

**Exhibit R-2, RDT&E Budget Item Justification**

Date: February 2003

**APPROPRIATION/BUDGET ACTIVITY**  
RDT&E, Defense-Wide/Applied Research - BA2

**R-1 ITEM NOMENCLATURE:**  
Strategic Defense Technologies 0602717BR

<b>Cost (\$ in millions)</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>	<b>FY 2008</b>	<b>FY 2009</b>
Total 0602717BR Cost	0	118.0	116.1	116.8	112.7	113.6	114.0	115.6
Project BB Small Business Innovative Research	0	1.3	1.3	1.3	1.3	1.3	1.3	1.4
Project BC Force Protection & Technology Applications	0	3.8	2.0	2.1	1.8	1.8	1.8	1.8
Project BG Nuclear Operations	0	26.4	26.8	23.2	27.5	27.5	28.1	28.4
Project BH System Survivability	0	86.5	86.0	90.2	82.1	83.0	82.8	84.0

**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 the National Military Strategy, supports the provisions of Joint Vision 2020 and is specifically directed by the 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. DTRA has taken the steps to develop this technology base.
  
- 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 to support the development of the technology base needed to support the national deterrent policy and military strategy. Initiatives supported 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 such activities 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 (CBRNE).
  - Support to OSD, JCS and Combatant Commands in war planning, force structure options and technology impacts, logistics, WMD mitigation operations and stockpile programs.
  - Develop and validate 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 technology programs focused on:
    - Simulator assessment technology
    - Electromagnetic Protection Technology

**APPROPRIATION/BUDGET ACTIVITY**

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**R-1 ITEM NOMENCLATURE:**

Strategic Defense Technologies 0602717BR

- Radiation hardened microelectronics technology
  - Nuclear Phenomenology, including
    - High Performance Computing
    - Nuclear effects
    - Nuclear technology knowledge application
  - Develop and validate technology programs designed to provide terrorist device defeat across the CBRNE spectrum.
- 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 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 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, balanced electromagnetic hardening technology, radio frequency threat reduction), assessment and protection technology, 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.

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**B. Program Change Summary:**

	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>
<b>Previous President's Budget</b>	<b>0</b>	<b>131.2</b>	<b>125.4</b>	<b>124.0</b>
<b>Current President's Budget</b>	<b>0</b>	<b>118.0</b>	<b>116.1</b>	<b>116.8</b>
<b>Total Adjustments</b>	<b>0</b>	<b>-13.2</b>	<b>-9.3</b>	<b>-7.2</b>
<b>Congressional program reduction</b>		<b>-10.0</b>		
<b>Congressional rescissions</b>		<b>-2.2</b>		
<b>Congressional increases</b>				
<b>Reprogrammings</b>				
<b>Internal Transfers (DoD Defense-Wide)</b>		<b>-1.0</b>	<b>.7</b>	<b>-.1</b>
<b>Internal Transfers (Within DTRA)</b>			<b>-10.0</b>	<b>-7.1</b>
<b>SBIR/STTR Transfer</b>				

**Change Summary Explanation:**

- In order to better define and capture its 6.2 resources, DTRA has created two new program elements:
  - WMD Defeat Technology (0602716BR)
  - Strategic Defense Technologies (0602717BR).
- Effective with FY 2003, specific resources associated with Projects BB, BC, BG, and BH will be split from the existing PE 0602715BR and realigned into PE 0602717BR, Strategic Defense Technologies.
- The decrease in FY 2003 from the previous President's Budget to the current President's Budget is the result of Congressional and Departmental action. Congress reduced this program by \$10M and Congressional rescissions affecting this program amounted to \$2.2M (-\$1.2M Section 8100-Business Process Reform/Management Efficiencies, -.2M Section 8109-Reduce Cost Growth of Information Technology Development, and -.8M Section 8135-Revised Economic Assumptions). The Department also transferred \$1M from DTRA from this PE as part of an OMB inflation adjustment.
- The decrease in FY 2004-2005 from the previous President's Budget to the current President's Budget is primarily the result of DTRA's internal Program Review and reflects a carefully balanced program focused on safeguarding America's interest from WMD by controlling and reducing the threat by providing quality tools and services for the warfighter. Accordingly, resources have been reprogrammed to support critical requirements across the spectrum of combat support, technology development, threat control, and threat reduction mission areas.
- 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.

