

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: Feb 2005

BUDGET ACTIVITY: 02
PROGRAM ELEMENT: 0602123N
PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

COST: (Dollars in Thousands)

Project	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Number	Actual	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
& Title								
FORCE PROTECTION APPLIED RESEARCH								
	104,801	143,652	101,650	130,227	151,143	141,482	125,350	103,731

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program element (PE) addresses applied research associated with providing the capability of Platform and Force Protection for the U.S. Navy. It supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial, and air) and the protection of those platforms. The goal is to provide the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage while preserving operational capability. Within the Naval Transformational Roadmap, this investment directly supports the Theater Air and Missile Defense transformational capability required by Sea Shield and the Ship to Objective Maneuver key transformational capability within Sea Strike. This is accomplished by improvements in platform offensive performance, stealth, and self defense. This PE supports the Future Naval Capabilities (FNC) Program in the areas of Fleet/Force Protection, Missile Defense, and Advanced Capability Electric Systems (ACES).

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: Feb 2005

BUDGET ACTIVITY: 02
PROGRAM ELEMENT: 0602123N
PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROGRAM CHANGE SUMMARY:

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
FY 2005 President's Budget Submission	112,868	96,269	98,643	125,631
Cong Rescissions/Adjustments/Undist. Reductions	0	-1,387	0	0
Congressional Action	0	48,800	0	0
Execution Adjustments	-7,142	0	0	0
FNC Realignment	0	0	3,150	5,906
Non-Pay Inflation Adjustments	-105	0	0	0
Program Adjustments	0	-30	-157	-2,087
Rate Adjustments	0	0	14	777
SBIR Assessment	-820	0	0	0
FY 2006/2007 President's Budget Submission	104,801	143,652	101,650	130,227

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable.

Schedule: Not applicable.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

COST: (Dollars in Thousands)

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
FORCE PROTECTION APPLIED RESEARCH	104,801	143,652	101,650	130,227	151,143	141,482	125,350	103,731

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project addresses applied research associated with providing the capability of Platform and Force Protection for the U.S. Navy. It supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial, and air) and the protection of those platforms. The goal is to provide the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage while preserving operational capability. Within the Naval Transformational Roadmap, this investment directly supports the Theater Air and Missile Defense transformational capability required by Sea Shield and the Ship to Objective Maneuver key transformational capability within Sea Strike by virtue of improvements in platform offensive performance, stealth, and self defense. This effort supports the Fleet/Force Protection, Missile Defense, and Advanced Capability Electric Systems (ACES) Future Naval Capabilities (FNC).

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2004	FY 2005	FY 2006	FY 2007
SURFACE SHIP & SUBMARINE HULL MECHANIC & ELECTRICAL (HM&E)	40,572	55,385	49,311	72,189

Efforts include: signature reduction, hull life assurance, hydromechanics, distributed control for automated survivability, and advanced electrical power systems. Signature reduction addresses electromagnetic, infrared, and acoustic signature tailoring, both topside and underwater. Hull life assurance addresses development of new structural system approaches for surface ships and submarines, including the management of weapons effects to control structural damage and the improvement of structural materials. Hydromechanics addresses hydrodynamic technologies, including the signature aspects of the hull-propulsor interface and maneuvering. Distributed intelligence for automated survivability addresses both the basic technology of automating damage control systems, as well as, distributed auxiliary control with self-healing capability.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

Advanced electrical power system addresses electrical and auxiliary system and component technology to provide improvement in energy and power density operating efficiency and recoverability from casualties. This activity supports the Advanced Capability Electric Systems (ACES) Future Naval Capability (FNC). This activity includes support to the FNC Enabling Capabilities for Battlefield Power. Increased funding in FY 2005 will be used to advance technology in the areas of fast-high power switches, capacitors, power and thermal management, fuel cells, and advanced power generation. Additional funding added in FY 2007 will be invested in power and energy technology.

FY 2004 Accomplishments:

- Continued development of analytical models to further define submarine modular hull concepts.
- Continued investigation of potential applications of silicon-carbide in future high voltage and high power applications.
- Continued the next generation Infrared Electro-Optic Visual (IR/EO/VIS) model for surface ships by development of mitigation strategy supporting low observable infrared platforms, development of supporting physics, and prototype measurement techniques.
- Continued preparation for shock testing of composite hull section in cooperation with Germany.
- Continued feasibility study of distributed pump-jet propulsion system (DPJP) concept for submarines.
- Continued evaluation of an Integrated Engineering Plant (IEP) concept to provide improved survivability of auxiliary systems that support combat systems.
- Continued advanced numerical acoustic codes (and gridding methods for those codes) for submarines.
- Continued algorithm/finite element model validation for submarine advanced degaussing/deamping.
- Continued physics based numerical model for electromagnetic scattering of hydrodynamic disturbances for Surface Ships.
- Continued development of surface ship acoustic flow noise model. Performed tank test for surface ship acoustic behavior validation.
- Continued evaluation of prediction methods which relate ship hydrodynamics and ship signatures.
- Continued to develop design tool for integrated antenna and composite topside.
- Continued development of reliability based design and structural analysis code development.
- Continued to investigate improved maneuvering simulation capability for submarines.
- Continued analytical and modeling investigation of cavitation, powering, and acoustic performance of submarine propellers.
- Continued study of flow noise over submarine control surfaces.
- Continued investigation of hybrid composite to steel joints for hybrid surface ship hulls, contributing

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

to agreement with Japan.

