PE NUMBER: 0602102F
PE TITLE: Materials

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2006

BUDGET ACTIVITY: 02 Applied Research

PE NUMBER AND TITLE: 0602102F 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
	Total Program Element (PE) Cost	117.460	121.451	111.073	116.564	118.397	119.912	121.275	Continuing	TBD
01SP	Space Materials Development	0.000	0.000	26.611	35.959	38.260	39.077	39.868	Continuing	TBD
4347	Materials for Structures, Propulsion, and Subsystems	71.274	74.572	45.264	47.907	45.656	46.006	46.260	Continuing	TBD
4348	Materials for Electronics, Optics, and Survivability	21.763	19.260	18.119	12.630	13.324	13.466	13.612	Continuing	TBD
4349	Materials Technology for Sustainment	17.365	16.817	18.417	17.516	18.456	18.631	18.774	Continuing	TBD
4915	Deployed Air Base Technology	7.058	10.802	2.662	2.552	2.701	2.732	2.761	Continuing	TBD

Note: In FY 2007, Project 01SP, Space Materials Development, efforts will transfer from PE 0602500F, Multidisciplinary Space Technology, Project 5025, Space Materials Development, in order to more effectively manage and provide oversight of the efforts. Funds for the FY 2006 Congressionally-directed Carbon Nanostructured Material for Fluid Purification in the amount of $5.0 million are in the process of being moved to PE 0602202F, Human Effectiveness Applied Research, from PE 0602102F, Materials, for execution. Funds for the FY 2006 Congressionally-directed Fully-Integrated Solar-Powered Interior Lighting Technology in the amount of $1.0 million are in the process of being moved to PE 0602102F, Materials, from PE 0601102F, Defense Research Sciences, for execution.

(U) A. Mission Description and Budget Item Justification

This program develops advanced materials, processing, and inspection technologies to reduce life cycle costs and improve performance, affordability, supportability, reliability, and survivability of current and future Air Force systems and operations. The program has four projects that develop: (1) structural, propulsion, and sub-systems materials and processes technologies; (2) electronic, optical, and survivability materials and processes technologies; (3) sustainment materials, processes technologies, and advanced non-destructive inspection methodologies; and (4) air base operations technologies including deployable base infrastructure, force protection, and fire fighting capabilities. Note: In FY 2006, Congress added $1.0 million for Polymer Nanocomposites as Future Materials for Defense and Energy Applications, $1.4 million for Computational Tools for Materials Development, $2.0 million for Domestic Titanium Powder Manufacturing Initiative, $3.2 million for Power Electronics Reliability, $2.25 million for Domestic High Modulus Polyacrylonitrile (PAN) Carbon Fiber Qualification Initiative, $2.1 million for Large Area, Advanced Physical Vapor Transport (APVT) Materials for Hi-Powered Devices, $1.7 million for Safer Nanomaterials and Nanomanufacturing, $1.4 million for Blast Resistant Barriers for Homeland Defense, $1.0 million for Advanced Materials Deposition for Semiconductor, $1.0 million for Advanced Manufacturing Technologies for Metals, Composites, Materials, $3.5 million for Air Force Minority Leaders Program, $5.0 million for Carbon Nanostructured Material for Fluid Purification, $1.0 million for Complex Composite Structures for Manned-Unmanned Air Vehicles, $1.5 million for Innovative Process for Continuous Fabrication of Carbon Nanotube Membranes, $1.0 million for Durable Hybrid Coatings for Aircraft Systems, $1.1 million for Engineered Optical Materials for High Energy Laser Development, $1.0 million for Nanoparticle Materials Coatings Research, $11.0 million for Strategic Partnership for Research in Nanotechnology, $2.1 million for Thermal Sprays for Structural Protection, $1.8 million for Minority LEADERS Research Program, $1.0 million for Nano Organic Polymer Materials: Dynamic Camouflage, $1.0 million for Chrome-Free Environmentally Friendly Corrosion Protection for Aircraft, and $1.0 million for Nanomaterials Commercialization Center of Pennsylvania. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials

technologies.