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- In FY 2004-2005, the Department transferred \$2.5M to DTRA in support of the Physical Security Equipment program; funding was also transferred from DTRA to other DoD elements as part of the revised Non Pay Purchase Inflation adjustment.

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

**D. Acquisition Strategy:** N/A

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2		<b>PROJECT NAME AND NUMBER:</b> Project BB– Small Business Innovative Research
	0602717BR	

Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project BB - Small Business Innovative Research	0	1.3	1.3	1.3	1.3	1.3	1.3	1.4

**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 2002	FY 2003	FY 2004	FY 2005
Small Business Innovative Research	0	1.3	1.3	1.3

**FY 2002 Accomplishments**

- Funding and activities performed in Project BB are in PE 0602715BR.

**FY 2003 Plans**

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

**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.

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2	0602717BR	<b>PROJECT NAME AND NUMBER:</b> Project BB– Small Business Innovative Research

**C. Other Program Funding Summary:** N/A

**D. Acquisition Strategy:** N/A

**E. Major Performers:** None

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2		<b>PROJECT NAME AND NUMBER:</b> 0602717BR Project BC– Force Protection & Technology Applications

Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project BC - Force Protection & Technology Applications	0	3.8	2.0	2.1	1.8	1.8	1.8	1.8

**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 program 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 program'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 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 2002	FY 2003	FY 2004	FY 2005
Balanced Survivability Assessments	0	2.0	2.0	2.1

**FY 2002 Accomplishments**

- Funding and activities performed in Project BC are in PE 0602715BR.

**FY 2003 Plans**

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

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2	0602717BR	<b>PROJECT NAME AND NUMBER:</b> Project BC– Force Protection & Technology Applications

**FY 2004 Plans**

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

Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005
Smart Building Program	0	1.8	0	0

**FY 2002 Accomplishments**

- Funding and activities performed in Project BC are in PE 0602715BR.

**FY 2003 Plans**

- Complete decommissioning for the Smart Building.
- Prepare final reports and present results at various venues.
- Transition lessons learned and technology to various ongoing DoD programs.

**C. Other Program Funding Summary:** N/A

**D. Acquisition Strategy:** N/A

**E. Major Performers:** None

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2	0602717BR	<b>PROJECT NAME AND NUMBER:</b> Project BG – Nuclear Operations

Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project BG - Nuclear Operations	0	26.4	26.8	23.2	27.5	27.5	28.1	28.4

**A. Mission Description and Budget Item Justification:**

- These programs directly reflect the National Military Strategy, support the provisions of Joint Vision 2020, 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/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, 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.
- **Combatant Command /Forces/Security Support.**
  - As tasked by the 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.

**Exhibit R-2a, RDT&E Project Justification**

Date: February 2003

**APPROPRIATION/BUDGET ACTIVITY**

RDT&amp;E, Defense-Wide/Applied Research - BA2

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**PROJECT NAME AND NUMBER:**

Project BG – Nuclear Operations

- 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.
- 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:**

<b>Cost (\$ in millions)</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>
Nuclear Programs	0	19.1	17.8	13.1

**FY 2002 Accomplishments**

- Funding and activities performed in Project BG are in PE 0602715BR.

**FY 2003 Plans**

- Nuclear Weapon Surety Thrusts:
  - Conduct modeling and testing to respond to weapon storage facility and weapon system safety requirements and criteria.
  - Continue 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.
  - Complete the B-2 Weapon System Safety Assessment.
  - Begin forensics nuclear activation project with Oak Ridge National Lab.
  - Complete Phase II SBIR –Automated Vulnerability Evaluation for Risks of Terrorism (AVERT) model and Isis model.
  - Begin Sentry forensics database project.
  - Begin storage facility fire suppression project.
  - Begin 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.
  - Continue evaluation of enduring stockpile weapons in support of the Air Force and Navy.
  - Prepare an Annual Surety Report for SECDEF and President.
- 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.

