# RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2003

BUDGET ACTIVITY: 03 - Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603924F High Energy Laser Advanced Technology Program

PROJECT: 5095

| COST ($ in Thousands) | | FY 2002 Actual | FY 2003 Estimate | FY 2004 Estimate | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | Cost to Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5095 | High Energy Laser Advanced Technology Program | 0 | 0 | 10,910 | 8,569 | 6,153 | 3,834 | 3,889 | 3,952 | 0 | 0 |
| | Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: In FY 2004, this program was transferred to the Air Force by the Office of the Secretary of Defense. The Air Force plans to continue the tri-Service operation of the program under the High Energy Laser (HEL) Joint Technology Office (JTO).

**(U) A. Mission Description**

This program funds DOD HEL advanced technology development aimed at translating technology solutions for broadly defined military problems into demonstrated pay-offs such as increased capabilities, increased supportability, or increased affordability. HEL weapon systems have many potential advantages, including speed-of-light velocity, high precision, nearly unlimited magazine depth, low-cost per kill, and reduced logistics requirements since there is no need for stocks of munitions or warheads. As a result, HELs have the potential to perform a wide variety of military missions. These include interception of ballistic missiles in boost phase; defeat of high-speed, maneuvering anti-ship and anti-aircraft missiles; and the ultra-precision negation of targets in urban environments with no collateral damage. This program is part of an overall DOD initiative in HEL science and technology being conducted by the HEL JTO. In general, efforts funded under this program are chosen for their potential to have major impact on multiple HEL systems and on multiple Service missions. As a result of this focus and of close coordination with the Military Departments and Defense Agencies, this program complements other DOD HEL programs that are directed at more specific Service needs. A broad range of technologies are addressed in key areas such as chemical lasers, solid-state lasers, beam control, optics, propagation, and free-electron lasers. Under this program these technologies are integrated and tested in sub-scale demonstration systems or sub-systems. When appropriate, the JTO will transition these technologies to appropriate Military Department, Defense Agency, and/or industry programs.

(U) FY 2002 ($ in Thousands)

(U) $0 This activity was performed under PE 0603924D8Z, High Energy Laser Research. Funding was approximately $15.8 million.

(U) $0 Total

(U) FY 2003 ($ in Thousands)

(U) $0 This activity is performed under PE 0603924D8Z, High Energy Laser Research. Funding is approximately $13.6 million.

(U) $0 Total

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**(U) A. Mission Description Continued**

(U) FY 2004 ($ in Thousands)

| | | |
|---|---|---|
| (U) | $0 | Accomplishments/Planned Program |
| (U) | $5,000 | Develop solid state lasers that have potential as future high energy laser (HEL) weapon laser devices because they require only electrical energy in order to run, thereby greatly simplifying systems engineering and supportability. A major focus will be the Joint High Power Solid State Laser (HPSSL) project to accelerate the demonstration of the solid state laser at initial weapon grade power levels. Demonstrate a 25 kilowatt laboratory laser. Continue development of a design for a 100 kilowatt laser. Assemble successful pieces from individual applied research projects (e.g., reliable pump diode lasers, diode-laser drivers, thin-disk amplifiers, phase-conjugate mirrors, mist cooling) into a demonstration sub-system scalable to weapon power levels. |
| (U) | $3,110 | Develop beam-control technologies for surface, air, and space mission areas, as well as develop supporting technologies. Using successful pieces from individual applied research projects (e.g., deformable mirrors, wavefront sensors, advanced tracking and compensation algorithms) begin to develop a fieldable, sub-scale tactical beam-control system. |
| (U) | $800 | Develop free electron laser (FEL) technologies that scale to high power and permit FELs to be fielded on military platforms. Begin designing and planning tests of a scalable FEL that can be operated on a military platform (e.g., a ship). |
| (U) | $1,000 | Develop chemical laser advanced technologies and concepts that allow higher performance and more supportable chemical lasers. Begin development of an integrated closed-cycle chemical laser device of high power, to include realistic capability to regenerate spent laser fuels. |
| (U) | $1,000 | Develop modeling and simulation technologies to provide a fully realistic model of end-to-end system performance, from birth of photons in the laser to their death at the target, thereby improving the design of HEL systems and reducing the need for expensive field testing. Demonstrate a fully realistic end-to-end system performance model applicable to many different HEL weapon systems. |
| (U) | $10,910 | Total |

**(U) B. Budget Activity Justification**

This program is in Budget Activity 3, Advanced Technology Development, since it enables and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

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**(U) C. Program Change Summary ($ in Thousands)**

| | | FY 2002 | FY 2003 | FY 2004 | Total Cost |
|---|---|---|---|---|---|
| (U) | Previous President's Budget | 0 | 0 | 0 | |
| (U) | Appropriated Value | | | | |
| (U) | Adjustments to Appropriated Value | | | | |
| | a. Congressional/General Reductions | | | | |
| | b. Small Business Innovative Research | | | | |
| | c. Omnibus or Other Above Threshold Reprogram | | | | |
| | d. Below Threshold Reprogram | | | | |
| | e. Rescissions | | | | |
| (U) | Adjustments to Budget Years Since FY 2003 PBR | | | 10,910 | |
| (U) | Current Budget Submit/FY 2004 PBR | | | 10,910 | |

(U) Significant Program Changes:
In FY 2004, this program was transferred to the Air Force by the Office of the Secretary of Defense. The Air Force plans to continue the tri-Service operation of the program under the High Energy Laser (HEL) Joint Technology Office (JTO).

**(U) D. Other Program Funding Summary ($ in Thousands)**

(U) PE 0602500F, Multi-Disciplinary Space Technology.
(U) PE 0602890F, High Energy Laser Research.
(U) PE 0603444F, Maui Space Surveillance System.
(U) PE 0603500F, Multi-Disciplinary Advanced Development Space Technology.
(U) PE 0603605F, Advanced Weapons Technology.
(U) PE 0601108F, High Energy Laser Research Initiatives.
(U) PE 0603883C, Ballistic Missile Defense Boost Phase Segment.
(U) PE 0602605F, Directed Energy Technology.
(U) PE 0602307A, Advanced Weapons Technology.
(U) PE 0602114N, Power Projection Applied Research.
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

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**(U) E. Acquisition Strategy**

Not Applicable.

**(U) F. Schedule Profile**

(U) Not Applicable.