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

		FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	119.498	74.156	78.620
(U)	Current PBR/President's Budget	117.460	121.451	111.073
(U)	Total Adjustments	-2.038	47.295	
(U)	Congressional Program Reductions			
	Congressional Rescissions	-0.092	-1.755	
	Congressional Increases		49.050	
	Reprogrammings			
	SBIR/STTR Transfer	-1.946		

(U) Significant Program Changes:

In FY 2007, Project 01SP, Space Materials Development, efforts will transfer from PE 0602500F, Multidisciplinary Space Technology, Project 5025, Space Materials Development, 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: **02 Applied Research**

PE NUMBER AND TITLE: **0602102F Materials**

PROJECT NUMBER AND TITLE: **01SP Space Materials 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
01SP Space Materials Development	0.000	0.000	26.611	35.959	38.260	39.077	39.868	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2007, Project 01SP, Space Materials Development, efforts will transfer from PE 0602500F, Multidisciplinary Space Technology, Project 5025, Space Materials Development, in order to more effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project develops the materials and processing technology base for spacecraft and launch systems to improve affordability, maintainability, and performance of current and future Air Force space systems. Families of affordable lightweight materials are being developed, including metals, polymers, ceramics, metallic composites, and nonmetallic composites to provide new capabilities for spacecraft, ballistic missile, and propulsion systems to meet the future space requirements. Rocket propulsion materials development in this project supports the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) program. Advanced high-temperature protection materials are being developed that are affordable, lightweight, dimensionally stable, thermally conductive, and/or ablation and erosion resistant to meet space and ballistic missile requirements. Materials technologies are also being developed to enable surveillance and terrestrial situational awareness systems and subsystems for space and ballistic missile applications.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop materials and processes to dramatically improve performance, durability, and cost of rocket propulsion systems.	0.000	0.000	11.500
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Develop new candidate materials and improved processing techniques to ensure more consistent material characteristics to meet the next level of performance goals for high-speed turbopump housings and turbines, ducts, valves, solid rocket casings, insulation, and nozzle throats. Evaluate performance of subscale test components in representative rocket engine environment. Continue analysis of material behavior in rocket combustion environment. Demonstrate innovative high-temperature metal, ceramic, and composite material candidates for solid rocket nozzles, exit cones, throats, and spacecraft propulsion components. Validate material models for direct replacement of materials. Scale-up testing from coupon level to more complex shapes and sizes. Fabricate subscale components. Incorporate innovative materials and concepts on demonstrator engines. Identify materials characteristics required to meet advanced performance and cost goals. Improve and optimize selected materials, test sub-elements, and sub-components for thrust chambers, nozzles, and catalysts.			
(U)			
(U) MAJOR THRUST: Develop affordable, advanced structural and non-structural materials and processing technologies for Air Force space applications.	0.000	0.000	11.008
(U) In FY 2005: Not Applicable.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials	PROJECT NUMBER AND TITLE 01SP Space Materials Development

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Validate initial material design concept of candidate metallic systems for thin gage structures for component operation in robust high-temperature, long duration cruise, or access to space environments. Continue analysis of research results and develop knowledge base on liquid oxygen compatibility with National Aeronautics and Space Administration (NASA) and industry. Evaluate large integrated concepts using composite materials in cryogenic environments and provide expertise for design and assessment of structural cryogenic tanks. Demonstrate high-temperature protection systems for expendable and reusable high-speed vehicle applications in collaboration with industry. Validate oxidation protection schemes for carbon-carbon materials for high-speed vehicle applications. Develop multifunctional nano-tailored composite technologies for space system capabilities and evaluate enhancements obtained. Continue to develop wear-resistant materials, lubricants, and Micro-Electro-Mechanical System (MEMS) devices for moving mechanical assemblies on spacecraft. Continue to evaluate candidate space materials and collect critical data to facilitate materials transition.			
(U)				
(U)	MAJOR THRUST: Develop materials and materials processing technologies to enable improved performance and affordability of surveillance, tracking, targeting, and situational awareness systems.	0.000	0.000	4.103
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Initiate development of nano-photonic materials for high performance optoelectronic devices for optical communications and system control architectures. Validate processes and develop process control methodology to enable very long wavelength infrared detection. Continue to develop suitable materials and materials process technologies for application in combined optical and radio frequency communication system apertures. Initiate research in nano-photonic materials for applications in very high bandwidth communications and modulators, laser communications, and radar.			
(U)	Total Cost	0.000	0.000	26.611

(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.									

(U) D. Acquisition Strategy

Not applicable.

Exhibit R-2a, RDT&E Project Justification			DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials	PROJECT NUMBER AND TITLE 4347 Materials for Structures, Propulsion, and Subsystems	

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
4347	Materials for Structures, Propulsion, and Subsystems	71.274	74.572	45.264	47.907	45.656	46.006	46.260	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Funds for the FY 2006 Congressionally-directed Fully-Integrated Solar-Powered Interior Lighting Technology in the amount of $1.0 million are in the process of being moved to PE 0602102F, Materials, from PE 0601102F, Defense Research Sciences, for execution.

