Exhibit R-2, RDT&E Budget Item Justification	Date: February 2004
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	**R-1 ITEM NOMENCLATURE:** Strategic Defense Technologies 0602717BR Re-titled in FY 2005 to WMD Defense Technologies

Cost ($ in millions)	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Cost to Complete
Total 0602717BR Cost	115.7	115.5	116.1	111.8	102.7	103.7	106.3	Continuing
Project BB Small Business Innovative Research	0*	1.3	2.6	2.4	2.4	2.4	2.5	Continuing
Project BC Force Protection & Technology Applications	3.2	2.0	2.1	1.8	1.6	1.6	1.7	Continuing
Project BG Nuclear Operations	25.4	26.2	25.0	25.5	23.4	24.6	25.8	Continuing
Project BH System Survivability	87.1	86.0	86.4	82.1	75.3	75.1	76.3	Continuing

*In year of execution, funding is executed under PE 0605502BR "Small Business Innovative Research"

A. Mission Description and Budget Item Justification:

The mission of the Defense Threat Reduction Agency (DTRA) is to safeguard America and its friends from weapons of mass destruction (WMD) by reducing the present threat and preparing for the future threat. This mission directly reflects several national and DoD-level documents to include the National Military Strategy, support to the Global War on Terrorism (GWOT), the dictates of the Quadrennial Defense Review (QDR), the Nuclear Posture Review (NPR), changes to the Unified Command Plan (UCP), the implementation of the Defense Transformation Planning Guidance (TPG) and is specifically directed by the Joint Chiefs of Staff (JCS) in the Joint Strategic Capabilities Plan (Nuclear Annex). To achieve this mission, DTRA has identified principal objectives along with strategies and tasks to ensure the objectives are met. Three of these objectives are deter the use of WMD, reduce the present threat and prepare for the future threat. A focused, strong threat reduction technology base is critical to achieving these objectives and is closely tied with the operational programs that make up its combat support mission. DTRA has taken the steps to develop this technology base and provide a foundation for transformational activities within the WMD arena as delineated in the TPG.

This budget submission provides the essential technologies to deter the use of nuclear weapons and prepare for the projected nuclear threat. It includes funding for assessments and development of strategies, concepts and strategic nuclear and WMD deterrence options. In addition, it provides funding for development and testing of special equipment, necessary facilities, and other associated costs necessary for the development of the technology base needed to support the national deterrent policy and military strategy. Supported initiatives include, but are not limited to, the following development efforts:

- Programs focused on assessing, enhancing and maintaining the survivability and operability of nuclear deterrent forces.
- Operational support programs focused on activities such as balanced survivability assessments, operational assessments, nuclear physical security technology development, and assessments of various OPTEMPO concerns obtained from chemical, biological, radiological, and nuclear environments.
- Support to the Office of the Secretary of Defense (OSD), JCS and Combatant Commands in war planning, force structure options, logistics, WMD mitigation operations and stockpile programs.
- Developing and validating advanced technology to provide enhanced WMD Training supporting Joint Mission Essential Tasks (JMETS) for forces and coordination of DoD WMD training requirements.

- Nuclear weapon effects survivability technology programs focused on:
- Simulator technology that enables simulation of the nuclear environments from a nuclear burst
- Assessments technology that develops design protocols, hardware, and software that enhances the ability of mission essential systems to survive a nuclear attack and to operate after a nuclear attack.
- Radiation hardened microelectronics technology that responds to DoD space and missile system requirements for radiation-hardened microelectronics and photonics to support mission needs.
- Human survivability technology that rapidly develops/converts radiation sensor, dosimetry and biological technologies for integration into real-time forward deployed tools for characterization of radiologically hazardous environments that impact warfighter mission and command and control decisions.

Nuclear sustainment technologies and projects support the viability and credibility of the nuclear force as well as development of nuclear environment survivability for Theater Missile Defense and National Missile Defense.

The nuclear sustainment program, driven by the specific taskings of the National Strategy, National Military Strategy, the Nuclear Posture Review, and the Joint Strategic Capabilities Plan, has two projects, i.e., Nuclear Operations and System Survivability.

Nuclear Operations develops and supports the National Nuclear Mission Management Plan; nuclear and WMD training expertise for the DoD; surety risk and hazard analyses; nuclear planning systems; nuclear deterrent option analyses; technical support for Nuclear Weapons Council (NWC) and nuclear Command, Control, Communications, Computers, and Intelligence (C4I) requirements; and WMD threat mitigation analyses.

The System Survivability Project develops simulator technology (nuclear, blast, thermal, radio frequency (RF) propagation, and optical/infrared (IR) background effects), electronics protection technology (radiation-hardened microelectronics, electromagnetic hardening technology, radio frequency threat reduction), assessment technology, radiation detection technologies, and provides technology to support the Congressionally mandated Nuclear Test Personnel Review. These development areas directly support the development of survivable and reliable systems for the warfighter.

Nuclear Sustainment projects comprise a critical component of the ability of the Department to meet the technology and sustainment challenges posed by the emerging international environment and the National Military Strategy. The coverage of the projects ranges through countering WMD threats to the maintenance of the national strategic nuclear deterrent.