**APPROPRIATION/BUDGET ACTIVITY**

RDT&amp;E, Defense-Wide/Applied Research - BA2

0602717BR

**PROJECT NAME AND NUMBER:**

Project BG – Nuclear Operations

- Continue the “Nuclear Deterrent Support Program”.
- Continue technical support to the Nuclear Weapons Council (NWC) and Joint Advisory Committee (JAC).
- Begin developing third edition of the Nuclear Mission Management Plan.
- Continue developing and presenting 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 Requirements & Planning Document.
- Stockpile Operations thrusts:
  - Develop and implement Defense Integration and Management of Nuclear Data Services(DIAMONDS) capability package 3 which includes additional enhancements to Maintenance Bay and Unsatisfactory Reporting System modules
  - Field additional integrated modules based upon user priorities and feedback while continuing to enhance fielded modules.
  - Field 3 additional CONUS nuclear storage sites, begin fielding OCONUS locations with secure communications to support DIAMONDS data transmission and access to stockpile information, tools, and data. Perform additional OCONUS exploratory visits.
  - Field enhanced integrated modules based on user priorities as well as integrated stockpile functions as necessary.
  - Migrate Special Weapons Information Management (SWIM) windows to web based environment for seamless integration with DIAMONDS.
  - Develop and implement initial Electronic Inspection Record Cards (IRC) and Weapon Information Reports (WIR) in DIAMONDS module.
  - Design maintenance scheduling module.
  - Field enhanced integrated modules based upon user priorities as well as integrated stockpile functions as necessary.

**FY 2004 Plans**

- Nuclear Weapon Surety Thrusts:
  - 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.
  - Continue storage facility fire suppression project.
  - 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 evaluation of enduring stockpile weapons in support of the Air Force and Navy.
  - Continue forensics nuclear activation project with Oak Ridge National Lab.
  - Begin application enhancements of AVERT for Navy and Air Force.
  - Continue Sentry forensics database project.
  - Continue development of electrical system Penetration Tester.

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2	0602717BR	<b>PROJECT NAME AND NUMBER:</b> Project BG – Nuclear Operations

- Begin analyses of abnormal environment scenarios for nuclear weapons systems.
  
- 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 the "Nuclear Deterrent Support Program".
  - Continue technical support to the Nuclear Weapons Council (NWC) and Joint Advisory Committee (JAC).
  - Complete developing third edition of the Nuclear Mission Management Plan.
  - Continue developing and presenting 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:
  - Development and implement initial maintenance scheduling module
  - Continue with the OCONUS fielding
  - Complete SWIM migration and implementation
  - Field enhanced Joint Nuclear Weapons Publication System (JNWPS), maintenance bay and Inspection Record Card modules.

<b>Cost (\$ in millions)</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>
Combatant Commands/Forces/Security Support	0	7.3	9.0	10.1

**FY 2002 Accomplishments**

- Funding and activities performed in Project BG are in PE 0602715BR.

**FY 2003 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.
- Continue 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.

**APPROPRIATION/BUDGET ACTIVITY**

RDT&amp;E, Defense-Wide/Applied Research - BA2

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**PROJECT NAME AND NUMBER:**

Project BG – Nuclear Operations

- Continue 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.
- Continue to execute 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.
- Conduct Force-on-Force exercise program using the Mighty Guardian series.
- Continue to examine and evaluate the future impacts of technology on political/military/economical trends-focused on WMD/Consequence Management (CM)/Nuclear proliferation.
- Continue to directly support the curriculum development for the Defense Nuclear Weapons School.
- Continue to serve as the DoD Executive Agent for nuclear weapons training and education.
- Continue to develop a comprehensive WMD Training program.
- Continue to expand and enhance expertise outreach training program across DoD.