(U) A. Mission Description and Budget Item Justification

This project develops the materials and processing technology base for aircraft and missiles to improve affordability, maintainability, and performance of current and future Air Force systems. A family of affordable lightweight materials is being developed, including metals, polymers, ceramics, metallic composites, and nonmetallic composites to provide upgraded capabilities for existing aircraft, missile, and propulsion systems to meet the future system requirements. Develops high-temperature turbine engine materials that will enable engine designs to double the turbine engine thrust to weight ratio. Advanced high temperature protection materials are being developed that are affordable, lightweight, dimensionally stable, thermally conductive, and/or ablation and erosion resistant to meet aerospace and missile requirements. Alternative or replacement materials are being developed to maintain the performance of aging operational systems. Friction and wear-resistant materials, paints, coatings, and other pervasive nonstructural materials technologies are being developed for propulsion and subsystems on aircraft, spacecraft, and missiles. Concurrently develops advanced processing methods to enable adaptive processing of aerospace materials.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop ceramics and ceramic matrix composite technologies for revolutionary performance and supportability improvements in advanced propulsion systems and high temperature aerospace structures.	5.738	4.077	3.833

(U) In FY 2005: Developed damage resistant advanced ceramic composites for high friction and fracture-prone environments. Tested tip rub tolerant concepts for ceramic blades. Updated the advanced ceramic composites life prediction model to permit prediction of its durability under stress gradients, temperature gradients, and long-term thermal exposure. Fabricated and tested integrally cooled ceramic composite sub-elements and small components. Developed laboratory-scale advanced fiber-matrix interface concepts, optimizing the robustness of these state-of-the-art ceramic composites in severe environments.

(U) In FY 2006: Design, fabricate, and test advanced ceramic composite coupons and sub-elements for demonstration of durability. Expand the ceramic composite life prediction model to account for complex component shapes and apply to complex turbine component shapes. Develop material/component acceptance criteria. Validate advanced weaving and design methodology of integrally cooled ceramic composites by designing, fabricating, and testing an annular trapped vortex combustor. Scale up advanced fiber-matrix interface coating concepts and apply to state-of-the-art ceramic composites.

(U) In FY 2007: Demonstrate advanced ceramic composite performance through testing under real and simulated engine

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4347 Materials for Structures, Propulsion, and Subsystems**