B. Program Change Summary:

	FY 2003	FY 2004	FY 2005
Previous President's Budget	**118.0**	**116.0**	**116.8**
Current President's Budget	**115.7**	**115.5**	**116.1**
Total Adjustments	**-2.3**	**-.5**	**-.7**
Congressional program reduction			
Congressional rescissions			
Congressional increases			
Reprogrammings			
Internal Transfers (DoD Defense-Wide)			
Internal Transfers (Within DTRA)	**-1.0**		
SBIR/STTR Transfer	**-1.3**		

Change Summary Explanation:

- The decrease in the FY 2003 funding profile from the previous President's Budget to the current Budget Execution Review is the result of SBIR funding transfer and below-threshold reprogramming. During the year of execution, SBIR funding is consolidated into PE 0605502BR "Small Business Innovative Research" for execution. DTRA also completed a below-threshold reprogramming in support of the University Partnership Program in the amount of $1M
- The decrease in FY 2004 from the previous President's Budget position and the current President's Budget position is the net result of a Congressional add (+$1M Enhanced Technique for Detection) and Congressional rescissions (-$300K Section 8029-Federally Funded Research and Development Centers, -$200K Section 8094-Management Improvements, and -$1M Section 8126-Savings from Outsourcing, Management Efficiencies, and Revised Economic Assumptions).
- The decrease in FY 2005 from the previous President's Budget position and the current President's Budget position is primarily the result of a non-pay-purchase inflation reduction levied by the Department.
- The resulting program provides for a flexible combat support structure; focused science and technology investments, to include such critical areas as WMD target defeat and nuclear weapons effects technologies; enhanced consequence management capabilities; force protection, infrastructure protection and dual-use homeland security initiatives; as well as the streamlining and transformation of the supporting business practices and workforce.

C. Other Program Funding Summary: see Exhibit R-2a

D. Acquisition Strategy: N/A

Exhibit R-2a, RDT&E Project Justification	Date: February 2004
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2 0602717BR	**PROJECT NAME AND NUMBER:** Project BB– Small Business Innovative Research

Cost ($ in millions)	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Cost to Complete
Project BB - Small Business Innovative Research	0*	1.3	2.6	2.4	2.4	2.4	2.5	Continuing

*In year of execution, funding executed under PE 0605502BR "Small Business Innovative Research"

A. Mission Description and Budget Item Justification:

- This project:
  - Provides the means for stimulating technological innovation in the private sector;
  - Strengthens the role of small business in meeting DoD research and development needs;
  - Fosters and encourages participation of minority and disadvantaged businesses in technological innovation;
  - Increases the commercial application of DoD supported research and development results.
- These efforts are responsive to PL 106-554.

B. Accomplishments/Planned Program:

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Small Business Innovative Research	0	1.3	2.6

FY 2003 Accomplishment

- In year of execution, funding executed under PE 0605502BR "Small Business Innovative Research"

FY 2004 Plans

- Support the Small Business Administration (SBA) National Direction by actively seeking small business contractors to perform innovative research.
- Execute Agency-approved SBIRs.

FY 2005 Plans

- Support the Small Business Administration (SBA) National Direction by actively seeking small business contractors to perform innovative research.
- Execute Agency-approved SBIRs.

C. Other Program Funding Summary: N/A

D. Acquisition Strategy: N/A

E. Major Performers: N/A

Exhibit R-2a, RDT&E Project Justification	Date: February 2004
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2 0602717BR	**PROJECT NAME AND NUMBER:** Project BC– Force Protection & Technology Applications

Cost ($ in millions)	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Cost to Complete
Project BC - Force Protection & Technology Applications	3.2	2.0	2.1	1.8	1.6	1.6	1.7	Continuing

A. Mission Description and Budget Item Justification:

- This project supports Assessment and Mitigation Technologies, which conducts mission vulnerability assessments of strategic U.S./Allied systems to facilitate the development of investment strategies for improved survivability, to include nuclear command and control.
- This project also ensures that assessment training programs, engineering designs, and new construction embody sound force protection, vulnerability mitigation, and collective protection principles.
- DTRA technologies and expertise are applied to enhance U.S. capabilities across the spectrum of the counterproliferation and force protection missions. These may include development of sensor technologies for initially identifying the consequences of weapons of mass destruction (WMD) through countering or protection against this threat.
- Some of the project's products and services include:
  - Balanced Survivability Assessments (BSA)
  - Smart Building program's strategic facility construction design and cost estimates
  - Vulnerability out-briefs and written reports
  - Overall force protection vulnerability trend data
  - National and NATO conferences for Underground Facility Managers
  - Multi-disciplined technical engineering expertise support

B. Accomplishments/Planned Program:

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Balanced Survivability Assessments	1.4	2.0	2.1

FY 2003 Accomplishments

- Conducted improved balanced survivability and integrated vulnerability assessments on DoD facilities as tasked by Combatant Commands, Joint Staff and the OSD/C3I and based on lessons learned from previous assessments.
- Conducted enhanced integrated vulnerability assessment of defense and critical national infrastructure facilities based on lessons learned from previous assessments.

FY 2004 Plans

- Conduct further improved and refined balanced survivability and integrated vulnerability assessments on DoD facilities as tasked by Combatant Commands, the Joint Staff, and OSD/C3I based on lessons learned from previous assessments and new technology.
- Conduct improved integrated vulnerability assessment of defense and critical national infrastructure facilities based on lessons learned from previous assessments and new technology.

FY 2005 Plans

- Conduct balanced survivability and integrated vulnerability assessments of DoD facilities as tasked by Combatant Commands, the Joint Staff, and OSD/C3I.
- Conduct integrated vulnerability assessment of defense and critical national infrastructure facilities.

