PE NUMBER: 0603112F
PE TITLE: Advanced Materials for Weapon Systems

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2006

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603112F Advanced Materials for Weapon Systems

	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	61.305	70.100	48.901	43.519	45.465	46.366	47.138	Continuing	TBD
2100	Laser Hardened Materials	22.836	28.040	33.624	28.583	31.023	31.667	32.262	Continuing	TBD
3153	Non-Destructive Inspection Development	6.262	12.516	3.945	3.990	4.332	4.414	4.483	Continuing	TBD
3946	Materials Transition	25.694	23.128	3.911	3.958	4.241	4.300	4.300	Continuing	TBD
4918	Deployed Air Base Demonstrations	6.513	6.416	2.305	2.344	2.544	2.596	2.645	Continuing	TBD
77SP	Advanced Space Materials	0.000	0.000	5.116	4.644	3.325	3.389	3.448	Continuing	TBD

Note: In FY 2007, Project 77SP, Advanced Space Materials, efforts will be transferred from PE 0603500F, Multidisciplinary Space Technology, Project 5032, Advanced Space Materials, in order to more effectively manage and provide oversight of the efforts. Funds for the FY 2006 Congressionally-directed Hybrid Bearing in the amount of $2.1 million and Design Manual for Titanium Honeycomb Sandwich Composite in the amount of $3.3 million are in the process of being moved to PE 0602203F, Aerospace Propulsion, and to PE 0603211F, Aerospace Technology Dev/Demo, respectively, from PE 0603112F, Advanced Materials for Weapon Systems, for execution. Funds for the FY 2006 Congressionally-directed Room Temperature Nanocrystalline Diamond Coating for De-Icing in the amount of $1.0 million and Non-Destructive Testing (NDI) Corrosion Detection in the amount of $1.0 million are in the process of being moved to PE 0603112F, Advanced Materials for Weapon Systems, from PE 0401318F, CV-22, and from PE 0605011F, RDT&E for Aging Aircraft, respectively, for execution.

(U) A. Mission Description and Budget Item Justification

This program develops and demonstrates materials technology for transition into Air Force systems. The program has four projects which develop: (1) hardened materials technologies for the protection of aircrews and sensors; (2) non-destructive inspection and evaluation technologies; (3) transition data on structural and non-structural materials for aerospace applications; and (4) airbase operations technologies including deployable base infrastructure, force protection, and fire fighting capabilities. Note: In FY 2006, Congress added $1.2 million for Reduced Composite Manufacturing Costs Through the Application of Advanced Textile Technology, $2.6 million for XD-2 Explosives Detection System, $5.0 million for the Metals Affordability Initiative, $1.0 million for Coated Field Repair, $1.5 million for Transparent Conductive Polymer Technology Development, $1.0 million for Materials Integrity Management Research for AF, $3.3 million for Design Manual for Titanium Honeycomb Sandwich Composite, $1.0 million for Advanced Composite Processes for Unmanned Aerial Vehicles (UAVs), $1.0 million for Continuous Integrated Vehicle Monitoring System, $1.0 million for Ultra-Lightweight Composites, $2.1 million for Hybrid Bearing, $2.6 million for Large Panel Sapphire Producability, $1.7 million for Hydrothermal Oxidation, $2.1 million for Assessing Aging Military Aircraft, $2.5 million for Stealth Radar Absorbing Material (RAM) Coatings, and $4.8 million for Aging Military Aircraft (A/C) Fleet Support at National Institute for Aviation Research. This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems

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

		FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	64.905	36.714	43.162
(U)	Current PBR/President's Budget	61.305	70.100	48.901
(U)	Total Adjustments	-3.600	33.386	
(U)	Congressional Program Reductions			
	Congressional Rescissions	-0.050	-1.014	
	Congressional Increases		34.400	
	Reprogrammings	-2.055		
	SBIR/STTR Transfer	-1.495		

(U) Significant Program Changes:

In FY 2007, Project 77SP, Advanced Space Materials, efforts will be transferred from PE 0603500F, Multidisciplinary Space Technology, Project 5032, Advanced Space Materials, in order to more effectively manage and provide oversight of the efforts.

