

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2007

| BUDGET ACTIVITY | PE NUMBER AND TITLE | | | | | | | |
|--------------------------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 2 - Applied Research | 0602307A - ADVANCED WEAPONS TECHNOLOGY | | | | | | | |
| COST (In Thousands) | FY 2006 Actual | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate | FY 2012 Estimate | FY 2013 Estimate |
| Total Program Element (PE) Cost | 34485 | 24061 | 19342 | 19791 | 19638 | 20362 | 20810 | 21268 |
| 042 HIGH ENERGY LASER TECHNOLOGY | 19054 | 19216 | 19342 | 19791 | 19638 | 20362 | 20810 | 21268 |
| NA5 Advanced Weapons Components (CA) | 15431 | 4845 | | | | | | |

A. Mission Description and Budget Item Justification: This applied research program element (PE) investigates advanced technologies for Future Force High Energy Laser (HEL) weapons technology, and, where feasible, exploits opportunities to enhance Current Force capabilities. The major effort under this PE is the development of a multi-hundred kilowatt (kW) Solid State Laser (SSL) laboratory demonstrator that can be integrated into a HEL weapon system to provide increased ground platform-based lethality. HEL systems have the potential to address the following identified Army capability gaps: 1) Defeat In-Flight Projectiles such as rockets, artillery, mortars, anti-tank guided missiles, and man-portable surface-to-air missiles; 2) Ultra-Precision Strike with little to no collateral damage; 3) Disruption of Electro-Optical (EO) and Infra-Red (IR) sensors; and 4) Neutralizing mines and other ordnance from a stand-off distance. HELs are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems. At weapon system power levels of greater than 100kW, SSL technology has the potential to enhance survivability by addressing the capability gaps identified above. This SSL technology effort addresses technical issues such as high average power output from compact and more efficient lasers; precision optical pointing and tracking; laser effects degradation due to atmospheric effects; lethality against a variety of targets; and effectiveness against low-cost laser countermeasures. The multi-hundred kilowatt laser and additional HEL technology components will be refined and upgraded to transition into an integrated SSL weapons system demonstrator that will be developed in PE 0603004A (Weapons and Munitions Advanced Technology) Project L96. Project NA5 funds congressional special interest items. Work in this PE is related to, and fully coordinated with, efforts in PE 0602890F and PE 0603924F (High Energy Laser Joint Technology Office), PE 0605605A (DoD High Energy Laser Systems Test Facility), and PE 0603004 (Weapons and Munitions Advanced Technology) Project L96. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work is performed by the U.S. Army Space and Missile Defense Command (SMDC), in Huntsville, AL, and the High Energy Laser Systems Test Facility, White Sands Missile Range, NM.

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| <u>B. Program Change Summary</u> | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|---|---------|---------|---------|---------|
| Previous President's Budget (FY 2007) | 36233 | 19430 | 19492 | 19826 |
| Current BES/President's Budget (FY 2008/2009) | 34485 | 24061 | 19342 | 19791 |
| Total Adjustments | -1748 | 4631 | -150 | -35 |
| Congressional Program Reductions | | -92 | | |
| Congressional Rescissions | | | | |
| Congressional Increases | | 4900 | | |
| Reprogrammings | -1748 | -177 | | |
| SBIR/STTR Transfer | | | | |
| Adjustments to Budget Years | | | -150 | -35 |

One FY07 congressional add totaling \$4900 was added to this PE: Army Missile and Space Technology Initiative

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| BUDGET ACTIVITY 2 - Applied Research | PE NUMBER AND TITLE 0602307A - ADVANCED WEAPONS TECHNOLOGY | | | | | | PROJECT 042 | | |
| COST (In Thousands) | FY 2006 Actual | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | FY 2010 Estimate | FY 2011 Estimate | FY 2012 Estimate | FY 2013 Estimate | |
| 042 HIGH ENERGY LASER TECHNOLOGY | 19054 | 19216 | 19342 | 19791 | 19638 | 20362 | 20810 | 21268 | |