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Smart Building Program	1.8		

FY 2003 Accomplishments

- Completed decommissioning for the Smart Building.
- Prepared final reports and present results at various venues.
- Prepared final reports and present results at various venues.
- Transitioned lessons learned and technology to various ongoing DoD programs.

C. Other Program Funding Summary: N/A

D. Acquisition Strategy: N/A

E. Major Performers: Approximately $500K of FY 2003 funding was obligated with the Defense Supply Center in Ohio, and approximately $1.4M of FY 2003 funding was obligated with Science Application International Corporation with locations in California and Virginia. Funds obligated were in direct support of work performed by Project BC-Force Protection & Technology Applications.

Exhibit R-2a, RDT&E Project Justification		Date: February 2004
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	0602717BR	**PROJECT NAME AND NUMBER:** Project BG – Nuclear Operations

Cost ($ in millions)	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Cost to Complete
Project BG - Nuclear Operations	25.4	26.2	25.0	25.5	23.4	24.6	25.8	Continuing

A. Mission Description and Budget Item Justification:

- These programs directly reflect the National Military Strategy, support the dictates of the Nuclear Posture Review (NPR), and are directed by the JCS in the Joint Strategic Capabilities Plan (JSCP) Nuclear Annex. This project for this Program Element encompasses two activities:
  - Nuclear Programs
  - Combatant Commands/Forces/Support. (Formerly Combatant Commands/Forces/Security Support)
- Responsive to the oversight of the Nuclear Weapons Council, they provide critical support to the Combatant Commands, Services, JCS and OSD.
- This project continues the realignment begun by DTRA at its inception so as to deal with the emerging 21st Century strategic landscape, and is divided into the two areas as described above:

- **Nuclear Programs**.
  - Nuclear Weapons Surety: As tasked by the DoD Nuclear Weapon System Safety Program, the surety programs will provide Combatant Commands, Services, and JCS with technical analysis, studies, research, and experimental data to identify and quantify risks of plutonium dispersal and Loss of Assured Safety (LOAS) due to accidents, fires or natural causes during normal, peacetime operations of the nations nuclear weapon systems. Additionally, these programs will provide studies to quantify the probability of success of targeted terrorist attacks on DoD facilities, leveraging these risk assessment advances.
  - Nuclear Mission Management Plan (NMMP): As tasked by Deputy Secretary of Defense and Director, Defense Research and Engineering (DDR&E), and in support of national requirements to maintain a strategic nuclear deterrent, conduct assessments and develop long-range plans. The continued development of the DoD Nuclear Mission Management Plan is designed to provide a comprehensive, integrated DoD roadmap for the sustainment and viability of U.S. nuclear forces, personnel, and infrastructure.
  - Stockpile Sustainment: Continue to act as DDR&E's Executive Agent for Annual Certification support related stewardship and sustainment activities.
  - Stockpile Operations Support: In support of national requirements to maintain a viable nuclear deterrent, this program provides automated tools to maintain, report, track and highlight trends affecting the nuclear weapon stockpile. It will provide crucial business process and information support to ensure continued sustainability and viability of the nuclear stockpile.
  - Additionally, they provide the DoD nuclear physical security applied research and force-on-force (FoF) testing programs to help insure the security of our nuclear forces.

- **Combatant Command /Forces/Support**.
  - As tasked by the Joint Strategic Capabilities Plan (JSCP) and DoD Directives, these programs will provide Combatant Commands, Services, JCS and DoD with focused analyses in support of nuclear planning and operations and WMD threat mitigation as they pertain to the combat survivability of the forces.
  - Provides technical support and curriculum development and enhancement for the Defense Nuclear Weapons School (DNWS), to include other WMD support, and other DoD nuclear training activities.

B. Accomplishments/Planned Program:

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Nuclear Programs	18.0	20.5	17.9

FY 2003 Accomplishments

- Nuclear Weapon Surety Thrusts:
  - Conducted modeling and testing to respond to weapon storage facility and weapon system safety requirements and criteria.
  - Continued the development, improvement, and population of a "Nuclear Surety Information Center," a weapon surety database and interface to utilize and archive completed assessments, studies, tools and test programs.
  - Completed the B-2 Weapon System Safety Assessment.
  - Began forensics nuclear activation project with Oak Ridge National Lab.
  - Completed Phase II SBIR –Automated Vulnerability Evaluation for Risks of Terrorism (AVERT).
  - Initiated Graphical User Interface (GUI) for ISIS-3D Fire model.
  - Began Sentry forensics database project.
  - Began demonstration of Storage Facility Tester.
  - Began development of electrical system Penetration Tester.
  - Supported annual certification and stockpile stewardship for the continued safety and reliability of the U.S. nuclear stockpile in the absence of underground testing.
  - Continued to improve the evaluation of enduring stockpile weapons in support of the Air Force and Navy.
  - Prepared an Annual Surety Report for SECDEF and President.
  - Began Fire Hazard Analysis on Nellis AFB Weapons Storage Area.
- Conducted Force-on-Force exercise program using the Mighty Guardian series.
  - Stockpile Sustainment Program thrusts:

- Supported annual certifications, at Presidential direction, of the continued safety and reliability of the U.S. nuclear stockpile in the absence of underground testing.
- Assessed impacts of Nuclear Posture Review and End-to-End Reviews.
- Continued enhancement of the "Nuclear Deterrent Support Program".
- Continued improvement of technical support to the Nuclear Weapons Council (NWC) and Joint Advisory Committee (JAC).
- Completed third edition of the Nuclear Mission Management Plan.
- Continued to improve the development and presentation of tailored nuclear weapons expertise and sustainment modules through Outreach 21 efforts to the War Colleges and operational units.
- Supported the further development of the Nuclear Weapons Stockpile Plan and Requirements & Planning Document.

