.052
PBD604			-0.068	-0.055
Inflation Savings		-0.068		
NWCF Rates Adjustments			0.001	0.005
Subtotal	-0.014	-0.130	-1.400	-1.752

Schedule:

VRLA BATTERY - FY03 (1st Qtr) – Program Inception; Cell Design and Development
FY04 (4th Qtr) - Cell Qualification Testing
FY05 (2nd QTR) - Certification / IOC

Technical:

Not Applicable

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2003**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	**PE 0101221N Strategic Sub & Wpns Sys Spt**	**S0004**

D. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	To Complete	Total Cost
267600 / 267606 BA2 OPN (Electronics)	11117	20905	8560	5297	3428	4034	4099	4170	0	61610
095000 BA1 (HM&E)	21018	38662	26660	63469	119774	126096	135260	139977	0	670916
094500 / 094505 BA1 (Batteries)	10657	13703	11471	26449	24080	30645	13721	114375	0	245101

E. ACQUISITION STRATEGY: *

VRLA Battery - The Type Commanders (TYCOMs) establish battery replacement schedules based on battery performance and maintenance availability. Beginning in FY04, NAVSEA intends to shift procurement from flooded batteries to VRLA. In FY05, the only replacement batteries available will be VRLA; thus the SHIPALT must be accomplished to support installations beginning in FY05.

Ship Control Station - The proposed architecture will consist of the following hardware components. Ship Control Panel (SCP), Ballast Control Panel (BCP), Remote Interface Controller (RIC), Remote Interface Box (RIB). The SCP will be modified be removing the existing panels and replacing them with the flat panel display that provide the operator controls and indications needed to control all plane surfaces. The existing emergency hydraulic control will be maintained.

F. MAJOR PERFORMERS: **

VRLA Batteries
NSWC Crane, Indiana: Development engineering and test support.
GNB, Fort Smith, Arkansas: Battery cell design/development.
General Dynamics Electric Boat, Groton, Connecticut: Ship alteration package design/development.
Northrop Grumman Newport News, Newport News, VA: Ship alteration package design/development.

Ship Control Station - NSWC CARDEROCK

*** Not required for Budget Activities 1,2,3, and 6**
**** Required for DON and OSD submit only.**

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1) | DATE: **February 2003**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N / BA-7** | PROGRAM ELEMENT: **PE 0101221N Strategic Sub & Wpns Sys Spt** | PROJECT NUMBER AND NAME: **S0004**

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 03 Cost	FY 03 Award Date	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	Cost to Complete	Total Cost	Target Value of Contract
											0.000	
Project Unit A											0.000	
Design/Development Engineering	SS/CPFF	Electric Boat, Groton, CT		1.300	01/03	0.569	01/04	0.000	N/A	0.000	1.869	1.957
Design/Development Engineering	SS/CPFF	NG NNEWS, VA		1.270	01/03	0.500	01/04	0.000	N/A	0.000	1.770	1.242
Developmental Test & Evaluation	SS/WR	NSWC CRANE, IN		1.430	01/03	1.431	01/04			0.000	2.861	3.301
											0.000	
Project Unit B											0.000	
Design/Development Engineering	SS/WR	NSWC Carderock, MD				0.325	01/04	2.020	01/05	2.875	5.220	5.220
											0.000	
											0.000	
											0.000	
Subtotal Product Development				4.000		2.825		2.020		2.875	11.720	

Remarks: NSWC Crane - Funds will be used to perform the initial VRLA cell design, battery well assessment studies and develop the prototype battery.

											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 2)								DATE: **February 2003**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-7**			PROGRAM ELEMENT **PE 0101221N Strategic Sub & Wpns Sys Spt**			PROJECT NUMBER AND NAME **S0004**						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 03 Cost	FY 03 Award Date	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 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	
											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	
Total Cost			0.000	4.000		2.825		2.020		2.875	11.720	

Remarks:

R-1 SHOPPING LIST - Item No. 165