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FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: February 2008

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603729N
PROGRAM ELEMENT TITLE: WARFIGHTER PROTECTION ADVANCED TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
Total PE	55,532	49,418	12,129	12,641	12,810	12,914	13,022
2914 WARFIGHTER PROTECTION ADVANCED TECHNOLOGY	16,550	11,958	12,129	12,641	12,810	12,914	13,022
9999 CONGRESSIONAL PLUS-UPS	38,982	37,460	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The efforts described in this Program Element (PE) are based on investment directions as defined in the Naval S&T Strategic Plan approved by the S&T Corporate Board (Jan 2007). This strategy is based on needs and capabilities from Navy and Marine Corps guidance and input from the Naval Research Enterprise (NRE) stakeholders (including the Naval enterprises, the combatant commands, the Chief of Naval Operations (CNO), and Headquarters Marine Corps). It provides the vision and key objectives for the essential science and technology efforts that will enable the continued supremacy of U.S. Naval forces in the 21st century. The Strategy focuses and aligns Naval S&T with Naval missions and future capability needs that address the complex challenges presented by both rising peer competitors and irregular/asymmetric warfare.

This program supports the development and demonstration of field medical equipment, diagnostic capabilities and treatments; technologies to improve warfighter safety and to enhance personnel performance under adverse conditions; and systems to prevent occupational injury and disease in hazardous, deployment environments. Navy investment in these areas is essential because Navy/USMC mission needs are not adequately addressed by the civilian sector or other Federal agencies. For example, civilian emergency medicine does not address casualty stabilization during long transit times to definitive care. The National Institutes of Health (NIH) focuses on the basic science of disease processes and not product development. Programs are coordinated with other Services through the Armed Services Biomedical Research Evaluation Management (ASBREM) Committee to prevent duplication of effort. This project funds the Force Health Protection program a Future Naval

UNCLASSIFIED

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Capability (FNC) that will provide technology options for future Navy and Marine Corps capabilities and supports the "Sea Warrior" component of the Naval Transformation Roadmap, medical logistics aspects of "Sea Basing" and expeditionary force medical support associated with "Sea Strike".

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

UNCLASSIFIED

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B. PROGRAM CHANGE SUMMARY:

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
FY 2008/FY 2009 President's Budget Submission	58,111	12,145	11,494
Congressional Action	-1,395	37,700	0
Congressional Undistributed Reductions/Rescissions	0	-322	0
Execution Adjustments	138	0	0
Program Adjustments	-66	0	650
Rate Adjustments	0	0	-15
SBIR Assessment	-1,256	-105	0
FY 2009 President's Budget Submission	55,532	49,418	12,129

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

E. PERFORMANCE METRICS:

Efforts within this PE are measured at two levels. At the lower level, each is measured against technical and financial milestones on a monthly basis. Annually, each project is reviewed in depth for technical and transition performance by the Chief of Naval Research (CNR).

UNCLASSIFIED

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PROJECT NUMBER: 2914

PROJECT TITLE: WARFIGHTER PROTECTION ADVANCED TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2914 WARFIGHTER PROTECTION ADVANCED TECHNOLOGY	16,550	11,958	12,129	12,641	12,810	12,914	13,022

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project supports the development and demonstration of field medical equipment, diagnostic capabilities and treatments; technologies to improve warfighter safety and to enhance personnel performance under adverse conditions; and systems to prevent occupational injury and disease in hazardous, deployment environments. Navy investment in these areas is essential because Navy/USMC mission needs are not adequately addressed by the civilian sector or other Federal agencies. For example, civilian emergency medicine does not address casualty stabilization during long transit times to definitive care. The NIH focuses on the basic science of disease processes and not product development. Programs are coordinated with other Services through the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee to prevent duplication of effort. This project funds the Force Health Protection program a Future Naval Capability (FNC) that will provide technology options for future Navy and Marine Corps capabilities and supports the "Sea Warrior" component of the Naval Transformation Roadmap, medical logistics aspects of "Sea Basing" and expeditionary force medical support associated with "Sea Strike".