- Stockpile Operations thrusts:
  - Completed Full Functional testing of Defense Integration and Management of Nuclear Data Services (DIAMONDS). The Headquarters, Air Force, now approves DIAMONDS for use for those sites that have it. The stand-alone Special Weapons Information Management (SWIM) system does not exist at DIAMONDS sites.
  - Migrated SWIM windows to web-based environment for seamless integration with DIAMONDS.
  - Implemented phase one of the Defense Integration and Management of Nuclear Data Services (DIAMONDS) Nuclear Ordinate Commodity Management (NOCM) module. This module will fully subsume all SWIM functionality.
  - Fielded electronic Inspection Record Cards (IRC) and Weapons Information Reports (WIR) in DIAMONDS.
  - Fielded two custodial sites and three headquarter sites (two of which were Navy) during FY2003.

FY 2004 Plans

- Nuclear Weapon Surety Thrusts:
  - Continue to conduct modeling and testing to respond to weapon storage facility and weapon system safety requirements and criteria.
  - Continue to improve the development and population of a "Nuclear Surety Information Center," a weapon surety database and interface to utilize and archive completed assessments, studies, tools and test programs.
  - Enhance forensics nuclear activation project with Oak Ridge National Lab.
  - Complete Demonstration of Automated Vulnerability Evaluation for Risk of Terrorism (AVERT).
  - Complete GUI Development for ISIS-3D Fire model.
  - Upgrade Sentry forensics database project.
  - Complete Demonstration and Validation of Storage Facility Tester.
  - Complete Fire Hazard Analysis for Weapon Storage Areas at Nellis AFB and Kirtland AFB.
  - Terminate development of electrical system Penetration Tester.
  - Support annual certification and stockpile stewardship for the continued safety and reliability of the U.S. nuclear stockpile in the absence of underground testing; review for new opportunities for enhance safety and reliability.
  - Improve upon evaluation of enduring stockpile weapons in support of the Air Force and Navy.

- Prepare an Annual Surety Report for SECDEF and President.
- Conduct and improve Force-on-Force exercise program using the Mighty Guardian series and based on lessons learned.
- Conduct exploratory research on physical security equipment and technology designed to enhance the protection of the nuclear stockpile.
- Stockpile Sustainment Program thrusts:
  - Support annual certifications, at Presidential direction, of the continued safety and reliability of the U.S. nuclear stockpile in the absence of underground testing.
  - Assess impacts of Nuclear Posture Review and End-to-End Reviews.
  - Continue and enhance the "Nuclear Deterrent Support Program".
  - Continue and improve upon technical support to the Nuclear Weapons Council (NWC) and Joint Advisory Committee (JAC).
  - Continue improvement, development and presentation of tailored nuclear weapons expertise and sustainment modules through Outreach 21 efforts to the War Colleges and operational units.
  - Continue to support development of the Nuclear Weapons Stockpile Plan and Requirements & Planning Document.
- Stockpile Operations thrusts:
  - Complete the NOCM module and SWIM integration into DIAMONDS.
  - Begin planning for the Nuclear Management Information System (NUMIS) integration into DIAMONDS.
  - Install DIAMONDS in 6 OCONUS custodial and headquarter location.
  - Continue to enhance Maintenance Bay, Unsatisfactory Reporting, and other modules based on user feedback and priorities while continuing development of the DIAMONDS system.
  - Provide Phase I of electronic Joint Nuclear Weapons Publication System (JWNPS) module DIAMONDS.

FY 2005 Plans

- Nuclear Weapon Surety Thrusts:
  - Continue to conduct modeling and testing to respond to weapon storage facility and weapon system safety requirements and criteria.
  - Initiate a nuclear surety program Indefinite Delivery/Indefinite Quantity (ID/IQ) for quick response to the emergent threats.
  - Improve storage facility fire suppression project based on previous results and new technology.
  - Complete the development and population of the "Nuclear Surety Information Center", a weapon surety database and interface to utilize and archive completed assessments, studies, tools and test programs.
  - Continue to improve the evaluation of enduring stockpile weapons in support of the Air Force and Navy.
  - Enhance forensics nuclear activation project with Oak Ridge National Lab.
  - Improve Sentry forensics database project based on previous results and new technology.

  - Begin analyses of abnormal environment scenarios for nuclear weapons systems.
- Conduct Force-on-Force exercise program using the Mighty Guardian series and based on lessons learned and new technology.
- Conduct exploratory research on physical security equipment and technology designed to enhance the protection of the nuclear stockpile.
- Stockpile Sustainment Program thrusts:
  - Support annual certification and stockpile stewardship for the continued safety and reliability of the U.S. nuclear stockpile in the absence of underground testing.
  - Continue to upgrade and improve the "Nuclear Deterrent Support Program".
  - Continue enhanced technical support to the Nuclear Weapons Council (NWC) and Joint Advisory Committee (JAC).
  - Complete developing third edition of the Nuclear Mission Management Plan.
  - Improve the development and presentation of tailored nuclear weapons expertise and sustainment modules through Outreach 21 efforts to the War Colleges and operational units.
  - Support development of the Nuclear Weapons Stockpile Plan and the Requirements & Planning Document.
- Stockpile Operations thrusts:
  - Field remaining Air Force OCONUS sites.
  - Begin fielding of DIAMONDS at Navy munitions sites.
  - Complete Phase I of NUMIS integration into DIAMONDS.
  - Complete integration of JNWPS publications into DIAMONDS.
  - Begin planning and implementation of the Decision Support Module for DIAMONDS.

