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

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

DATE: February 2004

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

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

| Cost ($ in Millions) | | FY 2003 Actual | FY 2004 Estimate | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | Cost to Complete | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total Program Element (PE) Cost | 0.000 | 10.818 | 8.547 | 6.136 | 3.826 | 3.887 | 3.958 | 0.000 | 0.000 |
| 5095 | High Energy Laser Advanced Technology Program | 0.000 | 10.818 | 8.547 | 6.136 | 3.826 | 3.887 | 3.958 | 0.000 | 0.000 |

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

**(U) A. Mission Description and Budget Item Justification**

This program funds HEL advanced technology development through the HEL JTO. HEL weapon systems have many potential advantages, including speed-of-light velocity, high precision, significant magazine depth, low-cost per kill, and reduced logistics requirements. As a result, HELs have the potential to perform a wide variety of military missions including 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 HEL Science and Technology program. 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 while complementing Service/Agency 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.

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.

**(U) B. Program Change Summary ($ in Millions)**

| | | FY 2003 | FY 2004 | FY 2005 |
|---|---|---|---|---|
| (U) | Previous President's Budget | 0.000 | 10.910 | 8.569 |
| (U) | Current PBR/President's Budget | 0.000 | 10.818 | 8.547 |
| (U) | Total Adjustments | 0.000 | -0.092 | |
| (U) | Congressional Program Reductions | | | |
| | Congressional Rescissions | | -0.092 | |
| | Congressional Increases | | | |
| | Reprogrammings | | | |
| | SBIR/STTR Transfer | | | |

(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 continues the tri-Service operation of the program under the HEL JTO.

| Exhibit R-2a, RDT&E Project Justification | | | DATE: February 2004 |
|---|---|---|---|
| BUDGET ACTIVITY: 03 Advanced Technology Development (ATD) | PE NUMBER AND TITLE: 0603924F High Energy Laser Advanced Technology Program | PROJECT NUMBER AND TITLE: 5095 High Energy Laser Advanced Technology Program | |

| Cost ($ in Millions) | | FY 2003 Actual | FY 2004 Estimate | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | Cost to Complete | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 5095 | High Energy Laser Advanced Technology Program | 0.000 | 10.818 | 8.547 | 6.136 | 3.826 | 3.887 | 3.958 | 0.000 | 0.000 |
| | Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

**(U) A. Mission Description and Budget Item Justification**

This program funds HEL advanced technology development through the HEL JTO. HEL weapon systems have many potential advantages, including speed-of-light velocity, high precision, significant magazine depth, low-cost per kill, and reduced logistics requirements. As a result, HELs have the potential to perform a wide variety of military missions including 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 HEL Science and Technology program. 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 while complementing Service/Agency 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.

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.

| **(U) B. Accomplishments/Planned Program ($ in Millions)** | FY 2003 | FY 2004 | FY 2005 |
|---|---|---|---|
| (U) In FY 2003, this activity was performed under PE 0603924D8Z, High Energy Laser Research. The FY 2003 funding was approximately $13.6 million. | | | |
| (U) | | | |
| (U) MAJOR THRUST: Develop solid state lasers that have potential as future high energy laser (HEL) weapon laser devices because of their inherent small size and the fact that they require only electrical energy in order to run, thereby greatly simplifying systems engineering and supportability. | 0.000 | 5.500 | 5.500 |
| (U) In FY 2003: Not Applicable. | | | |
| (U) In FY 2004: Participate in the Joint High Power Solid State Laser project to accelerate the demonstration of solid state lasers at initial weapon grade power levels. Continue development of a 25 kilowatt solid state laboratory laser. Begin development of a design for a 100 kilowatt laser. Begin assembly of 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 an advanced demonstration of solid state laser sub-systems scalable to weapon power levels. | | | |
| (U) In FY 2005: Participate in the Joint High Power Solid State Laser project to demonstrate a 25 kilowatt laser. Continue development of a design for a 100 kilowatt laser. Factors such as performance, cost, etc. will be evaluated between the various approaches funded by the Army, Air Force, and High Energy Laser Joint Technology Office. Continue to assemble successful pieces from individual applied research projects (e.g., reliable pump diode lasers, | | | |

| Exhibit R-2a, RDT&E Project Justification | | DATE February 2004 |
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| | | | | |
|---|---|---|---|---|
| | diode-laser drivers, thin-disk amplifiers, phase-conjugate mirrors, mist cooling) into an advanced demonstration of solid state laser sub-systems. | | | |
| (U) | | | | |
| (U) | MAJOR THRUST: Develop beam-control technologies for surface, air, and space mission areas, as well as develop supporting technologies. | 0.000 | 2.718 | 1.447 |
| (U) | In FY 2003: Not Applicable. | | | |
| (U) | In FY 2004: 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) | In FY 2005: Using successful pieces from individual applied research projects; such as deformable mirrors, wavefront sensors, advanced tracking and compensation algorithms; continue to develop a fieldable, sub-scale tactical beam-control system. | 0.000 | 0.800 | 0.800 |
| (U) | | | | |
| (U) | MAJOR THRUST: Develop free electron laser (FEL) technologies that scale to high power and permit FELs to be fielded on military platforms. | | | |
| (U) | In FY 2003: Not Applicable. | | | |
| (U) | In FY 2004: Begin designing and planning tests of a scalable FEL that can be operated on a military platform (e.g., a ship). | | | |
| (U) | In FY 2005: Continue designing and planning tests of a scalable FEL that can be operated on a military platform (e.g., a ship). | | | |
| (U) | | | | |
| (U) | MAJOR THRUST: Develop chemical laser advanced technologies and concepts that allow higher performance and more supportable chemical lasers. | 0.000 | 1.800 | 0.800 |
| (U) | In FY 2003: Not Applicable. | | | |
| (U) | In FY 2004: Begin development of an integrated closed-cycle chemical laser device of high power, to include realistic capability to regenerate spent laser fuels. | | | |
| (U) | In FY 2005: Demonstrate an integrated closed-cycle chemical laser device of high power, to include realistic capability to regenerate spent laser fuels. | | | |
| (U) | Total Cost | 0.000 | 10.818 | 8.547 |

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**(U) C. Other Program Funding Summary ($ in Millions)**

| | | FY 2003 Actual | FY 2004 Estimate | FY 2005 Estimate | FY 2006 Estimate | FY 2007 Estimate | FY 2008 Estimate | FY 2009 Estimate | Cost to Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| (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. | | | | | | | | | |

**(U) D. Acquisition Strategy**

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Not Applicable.