A. Mission Description and Budget Item Justification: This applied research project investigates advanced technologies for Future Force High Energy Laser (HEL) weapons technology, and, where feasible, exploits opportunities to enhance Current Force capabilities. The major effort under this project is the development of multi-hundred kilowatt (kW) Solid State Laser (SSL) laboratory technologies that can be integrated into a HEL weapon system to provide increased ground platform-based lethality. This SSL technology effort addresses technical issues such as high average power output from compact and more efficient lasers; precision optical pointing and tracking; laser effects degradation due to atmospheric effects; lethality against a variety of targets; and effectiveness against low-cost laser countermeasures. The multi-hundred kilowatt laser and additional HEL technology components will be refined and upgraded to transition into an integrated SSL weapons system demonstrator that will be developed in PE 0603004A/L96. Work in this project is related to, and fully coordinated with, efforts in PE 0602890F and PE 0603924F (High Energy Laser Joint Technology Office), PE 0605605A DOD High Energy Laser Systems Test Facility (HELSTF), and to PE 0603004 (Weapons and Munitions Advanced Technology) Project L96. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work is performed by the US Army Space and Missile Defense Command (SMDC), in Huntsville, AL, and the High Energy Laser Systems Test Facility (HELSTF), White Sands Missile Range, NM.

| <u>Accomplishments/Planned Program:</u> | <u>FY 2006</u> | <u>FY 2007</u> | <u>FY 2008</u> | <u>FY 2009</u> |
|--|----------------|----------------|----------------|----------------|
| Solid State Laser Effects: In FY06, Laser Lethality and Propagation Assessments initiated laser propagation and lethality studies in different environments at tactical ranges both at HELSTF and other test facilities using appropriate lasers. Developed test plan for utilizing existing assets for conducting low power propagation studies. Laser Modeling and Simulation initiated the development and validation of performance and propagation models for Solid State Lasers in a tactical environment. In FY07, Laser Lethality and Propagation Assessments conduct lethality assessments on an expanded target set representative of identified capability gaps. Laser Modeling and Simulation will begin integration of validated models into approved Army war-gaming models. In FY08, perform lethality studies of advanced fuses of candidate Rockets, Artillery, and Mortar (RAM) targets. In FY09, perform lethality studies of representative rockets. | 1165 | 1437 | 1500 | 1500 |
| Solid State Laser (SSL) Development, Phase 3 - 100kW: The goal of this Joint High Power Solid State Laser (JHPSSL) Phase 3 project is to develop and demonstrate alternative 100-kW-class, near-diffraction-limited diode-pumped solid-state lasers that have architectures that are favorable in terms of size, weight, efficiency, affordability, reliability, maintainability, supportability, environmental acceptability (air, land, and maritime), and ruggedness for tactical weapon applications. In FY06, initiated development of two 100kW SSL. Procured long lead items and began integration of components into subsystems that form the basis of 100kW laboratory laser devices that meet the JHPSSL Program Phase 3 performance goals for power, beam quality, run time, and efficiency. In FY07, fabricate remaining components, integrate subsystems into laser breadboards, and conduct preliminary performance tests towards integration of two complete 100kW SSL breadboards. In FY08, will continue laboratory performance testing and increase power output in order to characterize laser characteristics and achieve medium power (25 to 50 kW) laser output. In FY09, will complete integration and testing in order to achieve desired performance for evaluation and selection of the most promising laser and component technologies for the High Energy Laser Technology Demonstrator (HELTD). | 16724 | 17101 | 17842 | 18291 |
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| 2 - Applied Research | 0602307A - ADVANCED WEAPONS TECHNOLOGY | 042 | | |
| Space Application Concepts: In FY06, complete Joint Warfighting Space/Tactical Satellite (JWS/TacSat) cooperative Hyperspectral Imagery (HSI) payload development with Air Force Research Laboratory for JWS demonstration to validate Army Space Intelligence and reconnaissance tactical needs. This activity will be transferred to PE 0603006A (Command, Control, Communications Advanced Technology) beginning in FY07. | 1165 | | | |
| Small Business Innovative Research/Small Business Technology Transfer Programs | | 678 | | |
| Total | 19054 | 19216 | 19342 | 19791 |