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Combatant Commands/Forces/Security Support	7.4	5.7	7.1

FY 2003 Accomplishments

- Maintained U.S. European Command (EUCOM)/Supreme Headquarters Allied Powers Europe (SHAPE) European Theater Nuclear Support Program to provide in-theater nuclear and WMD support to EUCOM and North Atlantic Treaty Organization (NATO).
- Conducted the War Plans Support Program for the Combatant Commands
  - Objective was to respond to Combatant Commands requests to address counter-WMD challenges within theater war plans; to provide recommended executable solutions based upon detailed, integrated operational analyses with associated technical applications.
- Conducted support to STRATCOM and regional Combatant Commands with specific nuclear and WMD threat analysis in support of:
  - Single Integrated Operational Plan (SIOP) preparation
  - Development of integrated effects models
  - Direct planning support to regional Combatant Commands
  - Specified applications for the Deterrence Framework analytic structure.
- Executed the Strategic Deterrence Program to:
  - Support full range of nuclear and WMD Consequence Management Issues
  - Provide nuclear policy support and the assessment of the full range of nuclear/WMD issues for DoD components.
- Examined and evaluated the future impacts of technology on political/military/economical trends-focused on WMD/Consequence Management (CM)/Nuclear proliferation.
- Directly supported the curriculum development for the Defense Nuclear Weapons School. (Transitions to O&M funding in FY 2004.)
- Served as the DoD Executive Agent for nuclear weapons training and education. (Transition to O&M funding in FY 2004.)
- Initiated the development of a comprehensive WMD Training program. (Transitions to O&M funding in FY 2004.)
- Expanded and enhanced expertise outreach training program across DoD. (Transitions to O&M funding in FY 2004.)

FY 2004 Plans

- Maintain USEUCOM/Supreme Headquarters Allied Powers Europe (SHAPE) European Theater Nuclear Support Program to provide in-theater nuclear and WMD support to EUCOM and NATO.
- Refine and enhance the War Plans Support Program for the Combatant Commands
  - Objective is to respond to Combatant Commands requests to address counter-WMD challenges within theater war plans; to provide recommended executable solutions based upon detailed, integrated operational analyses with associated technical applications.
- Upgrade support to STRATCOM and regional Combatant Commands with specific nuclear and WMD threat analysis in support of:
  - Single Integrated Operational Plan (SIOP) preparation

  - Development of integrated effects models
  - Direct planning support to regional Combatant Commands
  - Specified applications for the Deterrence Framework analytic structure.
- Enhance execution of the Strategic Deterrence Program to:
  - Support full range of nuclear and WMD Consequence Management Issues
  - Provide nuclear policy support and the assessment of the full range of nuclear/WMD issues for DoD components.
- Continue to examine and evaluate the future impacts of technology on political/military/economical trends-focused on WMD/Consequence Management (CM)/Nuclear proliferation.

FY 2005 Plans

- Refocus USEUCOM/SHAPE European Theater Nuclear Support Program to provide in-theater nuclear and WMD support to EUCOM and NATO and toward the war on terrorism.
- Improve War Plans Support Program for the Combatant Commands focusing on changes to theater and on the War on Terrorism.
  - Objective is to respond to Combatant Command requests to address counter-WMD challenges within theater war plans; particularly the war on terrorism, to provide recommended executable solutions based upon detailed, integrated operational analyses with associated technical applications.
- Improve support to STRATCOM, U.S. Northern Command (NORTHCOM) and regional Combatant Commands with specific nuclear and WMD threat analysis in support of:
  - Single Integrated Operations Plan (SIOP) preparation
  - Development of integrated effects models
  - Direct planning support to regional Combatant Commands
  - Specified applications for the Deterrence Framework analytic structure.
  - Transformational activities
- Execute and enhance the Strategic Deterrence Program to:
  - Support full range of nuclear and WMD Consequence Management Issues
  - Provide nuclear policy support and the assessment of the full range of nuclear/WMD issues for DoD components.
- Continue to examine and evaluate the future impacts of technology on political/military/economical trends-focused on WMD/Consequence Management (CM)/Nuclear proliferation with a focus on the world after the War on Terrorism

C. Other Program Funding Summary: N/A

D. Acquisition Strategy: N/A

E. Major Performers: Approximately $7M of FY 2003 funding has been obligated with Science Applications International Corporation with locations in California and Virginia and approximately $7M of FY 2003 funding has been obligated with Northrop Grumman in Virginia. Funding obligated with these companies directly supported Project BG-Nuclear Operations

Exhibit R-2a, RDT&E Project Justification		Date: February 2004
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/Applied Research - BA2	0602717BR	**PROJECT NAME AND NUMBER:** Project BH – System Survivability

Cost ($ in millions)	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Cost to Complete
Project BH – System Survivability	87.1	86.0	86.4	82.1	75.3	75.1	76.3	Continuing