- Continued Dynamic Behavior of Composite Ship Structures (DYCOSS) joint effort with Dutch Navy.
- Continued designing software for the system manager for the Universal Control Architecture (UCA).
- Completed the validation of circulation control and advanced control surfaces with experiments.
- Completed comparison of DYSMAS analysis with German ship trial data.
- Completed development of a propeller sub-visual cavitation inception scaling law.
- Continued development of global surface wave measurement capability for ship models.
- Completed design and fabrication of Advanced Ducted Electric Propulsion Pod (ADEPP) model for hydrodynamic performance testing in the Large Cavitation Channel (LCC).
- Completed documentation of the historical use of circulation control technology in the Navy.
- Completed fabrication of prototype acoustic wireless sensor array for submarines.
- Completed validation of advanced prediction code for large amplitude roll motion of surface ship hulls.
- Completed, validated, and applied numerical codes to integrated propulsor/hull for advanced surface ship configurations.
- Initiated preliminary testing of Explosion Resistant Coating (ERC) against underwater explosion and ballistic threats.
- Developed technology for two-sided, low loss, high voltage power switches. (NRL)
- Initiated modeling of electric warship components and system electromagnetic signatures.
- Initiated investigation of superconducting degaussing techniques for surface ships.
- Initiated development of modeling and simulation tools for submarine coating concept.
- Initiated mmWave Signatures Analysis.
- Initiated circulation control analysis for three-dimensional flow effects.
- The following efforts reflect Electric Ship Research and Development Consortium (ESRDC) investments:
 - Completed fabrication of Fast Turn Off Phase Leg.
 - Initiated 9MVA Power Electric Building Block (PEBB) developmental demonstrations.
 - Initiated decentralized thermal management modeling and simulation.
 - Initiated demonstration of dynamic reconfigurable electric power control architecture.

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Continue and accelerate ship service fuel cell development.
- Continue and accelerate development of thermal management technology for shipboard power distribution.
- Continue Characterization of Biofilms on Scaffolds. (NRL)

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

- Complete circulation control analysis for three-dimensional flow effects.
- Complete development of modeling and simulation tools for submarine coating concept.
- Complete numerical model for electromagnetic scattering.
- Complete 9MVA PEBB developmental demonstrations.
- Complete thermal management modeling and simulation.
- Complete and deliver next generation IR scene model and next generation IR code.
- Complete demonstration of Fast Turn Off Phase Leg.
- Complete demonstration of dynamic reconfigurable electric power control architecture.
- Complete evaluation of prediction methods which relate ship hydrodynamics and ship signatures.
- Initiate and complete demonstration of prototype acoustic wireless sensor array system incorporating self powering, radio frequency unit, and sensors.
- Initiate and complete circulation control analysis for three-dimensional flow effects.
- Initiate and complete validation of Reynolds Average Navier-Stokes (RANS) code for advanced waterjet propulsor performance predictions.
- Initiate and complete validation of asymmetric hull forms with experimental data.
- Initiate development of a low-cost submarine distributed propulsor concept.
- Initiate development of flexible composite propeller concept.
- Initiate validation of powering prediction method for distributed pump-jet propulsion (DPJP) concepts.
- Develop Bacterial Mixture to Optimize Charge Generating Capacity. (NRL)
- Initiate development of quiet control surface design tool based on control surface flow noise studies.
- Fabricate High Surface Area Conducting Electrodes for use as Biofilm Scaffolds. (NRL)
- Form Biofilms on Scaffolds and Characterize Spatial Distribution and Chemistries. (NRL)
- Initiate development of structural analysis codes describing failure mechanisms of sandwich composites.
- Initiate work to assess cavitation performance of loop-bladed propulsor concept.
- Initiate development of test vessel and technology to evaluate performance and signature associated with electrically driven waterjets (AWJ-21) and Rim-drive motor (Advanced Hull-form Inshore Demonstrator - AHFID).
- Initiate multi-year program to directly convert thermal energy to electricity. Such a capability would allow elimination of the steam cycle on an electric warship.
- Initiate and accelerate development of pulsed power technology, to include pulsed alternators and capacitors.
- Initiate ACES applied research for on-board vehicle power system with trade studies and system design (transition to advanced technology effort in PE0603123N in FY 2006).
- Initiate flow noise evaluations of surface ships with AWJ-21 demonstrator.
- Initiate hull machinery noise measurements.

