

UNCLASSIFIED

PE NUMBER: 0602602F
PE TITLE: Conventional Munitions

Exhibit R-2, RDT&E Budget Item Justification								DATE February 2006																																					
BUDGET ACTIVITY 02 Applied Research				PE NUMBER AND TITLE 0602602F Conventional Munitions																																									
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	50.821	62.061	62.105	58.771	59.318	59.485	59.591	Continuing	TBD																																				
2068 Advanced Guidance Technology	15.912	19.431	17.957	18.204	19.013	19.163	19.252	Continuing	TBD																																				
2502 Ordnance Technology	34.909	42.630	44.148	40.567	40.305	40.322	40.339	Continuing	TBD																																				
<p>Note: In FY 2006, funding increased to support added emphasis on Battlefield Air Operations efforts.</p> <p>(U) <u>A. Mission Description and Budget Item Justification</u></p> <p>This program investigates, develops, and establishes the technical feasibility and military utility of advanced guidance and ordnance technologies for conventional air-launched munitions. The program includes two projects: (1) development of advanced guidance technologies, including seekers, navigation and control, target detection and identification algorithms, and simulation assessments; and (2) development of conventional ordnance technologies, including warheads, fuzes, explosives, munitions integration, and weapon lethality and vulnerability assessments. In FY 2006, Congress added \$2.8 million for Advanced Energy Technology for Munitions-Dominator Program and \$2.1 million for Falcon Eye. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary technologies.</p> <p>(U) <u>B. Program Change Summary (\$ in Millions)</u></p> <table style="width: 100%; margin-left: 40px;"> <thead> <tr> <th></th> <th style="text-align: right;"><u>FY 2005</u></th> <th style="text-align: right;"><u>FY 2006</u></th> <th style="text-align: right;"><u>FY 2007</u></th> </tr> </thead> <tbody> <tr> <td>(U) Previous President's Budget</td> <td style="text-align: right;">51.790</td> <td style="text-align: right;">58.058</td> <td style="text-align: right;">60.210</td> </tr> <tr> <td>(U) Current PBR/President's Budget</td> <td style="text-align: right;">50.821</td> <td style="text-align: right;">62.061</td> <td style="text-align: right;">62.105</td> </tr> <tr> <td>(U) Total Adjustments</td> <td style="text-align: right;">-0.969</td> <td style="text-align: right;">4.003</td> <td></td> </tr> <tr> <td>(U) Congressional Program Reductions</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Congressional Rescissions</td> <td style="text-align: right;">-0.039</td> <td style="text-align: right;">-0.897</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Congressional Increases</td> <td></td> <td style="text-align: right;">4.900</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Reprogrammings</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">SBIR/STTR Transfer</td> <td style="text-align: right;">-0.930</td> <td></td> <td></td> </tr> </tbody> </table> <p>(U) <u>Significant Program Changes:</u></p> <p style="padding-left: 20px;">Not Applicable.</p> <p style="padding-left: 20px;">C. Performance Metrics</p> <p style="padding-left: 20px;">(U) Under Development.</p>											<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	(U) Previous President's Budget	51.790	58.058	60.210	(U) Current PBR/President's Budget	50.821	62.061	62.105	(U) Total Adjustments	-0.969	4.003		(U) Congressional Program Reductions				Congressional Rescissions	-0.039	-0.897		Congressional Increases		4.900		Reprogrammings				SBIR/STTR Transfer	-0.930		
	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>																																										
(U) Previous President's Budget	51.790	58.058	60.210																																										
(U) Current PBR/President's Budget	50.821	62.061	62.105																																										
(U) Total Adjustments	-0.969	4.003																																											
(U) Congressional Program Reductions																																													
Congressional Rescissions	-0.039	-0.897																																											
Congressional Increases		4.900																																											
Reprogrammings																																													
SBIR/STTR Transfer	-0.930																																												

Exhibit R-2a, RDT&E Project Justification

DATE

February 2006

BUDGET ACTIVITY 02 Applied Research				PE NUMBER AND TITLE 0602602F Conventional Munitions			PROJECT NUMBER AND TITLE 2068 Advanced Guidance Technology		
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
2068 Advanced Guidance Technology	15.912	19.431	17.957	18.204	19.013	19.163	19.252	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

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

This project investigates, develops, and evaluates conventional munitions advanced guidance technologies to establish technical feasibility and military utility. This project includes development of advanced guidance including terminal seekers, navigation and control, signal and processing algorithms, and guidance and control simulations. Project payoffs include: adverse-weather and autonomous precision guidance capability; increased number of kills per sortie; increased aerospace vehicle survivability; improved reliability and affordability; and improved survivability and effectiveness of conventional weapons.