A. Mission Description and Budget Item Justification:

- These activities directly reflect the National Military Strategy, support the provisions of Joint Vision 2020 and the Nuclear Posture Review, and are directed by the Joint Chiefs of Staff (JCS) in the Joint Strategic Capabilities Plan (Nuclear Annex). Current and future warfighters and weapon systems, including the associated Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), missile defense and support systems/equipment, must be able to survive and operate effectively through a spectrum of hostile environments. Planned efforts emphasize the development and demonstration of innovative and cost-effective technologies to sustain the functional survivability of U.S. and Allied Forces and systems when confronted with threats from advanced conventional weapons, special weapons and limited nuclear attack. This project constitutes the DoD's resident science and technology expertise in nuclear and related survivability matters. It develops and demonstrates affordable strategies and hardening technologies for U.S. systems and forces; transfers the technical products to acquisition program offices; conducts component, subsystem, system and end-to-end performance tests and assessments as requested by the Services and Combatant Commands; and provides support to the Office of the Secretary of Defense on technical and policy matters that relate to the acquisition of survivable systems and strategic system sustainment.
- This project encompasses activities divided into four business areas as described below: Radiation Hardened Microelectronics, Simulation Technology, Assessment Technology and Radiation Detection Technologies, formerly known as Human Survivability.

- **Radiation Hardened Microelectronics.** The Radiation Hardened Microelectronics area responds to DoD space and missile system requirements for radiation-hardened microelectronics and photonics technology to support mission needs. The non-availability of this technology would adversely impact system survivability, performance, weight and cost. This program develops and demonstrates radiation-hard, high performance prototype microelectronics to support the availability of radiation-hardened microelectronics and photonics for DoD missions in both private sector and government organizations. This is achieved by two complementary components: a core program that develops and demonstrates enabling technologies; and an Accelerated Technology Development Program whose objective is to establish the capability to fabricate radiation hardened 0.15-micron Complementary Metal Oxide Semiconductor (CMOS) technology at two domestic radiation hardened semiconductor suppliers, BAE SYSTEMS and Honeywell DSES, by 2005.

- **Simulation Technology.** The Simulation Technology area develops technology to enable the simulation of components of the environments from a nuclear burst, for testing of military systems. Since the underground testing (UGT) moratorium, simulators have provided the only remaining experimental test beds for the development and validation of radiation-hardened DoD systems. Although the intensity and fidelity of these simulators do not match that of the UGT testbed, this program provides and maintains unique DoD radiation test facilities and through focused research develops the enabling technologies that closely approach the stressing environment of a nuclear burst. The simulators are used by the Defense Agencies, the Services and other federal departments (such as DOE) and allies to evaluate the impact of hostile environments on military systems that support missions in the air, on land, at sea, or in space. As military systems and concepts improve, especially in the area of electronics, parallel improvements in simulation technology are

required. Thus the program also develops technologies to improve the intensity, fidelity, reliability, reproducibility, and cost effectiveness of existing and future simulators (including radiation sources, power flow and conditioning components, energy storage, diagnostics, instrumentation, other test support equipment, debris shields, and numerical models and computer codes for radiation sources and pulsed power components and test beds); develops testbeds and response databases for synergistic prompt radiation and thermal effects for the defeat of biological agents; and develops concepts, plans, and risk reduction strategies for affordable next-generation radiation simulators with substantially improved intensity and fidelity.

- **Assessments Technology.** The Assessments Technology area develops design protocols, hardware, and software that enhance the ability of mission essential systems to survive a nuclear attack and to operate after a nuclear attack. It provides products and assistance to system program offices, the services, combatant commanders and the National Command Authority. It defines the engineering standards for hardening, develops testable design protocols, and develops effective nuclear threat mitigation technologies. To test system effectiveness, the program develops affordable and user-friendly technologies that predict and stimulate nuclear effects on military systems, particularly the impact of intense electromagnetic radiation that can destroy or severely degrade sensors and communications equipment. Because of the emergence of non-nuclear weapons that present a similar electromagnetic threat (high-power microwave or ultrawideband weapons), this area includes a parallel development effort to predict and mitigate their effects. This area develops tools that assess the vulnerabilities of mission essential infrastructure, nuclear missile interceptors, strategic radar systems, strategic command and control networks, computers, sensors, satellites, and other critical warfighting systems. It also provides cost-effective solutions for the nuclear hardening and testing of these systems and technical assistance for their implementation. Additionally, the Assessments Technology area develops the science and technology base for predictive nuclear effects assessments and maintains a core expertise in nuclear weapons testing methodologies. Enhanced Techniques for the Detection of Explosions (ETDE) is a cooperative program, which brings benefits to both military and civilian strategies. The objective is to develop a deployable detection system integrating multiple detection technologies utilizing cutting-edge computational framework, data fusion, and sensor response integration to assure that the United States improves it's level of detection capabilities and is prepared to meet future requirements for detection of explosives, IEDs, landmines and UXOs. Research will be conducted in the areas related to the development of advanced technologies for the detection of explosives, IEDs, landmines, and UXO. Research will be carried out in areas of ion trap mass spectrometry, including new types of ion/molecular reactions and neutron-based gamma ray detection.

- **Radiation Detection Technologies.*** This area, formerly known as Human Survivability, rapidly develops or converts radiation sensor, dosimetry and biological technologies for integration into real-time, forward-deployed tools for characterization of radiologically hazardous environments impacting warfighter mission and command and control decisions. Its products protect the health and welfare of U.S. service personnel and allied forces by monitoring and improving human survivability in the conduct of operations on the radiological/WMD battlefield or in areas of suspected WMD development or release. Lessons learned are applied from the Nuclear Test Personnel Review Program (O&M-funded) to allow warfighters and peacekeepers to quantify and mitigate the risk in post-Cold-War settings (i.e., limited nuclear exchanges, terrorist actions, radiological dispersal weapons, and other radiation risk scenarios) by developing field measurement and dosimetry systems to support military radiological guidelines for the protection of human resources. This provides direct support to warfighters by predicting and quantifying the operational impact of WMD and soldier effectiveness on NBC battlefields; providing performance and cost analyses to support the Defense Acquisition Board; and facilitating joint efforts with system program offices to apply the Agency's expertise and technologies to specific Service applications.