R1 Line Item 5

Page 6 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

- Initiate Advanced Concept Technology Demonstration (ACTD) support for ERC application to surface ships.
- Pursue technology for wafer bonded high voltage power switches. (NRL)
- Pursue technology for alternate approaches to high voltage fast turn off switches. (NRL)

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete flow noise evaluations of surface ships with AWJ-21 demonstrator.
- Complete shock testing of composite hull section in cooperation with Germany.
- Complete dynamic reconfigurable electric power distribution concepts.
- Complete development of flexible composite propeller concept.
- Complete investigation of distributed pump-jet propulsion acoustic performance.
- Complete the initial assessment of performance and maneuvering of asymmetric hull forms.
- Complete validation of powering prediction method for distributed pump-jet propulsion (DPJP) concepts.
- Initiate prediction of constrained (heave and roll) capsizing motions using advanced codes.
- Initiate and complete demonstration of dynamic stability of an advanced intelligent, reconfigurable, solid-state-based, zonal-electrical power system that reconfigures within 10 milliseconds.
- Develop and fabricate mm to um-scale Biofilm Scaffolds. (NRL)
- Develop Inch-Scale Prototype Microbial Fuel Cell to Test Scaffolds/Electrodes. (NRL)
- Initiate demonstration of "point of use" electric power system architectures and advanced energy storage.
- Initiate definition of primary family of Power Electronic Building Blocks for DoD Power applications and Plug and Play criteria for military electric power systems.
- Initiate Power Characterization on Prototype. (NRL)
- Pursue technology for characterizing defects in silicon carbide materials. (NRL)
- Pursue technology for highly efficient high voltage high power switches. (NRL)

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete evaluation of an Integrated Engineering Plant (IEP) concept to provide improved survivability.
- Complete hull machinery noise measurements.
- Complete Dynamic Behavior of Composite Ship Structures (DYCOSS) joint effort with Dutch Navy.
- Complete modeling of electric warship components and system electromagnetic signatures.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

- Complete investigation of distributed pump-jet propulsion acoustic performance.
- Complete ACTD support for ERC application to surface ships.
- Complete development of global surface wave measurement capability for ship models.
- Initiate and complete experimental database for extreme submarine maneuvers (e.g., crashback).
- Initiate development of mitigation concepts (passive and active) of propulsor cavitation.
- Initiate fabrication of small-scale composite hull structure for acoustic investigation.
- Initiate demonstration of distributed power generation, rapid power transfer, and energy storage technologies within the context of zonal electric power systems.
- Initiate ACES development of backpack-sized power generation technologies to provide a primary charging system of approximately 500 Watts.
- Miniaturize Prototype Biofilm-Enhanced Power Generator. (NRL)
- Characterize and Optimize Miniaturized Prototype Power Output. (NRL)
- Expand the study of reliability of silicon carbide power switches. (NRL)
- Pursue new concepts for high power high voltage switches. (NRL)

	FY 2004	FY 2005	FY 2006	FY 2007
ADVANCED ENERGETICS	0	12,293	14,963	15,952

Advanced Energetics efforts address technology development to provide substantial improvements in energetic material systems and subsystems, primarily in terms of performance, but also addressing safety, reliability, and affordability concerns. Goals include: advanced energetic materials for warheads, propellants, and reactive material based subsystems for both defensive and offensive applications. Efforts include development of new fuels, oxidizers, explosive ingredients and formulations, and reliable simulation tools and diagnostics to develop and design superior performance, reduced vulnerability systems tailored to specific warfighter missions.

FY 2004 Accomplishments:

- Continued development and evaluation of advanced explosive/propellant/reactive ingredients and formulations for next generation higher performing systems until expenditure of FY 2003 funding.
- Continued development of advanced directed energy hydro-reactive material warhead concepts to enhance performance of undersea warheads until expenditure of FY 2003 funding.
- Continued technology development for the next generation reactive material warhead concepts (formulations,

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

material properties, and lethality models) for high density reactive materials and novel reactive structural materials.

FY 2005 Plans:

- Continue all efforts of FY 2004.
- Initiate efforts to investigate advanced multiphase blast concepts to enhance performance of air and underwater blast warheads.
- Initiate proof of concept efforts to develop insensitive explosives, propellants, and munitions without compromising performance. This work will involve development of high quality, small particle energetic ingredients, novel processing techniques, and advanced energy conversion concepts.

FY 2006 Plans:

- Continue all efforts of FY 2005.

FY 2007 Plans:

- Continue all efforts of FY 2006.

	FY 2004	FY 2005	FY 2006	FY 2007
FLEET FORCE PROTECTION AND DEFENSE AGAINST UNDERSEA THREATS	13,836	10,398	18,090	19,835

This Activity is combined and renamed from Sensors and Associated Processing Activity and Underwater Platform Self-Defense Activity to more accurately describe its scope.

Fleet Force Protection and Defense against Undersea Threats efforts include applied research for complementary sensor and processing technologies for platform protection and shipboard technologies to increase the survivability of surface ship and submarine platforms against torpedo threats. Current small platforms (both surface and airborne) have little to no situational awareness (SA) or self-protection against air, surface, and asymmetric threats. A goal of this activity is to provide these platforms with effective self-protection. The technology areas specific to platform protection will develop individual, multispectral (Electro-Optic (EO), Infrared (IR), Radio Frequency (RF), electromagnetic (EM), visual, and acoustic), or chemical

R1 Line Item 5

Page 9 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

sensors/biosensors and associated processing. To defend platforms from current and advanced threats in at-sea littoral environments and in port, these technologies must improve multispectral detection and distribution of specific threat information.