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

	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) MAJOR THRUST: Investigate and develop advanced guidance component technologies for adverse weather and autonomous seekers for air-delivered munitions, such as detectors and detector arrays, receiver electronics, signal pre-processing, target recognition, spatial target characteristics, optics, and low-cost beam scanning and shaping technologies. These technologies will enable the development of next generation seekers that will increase a weapon's kill probability, reduce pilot workload, and enhance sortie effectiveness.	6.562	6.441	6.780
(U) In FY 2005: Tested initial laser ranging and detection seeker with the capability to perform 'single-shot' imaging technology. Conducted ground testing a low-cost, synthetic aperture radar seeker to assess future advanced guidance applications. Designed, demonstrated, and tested five optical seeker systems using multiple discriminates to improve performance against obscured or hidden targets.			
(U) In FY 2006: Incorporate and test improved components in laser ranging and detection seekers with goal to provide "single-shot" imaging at useful ranges. Complete testing of a low-cost synthetic aperture radar seeker. Begin fabrication of an optical seeker that uses multi-discriminate signatures to improve targeting against obscured targets. Using ground test data, augment the shape signatures in the automatic target acquisition algorithms to add laser multi-discriminate signatures.			
(U) In FY 2007: Continue improving and testing components in laser ranging seeker to provide "single-shot" imaging. Continue fabrication of an optical seeker that uses multi-discriminate signatures to improve targeting obscured targets. Using ground test data, continue augmenting the shape signatures in the automatic target acquisition algorithms to add laser multi-discriminate signatures.			
(U) MAJOR THRUST: Investigate and develop advanced navigation and control technologies for air-delivered munitions to include nonlinear controllers, biomimetic guidance, clutter rejection modules, detection and segmentation modules, and micro-electromechanical gyros. These technologies will allow a more efficient flight path to target, increase stand off ranges, improve resistance to Global Positioning System (GPS) jamming, and	3.441	3.620	3.800

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification			DATE February 2006		
BUDGET ACTIVITY 02 Applied Research		PE NUMBER AND TITLE 0602602F Conventional Munitions	PROJECT NUMBER AND TITLE 2068 Advanced Guidance Technology		
(U) B. Accomplishments/Planned Program (\$ in Millions)			<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
enhance strike aircraft effectiveness and survivability.					
(U) In FY 2005: Completed developing new design technologies for tactical munitions flight control systems. Completed a modeling and simulation testbed for developing novel ways to enhance weapon system effectiveness through higher levels of integration of guidance, navigation, control, and estimation algorithms. Investigated the neuro-physiology of insects for applications to guidance. Completed investigating concepts for penetrator guidance below the ground surface.					
(U) In FY 2006: Initiate development of navigation and guidance techniques to autonomously guide cooperative robotic weapons without location information from Global Positioning System (GPS). Begin developing guidance techniques for small agile vehicles in close proximity to cluttered terrain. Continue investigating the neuro-physiology of insects for application to guidance, particularly engaging moving ground targets. Begin evaluating advanced navigation systems within GPS jamming environments.					
(U) In FY 2007: Continue developing navigation and guidance techniques to autonomously guide cooperative robotic weapons without location information from GPS. Continue developing small agile vehicle guidance to avoid obstacles. Continue applying the neuro-physiology of insects to guide small vehicles to moving targets in an urban-like environment. Continue evaluating navigation systems within GPS jamming environments.					
(U)					
(U) MAJOR THRUST: Investigate and develop advanced optical and digital processors and target detection, classification, and identification algorithms for improved seeker performance to allow greater air-delivered weapon autonomy. Continue developing highly innovative concepts and approaches in guidance and control. These seekers will deny an enemy the ability to hide or camouflage a target, while also decreasing aircrew workload.			1.847	2.900	2.809
(U) In FY 2005: Transitioned initial biomimetic principles developed in basic research for variable resolution sensors that emulate biological or human characteristics for use in advanced seeker components for moving target scenarios. Investigated polarization measurement to differentiate the properties of manmade materials from natural backgrounds. Developed an in-house capability to evaluate contractor-developed optic-flow algorithms.					
(U) In FY 2006: Continue work in biomimetic principles by developing modular models to investigate particular target attributes. Continue investigating polarization techniques to develop model behavior theory. Continue in-house capability to evaluate contractor developed optic-flow algorithms.					
(U) In FY 2007: Continue developing innovative approaches in guidance and control. Continue investigating particular target attributes using biomimetic principles. Continue developing polarization behavior theory models. Continue to evaluate contractor developed optic-flow algorithms.					
(U)					
(U) MAJOR THRUST: Investigate and develop detailed six-degree-of-freedom and hardware-in-the-loop simulations			4.062	4.400	4.568
Project 2068		R-1 Shopping List - Item No. 12-4 of 12-10	Exhibit R-2a (PE 0602602F)		