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: **0603112F Advanced Materials for Weapon Systems**

PROJECT NUMBER AND TITLE: **2100 Laser Hardened Materials**

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
2100 Laser Hardened Materials	22.836	28.040	33.624	28.583	31.023	31.667	32.262	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced materials technologies that enhance protection for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in threat environments. Advanced materials technologies are also developed and demonstrated to enhance protection for Air Force sensor systems to ensure safety, survivability, and operability in threat environments.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced materials technologies that enhance hardening for sensors, avionics, and components to increase survivability and mission effectiveness of aerospace systems. Note: Increase in FY 2006 and out is due to an increased emphasis on sensor protection. This effort includes Congressional Add funding of $1.5 million in FY 2005 and $2.6 million in FY 2006 for Large Panel Sapphire Producability.	12.438	21.104	26.487
(U) In FY 2005: Demonstrated hardening options that can be incorporated into selected electro-optical sensor systems. Initiated hardening development for multispectral and hyperspectral sensor systems.			
(U) In FY 2006: Develop a mid-wavelength infrared testbed based on a candidate optical system. Evaluate solid state limiter materials having potential for dual band operation. Evaluate jamming and damage phenomenologies for large format charge coupled devices (CCD).			
(U) In FY 2007: Mature hardening technology and develop a hardened candidate system. Develop candidate dual band limiter materials. Develop protection strategies for large format CCDs.			
(U)			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced materials technologies that enhance protection for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a threat environment. Note: This effort includes Congressional Add funding of $1.7 million in FY 2005 for Plasma Enhanced Chemical Vapor Deposition for Advanced Laser Program.	10.398	6.936	7.137
(U) In FY 2005: Transitioned candidate materials technology advancements to improve performance of daytime statistical filter technology. Demonstrated night vision goggle (NVG) compatible peripheral protection eyewear. Characterized the performance of breadboard panoramic NVG (PNVG)/NVG systems incorporating agile filter technology. Developed agile filter and optical limiter technologies.			
(U) In FY 2006: Develop and characterize an NVG brassboard system using state-of-the-art agile filters and optical power limiters. Continue to develop agile filter and optical limiter technologies.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE 2100 Laser Hardened Materials

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

	FY 2005	FY 2006	FY 2007
(U) In FY 2007: Demonstrate brassboard performance using state-of-the-art agile filters and optical power limiters. Characterize and incorporate agile filter and optical limiter technologies into devices for Air Force applications.			
(U) Total Cost	22.836	28.040	33.624

(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) Related Activities:									
(U) PE 0602102F, Materials.									
(U) PE 0602202F, Human Effectiveness Applied Research.									
(U) PE 0603231F, Crew Systems and Personnel Protection Technology.									
(U) PE 0603500F, Multi-Disciplinary Advanced Development Space Technology.									
(U) PE 0604706F, Life Support Systems.									
(U) This project has been coordinated through the Tri-Service Laser Hardened Materials and Structures Group and the Joint Service Agile Laser Eye Protection Program.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification		DATE: February 2006
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE: 3153 Non-Destructive Inspection Development