Another goal of this effort is to develop a torpedo defense capability to fill Sea Shield Warfighting Capability Gap/Enabling Capability: Platform Defense against Undersea Threats, including Two Torpedo Salvo Defense. This provides a capability to prevent any of the torpedoes, in up to four-torpedo salvos fired at high value units, from hitting those units. Specific technology includes two efforts. The first is Next Generation Countermeasure (NGCM), a mobile adaptive acoustic countermeasure with acoustic communication links to enable countermeasure connectivity and group behavior to defeat threat torpedoes. The second is Anti-Torpedo Torpedo (ATT)/Tripwire Demonstration, technologies for passive shipboard detection, classification, and localization (DCL) of incoming torpedoes and an ATT to engage the threat torpedoes.

This activity supports the Fleet and Force Protection Future Naval Capabilities (FNC). This effort includes support to Sea Shield Pillar and FNC Enabling Capabilities for Aircraft Integrated Self-protection Suite, Fortified Position Security, and Hostile Fire Detection and Response Spirals 1 and 2. Budget Activity 2 sensor efforts are co-funded by PE 0602235N and 0602271N. Funding decrease in FY 2005 reflects transfer of sensor effort to PEs 0602235N and 0602271N.

FY 2004 Accomplishments:

Sensors & Associated Processing -

- Continued development of reagentless sensors for weapons of mass destruction/explosives.
- Continued field tests to assess system performance and quantify influences on detection range with respect to signal detection and jamming of threats to low altitude platforms. (NRL)
- Completed development of mercury cadmium telluride (MCT) mid-wave infrared (MWIR) two-color stacked diode focal plane arrays with operating temperatures in excess of 120-degrees Kelvin for Missile Warning System.
- Completed development of a high frame rate processor and controller for the Visible and MWIR laser receiver sub-systems of the closed-loop countermeasure system for the Shipboard EO/IR Closed Loop Self-protection system.
- Completed optimization experiments of the multiband countermeasure laser showing output power exceeding expected values in Bands II and IVb for EO/IR Laser Jammer for Tactical Aircraft (TACAIR).
- Completed delivery of two Dismounted Digital Automated Computing Terminal (D-DACT) units to Kodak for

R1 Line Item 5

Page 10 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

integration with Organic Light Emitting Diode (OLED) displays for End User Terminal (EUT).

- Completed fabrication of a silica-insulated microwire with adequate breakdown voltage and temperature characteristics in continuous lengths exceeding 600 meters that also exceeds the program's mechanical strength requirements for IDECM P3I.
- Completed efforts in stochastic chemical sensors for naval applications to provide single molecule detection.
- Completed the design for user interface for low-cost compact adaptive optics system. (NRL)
- Developed extremely high extraction efficiencies for explosives on a microchip-based sensor by means of novel porous organic sol-gels polymerized within microfluidic channels. (NRL)
- Initiated development of anti-tampering antenna isolation panels for NULKA decoys: lightweight microwave absorbing composites that degrade in seawater. (NRL)
- Initiated development of a small aperture biomimetic bidirectional acoustic sensor and quantum dot reagents for real time chemical sensing.

Underwater Platform Self-Defense -

- Completed transducer design for NGCM mobile-ready transducer.
- Completed transition of technologies for enabling ATT salvo engagements into the Technology Requirements Model (TRM) engagement model to allow evaluation of these approaches to salvo engagements.
- Completed upgrade of simulation models using the TRM framework to enable simulation of the performance of the ATT with added ATT sonar processing channels in wake operations.
- Initiated mobile NGCM guidance and control interface to Naval Underwater Weapon Center (NUWC) Newport Division signal generation electronics.
- Initiated NGCM testbed power amplifier design and started design for merging adaptive and signal processing board into single board for NGCM/MK2.

FY 2005 Plans:

Sensors & Associated Processing -

- Continue all efforts of FY 2004 less those noted as completed above.
- Continue work on anti-tampering antenna isolation panels for NULKA decoys: fabricate hydrogen-bonded polymers and test for sensitivity to water degradation. Test isolation performance of new microwave absorbing composites. (NRL)
- Continue development of compact sensor systems in support of responsive Intelligence, Surveillance, and Reconnaissance (ISR). (NRL)

R1 Line Item 5

Page 11 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

- Complete the integration of all functions (detection, identification, and jamming) into a field testable Low Altitude Threat Detection and Jamming prototype and perform final concept test. (NRL)
- Complete development of a variable geometry mirror for the aircraft in conjunction with the ground based laser optics. (NRL)
- Complete the field tests to assess system performance and quantify influences on detection range with respect to signal detection and jamming of threats to low altitude platforms. (NRL)
- Antibodies for biowarfare agents will be synthetically modified with enzymes and studied via surface plasmon resonance to gain a better understanding of the impact tagging these recognition sites have on molecular recognition (kinetics and selectivity) for sensor applications. (NRL)
- Synthesize new metal sulfides as catalysts for fuel cells and evaluate their electrochemical performance. (NRL)
- Initiate design and development of large (1.5m dia.) telescopes with associated adaptive optics for the Naval Prototype Optical Interferometer (NPOI). (NRL)
- Initiate the design and development of integrated laser ground based, aircraft protection design to protect large aircraft from Infrared Surface to Air Missiles (SAMs) upon ingress and egress to an airport. (NRL)
- Initiate development of solid projectile coilgun design, consumable casing material and improve railgun efficiency. (NRL)

Underwater Platform Self-Defense -

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete upgrade of TRM simulations with extended ATT guidance law for wake operations and integration of processing for all sonar channels.
- Initiate analysis of capability to enable limited acoustic communications among NGCM units.
- Initiate incorporation of ATT warhead acoustic model into TRM.
- Initiate modification of TRM simulations to include additional ATT salvo guidance techniques.
- Initiate technology development to enable NGCM group behavior.