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification							DATE February 2006			
BUDGET ACTIVITY 02 Applied Research				PE NUMBER AND TITLE 0602602F Conventional Munitions		PROJECT NUMBER AND TITLE 2068 Advanced Guidance Technology				
(U)	<u>B. Accomplishments/Planned Program (\$ in Millions)</u>					<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>		
	including synthetic aperture radar, automatic target recognition, and biomimetic processing. Technologies also include trajectory optimization algorithm and polarization sensing and models to analyze guided munitions and their components that will enable requirement studies, design iteration and evaluation, and experiment risk reduction. These simulations will shorten development time, reduce development costs, and provide more effective munitions.									
(U)	In FY 2005: Conducted analysis efforts and multi-sensor modeling to improve target signature prediction models, expedite development, and reduce the acquisition cycle expense for state-of-the-art seekers. Developed and tested simulation models and reusable end-system simulation tools. Developed a prototype waveform generator, to meet DoD simulator requirements, which use of a commercial synthesizer chip.									
(U)	In FY 2006: Complete development and establish a reusable, simulation architecture consisting of a set of reusable interoperable simulations to evaluate emerging munitions technologies. Complete developing an arbitrary waveform simulation using a commercial synthesizer chip. Improve existing multi-spectral phenomenology models for synthetic scene generation.									
(U)	In FY 2007: Continue refining the set of interoperable simulations, validating the reusable aspect, to evaluate emerging munitions technologies. Improve existing multi-spectral phenomenology models and evaluate in a synthetic scene environment. Develop a set of reusable modeling tools to allow munition simulations to be built from standardized components using standard commercial products.									
(U)	CONGRESSIONAL ADD: Falcon Eye.					0.000	2.070	0.000		
(U)	In FY 2005: Not Applicable.									
(U)	In FY 2006: Conduct Congressionally-directed effort for Falcon Eye.									
(U)	In FY 2007: Not Applicable.									
(U)	Total Cost					15.912	19.431	17.957		
(U)	<u>C. Other Program Funding Summary (\$ in Millions)</u>									
		<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>Cost to</u>	<u>Total Cost</u>
		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U)	Related Activities:									
(U)	PE 0603601F, Conventional Weapons Technology.									
(U)	This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									
Project 2068			R-1 Shopping List - Item No. 12-5 of 12-10				Exhibit R-2a (PE 0602602F)			

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602602F Conventional Munitions	PROJECT NUMBER AND TITLE 2068 Advanced Guidance Technology
<p>(U) <u>D. Acquisition Strategy</u> Not Applicable.</p>		

Project 2068

R-1 Shopping List - Item No. 12-6 of 12-10

Exhibit R-2a (PE 0602602F)

UNCLASSIFIED

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification

DATE

February 2006

BUDGET ACTIVITY
02 Applied ResearchPE NUMBER AND TITLE
0602602F Conventional MunitionsPROJECT NUMBER AND TITLE
2502 Ordnance Technology

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
2502 Ordnance Technology	34.909	42.630	44.148	40.567	40.305	40.322	40.339	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

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

This project investigates, develops, and evaluates conventional ordnance technologies to establish technical feasibility and military utility to include technologies for advanced conventional weapon dispensers, submunitions, safe and arm devices, fuzes, explosives, warheads, and weapon airframe and carriage technology. The project also assesses the lethality and effectiveness of current and planned conventional weapons technology programs and assesses target vulnerability. The payoffs include: improved storage capability and transportation safety of fully assembled weapons; improved warhead and fuze effectiveness; improved submunition dispensing; low-cost airframe/subsystem components and structures; and reduced aerospace vehicle and weapon drag.