**FY 2004 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.
- Continue the War Plans Support Program for the Combatant Commands
  - 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.
- Continue support to STRATCOM, the newly formed NORTHCOM, and regional Combatant Commands with specific nuclear and WMD threat analysis in support of:
  - SIOP preparation
  - Development of integrated effects models
  - Direct planning support to regional Combatant Commands
  - Specified applications for the Deterrence Framework analytic structure.
- Continue to execute the Strategic Deterrence Program to:

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- 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.
- Conduct Force-on-Force exercise program using the Mighty Guardian series.
- Conduct exploratory research on physical security equipment and technology designed to enhance the protection of the nuclear stockpile.
- Continue to examine and evaluate the future impacts of technology on political/military/economical trends-focused on WMD/Consequence Management (CM)/Nuclear proliferation.
- Continue to directly support the curriculum development for the Defense Nuclear Weapons School; program will transition to O&M funding in FY 2004.
- Continue to serve as the DoD Executive Agent for nuclear weapons training and education; program will transition to O&M funding in FY 2004.
- Continue to develop a comprehensive WMD Training program; program will transition to O&M funding in FY 2004.
- Continue to expand and enhance expertise outreach training; program across DoD; program will transition to O&M funding in FY 2004.

**C. Other Program Funding Summary:** N/A

**D. Acquisition Strategy:** N/A

**E. Major Performers:** None

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>		Date: February 2003
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/Applied Research - BA2		<b>PROJECT NAME AND NUMBER:</b> Project BH – System Survivability
	0602717BR	

Cost (\$ in millions)	FY 2002	FY 2003	Y 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Project BH - System Survivability	0	86.5	86.0	90.2	82.1	83.0	82.8	84.0

**A. Mission Description and Budget Item Justification:**

- These programs directly reflect the National Military Strategy, support the provisions of Joint Vision 2020, and the Nuclear Posture Review, and are directed by the 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; 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.
- Project BH encompasses programs formerly divided into the five business areas: Radiation Hardened Microelectronics, Simulator Technology, Assessments and Protection Technology, Balanced Electromagnetic Hardening, and Human Risk and Technology. These business areas are now divided into four business areas and described below: Radiation Hardened Microelectronics; Simulation Technology, Assessment Technology from the Simulator Technology and Electromagnetics Technology areas, and the Human Survivability area.
- **Radiation Hardened Microelectronics.** 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. The program involves the development and demonstration of radiation-hard, high performance prototype microelectronics to support the availability of radiation-hardened microelectronics and photonics for DoD missions through private sector and government organizations. This is achieved through the development and demonstration of enabling technologies to ensure the continued availability of special materials and radiation-hardened microelectronics and photonic devices.
- **Simulation Technology.** This program is being revised to respond to the Defense Science Board Task Force on Nuclear Effects Simulation, which recommended that DTRA pursue developing some of the capability lost with the moratorium on underground testing. Since the underground testing (UGT) moratorium, simulators have provided the only remaining experimental test bed for the development and validation of radiation-hardened DoD systems. The intensity and fidelity of these simulators do not match that of the UGT testbed, but, through this program, the agency develops, provides and maintains unique DoD radiation test facilities and enabling technologies that are used by the Defense Agencies, the Services and other federal departments (such as DOE) to evaluate the impact of hostile environments on military systems that support missions in the air, on land, at sea, or in space. 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

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numerical models and computer codes for radiation sources and pulsed power components and test beds); develops concepts, plans, and risk reduction strategies for affordable next-generation radiation simulators with substantially improved intensity and fidelity; support improvements to the two existing test centers, one at Titan Pulsed Sciences Division in San Leandro, California, and one at the Arnold Engineering Development Center (AEDC) in Tullahoma, Tennessee; installs and characterizes upgrades to the new Decade x-ray simulator and to existing radiation simulators at Titan.