FY 2006 Plans:

Sensors & Associated Processing -

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete small aperture biomimetic bidirectional acoustic sensor efforts.
- Initiate platform integration analysis and design review for Integrated EO/IR Self-protection Suite for

R1 Line Item 5

Page 12 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

Rotary Wing Aircraft.

- Initiate testing of the MWIR gunfire detection system with the D-DACT network for End User Terminal (EUT).
- Initiate investigation of improved jam codes and closed-loop countermeasure techniques to integrate with the Shipboard Integrated Electro-Optic Defense Systems (SHIELDS) hardware for Shipboard EO/IR Closed Loop Self-protection.
- Initiate efforts in nanoscale biosensor/bioprocessing components.
- Initiate data collection for a database of chemical signatures from actual naval assets (land and water-based).
- Develop portable detection system for defense against small arms fire and rocket propelled grenades (RPG) using Field Programmable Gate Arrays (FPGAs), infrared focal plane arrays (IRFPA), and filtering algorithms. (NRL)
- Microfluidic electrophoretic separations will be performed on enzyme bound antibodies in the presence of antigens, taking advantage of post-column enzymatic amplification to monitor their interactions. (NRL)
- Enhance the sulfur tolerance of sulfide and phosphate based catalysts through optimization of synthesis and rigorous physical characterization. (NRL)
- Integrate and conduct prototype testing of the airborne mirror system and remote laser optics into a ground based test facility and evaluate their performance. (NRL)
- Expand research in the development of low-cost, light-weight radar absorbing materials (RAM) to reduce cost and weight of Tactical Unmanned Air Vehicles (UAV). (NRL)
- Continue the design and development of integrated laser ground based, aircraft protection design with final design of a rotating variable geometry mirror. (NRL)
- Continue railgun high-capacity recharger design, solid-projectile coilgun experiments, and consumable material characterization. (NRL)
- Complete development of anti-tampering antenna isolation panels for NULKA decoys: demonstrate isolation performance and water degradability of microwave absorptive composite. (NRL)

Underwater Platform Self-Defense -

- Continue all efforts of FY 2005 less those noted as completed above.

FY 2007 Plans:

Sensors & Associated Processing -

- Continue all efforts of FY 2006 less those noted as completed above.

R1 Line Item 5

Page 13 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

- Initiate laboratory investigations of the conformal jammer with fiber coupled laser concept for Integrated EO/IR Self-protection Suite for Rotary Wing Aircraft.
- Initiate development of additional jam codes and tracking algorithms to support final at-sea testing of the SHIELDS hardware for Shipboard EO/IR Closed Loop Self-protection.
- Complete development of quantum dot reagents for real time chemical sensing.
- Complete design and optimization of reagentless sensors for weapons of mass destruction and explosives.
- Conduct first demonstration of high resolution imaging of faint sources using the combined adaptive optics and optical interferometry at NPOI. (NRL)
- Demonstrate the efficacy of the NRL catalysts in fuel cells and work with industry to independently evaluate the catalysts. (NRL)
- Expand the integration effort into a mobile design and analyze the performance. (NRL)
- Microparticles will be labeled with selective antibodies and contained within novel microfluidic weirs devices, and studied for the simultaneous separation of multiple antigens in a single step. (NRL)
- Continue design and development of integrated laser ground based, aircraft protection with fabrication and initial integration with ground based system. (NRL)
- Continue high-capacity recharger experiments, coilgun armature experiments, and foreign object debris (FOD)-less casing fabrication. (NRL)

Underwater Platform Self-Defense -

- Continue all efforts of FY 2006.

	FY 2004	FY 2005	FY 2006	FY 2007
AIRCRAFT TECHNOLOGY	5,646	9,938	13,054	14,221

The Aircraft Technology activity develops high impact, scaleable naval air vehicle technologies, such as structures and flight controls for future and legacy air vehicles, integrated avionics, advanced electrical power systems, and aerodynamics, which significantly increase the naval warfighter's capabilities, effectiveness, readiness, and safety, while reducing life cycle cost. This activity directly supports the naval aviation vision, providing a robust and credible forward presence through flexible response and dominant power projection from the sea.

FY 2004 Accomplishments:

- Continued development of survivability/reduced observables technology (classified).

R1 Line Item 5

Page 14 of 24

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

- Continued Computational Fluid Dynamics (CFD) modeling of ship airwake flows to provide higher fidelity.
- Continued design for demonstration of an all-composite replacement for dynamically loaded control surfaces for tactical aircraft.
- Completed demonstration of intelligent flight control prognostics and reconfiguration algorithm simulations.
- Completed investigation of in-flight, autonomously reconfigurable air vehicles.
- Initiated Persistent Intelligence, Surveillance, and Reconnaissance (ISR) Unmanned Air Vehicle (UAV) technologies: Capability tailored to the Expeditionary Strike Group (ESG), a high endurance sensor and communication capability focused on disparate structurally integrated sensors (Electro-Optic (EO), Infrared (IR), Radio Frequency (RF)), electronic support, and communications packages, low volume high power generation capability, high capacity miniaturized data transmission, and short take off.
- Initiated Joint Transformational Strike (JTS) technology addressing Automatic Target Recognition (ATR) and Combat Identification (CID).