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

	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U) MAJOR THRUST: Investigate and develop high fidelity analytical tools, such as computational mechanics models for predicting weapons' effects and assessing target vulnerability. These analysis tools will reduce air-delivered munitions development costs and provide weapons that can generate maximum lethality against a given target class.	4.682	7.024	6.700
(U) In FY 2005: Upgraded and refined basic models illustrating fragmentation effects against various target facilities, including hardened facilities and weapons of mass destruction (WMD). Used campaign analysis tools to compare inventory, budgeted, and conceptual munitions to identify high payoff technologies. Used improved engineering level predictive methods with a simplified finite element model that estimated the damage from collapse and instability caused by direct weapon strikes. Developed models to assess the failure of blast doors and other hardened assets in deep underground facilities.			
(U) In FY 2006: Develop code enhancements to computer model for dynamic submunition dispensing of new weapon concepts. Continue developing a simplified finite element model to estimate damage to buildings caused by direct weapon effects. Improve methods for predicting the effects of munition detonations in embedded soil, concrete or rock.			
(U) In FY 2007: Continue modeling damage to buildings caused by direct weapon effects. Continue improving methods for predicting damage caused by detonation of penetrating warheads in a variety of materials. Develop a model to predict the vulnerability of protected assets in deep underground facilities.			
(U) MAJOR THRUST: Investigate and develop more efficient, affordable explosives including inert dense metal additives, tungsten-laden explosives, cast and cure high energy composite explosives, and nano-scale metal fuels that provide both higher blast performance and lower ignition sensitivity for air-delivered munitions. These technologies will enable safer, more insensitive to unplanned stimuli, and less expensive explosive fills for inventory and future weapons.	4.034	5.803	6.600

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification			DATE February 2006		
BUDGET ACTIVITY 02 Applied Research		PE NUMBER AND TITLE 0602602F Conventional Munitions	PROJECT NUMBER AND TITLE 2502 Ordnance Technology		
(U)	B. Accomplishments/Planned Program (\$ in Millions)		<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
(U)	In FY 2005: Developed a highly energetic material with twice the power density of conventional explosives by establishing experimental fragment threshold on-set velocities for a variety of new energetic candidates. Increased the energy output, while maintaining the producibility of cast/cure Plastic Bonded Explosives (PBX), by using advanced energetic materials, plasticizers, and formulation techniques. Conducted an effort to add dense metal powders to PBX to enhance near-field lethality when low collateral damage attributes are required.				
(U)	In FY 2006: Continue developing highly energetic material with twice the power density of conventional by developing and validating new energetics ignition parameters. Demonstrate use of multi-functional material or nano energetic fills. Fabricate cast/cure PBX using advanced materials, plasticizers, and formulation techniques.				
(U)	In FY 2007: Continue developing highly energetic material with twice the power density of conventional explosives by delivering a modeling and simulation capability for enhanced blast materials. Develop energetic liner technology to enhance blast output yet improve the insensitive munition attributes of the weapon system. Demonstrate performance of cast/cure PBX using advanced materials, plasticizers, and formulation techniques.				
(U)					
(U)	MAJOR THRUST: Investigate and develop advanced fuze technologies for air-delivered munitions, such as commercially available micro-mechanical systems, shock-hardened fuzes, low energy detonators, light activated and modular firing systems for advanced single-point initiation, switches, capacitors, power sources, and safe-arming components. These advanced fuze technologies will enhance lethality through precise selection of burst-height at, above, or below the surface to increase weapon safety and tactical performance, while simultaneously decreasing procurement costs and system supportability requirements.		8.315	7.300	7.050
(U)	In FY 2005: Conducted research into the development of a high resolution, electromagnetic countermeasure-hardened, active imaging fuze that calculates warhead burst direction and detonation time. Complete initial design of a miniaturized fuze to effectively control the release of anti-agent for defeating weapons of mass destruction. Developed preliminary miniaturized fuze to provide safe and arm, burst point sensor and low power initiator in a four cubic inch package. Begin developing a wireless communication system to fuze a hard target munition.				
(U)	In FY 2006: Demonstrate a high resolution, electromagnetic countermeasure-hardened, active imaging fuze that calculates warhead burst direction and detonation time. Continue developing a miniaturized fuze to provide safe and arm, burst point sensor and low power initiator in a four cubic inch package. Continue developing a wireless communication system to fuze a hard target munition. Begin to develop waveform agile fuze to defeat smart jamming devices.				
(U)	In FY 2007: Continue developing a miniaturized fuze to provide safe and arm, burst point sensor and low power initiator in a four cubic inch package. Continue developing a wireless communication system to fuze a hard target				