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
3153	Non-Destructive Inspection Development	6.262	12.516	3.945	3.990	4.332	4.414	4.483	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Funds for the FY 2006 Congressionally-directed Non-Destructive Testing (NDI) Corrosion Detection in the amount of $1.0 million are in the process of being moved to PE 0603112F, Advanced Materials for Weapon Systems, from PE 0605011F, RDT&E for Aging Aircraft, respectively, for execution.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced nondestructive inspection/evaluation (NDI/E) technologies to monitor performance integrity and to detect failure causing conditions in weapon systems components and materials. NDI/E capabilities greatly influence and/or limit many design, manufacturing, and maintenance practices. This project provides technology to satisfy Air Force requirements to extend the lifetime of current systems through increased reliability and cost-effectiveness at field and depot maintenance levels. Equally important is assuring manufacturing quality, integrity, and safety requirements.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate advanced technologies to improve capabilities to inspect for cracks and other damage to extend the total safe life of turbine engines.	1.292	1.042	0.891
(U) In FY 2005: Developed methods to detect and characterize damage in repaired (linear friction welded) turbine engine components. Demonstrated enhanced NDI/E approaches to extend the life of fracture-critical gas turbine engine components.			
(U) In FY 2006: Demonstrate methods to detect and characterize damage in repaired (linear friction welded) turbine engine components. Validate enhanced NDI/E approaches to extend the life of fracture-critical gas turbine engine components.			
(U) In FY 2007: Transition methods to detect and characterize damage in repaired (linear friction welded) turbine engine components. Transition enhanced NDI/E approaches to extend the life of fracture-critical gas turbine engine components.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate advanced inspection technologies supporting low-observable (LO) systems to enhance affordability and ensure full performance and survivability.	0.898	0.624	0.315
(U) In FY 2005: Developed a portable diagnostic probe that is broadband and will provide complex electromagnetic material properties. Developed a portable, multifunctional, multi-platform diagnostics tool for use in battle damage repair of LO materials and structures.			
(U) In FY 2006: Develop and demonstrate a portable, multifunctional, multi-platform diagnostics tool for use in battle damage assessment and repair of LO materials and structures.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603112F Advanced Materials for Weapon Systems**	PROJECT NUMBER AND TITLE **3153 Non-Destructive Inspection Development**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2007: Transition a portable, multifunctional, multi-platform diagnostics tool for use in battle damage assessment and repair of LO materials and structures.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced technologies for improved capabilities in materials corrosion, fatigue monitoring, and testing of aging aircraft to reduce operations and maintenance costs. These technologies will contribute to full operability and safety of the aircraft fleet. Note: This effort includes Congressional Add funding of $1.2 million in FY 2005 for Quantitative Inspection Techniques for Assessing Aging of Military Aircraft and $6.9 million in FY 2006 ($2.1 million for Assessing Aging Military Aircraft and $4.8 million for Aging Military A/C Fleet Support at National Institute for Aviation Research).	2.322	8.022	1.343
(U)	In FY 2005: Transitioned advanced technologies for improved capabilities in detection and characterization of corrosion of joints in aging aircraft. Demonstrated advanced methods such as magneto-resistive arrays to detect cracks in multiple layers to meet aging aircraft life extension requirements.			
(U)	In FY 2006: Transition advanced electromagnetic techniques to detect cracks in multiple layers to meet aging aircraft life extension requirements. Identify and develop application-focused NDI/E technologies to meet emerging inspection requirements for aging aircraft.			
(U)	In FY 2007: Demonstrate application-focused NDI/E technologies to meet emerging inspection requirements for aging aircraft.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced systems status monitoring technologies to provide on-board and embedded sensing to gain continuous awareness of the state of key subsystems. Note: This effort includes Congressional Add funding of $1.6 million in FY 2005 ($1.1 million for Materials Integrity Management Research and $0.5 million for Continuous Integrated Vehicle Health Monitoring System) and $2.0 million in FY 2006 ($1.0 million for Materials Integrity Management Research for AF and $1.0 million for Continuous Integrated Vehicle Monitoring System).	1.750	2.828	1.396
(U)	In FY 2005: Developed sensors to monitor real-time health of high-temperature protection systems. Developed smart sensor technologies for wiring health analysis. Developed novel field-level inspection tools for assessing the structural health of airframes.			
(U)	In FY 2006: Continue development of sensors to monitor real-time health of high-temperature protection systems. Continue development of smart sensor technologies for wiring health analysis. Continue development of field-level inspection tools for assessing the structural health of airframes.			
(U)	In FY 2007: Validate optimal sensing approaches for real-time health monitoring of high-temperature protection systems and characterize power scavenging and signal transmission issues. Validate smart sensor technologies for			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE 3153 Non-Destructive Inspection Development

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

	FY 2005	FY 2006	FY 2007
wiring health analysis. Validate field-level inspection tools for assessing the structural health of airframes.			
(U) Total Cost	6.262	12.516	3.945

(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) Related Activities:

(U) PE 0602102F, Materials.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE: 3946 Materials Transition	

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
3946 Materials Transition	25.694	23.128	3.911	3.958	4.241	4.300	4.300	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Funds for the FY 2006 Congressionally-directed Hybrid Bearing in the amount of $2.1 million and Design Manual for Titanium Honeycomb Sandwich Composite in the amount of $3.3 million are in the process of being moved to PE 0602203F, Aerospace Propulsion, and to PE 0603211F, Aerospace Technology Dev/Demo, respectively, from PE 0603112F, Advanced Materials for Weapon Systems, for execution. Funds for the FY 2006 Congressionally-directed Room Temperature Nanocrystalline Diamond Coating for De-Icing in the amount of $1.0 million are in the process of being moved to PE 0603112F, Advanced Materials for Weapon Systems, from PE 0401318F, CV-22, for execution.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced materials and processing technologies for fielded and planned Air Force weapon, airframe, and propulsion applications. Advanced materials and processes that have matured beyond applied research are characterized, critical data are collected, and critical evaluations in the proposed operating environment are performed. These design and scale-up data improve the overall affordability of promising materials and processing technologies, providing needed initial incentives for their industrial development.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced materials and processing technologies for air vehicles and subsystems to enhance the lift, propulsion, low-observable performance, and overall affordability of air vehicles. Note: This effort includes Congressional Add funding of $17.9 million in FY 2005 ($7.5 million for the Metals Affordability Initiative, $1.4 million for Advanced Composite Processes, $1.5 million for Transparent Conductive Polymer Technology Development, $3.0 million for Titanium Matrix Composites, $3.5 million for Stealth RAM Coatings, and $1.0 million for Ultra-Lightweight Composites for Ballistic and Bomb Protection) and $12.2 million in FY 2006 ($1.2 million for Reduced Composite Manufacturing Costs Through the Application of Advanced Textile Technology, $5.0 million for Metals Affordability Initiative, $1.5 million for Transparent Conductive Polymer Technology Development, $1.0 million for Advanced Composite Processes for Unmanned Aerial Vehicles (UAVs), $1.0 million for Ultra-Lightweight Composites, and $2.5 million for Stealth RAM Coatings).	22.207	16.555	3.389

(U) In FY 2005: Developed and demonstrated reliable life extension capabilities for turbine engine rotors. Demonstrated a high temperature composite for turbine engine components. Validated performance of ceramic composite materials for exhaust components in a turbine engine environment. Developed and characterized advanced materials and materials process capabilities for ultra-lightweight, ultra-high power generation for airborne directed energy weapons. Developed materials and their suitability for a mid-infrared laser source enabling aircraft infrared countermeasures. Validated and transitioned improved materials and inspection tools/processes for LO systems to enable higher mission capable rates.