FY 2005 Plans:

- Continue all efforts of FY 2004 less those noted as completed above.
- Complete Computational Fluid Dynamics (CFD) modeling of ship airwake flows to provide higher fidelity.
- Complete design for demonstration of an all-composite replacement for dynamically loaded control surfaces for tactical aircraft.
- Complete Persistent Intelligence, Surveillance, and Reconnaissance (ISR) Unmanned Air Vehicle (UAV) technologies effort.
- Complete Joint Transformational Strike (JTS) technology addressing Automatic Target Recognition (ATR) and Combat Identification (CID).

FY 2006 Plans:

- Continue development of survivability/reduced observables technology (classified).
- Initiate demonstration of system integration of a shaped memory alloy into a Reconfigurable Rotor Blade system for improved range and lifting capacity in a tilt rotor aircraft.
- Initiate development of Ship-To-Objective Maneuver (STOM) Heavy Lift System Concept.
- Initiate development of flight control, intelligent autonomy, command & control, and multi-vehicle cooperation technologies for unmanned air vehicles.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.

	FY 2004	FY 2005	FY 2006	FY 2007
MISSILE DEFENSE (MD)	7,753	7,305	6,232	8,030

This activity describes science and technology (S&T) projects of the Missile Defense Future Naval Capability (FNC) program:

- Distributed Weapons Coordination (DWC) (including sensor coordination) open architecture combat system algorithms for automated battle management aids (ABMA), including common threat evaluation (CTE) and preferred shooter recommendation (PSR) functions that will enable fleet units to defend against air and missile attacks with increased effectiveness and efficiency.
- Littoral Affordability (classified program).
- Advanced Area Defense Interceptor (AADI) S&T planning effort for Navy - Marine Corps Air Directed Surface to Air Missile (ADSAM) live firing demonstration at White Sands Missile Range in FY08.
- Composite Combat Identification (CCID) algorithms for rapid, high confidence, positive hostile identification of air and missile threats at long range by all theater air and missile defense units.

FY 2004 Accomplishments:

- Continued development of DWC algorithms for CTE and PSR functions; initiated development of sensor coordination algorithms.
- Continued Littoral Affordability effort (classified program).
- Completed CCID risk reduction effort in development of a common reasoning algorithm. Overall CCID effort continuing under PEs 0602235N and 0603235N.

FY 2005 Plans:

- Continue DWC and Littoral Affordability efforts of FY 2004.
- Initiate AADI experimental planning for Navy ADSAM demonstration in FY 2008 (associated with AADI advanced technology efforts continuing under PE 0603123N).

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

FY 2006 Plans:

- Continue all efforts of FY 2005.

FY 2007 Plans:

- Continue AADI S&T planning and coordination for FY 2008 Navy ADSAM live-fire demonstration.
- Complete DWC development and documentation of CTE and PSR algorithms; continue development and testing of sensor coordination algorithms.

CONGRESSIONAL PLUS-UPS:

	FY 2004	FY 2005
ADPICAS	0	1,485

FY 2005: Initiate development of intelligent composite active structures and systems to provide precision position control and vibration suppression for military and space structures to enhance their structural performance and reduce their fuel consumption. Applications include fighter jets, helicopters, smart rockets, satellites, and space stations.

	FY 2004	FY 2005
BATTERY CHARGING TECHNOLOGY	2,051	2,081

FY 2004: Completed a prototype battery charger for nickel cadmium and sealed lead acid batteries and delivered the unit to NAVSEA-Crane for 3rd party performance verification. Prototype testing demonstrated that the batteries tested under this tasking can be charged without heating in 20 to 30 minutes, and life cycle testing has begun. FY 2005: Continue research efforts funded in FY 2003 and FY2004. Initiate development and validation of a charging algorithm for lithium-ion batteries. Initiate development of a DC-DC converter hardware design and engineering model.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

	FY 2004	FY 2005
BLAST RESISTANT ANECHOIC SPRAYABLE ELASTOMERIC COATINGS FOR NAVY SHIPS	0	990

FY 2005: Initiate development, testing, and evaluation of a new coating system that can be applied to metal ship bulkheads and armored vehicles providing blast protection to the occupants. The end of the first year of development will result in one or more fire retardant coating systems that can be applied to metal structures and provide blast protection.

	FY 2004	FY 2005
CENTER FOR ADVANCED POWER SYSTEMS	3,854	0

FY 2004: Completed purchase of state-of-the-art energy storage devices, DC experimental bus including controls and system integration, and completed 5MW superconducting motor testing.

	FY 2004	FY 2005
CENTER FOR CRITICAL INFRASTRUCTURE PROTECTION	0	6,735

FY 2005: Initiate development of innovative technology solutions for use in the protection of critical infrastructure. Technologies will be developed that will increase protection for ports and the merchant shipping system, maintaining port operations, and the surrounding infrastructure.