(U) **B. Accomplishments/Planned Program ($ in Millions)**	FY 2005	FY 2006	FY 2007
service life conditions. Incorporate environmental degradation analysis into the ceramic composite life prediction model to address time dependent degradation associated with environmental exposure and validate the model. Demonstrate the severe environment durability of advanced ceramic composite systems with advanced interfaces via mechanical testing.			
(U)			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop enabling polymeric materials for diverse aerospace structural applications including enhanced aircraft canopies, micromechanical devices, advanced wiring concepts, and improved low-observable platforms. Note: This effort includes Congressional Add funding of $13.0 million in FY 2005 ($2.5 million for ONAMI Safer Nanomaterials and Nanomanufacturing and $10.5 million for Strategic Partnership for Research in Nanotechnology) and $16.2 million in FY 2006 ($1.0 million for Polymer Nanocomposites as Future Materials for Defense and Energy Applications, $1.7 million for Safer Nanomaterials and Nanomanufacturing, and $1.5 million for Innovative Process for Continuous Fabrication of Carbon Nanotube Membranes, $11.0 million for Strategic Partnership for Research in Nanotechnology, and $1.0 million for Nano Organic Polymer Materials: Dynamic Camouflage).	16.971	19.815	5.633
(U) In FY 2005: Established the enhanced performance of nanostructured polymeric materials for gas and fluid containment. Developed techniques and materials for nanoscale architectures to address advanced Air Force conducting, structural, and electromechanical applications. Completed development of a hybrid thin wire making process. Completed development of Two Photon Absorbing (TPA) polymer materials for night vision goggle and sensor protection applications. Tested the durability of waterborne conductive nanocomposites. Enhanced conductive polymeric nanocomposites for use in elimination of secondary conductive coatings for aircraft lightning strike protection. Demonstrated the feasibility of lightweight radio frequency polymer substrates for reduced aperture size, conformal radar, and antenna systems.			
(U) In FY 2006: Continue to develop techniques and materials for nanoscale architectures to address advanced Air Force conducting, structural, and electromechanical applications. Develop second-generation TPA materials for night vision goggle and optical limiting applications. Investigate use of photonic crystals to enhance second- and third-order nonlinear optical properties for use in optical limiting applications. Demonstrate improved life for Air Force aircraft tires by incorporation of nanostructured polymeric materials. Validate aromatic hyperbranched polymers as viscosity-lowering additives for structural component manufacture via solvent-free processes. Investigate microfabrication of organic-inorganic nanophotonic structures that have the potential to impact Air Force electromagnetic applications for reduced aperture size, conformal radar, and antenna systems. Begin development of adaptive (shape memory and actuator) materials based on polymer nanocomposites for adaptive aircraft structures, wings, fins, antennas, and mirrors. Scale up improved polymer proton exchange membranes for high efficiency, long			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4347 Materials for Structures, Propulsion, and Subsystems**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	life, lightweight, fuel cell applications. Demonstrate polymer photovoltaic materials for high efficiency, long life, lightweight, solar cell applications.			
(U)	In FY 2007: Continue to develop techniques and materials for nanoscale architectures to address advanced Air Force conducting, structural, and electromechanical applications. Continue to develop second-generation TPA materials for night vision goggle and optical limiting applications. Demonstrate optical limiting with improvements in nonlinear optical properties using photonic crystals. Demonstrate improved life nanostructured aircraft tires. Demonstrate aromatic hyperbranched polymers as rheology-modifying additives for structural component manufacture via resin transfer molding processes. Demonstrate organic-inorganic nanostructured materials for Air Force electromagnetic applications. Continue development of adaptive (shape memory and actuator) materials based on polymer nanocomposites for adaptive aircraft structures, wings, fins, antennas, and mirrors. Demonstrate polymer proton exchange membranes for Air Force fuel cell applications. Demonstrate polymer photovoltaic materials for high efficiency, long life, lightweight, solar cell applications.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop affordable lightweight metallic materials, behavior and life prediction technologies, higher temperature intermetallic alloys, and metals processing technology to enable enhanced performance, lower acquisition costs, increased durability, and improved reliability for Air Force weapon systems. Note: This effort includes Congressional Add funding of $10.0 million in FY 2005 ($3.5 million for Advanced Manufacturing Technologies for Metals, Composites (UMR), $2.0 million for Domestic Titanium Powder Manufacturing Initiative, $2.5 million for Titanium Matrix Composites, $1.0 million for Computational Tools for Materials Development, and $1.0 million for Optimal Design of Materials Processes) and $4.4 million in FY 2006 ($1.0 million for Advanced Manufacturing Technologies for Metals, Composites, Materials, $2.0 million for Domestic Titanium Powder Manufacturing Initiative, and $1.4 million for Computational Tools for Materials Development).	22.408	19.252	17.315
(U)	In FY 2005: Developed reliable life extension capabilities for turbine engine rotors. Evaluated performance of high-temperature structural materials through preliminary certification testing and/or ground-based engine rig testing. Initiated concept identification of advanced metallic materials for enhanced performance propulsion for air platforms with an emphasis on higher temperature capability. Developed and matured computational methods of modeling mechanical properties to metal suppliers and vendors to enable cost and schedule savings due to reduced amount of proof and release testing. Evaluated processes and protocols for unitized manufacturing of aerospace components.			
(U)	In FY 2006: Demonstrate reliable life extension capability for turbine engine rotors. Explore materials-damage predictive approaches for engine health determination and life extension capability. Explore advanced metallic materials for enhanced performance propulsion for air platforms with an emphasis on higher temperature capability.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4347 Materials for Structures, Propulsion, and Subsystems**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	Explore computational methods supporting development and processing to reduce costs to accelerate insertion of advanced metals into Air Force systems. Continue the identification of processes and protocols for unitized manufacturing of aerospace components.			
