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| <b>MDA RDT&amp;E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)</b> | DATE<br><b>February 2002</b> |
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| <b>BUDGET ACTIVITY</b><br><b>2 - Applied Research</b> | <b>PE NUMBER AND TITLE</b><br><b>0602173C Support Tech - Applied Research</b> |
|---|---|

| COST <i>(In Thousands)</i>                    | FY2001<br>Actual | FY 2002<br>Estimate | FY 2003<br>Estimate | FY 2004<br>Estimate | FY2005<br>Estimate | FY2006<br>Estimate | FY2007<br>Estimate | Cost to<br>Complete | Total Cost |
|---|------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|---------------------|------------|
| Total Program Element (PE) Cost               | 31219            | 0                   | 0                   | 0                   | 0                  | 0                  | 0                  | TBD                 | TBD        |
| 1461 BMC4I                                    | 15291            | 0                   | 0                   | 0                   | 0                  | 0                  | 0                  | TBD                 | TBD        |
| 1651 Innovative Science and Technology (IS&T) | 10383            | 0                   | 0                   | 0                   | 0                  | 0                  | 0                  | TBD                 | TBD        |
| 1660 Statutory and Mandated Programs          | 5545             | 0                   | 0                   | 0                   | 0                  | 0                  | 0                  | TBD                 | TBD        |

The Ballistic Missile Defense (BMD) Program and resulting FY 2002 President's Budget request has been developed based on revised Secretary of Defense direction to develop capabilities to defend against the missile threat and sustain appropriate deterrence levels. Beginning in FY 2002, funding from this Program Element is moved to the Missile Defense Agency (MDA) Program Element 0603175C to facilitate BMD system capability evolution, allow timely responses and reactions to changes in the BMD program, and provide the programmatic agility to mitigate unforeseen consequences.

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

This program element provides the only applied research projects in the Department of Defense which focus specifically on future Ballistic Missile Defense Organization (BMDO) technical requirements. To prepare to meet critical future active defense needs, the program element invests in an aggressive program of high-leverage technologies that yield markedly improved capabilities across a selected range of boost phase methods and terminal defense interceptors, advanced target sensors, and innovative science. Program investments are to provide 1) component technologies that offer improved performance or reduced costs for BMDO acquisition programs, 2) better understanding of the material characteristics and physics for processes that form the basis of technologies, and 3) technical solution options to mitigate far-term and unpredicted threats.

The Innovative Science and Technology (IS&T) project invests seed money in high-risk technologies that could significantly change how BMDO develops future systems. Specific technology includes: 1) sensing, imaging, ranging, and discrimination, 2) phenomenology studies and boost phase intercept handover, 3) electronic and photonic materials and devices and wide band gap technology, 4) information processing and computing technologies, 5) directed energy, non-linear optical devices and processes, 6) Miniature Interceptor Technology (MIT) propulsion and kill enhancement and, 7) power generation and conditioning and thermal management. This project conducts proof-of-concept research and matures novel technologies for transition to advanced development. Other Applied Research projects more closely aligned with existing BMDO Surveillance, and Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I) technology efforts are managed under these projects respectively.

Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs are managed under project 1660. Pursuant to PL 102-564, a two-phased competition for small businesses with innovative technologies is conducted, focusing on relevant BMDO technologies with an emphasis on technologies with commercial application potential. Per Office of the Secretary of Defense (OSD) Program Budget Decision implemented in the FY 2001 President's Budget