	FY 2004	FY 2005
COMPOSITE REPAIR OF METAL STRUCTURES	0	990

FY 2005: Initiate development of low cost, sonic resistant composite repairs for metal airframe structures. This new concept for the repair of the Navy's aging fleet of both fixed wing and rotary wing aircraft offers the promise to extend the airframe life at a significantly lower cost and with greater reliability and safety than methods currently in use.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

	FY 2004	FY 2005
COMPOSITES DEVELOPMENT FOR NAVY LOW RISE CONSTRUCTION	0	1,485

FY 2005: Initiate development and demonstration of prototype wood plastic composite (WPC) structural components for military housing. These structural components will provide the following advantages relative to conventional wood products; (1) resist moisture penetration into the building structure, (2) resist high lateral loads from seismic and wind events, and (3) facilitate proper construction techniques.

	FY 2004	FY 2005
CORROSION MODELING SOFTWARE PROJECT - NAVAIR	3,042	4,160

FY 2004: Completed development of a workable analytical corrosion maintenance model and validated through specimen testing, in an effort to establish guidelines and criteria for high strength steel components, in particular, arrestment gear of carrier aircraft. FY 2005: Continue development and validation testing of workable corrosion maintenance guidelines and criteria for high strength steel components. Airframe criteria calling for the repair and/or replacement of all corroded parts in the Fleet are very difficult to implement both with respect to time and resources. The results of this effort will enable maintenance teams to delineate between various aircraft corrosion states, with potential safety impacts and identification of corrosion that is cosmetic.

	FY 2004	FY 2005
DEPLOYABLE FIBER OPTIC FORCE PROTECTION SYSTEM	961	0

FY 2004: Initiated research and development for a smart video camera system and passive fiber optic hydrophone array and processor to provide security against a waterside terrorist threat approaching Navy ships. Coordinating effort with synergistic project at DSTO Australia.

	FY 2004	FY 2005
FUSION PROCESSOR AND INTEGRATED CONTEXTUAL REASONING	6,150	0

FY 2004: Completed process of Navy Hyperspectral/Imaging for Surveillance and Targeting (HISTAR) data using hyper-spectral target detection and discrimination algorithms in real-time to optimize performance, minimizing

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

false alarms. System being installed on NRL P-3 test aircraft for performance assessment.

	FY 2004	FY 2005
HIGH EFFICIENCY QUIET ELECTRIC DRIVE	1,349	990

FY 2004: Completed development of a quiet, efficient, electric drive to allow transition from mechanical to electric drive in submarines and smaller surface combatants. Fabricated and tested a reduced-scale, single-phase demonstration model. FY 2005: Modify the single-phase model to a three-phase model and test and evaluate.

	FY 2004	FY 2005
HYPERSPECTRAL DATA FUSION	0	3,368

FY 2005: Initiate demonstration of a hyperspectral/imager for surveillance and tracking in the airborne realtime processing on the NRL P-3 test aircraft.

	FY 2004	FY 2005
INTEGRATED FUEL PROCESSOR-FUEL CELL SYSTEM	2,324	1,981

FY 2004: Completed design, fabrication & testing of a single, semi-integrated fuel-processing reactor utilizing a surrogate fuel. Continued development of hydrogen purification & thermal integration units and performed a reactor switching demonstration of the prototype hardware. FY 2005: Develop and demonstrate a prototype integrated fuel processor/fuel cell system to operate on JP-5 fuel. If successful, the system may provide payoffs of increased efficiency and lower emissions of auxiliary power units used onboard aircraft and ocean-going vessels.

	FY 2004	FY 2005
LIGHTWEIGHT SHIP STRUCTURES (LSS)	0	990

FY 2005: Initiate research to explore, develop and optimize alloys based on Al-Zn-Mg-Sc-Zr. Efforts will include alloy fabrication, microstructural and mechanical characterization, stress corrosion cracking studies and development of a cost-benefit analysis, demonstrating the feasibility of implementing the alloy and

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

providing the foundation for subsequent certification.

	FY 2004	FY 2005
LOW-COST, RAPID PROTOTYPE/PRODUCTION TECHNOLOGY FOR POLYMERIC AIRCRAFT COMPONENTS INITIATIVE	1,447	2,278

FY 2004: Initiated the development and qualification of a rapid prototyping and production technology based on Selective Laser Sintering (SLS) which will be used for the design, development and qualification of advanced polymeric aircraft components. The SLS process uses a laser to fuse (sinter) plastic powders into complex shaped plastic parts. A part can be built using only the computer aided design (CAD) model downloaded directly to the laser-sintering machine. This technology will help reduce the weight and manufacturing costs of aircraft components while improving their performance. FY 2005: Continue with the development and qualification of a rapid prototyping and production technology based on Selective Laser Sintering (SLS) which will be used for the design, development, and qualification of advanced polymeric aircraft components. The focus for this year's effort will be on material and process optimization with emphasis on meeting aerospace application requirements.

	FY 2004	FY 2005
MARK V PATROL BOAT REPLACEMENT CRAFT PROTOTYPE	0	1,485

FY 2005: Initiate construction of the new composite MKV.I prototype craft.