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification			DATE February 2006		
BUDGET ACTIVITY 02 Applied Research		PE NUMBER AND TITLE 0602602F Conventional Munitions	PROJECT NUMBER AND TITLE 2502 Ordnance Technology		
(U) B. Accomplishments/Planned Program (\$ in Millions)			<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
munition. Continue to develop a waveform agile fuze to defeat smart jamming devices.					
(U) MAJOR THRUST: Investigate and develop control and carriage technologies for ordnance packages for advanced air-delivered munitions in order to enhance weapon lethality. Examples of these technologies include high-energy formulations, mass-focus fragmentation, and multi-sensor fuzing. These technologies will increase weapon systems effectiveness by contributing to increased weapon load-out on strike aircraft and enhanced sortie effectiveness. Note: In FY 2007, funds are increased to support Battlefield Air Operations efforts.			10.183	11.067	16.350
(U) In FY 2005: Investigated specific missile subsystem technologies to counter low-observable air targets. Conducted an effort to design and ground test precise time-of-arrival munitions. Identified the critical technologies needed for an advanced next generation, low cost miniature cruise missile. Developed technologies to deny enemy operations through loitering, persistent, low-cost multiple-shot munitions.					
(U) In FY 2006: Continue research to develop precise time-of-arrival munitions. Continue to identify critical technologies needed for an advanced next generation, low-cost miniature cruise missile. Continue investigating technologies to deny enemy operations through loitering, persistent, low-cost, multiple-shot munitions. Begin investigating application of nanotube-reinforced composites to reduce structural weight of weapons. Develop a miniaturized attack system to communicate target aim point position from behind enemy lines. Develop a covert video capability to collect and transmit data to coordinate attack of enemy targets.					
(U) In FY 2007: Complete precision time-of-arrival investigation to defeat tunnel blast doors. Continue investigating technologies for miniature cruise missile development. Finish the design studies for loitering, persistent, low-cost multiple-shot munitions. Finish the initial investigation of nanotube reinforced composites to reduce structural weight of weapons. Continue miniaturizing the attack system to communicate target aim point position from behind enemy lines. Continue to develop a covert video capability to collect and transmit data to coordinate attack of enemy targets.					
(U) MAJOR THRUST: Investigate and develop advanced warhead kill mechanisms, such as adaptable warhead, directional control and fragmenting ordnance, and application of reactive metals. The investigation includes characterization of the dynamic response of metals and geologic materials, adjustable yield ordnance packages, and distributed multi-point fire set to enhance air-delivered munition lethality. This enhanced lethality supports the development of smaller munitions with effectiveness similar to current inventory weapons with a corresponding increase in aircraft load-out and sortie effectiveness.			7.695	8.676	7.448
(U) In FY 2005: Evaluated an ordnance package designed for low collateral damage with high near-field and minimum far-field lethality. Evaluated low collateral damage and multi-mode warheads. Conducted in-house studies to					
Project 2502		R-1 Shopping List - Item No. 12-9 of 12-10	Exhibit R-2a (PE 0602602F)		

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification							DATE February 2006			
BUDGET ACTIVITY 02 Applied Research				PE NUMBER AND TITLE 0602602F Conventional Munitions		PROJECT NUMBER AND TITLE 2502 Ordnance Technology				
(U)	<u>B. Accomplishments/Planned Program (\$ in Millions)</u>					<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>		
	improve penetrating warhead case survivability, depth of burial, and trajectory control, with lower case thickness. Evaluated the use of tungsten in high-speed penetrating weapons. Evaluated high energetic materials for adaptable warheads to attack mobile ground targets.									
(U)	In FY 2006: Demonstrate an ordnance package designed for low collateral damage and minimum far-field lethality. Complete in-house effort to improve penetrating warhead case survivability, depth of burial, and trajectory control with lower case thickness. Continue evaluating tungsten for high-speed penetrating weapons. Begin an effort to develop focusing kill mechanisms for dual role, dual range missiles. Begin to investigate micro damage technologies to neutralize electronics with small robotic weapons.									
(U)	In FY 2007: Continue evaluating tungsten for high-speed penetrating weapons. Continue an effort to develop focusing kill mechanisms for dual role, dual range missiles. Continue investigating micro damage technologies to neutralize electronics with small robotic weapons.									
(U)										
(U)	CONGRESSIONAL ADD: Advanced Energy Technology for Munitions Dominator Program.					0.000	2.760	0.000		
(U)	In FY 2005: Not Applicable									
(U)	In FY 2006: Develop lightweight fuel cell stack materials to increase system power density. Additional goals include development of lightweight recuperators, heat exchanges, and cathode air blowers. Advanced fuel processing catalysts which are capable of logistic fuel operability will also be studied.									
(U)	In FY 2007: Not Applicable.									
(U)	Total Cost					34.909	42.630	44.148		
(U)	<u>C. Other Program Funding Summary (\$ in Millions)</u>									
		<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>Cost to</u>	<u>Total Cost</u>
		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U)	Related Activities:									
(U)	PE 0603601F, Conventional Weapons Technology.									
(U)	This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									
(U)	<u>D. Acquisition Strategy</u>									
	Not Applicable.									
Project 2502										
R-1 Shopping List - Item No. 12-10 of 12-10										
Exhibit R-2a (PE 0602602F)										