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

Exhibit R-2, RDT&E Budget Item Justification	DATE: February 2006
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603924F High Energy Laser Advanced Technology Program

	Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	9.490	5.713	3.713	3.781	4.106	4.200	4.272	Continuing	TBD
5095	High Energy Laser Advanced Technology Program	9.490	5.713	3.713	3.781	4.106	4.200	4.272	Continuing	TBD

(U) A. Mission Description and Budget Item Justification

This program funds high energy laser (HEL) advanced technology development through the HEL Joint Technology Office (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 Department of Defense (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 2005	FY 2006	FY 2007
(U)	Previous President's Budget	9.760	5.801	3.671
(U)	Current PBR/President's Budget	9.490	5.713	3.713
(U)	Total Adjustments	-0.270	-0.088	
(U)	Congressional Program Reductions		-0.005	
	Congressional Rescissions	-0.007	-0.083	
	Congressional Increases			
	Reprogrammings			
	SBIR/STTR Transfer	-0.263		
(U)	Significant Program Changes:			

C. Performance Metrics
Under Development.

Exhibit R-2a, RDT&E Project Justification		DATE: February 2006
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 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
5095	High Energy Laser Advanced Technology Program	9.490	5.713	3.713	3.781	4.106	4.200	4.272	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This program funds high energy laser (HEL) advanced technology development through the HEL Joint Technology Office (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 Department of Defense (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 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop solid state lasers that have potential as future 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.	5.960	4.102	2.877

(U) In FY 2005: Participated in the Joint High Power Solid State Laser (JHPSSL) project and demonstrate three 25 kilowatt lasers. Developed test hardware for and conduct independent, government testing of these lasers. Factors such as performance, cost, etc. were evaluated between the various approaches funded by the Army, Air Force, and HEL JTO. Developed a design for a 100 kilowatt laser. Conducted a proposal call for the 100 kilowatt JHPSSL, performed the selection process, and initiated funding to one or more contractors. Developed high-power laser component technology addressing all elements of the laser (e.g., diode pump lasers, wavefront control technology, thermal control, beam combining technology, etc.). Conducted Service and Agency proposal call for FY 2005 and funded first year of selected efforts.

(U) In FY 2006: Continue to participate in the JHPSSL effort to demonstrate 100 kilowatts. Assess advanced configurations for power scaling such as combined fiber lasers. Conduct necessary studies to understand and improve fieldability of solid state lasers. Continue to assemble successful pieces from individual applied research projects (e.g., long-life diode-laser drivers, thin-disk amplifiers, phase-conjugate mirrors, mist cooling) into an advanced demonstration of solid state laser sub-systems. Conduct an industry proposal call for FY 2006, fund first

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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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	year of selected efforts, and fund second year of FY 2005 Service and Agency efforts.			
(U)	In FY 2007: Continue to participate in the JHPSSL project to demonstrate a 100 kilowatt laser. The 100 kilowatt demonstration(s) will occur during this period. Provide for independent, government-sponsored measurement of the 100 kilowatt laser(s). Explore the need for other high value experiments to follow the 100 kilowatt program and begin planning as appropriate. Continue the component development program with emphasis on improvement of existing power-scaling architectures as well as next generation components and architectures. Continue to fund the contract efforts started in FY 2006, conduct Service and Agency proposal call for FY 2007, and fund first year of selected efforts.			
(U)				
(U)	MAJOR THRUST: Develop beam-control technologies for surface, air, and space mission areas, as well as develop supporting technologies.	2.175	0.429	0.330
(U)	In FY 2005: Maintained the component development program. Planned for a high-value integrated beam control demonstration that would use successful pieces from individual applied research projects (e.g., deformable mirrors, wavefront sensors, advanced tracking and compensation algorithms) and specifically address tactical applications. Conducted Service and Agency proposal call for FY 2005 and funded first year of selected efforts.			
(U)	In FY 2006: Continue component development program and pursuit of an integrated beam control demonstration addressing tactical applications. Conduct an industry proposal call for FY 2006, fund first year of selected efforts, and fund second year of FY 2005 Service and Agency efforts.			
(U)	In FY 2007: Continue pursuit of an integrated beam control demonstration addressing tactical applications. Address advanced beam control architectures and algorithms that have not already been tested in the integrated beam control demonstration. Continue to fund the contract efforts started in FY 2006, conduct Service and Agency proposal call for FY 2007, and fund first year of selected efforts.			
(U)				
(U)	MAJOR THRUST: Develop free electron laser (FEL) technologies that scale to high power and permit FELs to be fielded on military platforms.	0.968	1.182	0.506
(U)	In FY 2005: Demonstrated FEL system components for power scaling. A 10 kilowatt laboratory demonstrator was used as a test bed. Demonstrated a separate photocathode test bed and refined photocathode models as a tools to design robust, long-life photocathodes. Investigated development of a separate injector test stand in conjunction with the photocathode test bed. Analyzed ship-board integration requirements. Conducted Service and Agency proposal call for FY 2005 and funded first year of selected efforts.			
(U)	In FY 2006: Develop and demonstrate technologies leading to a 100 kilowatt class demonstrator. Develop end-to-end simulation to develop refined system level technology for power scaling. Continue analysis of shipboard			

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(U) B. Accomplishments/Planned Program ($ in Millions)

		FY 2005	FY 2006	FY 2007
	integration requirements. Conduct an industry proposal call for FY 2006, fund first year of selected efforts, and fund second year of FY 2005 Service and Agency efforts.			
(U)	In FY 2007: Examine all system components including compact electron beam lines, optical beam handling outside the laser, shipboard thermal management systems, and compact electrical power conditioning systems. Continue to fund the contract efforts started in FY 2006, conduct Service and Agency proposal call for FY 2007, and fund first year of selected efforts.			
(U)				
(U)	MAJOR THRUST: Develop chemical laser advanced technologies and concepts that allow higher performance and more supportable chemical lasers. Note: Work in this thrust will be completed in FY 2005.	0.387	0.000	0.000
(U)	In FY 2005: Demonstrated chemical laser generators that are capable of operating in a gravity free environment.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	9.490	5.713	3.713

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 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									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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**

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

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

Not Applicable.