	FY 2004	FY 2005
MINIATURE AUTONOMOUS VEHICLES (MAVS)	1,163	1,784

FY 2004: Completed validation, through in-water testing, modeling, and simulation of a distributed communication and control architecture for a cooperating multi-vehicle fleet of autonomous underwater vehicles (AUV). FY 2005: Continue in-water demonstrations of distributed communications and control architecture. Expanded multi-vehicle fleet to include underwater crawlers.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

	FY 2004	FY 2005
NANOSTRUCTURED COMPOSITE MARINE COATINGS	2,409	0

FY 2004: Initiate development of multifunctional, high performance anticorrosion coatings that are capable of sequestering diffusive ions, are highly hydrophobic, and provide self healing properties using specific Ni catalysts and encapsulation techniques for ship tank application.

	FY 2004	FY 2005
PMRF FORCE PROTECTION LAB	0	7,924

FY 2005: Initiate development of force protection and security technologies by integrating, evaluating and demonstrating enabling technologies, tools, and processes. Approaches include integration of advanced sensor systems, novel sensor and data fusion processes, behavior modeling and analysis, and data mining and knowledge extraction techniques.

	FY 2004	FY 2005
PROJECT ENDEAVOR	3,296	1,684

FY 2004: Developed and integrated structural loading and hydrodynamic modeling design tools, and initiated transition of tools for Navy use at NSWC Carderock. FY 2005: Produce a software system that integrates the design process for advanced marine vehicles with mission and environmental (wind, wave, etc.) requirements, will begin to produce some stand-alone modules dealing with mission planning, wave forecasting and hindcasting as well as completing the integration process. A major focus will be technology transfer of system components.

	FY 2004	FY 2005
SMALL WATERCRAFT PROPULSION DEMONSTRATOR	0	1,485

FY 2005: Initiate development of an advanced internal combustion engine and associated electrical generator.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

	FY 2004	FY 2005
SOLID OXIDE REGENERATIVE FUEL CELL	2,900	0

FY 2004: Conducted thermal cycling and long-term reliability testing to demonstrate the durability and reliability of a 1 KW regenerative solid oxide fuel cell. Solid oxide fuel cells have the potential to offer improved fuel efficiencies and power densities over other options for naval vessel applications.

	FY 2004	FY 2005
STRUCTURAL RELIABILITY OF FRP COMPOSITE IN SHIP ASSEMBLIES	1,932	990

FY 2004: Completed fabrication of VARTM/SCRIMP composite panels. Material properties were evaluated for statistical data analysis and model development. FY 2005: Resolve the uncertainty surrounding mechanical property variability for composite laminates and the associated effect on structural reliability as it relates to design guidelines and analysis methods.

	FY 2004	FY 2005
THEATER SUPPORT VESSEL HULL MATERIAL DEVELOPMENT	0	1,981

FY 2005: Initiate the design and development of technologies including an alternative hull and air cushion for advanced littoral combat ships. These technologies will allow improved delivery of firepower and information, as well as, increased hydrodynamic, aerodynamic, stealth, and survivability traits.

	FY 2004	FY 2005
UNMANNED SEA SURFACE VEHICLES FOR MARITIME MISSIONS	4,116	3,467

FY 2004: Defined operational concept and completed design of prototype unmanned surface vehicles. Primarily focused on enhanced speed, range, endurance, seakeeping, and payload fraction, considered in the context of potential unmanned vehicle missions. Initiated construction of two prototypes for at-sea testing. Developed launch and recovery testbed. FY 2005: Deliver two prototype vehicles. Begin operational testing to determine at-sea performance. Develop techniques for deploying and retrieving vehicles from host platform. Incorporate advanced power and autonomy technologies.

UNCLASSIFIED

UNCLASSIFIED

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2a

DATE: Feb 2005

BUDGET ACTIVITY: 02

PROGRAM ELEMENT: 0602123N PROGRAM ELEMENT TITLE: FORCE PROTECTION APPLIED RESEARCH

PROJECT TITLE: FORCE PROTECTION APPLIED RESEARCH

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

PE 0204152N	(E-2 Squadrons)
PE 0205601N	(HARM Improvement)
PE 0601153N	(Defense Research Sciences)
PE 0602131M	(Marine Corps Landing Force Technology)
PE 0602235N	(Common Picture Applied Research)
PE 0602271N	(RF Systems Applied Research)
PE 0603123N	(Force Protection Advanced Technology)
PE 0603235N	(Common Picture Advanced Technology)
PE 0603271N	(RF Systems Advanced Technology)
PE 0603502N	(Surface and Shallow Water Mine Countermeasures)
PE 0603513N	(Shipboard System Component Development)
PE 0603553N	(Surface ASW)
PE 0603561N	(Advanced Submarine System Development)
PE 0603573N	(Advanced Surface Machinery Systems)
PE 0603609N	(Conventional Munitions)
PE 0603640M	(USMC Advanced Technology Demonstration (ATD))
PE 0604307N	(Surface Combatant Combat System Engineering)
PE 0604518N	(Combat Information Center Conversion)
PE 0604558N	(New Design SSN)
PE 0604561N	(SSN-21 Developments)

NON NAVY RELATED RDT&E:

PE 0602270A	(Electronic Warfare Technology)
PE 0602204F	(Aerospace Sensors)

D. ACQUISITION STRATEGY:

Not applicable.

UNCLASSIFIED