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603112F Advanced Materials for Weapon Systems**	PROJECT NUMBER AND TITLE **3946 Materials Transition**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2006: Develop materials-damage predictive approaches for engine health determination and life extension capability. Transition reliable life extension capability for turbine engine rotors. Continue development and demonstration of high temperature composites for turbine engine applications and initiate transition of these materials to relevant platforms. Scale-up advanced materials and initiate scale-up of fabrication processes to increase the capabilities of coated conductors for ultra-lightweight, ultra-high power generation for airborne directed energy weapons. Evaluate materials properties for a mid-infrared laser source enabling aircraft countermeasures and integrate best material improvement methods. Investigate primer/sealer material for improved durability of LO materials in fluid contaminated areas on emerging fighter aircraft. Develop flexible/lightweight conductive gap filler for LO aircraft. Develop processes for removal of radar absorbing material on large aircraft areas. Develop hot-melt conductive fastener fill. Improve processing of room-temperature-storable radar absorbing structure repair materials. Develop nondestructive evaluation tool for limited access areas on aircraft.			
(U)	In FY 2007: Develop materials-damage predictive approaches for engine health determination and life extension capability. Complete transition of high-temperature organic matrix composites for turbine engine components. Characterize advanced materials and materials process capabilities for scaled-up processing techniques and assess process repeatability for power generation materials for airborne directed energy weapons. Demonstrate functionality of integrated methods for a mid-infrared laser source enabling aircraft countermeasures. Demonstrate flexible/lightweight conductive gap filler. Evaluate processes for removal of radar absorbing material on large aircraft areas. Demonstrate primer/sealer material for improved durability of LO materials in fluid contaminated areas on emerging fighter aircraft. Evaluate improved processing of room-temperature-storable radar absorbing structure repair materials. Demonstrate nondestructive evaluation tool for limited access areas on aircraft.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced materials and processing technologies to enhance the sustainability of Air Force aerospace systems by lowering operations and maintenance costs and ensuring the full operability and safety of systems and personnel. Note: This effort includes Congressional Add funding of $2.8 million in FY 2005 for Fast Field Repair of Coated Aircraft and Equipment and $1.0 million in FY 2006 for Coated Field Repair.	3.487	1.250	0.522
(U)	In FY 2005: Demonstrated corrosion resistant coatings and corrosion prevention compounds for aging aircraft structures applications. Developed test methodologies and evaluation techniques to determine durability and characterize failure mechanisms of hybrid structures in UAVs.			
(U)	In FY 2006: Develop test methodologies and evaluation techniques to facilitate transition of emerging materials and processes for sustainment of Air Force systems.			
(U)	In FY 2007: Continue to develop test methodologies and evaluation techniques to facilitate transition of emerging			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE 3946 Materials Transition

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	materials and processes for sustainment of Air Force systems.			
(U)				
(U)	CONGRESSIONAL ADD: Design Manual for Titanium Honeycomb Sandwich Composite.	0.000	3.253	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Design Manual for Titanium Honeycomb Sandwich Composite.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Hybrid Bearing.	0.000	2.070	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Hybrid Bearing.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	25.694	23.128	3.911

(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) Related Activities:									
(U) PE 0602102F, Materials.									
(U) PE 0603203F, Advanced Aerospace Sensors.									
(U) PE 0603211F, Aerospace Technology Dev/Demo.									
(U) PE 0603216F, Aerospace Propulsion and Power Technology.									
(U) PE 0603500F, Multi-Disciplinary Advanced Development Space Technology.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE 3946 Materials Transition

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

eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE: 4918 Deployed Air Base Demonstrations	

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
4918 Deployed Air Base Demonstrations	6.513	6.416	2.305	2.344	2.544	2.596	2.645	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced, rapidly deployable airbase technologies that reduce airlift and manpower requirements, setup times, and sustainment costs, and improve protection and survivability of deployed Air Expeditionary Force (AEF) warfighters. Affordable, efficient technologies are developed and demonstrated to provide deployable infrastructure, advanced weapon system support, force protection, and fire fighting capability for deployed AEF operations.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST/CONGRESSIONAL ADD: Demonstrate and transition advanced rapidly deployable airbase infrastructure technologies that reduce airlift and manpower requirements, setup times, and sustainment costs in support of AEF operations. Note: This effort includes Congressional Add funding of $4.5 million in FY 2005 ($3.4 million for Plasma Arc/Waste to Energy Production and $1.1 million for Advanced Polymer Technology for Agile Combat Support) and $1.7 million in FY 2006 for Hydrothermal Oxidation.	5.475	2.765	1.152
(U) In FY 2005: Developed a 10 kW fuel cell power system that improves deployable power systems performance and reduces airlift requirements for support of AEF operations. Demonstrated rapid airfield assessment technologies that improve deployable systems performance and reduce airlift requirements for support of AEF operations.			
(U) In FY 2006: Demonstrate a 10 kW fuel cell power system that improves deployable power systems performance. Demonstrate packed bed fuel treatment technology to remove sulfur and integrate with both proton exchange membrane fuel cell and solid oxide fuel cell stacks. Develop advanced integrated shelter power/heating, ventilation, and air conditioning concepts that will integrate fuel cell, solar, and heat pump technologies into a highly efficient compact system that can provide total energy and air conditioning requirements for individual deployable shelters. Develop continuous load deflection technology and improved crater/spall repair materials and methodologies for improved airfield assessment and rapid repair.			
(U) In FY 2007: Demonstrate a 10 kW fuel cell power system that improves deployable power systems performance. Demonstrate packed bed fuel treatment technology. Demonstrate advanced integrated shelter power/heating, ventilation, and air conditioning concept. Continue to develop continuous load deflection technology and improved crater/spall repair materials and methodologies for improved airfield assessment and rapid repair.			
(U)			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Demonstrate and transition affordable, efficient technologies to provide force protection and fire fighting capability for deployed AEF operations. Note: This effort includes Congressional Add funding of $2.6 million in FY 2006 for XD-2 Explosives Detection System.	1.038	3.651	1.153