The decrease in funds from FY 2007 to FY 2008 and out reflects the realignment of funds for 6.2 applied research in support of the Force Health Protection FNC.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2007	FY 2008	FY 2009
CASUALTY CARE AND MANAGEMENT	8,114	5,775	6,598

The goal of Casualty Care and Management is to maximize the continuum of care with lifesaving interventions as close to the battlespace as possible. This is in an increasingly lethal battlespace, with reduced infrastructure and logistics.

UNCLASSIFIED

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The decrease in funds from FY 2007 to FY 2008 reflects the realignment of funds for 6.2 applied research in support of the Force Health Protection FNC. The increase from FY 2008 to FY 2009 is due to the transition of some efforts from the Healthy and Fit Force activity (this PE) into the Casualty Care and Management activity.

FY 2007 Accomplishments:

- Continued studies into the safety of hypotensive resuscitation to support development of resuscitation fluids that enhance cardiovascular function, tissue perfusion and oxygen delivery. Improved resuscitation fluids are needed to prevent casualty deaths from shock and associated tissue/organ damage.
- Continued identification of Food and Drug Administration (FDA) approved products as well as new development of novel therapeutics that protect against the induction of hemorrhagic shock. A reduced need for resuscitation fluids would significantly reduce the medical logistical burden for Naval forces.
- Continued development of casualty management tools and data. These tools and data are required by combat, material development, and medical planners to evaluate the effectiveness of personal protection systems and healthcare support services, and to project future material and training requirements.
- Continued development of an effective analgesic for controlling severe pain that does not have the adverse effects of morphine (cardiorespiratory depression, sedation) or the addiction potential. Naval casualties are expected to "stay in the fight" as long as possible and the use of morphine removes that capability.
- Continued efforts to develop prototype technology for closed-loop resuscitation for USMC en route care system.
- Continued preclinical study to evaluate use of vasopressin to manage traumatic brain injury (TBI).
- Completed development of drugs and devices for treatment of uncontrolled external/extremity hemorrhage in the far forward battlefield. Blood loss is the leading cause of preventable death in combat.
- Completed evaluation of novel antibiotics against multi-drug resistant bacteria.
- Completed study to determine time-to-occlusion of vascular shunts.
- Completed one project to enhance medical planning tools for combat developers.
- Completed market survey of Commercial off the Shelf (COTS) technologies related to blood transfusion safety.
- Initiated clinical trial evaluating safety of vasopressin for treatment of trauma patients.
- Initiated efforts to produce oxygen in situ for medical care, supporting USMC En Route Care System.
- Initiated efforts to develop a novel fibrinogen-like bandage using nanotechnology for hemorrhage control (internal and external).
- Terminated study to develop selective and specific biomarkers for detection of TBI.

UNCLASSIFIED

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FY 2008 Plans:

- Continue all efforts of FY 2007 less those noted as completed above.
- Complete efforts to develop prototype technology for closed-loop resuscitation for USMC En Route Care system.
- Complete remaining project to enhance medical planning tools for combat developers.
- Complete study to determine safety of hypotensive resuscitation in casualties in presence of hemorrhagic shock and hypothermia.
- Complete four studies on pharmacologic resuscitation; Down-select best agent for continued development.
- Initiate study to demonstrate selectivity/specificity of biomarkers for mild & moderate TBI in appropriate pre-clinical model.
- Initiate efforts to develop advanced technologies for First Responders.
- Initiate efforts to develop advanced technologies to support the Forward Resuscitative Surgery/Shipboard Surgical Systems.
- Initiate program to develop advanced technologies to support En Route Care of casualties.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Continue program to examine comorbidity of traumatic brain injury and PTSD. (Realigned from Healthy and Fit Force activity of this PE after 2008.)
- Complete preclinical study to evaluate use of vasopressin to manage TBI.
- Initiate efforts to treat the psychological manifestations' of combat stress

	FY 2007	FY 2008	FY 2009
CASUALTY PREVENTION	6,863	4,875	5,531

Casualty Prevention includes protecting the warfighter from environmental, occupational and battlefield threats.