- Assessments Technology.** The Assessments Technology program provides testable system design protocols and modeling and simulation (M&S) tools for system designers and users of nuclear effects simulators. Includes development and demonstration of hardened system design and test qualification techniques to produce hardware that can be tested without the need for underground nuclear weapon tests. Survivability Assessments is evolving from an emphasis on strategic assessments for nuclear C2 against prompt radiation to Missile Defense Agency (MDA) and Theater assessments, balanced protection of battlespace, critical infrastructure and network protection. It directly responds to warfighter and acquisition program survivability needs by providing solutions, including development of affordable technologies and methodologies for system-level and family-of-system-level assessments, systems hardening, and testing of the effects of nuclear weapons. The program also directly responds to warfighter and acquisition program survivability needs by providing solutions, including development of affordable technologies and methodologies for system-level and family-of-system-level assessments, systems hardening, and testing of the effects of nuclear weapons. Includes end-to-end assessment technologies for nuclear command and control and Tactical Warning/Attack Assessment networks. Develops disturbed environments test sets to simulate scintillation effects on radar and communications system and to simulate the structure for optical and infrared backgrounds, which disrupt space-based and missile defense interceptor sensors. The program also provides the necessary science and technology to develop warfighting systems and DoD mission-related infrastructure survivable in multiple electromagnetic (EM) environments, including nuclear electromagnetic pulse (EMP), high power microwaves (HPM). Designs and develops innovative, low-cost, balanced EM protection and test technologies for weapon systems; C3; and supporting infrastructure systems to the Combatant Commands, Services and other DoD agencies.
- Human Survivability.** Rapidly develops/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/control decisions. Products protect the health and welfare of U.S. service personnel and allied forces by monitoring and improving human survivability in the conduct of necessary operations on the radiological/WMD battlefield or in areas of suspected WMD development or release. Applies lessons learned from the Nuclear Test Personnel Review Program (O&M-funded) to allow warfighters and peacekeepers to quantify/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 the WMD and conventional battlefield soldier effectiveness on NBC battlefields; providing performance and cost analysis to support the Defense Acquisition Board; and joint efforts with system program offices to apply the Agency’s expertise and technologies to specific Service applications.

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**B. Accomplishments/Planned Program:**

Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005
Radiation Hardened Microelectronics	0	58.4	53.3	54.2

**FY 2002 Accomplishments**

- Funding and activities performed in Project BH are in PE 0602715BR.

**FY 2003 Plans**

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

**FY 2004 Plans**

- Complete test structure demonstration of radiation-hard 0.15-micron technology for accelerated program at Honeywell and BAE Systems.
- Complete circuit qualification of radiation-hard 0.25 micron technology for accelerated program 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.

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Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005
Simulation Technology	0	15.8	13.4	15.8

**FY 2002 Accomplishments**

- Funding and activities performed in Project BH are in PE 0602715BR.

**FY 2003 Plans**

- Demonstrate 1 Mega-Volt (MV) Fast Marx Generator.
- Develop improved 20-100 KeV simulator capability.
- Demonstrate 40 kJ Ar PRS on Decade Quad.
- Continue customer test support at Titan Pulsed Sciences Division.
- Upgrade and integrate cold x-ray debris shields at the Decade Radiation Test Facility (DRTF).
- Begin replacement of obsolete user and machine instrumentation at the DRTF.

**FY 2004 Plans**

- Demonstrate Ar/Kr/Xe “Black Body” spectrum on Decade Quad (DQ).
- Demonstrate large area survivable lithium debris shield.
- Improve cold x-ray yield and debris shielding capability by a 3X increase in the fluence – area metric on Decade.
- Continue customer test support at Titan Pulsed Sciences Division (TPSD).
- Begin integration of test capabilities to support Ground Based Missile Defense/Exoatmospheric Kill Vehicle (GMD/EKV) testing.
- Continue replacement of obsolete user and machine Data Acquisition System (DAS) instrumentation at the Decade Radiation Test Facility (DRTF).
- Demonstrate 50% increase in warm x-ray dose rate on Double Eagle (DE).
- Demonstrate 50% increase in hot x-ray dose on DE.

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Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005
Assessments Technology	0	11.4	18.2	19.1

**FY 2002 Accomplishments**

- Funding and activities performed in Project BH are in PE 0602715BR.