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE 4918 Deployed Air Base Demonstrations

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

		FY 2005	FY 2006	FY 2007
(U)	In FY 2005: Demonstrated deployable protective and advanced blast suppression technologies to protect deployed warfighters. Demonstrated a reduced-size full-capability fire fighting vehicle for deployed operations. Developed improved fire fighter safety technologies. Developed advanced air filtration technologies for expeditionary structures.			
(U)	In FY 2006: Demonstrate improved blast suppression technologies and fragmentation protection materials for new and existing structures. Initiate demonstration of explosive storage protective technologies. Demonstrate improved fire fighter safety technologies. Continue development of advanced air filtration technologies for expeditionary structures.			
(U)	In FY 2007: Continue demonstrating improved blast suppression technologies and fragmentation protection materials for new and existing structures and for explosive storage facilities. Complete demonstration of improved fire fighter safety technologies and transition technology to operational units. Initiate an integrated crash/rescue fire fighting demonstration. Integrate air filtration technologies into demonstration for expeditionary structures.			
(U)	Total Cost	6.513	6.416	2.305

(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) Related Activities:									
(U) PE 0602102F, Materials.									
(U) PE 0603287F, Physical Security Equipment.									
(U) PE 0604617F, Agile Combat Support.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: **February 2006**

BUDGET ACTIVITY: **03 Advanced Technology Development (ATD)**

PE NUMBER AND TITLE: **0603112F Advanced Materials for Weapon Systems**

PROJECT NUMBER AND TITLE: **77SP Advanced Space Materials**

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
77SP Advanced Space Materials	0.000	0.000	5.116	4.644	3.325	3.389	3.448	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2007, Project 77SP, Advanced Space Materials, efforts will be transferred from PE 0603500F, Multidisciplinary Space Technology, Project 5032, Advanced Space Materials, in order to more effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates materials and processing technologies for transition into Air Force space systems. Materials and processes development is scaled up to the appropriate level to demonstrate materials capability in the relative environment. Sub-scale components and nonstructural material components are developed and demonstrated to validate expected materials characteristics. Critical data on both structural and nonstructural materials is developed and provided for engineering and system design decisions. Laser hardened materials technologies are developed, demonstrated, and transitioned for the broadband protection of space sensors from a variety of laser threats. Reducing risk in materials technology improves the affordability, reliability, survivability, and operational performance of current and future space systems.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate advanced materials and processing technologies to enable revolutionary improvements in the performance of air-breathing and rocket-based aerospace vehicles and weapons.	0.000	0.000	5.116
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Develop advanced materials approaches to provide durable, maintainable high-temperature protection systems for leading edge applications on high-speed, reusable launch, and future reentry vehicle concepts. For management of the thermal and structural loads, combinations of candidate materials, including organic matrix composites, ceramics, metals, carbon foams, aerogels, heat pipes, and phase change materials, will be investigated. Develop advanced ceramic materials and processing technologies for load bearing structures designed for high-temperature, multi-cycle applications in an oxidizing environment. Develop rocket propulsion materials for liquid and solid rocket engine components and validate performance in scaled component demonstrations.			
(U) Total Cost	0.000	0.000	5.116

(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) Not Applicable.									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603112F Advanced Materials for Weapon Systems**	PROJECT NUMBER AND TITLE **77SP Advanced Space Materials**

(U) D. Acquisition Strategy

Not Applicable.