The decrease in funds from FY 2007 to FY 2008 reflects the realignment of funds for 6.2 applied research in support of the Force Health Protection FNC. In FY 2009 some efforts from the Healthy and Fit Force activity (in this PE) transition to Casualty Prevention.

UNCLASSIFIED

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FY 2007 Accomplishments:

- Continued development of improved hearing protection systems, educational tools, and pharmacological treatment paradigms to protect and restore hearing in Warfighters exposed to high noise environments.
- Continued research into understanding neurological and cognitive effects of blast injuries. There is an increasing amount of information related to the correlation of closed-head blast injury with cognitive and motor deficits as well as long term emotional problems such as Post-Traumatic Stress Disorder (PTSD).
- Completed development of protective personal gear and physiologic monitoring ensembles to reduce injury risk and enhance personnel safety in warm and cold water operations for Navy divers.
- Completed research on return-to-duty criteria for heat injury patients.
- Completed development of diagnostic tools for detecting and treating susceptibility to vestibular-related disorientation in aviators.

FY 2008 Plans:

- Complete development of improved hearing protection systems, educational tools, and pharmacological treatment paradigms to protect and restore hearing in Warfighters exposed to high-noise environments.
- Complete research into understanding neurological and cognitive effects of blast injuries.
- Initiate efforts to mitigate the effects of environmental and other threats to health.
- Initiate efforts to reduce operational injuries.

FY 2009 Plans:

- Continue all efforts of FY 2008 less those noted as completed above.
- Continue research to determine the safety and efficacy of perfluorocarbons in treating decompression sickness and arterial gas embolism. (Realigned from Healthy and Fit Force activity of this PE after 2008.)
- Initiate development of tools to prevent psychological stress. (Similar effort funded in Healthy and Fit Force activity of this PE prior to FY 2009.)

	FY 2007	FY 2008	FY 2009
HEALTHY AND FIT FORCE	1,573	1,308	0

Healthy and Fit Force efforts preserve health and enhance fitness of ready forces against physical and psychological threats through the continuum of peace and war.

R1 Line Item 22

Page 7 of 11

UNCLASSIFIED

UNCLASSIFIED

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The decrease in funds from FY 2007 to FY 2008 and out reflects the realignment of funds for 6.2 applied research in support of the Force Health Protection FNC. This effort moves to Casualty Care and Management and Casualty Prevention activities in this PE in FY 2009.

FY 2007 Accomplishments:

- Continued evaluations of pharmacological compounds to combat motion-sickness in aviators without causing fatigue or cognitive deficit.
- Continued program for creating strategies to "inoculate" Warfighters against the effects of combat related stressors.
- Continued development of decision support tools for controlling disease and non-battle injuries on Navy vessels.
- Continued Virtual Reality Therapy Tools for acute PTSD.
- Completed identification of factors and causes of injury in shipboard and aviation scenarios, and development of exposure guidelines and engineering specifications for preventing mechanical shock-related injury. Musculoskeletal injury has a major impact on force readiness and warfighter health.

FY 2008 Plans:

- Complete evaluations of pharmacological compounds to combat motion-sickness in aviators without causing fatigue or cognitive deficit.
- Complete program for creating strategies to "inoculate" Warfighters against the effects of combat related stressors.
- Complete Virtual Reality Therapy Tools for acute PTSD.
- Complete development of decision support tools for controlling disease and non-battle injuries on Navy vessels.
- Initiate program to examine comorbidity of traumatic brain injury and PTSD. (This effort moves to Casualty Care and Management activity in this PE in FY 2009).
- Initiated research to determine the safety and efficacy of perfluorocarbons in treating decompression sickness and arterial gas embolism. (This effort moves to Casualty Prevention activity in this PE in FY 2009)

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E:

R1 Line Item 22

Page 8 of 11

UNCLASSIFIED

UNCLASSIFIED

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PE 0601153N Defense Research Sciences

PE 0602235N Common Picture Applied Research

PE 0602236N Warfighter Sustainment Applied Research

PE 0603236N Warfighter Sustainment Advanced Technology

PE 0604771N Medical Development

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E:

PE 0602716A Human Factors Engineering Technology

PE 0602785A Manpower/Personnel/Training Technology

PE 0602787A Medical Technology

PE 0603002A Medical Advanced Technology

PE 0602202F Human Effectiveness Applied Research

PE 0603231F Crew Systems and Personnel Protection Technology

D. ACQUISITION STRATEGY:

Not applicable.