B. Accomplishments/Planned Program:

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Radiation Hardened Microelectronics	58.4	55.6	54.2

FY 2003 Accomplishments

- Continued initial development of a 0.15-micron radiation-hard, complementary metal oxide semiconductor (CMOS) fabrication process for the accelerated program.
- Completed accelerated program test structure demonstration of 0.25-micron radiation hardened CMOS at BAE SYSTEMS and Honeywell.
- Demonstrated a prototype radiation-hard, 0.35-micron mixed signal technology for applications with a 4X increase in performance.
- Completed fabrication of prototype Honeywell and BAE SYSTEMS 4/8 million-gate application specific integrated circuit.
- Completed validation of prototype Boeing very deep submicron electronic design automation (EDA) system.
- Completed demonstration of prototype radiation hardened embedded non-volatile random access memory.
- Demonstrated rad hard mixed-signal technology.

FY 2004 Plans

- Complete test structure demonstration of radiation-hard 0.15-micron technology for the accelerated programs at BAE SYSTEMS and Honeywell
- Complete circuit qualification of radiation-hard 0.25-micron technology for the accelerated programs at BAE SYSTEMS and Honeywell.
- Complete testing of Honeywell 16 million bit multi-chip module.
- Complete testing of prototype 64-kilobit focal plane gate array.
- Demonstrate radiation hardened embedded giant magneto resistive non-volatile random access memory technology.
- Complete demonstration of a prototype radiation-hard mixed-signal 0.35-micron deep submicron technology.
- Demonstrate analog and mixed-signal electronic design automation.
- Continue initial development of a 0.15-micron radiation-hard, CMOS fabrication process for the accelerated program.

FY 2005 Plans

- Demonstrate radiation-hard 0.15-micron bulk product demonstration vehicle.
- Demonstrate 0.15-micron CMOS bulk and silicon-on-insulator (SOI) digital technology for DoD space and missile systems.
- Demonstrate ultra-deep submicron rad-hard EDA development system.
- Demonstrate Synthetic Exercise Environment (SEE) mitigation methods for < 130nm CMOS technology.
- Demonstrate radiation-hard hardened-by-design 130nm CMOS technology.
- Demonstrate radiation-hard ultra-deep sub micron compiler for 130nm/150nm bulk and SOI CMOS technologies.

- Demonstrate radiation-hard system-on-a-chip (SOC).
- Demonstrate radiation-hard Read Out Integrated Circuit (ROIC).
- Demonstrate 4M gate Application Specific Integrated Circuit (ASIC).

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Simulation Technology	16.4	13.4	15.8

FY 2003 Accomplishments

- Demonstrated prototype Fast Marx Generator technology to enable affordable simulator capability upgrades.
- Developed improved 20-100 keV x-ray diagnostics capability to enable accurate model validation.
- Demonstrated reproducible cold x-ray source performance on the Decade Quad, an x-ray simulator.
- Supported customer NWE tests at the West Coast Facility (WCF) including Advanced Extremely High Frequency, (EHF), Space-Based Infrared System (SBIRS) High, Minuteman III, Global Positioning System, B2 Bomber, and Sandia Defense Programs.
- Supported terrorist threat response tests of civilian building curtain walls at the Large Blast/Thermal Simulator (LBTS).
- Demonstrated 67% increase in warm x-ray dose-rate test capability at the WCF in support of DOE strategic component testing.
- Demonstrated routine 18 ns prompt gamma source operation at the WCF in support of satellite electronics test customers.
- Demonstrated enhanced effectiveness of high dose-rate radiation sources for the defeat of biological agents.
- Demonstrated proof-of-demonstration of a 250-ns long implosion time cold x-ray source load on Double-EAGLE, an x-ray simulator.
- Initiation of 250-ns plasma radiation source load on Decade Quad.
- Demonstrated proof-of-demonstration of an 80-mil bremsstrahlung diode for low end-point (200 kV) x-ray development sources.

FY 2004 Plans

- Demonstrate increased cold x-ray yield on DTRA simulators.
- Continue NWE test customer support at the WCF.
- Demonstrate 50% increase in hot x-ray dose at the WCF.
- Support Sandia Defense Programs strategic component response model validation testing.
- Initiate new and innovative approaches to enable >10X improvements in warm x-ray sources.
- Support Army NWE tests of the Stryker vehicle at the LBTS.

FY 2005 Plans

- Advance the cold x-ray source and debris mitigation technology readiness levels to enable future MDA test support.
- Continue warm x-ray source technology development.
- Continue modernization of obsolete data acquisition system instrumentation at the WCF.
- Continue NWE test customer support at the WCF.

- Extend the database for advanced biological agent defeat concepts.
- Begin modernization of the data acquisition system at the WCF.