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| <p>Submission, mandatory SBIR/STTR programs are not budgeted (FY 2002-2007). Required SBIR/STTR programs are funded during the year of execution from internal BMDO resources.</p> <p>The program objective of the Technology Applications (TA) Program (managed under project 1660), established in 1986, is to develop and support the transfer of BMD-derived technology to other Department of Defense agencies as well as other federal, state, and local government institutions, laboratories, universities, and industry. Incorporation of technology applications by the private sector and other government agencies can result in reduced unit costs and further improvements to future BMDO applications.</p> <p>The Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) program is also managed in project 1660 under this program element. The HBCU/MI program increases and improves the participation of minority colleges and institutions in BMDO programs. The program responds to Section 832 of Public Law (PL) 101-510, which establishes a five percent goal for minority research grants. The program introduces HBCUs and MIs to BMDO technology areas and the BMDO procurement process.</p> <p>Many of today's baseline technologies incorporated into BMDO systems like Theater High Altitude Area Defense (THAAD), Patriot Advanced Capability (PAC3), and Ground Based Radar (GBR) are viable due to the wise investment in innovative technologies some ten or more years ago. Examples include: indium antimonide and mercury cadmium telluride ultra-sensitive infrared detectors; 32-bit radiation hardened Reduced Instruction Set Computer (RISC) processors for image analysis; composite materials for lightweight satellite structures; interferometric fiber-optic gyroscopes for miniaturized guidance and control systems; and solid-state gallium arsenide transmitter/receivers for advanced BMDO radars; and dual wave passive imaging for BMD test missions.</p> <p><u>Acquisition Strategy:</u> The IS&amp;T program solicits proposals by an annual Broad Agency Announcement (BAA) of research opportunities. Proposals received are competitively judged according to BMD innovation, relevance, cost, and capabilities of the offeror. The HBCU/MI program also receives proposals in response to a biannual BAA. For the SBIR and STTR programs, strong emphasis is placed on the commercial nature of the proposed effort. BMDO conducts an annual SBIR/STTR solicitation and competition, and the executing agents award and manage the contracts. BMDO employs government executing agents, called Science and Technology Agents (STAs) from the Army, Navy, Air Force, and NASA, with each STA responsible for a specific technical area.</p> <p><b>FY 2001 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 10383 IS&amp;T (1651): Continued innovative applied research tasks. Prepared for the flight (4<sup>th</sup> Quarter) of the Dual Mode Experiment on Bowshock Interactions (DEBI) to compare results to existing phenomenology model. Continued plume phenomenology investigations for discrimination, typing, and hardbody handover. Continued development of innovative sensor technology including the computer tomographic spectrometer, antenna-coupled micro-bolometers, and multiwavelength imagers. Continued development of ultrafast switches and wavelength multiplexed transmitters for advanced communications systems. Continued development of advanced neural networks and other technologies for on-board autonomous navigation and control. Continued development of advanced miniature interceptor technology, propellant technology, and kill enhancement technologies. Continued development of active sensing technology and phenomenology for hypersonic interceptors. Continued to provide test bed for advanced sensor demonstrations and to provide coverage for national missions.</li> </ul> |   |                              |
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- 1532 Technology Applications (1660): TA Database: Maintained up-to-date information on potential BMD programs that have commercial applications. Updated graphics and interactive modes into national information infrastructure on BMD sponsored technologies. Panel Reviews: Provided assistance to large, medium, and small businesses wishing to bring BMD supported technology to the commercial market. Outreach: Developed assistance publications, brochures and target articles for journals and newspapers, quarterly newsletters, conference exhibits, and advertisements in reports on MDA technology. Networking: Expanded results of technology transfer by working with other Federal technology transfer organizations and activities such as the OSD DDR&E Director, Office of Technology Transition, NASA and Department of Energy (DOE). Interacted with professional/technical associations and societies involved with technology transfer and commercialization.
  - 15291 BMC4I (1461): Investigated photoconduction on active pixel sensors; initiate and begin joint effort with US Air Force (USAF) and NASA in laser communications networking between platforms of the Unmanned Aerial Vehicle, Low Earth Orbit satellite and ground station; initiate shipboard high precision Lidar system work with U.S. Navy at Pacific Missile Range Facility. Continued Bottom Anti-Reflective Coatings research based on successful SBIR efforts.
  - SBIR/STTR (1660): Awarded an estimated 200 Phase I SBIR Awards to 150 firms and 70 Phase II SBIR awards to 65 firms.
  - 1210 HBCU/MI (1660): Conducted competition and incrementally fund an estimated 10 contracts in the areas of electronics, sensors, materials, and BMC3.
  - 2803 Civilian Salaries (1660): Executing Agents for management of SBIR/STTR programs.
- Total 31219

| <b>B. Program Change Summary</b>                 | <u>FY 2001</u> | <u>FY 2002</u> | <u>FY 2003</u> |
|--|----------------|----------------|----------------|
| Previous President's Budget (FY 2002 PB)         | 37747          |                |                |
| Congressional Adjustments                        | 18500          |                |                |
| Appropriated Value                               | 56247          |                |                |
| Adjustments to Appropriated Value                |                |                |                |
| a. Congressional General Reductions              | -516           |                |                |
| b. SBIR / STTR                                   | -24895         |                |                |
| c. Omnibus or Other Above Threshold Reductions   |                |                |                |
| d. Below Threshold Reprogramming                 | 383            |                |                |
| e. Rescissions                                   |                |                |                |
| Adjustments to Budget Years Since FY 2002 PB     | -6528          |                |                |
| Current Budget Submit (FY 2003 Budget Estimates) | 31219          |                |                |

Change Summary Explanation:  
 Significant FY 2001 increase due to Congressional Action. Beginning in FY 2002, funding from this Program Element is moved to the Ballistic Missile Defense Organization Program Element 0603175C.