**FY 2003 Plans**

- Provide Subject Matter Expert (SME) support to Congressional Commission on Electromagnetic Pulse
- Develop advanced conductive adhesives for High Altitude Electromagnetic Pulse (HEMP)-shielded composite shelters
- Develop Mission Degradation Analysis (MIDAS) model integration methodology.
- Update MIL-STD-188-125 for HEMP Protection of Fixed C4I Facilities and MIL-STD-2169 for the High Altitude Electromagnetic (EM) Pulse environment.
- Assess digital battlespace architectures for susceptibility to EM upset or damage.
- Update MILITARY-HANDBOOK-423, HEMP Protection for Fixed and Transportable Ground Base C4I Facilities. (began in FY 2002).
- Design affordable validation and verification via small scale and high-level testing of High Altitude Electromagnetic Pulse Targeting Application/Source Region Electromagnetic Pulse Targeting Application (HEMPTAPS/SREMP TAP) and Electromagnetic Pulse-Vulnerability Number (EMP-VN) tools for the reliability of the results for the target analysis application.
- Continue populating the EMP-VN and EMP Battle Engagement tool with the appropriate EMP test databases to increase the reliability of the tools. Develop EMP-VN for mobile targets like Air Defense systems for STRATCOM.
- Incorporate the range to effects model for high power E-weapon effects analysis into EMPVN tool and validate the model with test data.
- Complete a major upgrade to EMP/SREMP effects analysis methods and target assessment and planning tools used by warfighters.
- Obtain warfighters’ operational approval of EMP/SREMP effects tools.
- Initiate a study of the Integrated Design Environment concept.
- Complete development of System Hardening Upset and Recovery macro cell library of functions application to the GPS system.
- Transition and demonstrate the System Hardening Upset and Recovery macro cell library to the Peregrine foundry.
- Incorporate the System Hardening Upset and Recovery functions into the AF’s Improved Space Architecture Concept (ISAC).
- Deliver Testable Hardware Toolkit Version 3.0.
- Complete the first phase development of the thermostructural response (TSR) Toolkit, Version 1.0.

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- Continue planning for a joint space sensor system demonstration with NASA.
- Complete fully coupled HPC model for a complex optical telescope experiencing prompt nuclear weapon radiation.
- Continue the cooperative HPC effort with SNL to assist and transfer applicable technology to DTRA's programs.
- Operability Assessments and Disturbed Environment Assessment Technology
- Begin X-Band Radar Nuclear Effects Clutter Simulator (RNECS) Development.
- Complete the Electronic Battle Book (EBB) database to include multiple link assessments due to nuclear weapons detonation for USSPACECOM exercises and assessments.
- Complete USSPACECOM operability assessment of tactical warning/attack assessment (TW/AA) system considering impacts of future Ground Midcourse Defense (GMD) system integration.
- Support GMD hardware-in-the-loop (HWIL) testing.
- Continue development of a Visible Display Simulator to support Spaced Based Infra-Red Systems (SBIRS) Low testing and other future customers.
- Support GMD In-Flight Information Control System (IFICS) testing.
- Develop nuclear environment software modules for integration with HWIL facilities.
- Conduct testing of Early Warning Radars (EWRs) in support of GMD program upgrades. Develop radar disturbance mitigation techniques for GMD Ground-Based Radar and EWRs.
- Provide IR scene testing of MDA sensors.
- Support IR and communications testing of Space-Based Infrared Satellite (SBIRS).
- Continue communication/radar atmospheric effects participation in operational/ warfighting exercises through operational assessments.
- Initiate GMD requirements development support for command and control.
- Complete GMD requirements development support.
- Initiate USSTRATCOM force employment assessment.
- Continue development of nuclear effects keepout algorithms for the GMD Battle Management System.
- Continue to assess the survivability of the GMD Communications Network (GCN) and GMD ground facilities.
- Continue Next Generation Network (NGN) Hard-ware-in-the-loop testbed study of the GCN.
- Continue development of Operability Assessment Tool for Systems (OATS).
- Start integration of OATS with the NGN HWIL Testbed.

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- Modify Propagation Effects Radar Simulation (PERSIM) Tool to include MDA/SMD S-Band Radar Model.
- Initiate assessment of the hardening design of the GMD Common Kill Vehicle (CKV).