UNCLASSIFIED

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PROJECT NUMBER: 9999

PROGRAM ELEMENT TITLE: WARFIGHTER PROTECTION ADVANCED TECHNOLOGY

PROJECT TITLE: CONGRESSIONAL PLUS-UPS

CONGRESSIONAL PLUS-UPS:

	FY 2007	FY 2008
BRAIN INJURY DISEASE MANAGEMENT INITIATIVE	1,992	0

This effort supported the Brain Injury Disease Management initiative.

	FY 2007	FY 2008
C. W. BILL YOUNG BONE MARROW DONOR RECRUITMENT AND RESEARCH PROGRAM	30,662	31,300

FY 2007 Accomplishments - Using the resources of a national network of bone marrow donation and transplantation centers, this research addressed refining a contingency response capability to provide rapid medical treatment for victims of marrow-toxic agents such as ionizing radiation or certain toxic chemicals. Development of a radiation injury treatment network to prepare for the care of patients resulting from a hematopoietic toxic event and expanding the genetic diversity of the registry through continued addition of adult donors and cord blood units are among the many accomplishments of this effort.

FY 2008 Plan - This effort will continue to test, develop and evaluate military contingency capabilities in order to improve care for casualties of marrow-toxic substances. Procedures will be developed, tested, evaluated and refined for identifying and providing correctly matched marrow for casualties with toxic injuries to their marrow as well as matched platelets for a number of military medical problems including combat trauma. Other associated medical therapies including targeted medical care and use of hematopoietic stimulating pharmaceuticals will be incorporated.

	FY 2007	FY 2008
INTEGRATED WARFIGHTER BIODEFENSE PROGRAM	3,254	2,384

FY 2007 Accomplishments - This research addressed the development of novel tools for generating situational awareness, modeling and simulation of the spread of infectious disease, medical and non-medical interventions, and generating a Common Operating Picture (COP).

FY 2008 Plan - This effort will focus on developing pilot versions of modeling software for use by USNORTHCOM

UNCLASSIFIED

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PROJECT TITLE: CONGRESSIONAL PLUS-UPS

and other DoD components responsible for pandemic influenza response, prototype models for infectious diseases other than pandemic influenza and prototype models that address acute and chronic diseases and the options for prophylaxis and treatment to generate improved Force Health Protection.

	FY 2007	FY 2008
MASSIVE TISSUE INJURY/AMPUTATION REPAIR WITH COMPOSITE TISSUE TRANSPLANTATION	0	2,981

This effort supports massive tissue injury/amputation repair with composite tissue transplantation.

	FY 2007	FY 2008
NAVY SPECIAL WARFARE PERFORMANCE AND INJURY PREVENTION PROGRAM	1,074	0

This effort created an aggressive and sustained injury prevention and human performance enhancement initiative to identify risk factors for injury and improvement of suboptimal physical, physiological and nutritional parameters through specifically designed intervention programs.

	FY 2007	FY 2008
NEURAL CONTROL OF EXTERNAL DEVICES (ARTIFICIAL LIMB MOVEMENT)	0	795

This effort supports neural control of external devices (artificial limb movement).

	FY 2007	FY 2008
NURSING TELEHEALTH RESEARCH PROGRAM	1,000	0

This effort supported the Nursing Telehealth Research Program.

	FY 2007	FY 2008
VIRTUAL INTERACTIVE TRAINING AND ASSESSMENT SYSTEM	1,000	0

This effort supported Virtual Interactive Training and Assessment System research.