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Assessments Technology	11.4	15.9	15.3

FY 2003 Accomplishments

- Provided subject matter expert support to Congressional Commission on Electromagnetic Pulse.
- Developed advanced conductive adhesives for High Altitude Electromagnetic Pulse (HEMP)-shielded composite shelters.
- Developed Mission Degradation Analysis (MIDAS) model integration methodology.
- Updated MIL-STD-188-125 for HEMP Protection of Fixed C4I Facilities and MIL-STD-2169 for the High Altitude Electromagnetic (EM) Pulse environment.
- Updated MILITARY-HANDBOOK-423, HEMP Protection for Fixed and Transportable Ground Base C4I Facilities. (Began in FY 2002).
- Completed development of System Hardening Upset and Recovery macro cell library of functions application to the Global Positioning System (GPS).
- Incorporated the System Hardening Upset and Recovery functions into the USAF's Improved Space Architecture Concept (ISAC).
- Delivered Testable Hardware Toolkit Version 3.0.
- Completed the Electronic Battle Book (EBB) database to include multiple link assessments due to nuclear weapons detonation for USSPACECOM exercises and assessments**.**

FY 2004 Plans

- Investigate critical infrastructure interdependency and cascading effects of WMD/advanced electromagnetic threats using Next Generation Testbed (Mission Degradation Analysis System (MIDAS)).
- Validate Operability Assessment Tool for Systems (OATS) using assessment results from the next-generation-network testbed.
- Continue communication/radar atmospheric effects participation in operational/warfighting exercises through operational assessments.
- Continue development of a Visible Display Simulator to support Spaced Based Infrared Systems (SBIRS) Low testing and other future customers.
- Develop nuclear environment software modules for integration with hardware-in-the-loop facilities.
- Continue to provide support to Missile Defense Agency (MDA) Ground-based Midcourse Defense (GMD) for facility EMP hardening.
- Develop/complete radiation hardening toolkits (e.g., Thermostructural Response Toolkit) for the system designer and warfighter.
- Continue NWE assessments for MDA systems and architectures.
- Continue to provide subject matter expert support of Congressional Commission on Electromagnetic Pulse.
- Wideband Channel Simulator (WCS) Certification completed.

- Ion trap mass spectrometry – Investigate Cylindrical Ion Trap Mass Spectrometry – increase detection limits down below the ppb level. Neutron-base detection: Test techniques and collect data on multiple HPGe gamma detection sensors.

FY 2005 Plans

- Complete X-Band Radar Nuclear Effects Clutter Simulator (RNECS) development.
- Initiate Upgraded Early Warning Radar (UEWR) RNECS development.
- Initiate Enhanced WCS upgrades.
- Continue to provide innovative hardening solutions to the National Military Command Center (NMCC).
- Ensure integrated design environment (IDE) incorporates testable hardware toolkit (THT) and thermo-structural response (TSR) toolkit with high performance computing interface.
- Conduct Pathfinder missile defense telescope x-ray test.
- Update/refine nuclear effects demonstrator (NED) assessment tool to support USSTRATCOM and initiate update of NED to support other Combatant Commands.
- Update/refine Operability Assessment Tool for Systems (OATS) to assess network capability and reliability. Continue operability assessment of the Ground-based Midcourse Defense (GMD) Communication Network (GCN) using OATS.
- Acquire parameters to model prioritized infrastructures and missions to assess impact on DoD missions.
- Apply integrated hardening technology to a new class of warfighter system.
- Develop high-altitude burst effects assessment tool for combatant commands.

Cost ($ in millions)	FY 2003	FY 2004	FY 2005
Human Survivability*	0.9	1.1	1.1

* Retitled to Radiation Detection Technologies in FY 2005 to better define the program.

FY 2003 Accomplishments

- Continued International Cooperation through involvement in The Technical Cooperation Program (TTCP) AG-48, a joint agreement for radiation monitoring.
- Accelerated UAV-based radiological spectroscopy package and added a chemical detector.
- Continued development of hand-held Rolling Circle Amplification (RCA) based radiobiological dosimeter.
- Continued development of mobile Electron Paramagnetic Resonance (EPR) device.
- Continued human response effort through the DTRA sponsored Human Response Dose Committee.
- Delivered Automated Hematology Analyzers to the Air Force Radiation Assessment Team for incorporation into Field Laboratory for Assessment of Radiation Exposure (FLARE).
- Continued participation in Human Response Steering Committee, TTCP and the Arctic Military Environment Cooperation Program.

FY 2004 Plans

- Complete unmanned aerial vehicle (UAV) detector integration activity.
- Continue human response effort through the DTRA sponsored Human Response Dose Committee.
- Initiate work on a biodosimeter to assume total dose.
- Continue participation in Human Response Steering Committee, The Technical Cooperation Program, and the Arctic Military Environment Cooperation Program.

FY 2005 Plans

- Complete Electron Paramagnetic Resonance (EPR) development
- Continue human response effort through the DTRA sponsored Human Response Dose Committee.
- Commence The Technical Cooperation Program (TTCP) (DREO Canada) collaboration for validation of EPR biodosimetry project.
- Initiate an ACTD to provide an Airborne Radiological Detection, Identification and Mapping System (ARDIMS).
- Continue participation in Human Response Steering Committee, The Technical Cooperation Program and the Arctic Military Environment Cooperation Program.

C. Other Program Funding Summary: N/A

D. Acquisition Strategy: N/A

E. Major Performers: Approximately $18M of FY 2003 funding has been obligated with BAE Systems located in Virginia and approximately $21M of FY 2003 funding has been obligated with Honeywell Inc located in New Hampshire. Funding obligated is in direct support of Project BH-System Survivability.