**FY 2004 Plans**

- Continue to provide innovative hardening solutions to the National Military Command Center (NMCC)
- Continue development of a Radio Frequency/High Power Microwave military standard/handbook.
- Integrate advanced limiter technology into a sensitive communication receiver in cooperation with the Office of Naval Research.
- Continue to develop integrated EM predictive tools for rapid regional assessments.
- Investigate critical infrastructure interdependency and cascading effects of WMD/advanced EM threats using Next Generation Testbed.
- Update prototype Assessment Interviewer Tools in MIDAS.
- Increase number of effects models integrated into MIDAS.
- Increase number of Critical Infrastructures models integrated into MIDAS.
- Complete the validation of the Nuclear and non-nuclear EMP tools developed for STRATCOM.
- Populate the EMP Tools with adequate and appropriate test databases.
- Complete the Full Operational Capability (FOC) for the STRATCAT tool for STRATCOM.
- Supported IR and communication testing of Space-Based Infrared Satellite (SBIRS).
- Continue development of nuclear effects keepout algorithms for the GMD Battle Management System.
- Continue to assess the survivability of the GMD Communications Network (GCN) and GMD ground facilities.
- Continue Next Generation Network (NGN) Hard-ware-in-the-loop testbed study of the GCN.
- Continue development of Operability Assessment Tool for Systems (OATS).
- Continue integration of OATS with the NGN HWIL Testbed
- Continue replacement of obsolete user and machine instrumentation at the DRTF.
- Continue development of an Integrated Design Environment (IDE) by applying advanced modeling and simulation techniques to system hardness qualification
- Continue development of a COTS operability and survivability protocol for designing and testing systems containing COTS parts.
- Continue assessment of the hardening design of the GMD Common Kill Vehicle (CKV).
- Continue Testable Hardware Toolkit upgrades for Decade facility.

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- Use Propagation Effects Radar Simulation (PERSIM) Tool to assess SMD S-Band Radar performance.
- Continue development of a thermostructural response (TSR) toolkit to include impulse loading (Mag Flyer).
- Validate OATS using assessment results from the Next Generation Network (NGN) Testbed.
- Continue communication/radar atmospheric effects participation in operational/ warfighting exercises through operational assessments.
- Support GMD hardware-in-the-loop (HWIL) testing.
- Continue development of a Visible Display Simulator to support Spaced Based Infra-Red Systems (SBIRS) Low testing and other future customers.
- Support GMD In-Flight Information Control System (IFICS) testing.
- Develop nuclear environment software modules for integration with HWIL facilities
- Provide IR scene testing of MDA sensors.
- Continue X-Band Radar Nuclear Effects Clutter Simulator (RNECS) Development.
- Initiate development of the Integrated Design Environment (IDE) Concept by applying advanced modeling and simulation techniques to system hardness qualification.
- Initiate a modeling and simulation effort to maximize the use of increased computer capability (i.e. HPC).
- Develop COTS guideline for developing radiation hardened systems.
- Initiate a Pointman/Pathfinder system demonstration of end-to-end system hardening.
- Examine new and emerging technologies for application in radiation hardened systems.
- Incorporate fault tolerant logic and system applications into the System Hardening Upset and Recovery macro cell library.
- Complete the HPC coupled model for a complex optical telescope under prompt nuclear weapon radiation.
- Complete planning for a sensor system space demonstration with NASA and initiate the demonstration program.

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Cost (\$ in millions)	FY 2002	FY 2003	FY 2004	FY 2005
Human Survivability	0	0.9	1.1	1.1

**FY 2002 Accomplishments**

- Funding and activities performed in Project BH are in PE 0602715BR.

**FY 2003 Plans**

- Continue International Cooperation through The Technical Cooperation Program (TTCP) AG-48 Involvement
- Acceleration of Unmanned Aerial Vehicle (UAV) Based radiological spectroscopy package and add chemical detector. Continue effort on hand-held Rolling Circle Amplification (RCA) based radiobiological dosimeter.
- Continue effort on mobile Electron Paramagnetic Resonance (EPR) device.
- Continue human response effort through the DTRA sponsored Human Response Dose Committee
- Continue support for radiation standards development.
- Continue technology watch and support promising Human Survivability projects.
- Deliver Automated Hematology Analyzers to the Air Force Radiation Assessment Team for incorporation into Field Laboratory for Assessment of Radiation Exposure (FLARE).
- Continue participation in Human Response Steering Committee, The Technical Cooperation Program, and the Arctic Military Environment Cooperation Program.

**FY 2004 Plans**

- Continue International Cooperation through TTCP AG-48 Involvement
- Complete UAV Project
- Complete Rolling Circle Amplification (RCA) Project.
- Complete EPR Project
- Continue human response effort through the DTRA sponsored Human Response Dose Committee
- Continue support for radiation standards development.
- Continue technology watch and support promising Human Survivability projects.

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**C. Other Program Funding Summary:** N/A

**D. Acquisition Strategy:** N/A

**E. Major Performers:** None