(U)	In FY 2007: Develop materials-damage predictive approaches for engine health determination and life extension capability. Continue exploration of advanced metallic materials for enhanced performance propulsion for air platforms with an emphasis on higher temperature capability. Develop computational methods supporting development and processing to reduce costs to accelerate insertion of advanced metals into Air Force systems. Demonstrate processes and protocols for unitized manufacturing of aerospace components.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop affordable, advanced organic matrix composite structural materials and technologies for Air Force systems applications including lightweight structures for aerospace subcomponents and other structures requiring thermal and/or structural management for environmental control. Note: This effort includes Congressional Add funding of $8.5 million in FY 2005 ($1.0 million for Cost-Effective Composite Materials for Manned and Unmanned Flight Structures, $1.1 million for Materials Science Laboratory, $3.6 million for Nanostructured Materials for Advanced Air Systems, and $2.8 million for Wright Brothers Institute - Nanostructured Materials for Advanced Air Force Systems) and $3.25 million in FY 2006 ($1.0 million for Complex Composite Structures for Manned-Unmanned Air Vehicles and $2.25 million for Domestic High Modulus PAN Carbon Fiber Qualification Initiative).	16.721	13.096	9.790
(U)	In FY 2005: Developed life prediction capabilities for high temperature turbine engines and airframe hot structures. Optimized materials and processing scale-up of high temperature organic matrix composites for affordable turbine, aircraft structures, and high-speed vehicle applications. Developed materials and processes for nanomaterials as matrix additives and/or high performance composites with tailored and multi-functional capabilities. Tested materials and processes at the subcomponent level for improved reliability and performance for thermal management applications.			
(U)	In FY 2006: Continue development of life prediction capabilities for high temperature turbine engine and airframe hot structures. Demonstrate high temperature organic matrix composites onto relevant DoD platforms. Investigate and assess future requirements for material development as applied to next generation high-speed vehicle applications. Continue development of materials and processes for nanotailored composites with multifunctional capabilities. Initiate nanomaterial modeling efforts. Continue demonstration of novel materials and processes that enhance the reliability and performance of thermal management subsystems.			
(U)	In FY 2007: Demonstrate tools and methodologies required for life prediction of materials in high temperature turbine engine and airframe structures environments. Continue demonstration of high temperature organic matrix			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4347 Materials for Structures, Propulsion, and Subsystems**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	composites onto relevant DoD platforms. Initiate new material development and affordable processing for space and high-speed vehicle applications. Continue development of new materials and processes for nanotailored composites with multifunctional capabilities. Continue nanomaterial modeling and technology efforts. Continue development and demonstration of advanced material concepts and processes for thermal management applications.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop nonstructural materials for fluids, lubricants, aircraft topcoat and corrosion resistant coatings, and specialty treatments to improve system performance and reduce life cycle costs. Note: This effort includes Congressional Add funding of $1.0 million in FY 2005 for Durable Hybrid Coatings for Aircraft Systems and $3.0 million in FY 2006 ($1.0 million for Durable Hybrid Coatings for Aircraft Systems, $1.0 million for Nanoparticle Materials Coatings Research, and $1.0 million Chrome-Free Environmentally Friendly Corrosion Protection for Aircraft).	9.436	12.122	8.693
(U)	In FY 2005: Fabricated candidate materials for use in electrostatic discharge control gap treatments. Refined the advanced analytical models that will be used to predict the optical properties of specialty coatings based on measured data. Developed non-chromate surface treatments with advanced performance coatings for aircraft corrosion protection systems. Developed environmentally friendly corrosion protection systems with a 30-year life expectancy. Designed and developed nanostructured multifunctional coatings to control friction and wear in extreme environments. Fabricated and tested surface treatments for friction, stiction, and wear control in micro-devices.			
(U)	In FY 2006: Evaluate candidate materials for use in electrostatic discharge control gap treatments. Validate the advanced analytical models that will be used to predict the optical properties of specialty coatings based on measured data. Demonstrate non-chromate surface treatments via flight test. Continue to develop environmentally friendly corrosion protection systems with a 30-year life expectancy. Continue to develop nanostructured multifunctional coatings to control friction and wear in extreme environments. Continue testing of surface treatments for friction, stiction, and wear control in micro devices.			
(U)	In FY 2007: Demonstrate candidate gap treatment materials on air vehicles. Complete validation of the advanced analytical models that will be used to predict the optical properties of specialty coatings based on measured data. Continue to demonstrate and validate the non-chromate surface treatments for aircraft corrosion protection systems. Formulate chrome-free primer for corrosion protection systems with a 30-year life expectancy. Validate multifunctional coatings on engineering components. Downselect surface treatment candidates for further development for friction, stiction, and wear control in micro devices.			
(U)				
(U)	CONGRESSIONAL ADD: Air Force Minority Leaders Program.	0.000	3.450	0.000
(U)	In FY 2005: Not Applicable.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials	PROJECT NUMBER AND TITLE 4347 Materials for Structures, Propulsion, and Subsystems

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2006: Conduct Congressionally-directed effort for Air Force Minority Leaders Program.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Minority LEADERS Research Program.	0.000	1.774	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Minority LEADERS Research Program.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Nanomaterials Commercialization Center of Pennsylvania.	0.000	0.986	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Nanomaterials Commercialization Center of Pennsylvania.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	71.274	74.572	45.264

(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 0603112F, Advanced Materials for Weapon Systems.									
(U) PE 0603211F, Aerospace Technology Dev/Demo.									
(U) PE 0603202F, Aerospace Propulsion Subsystems Integration.									
(U) PE 0603216F, Aerospace Propulsion and Power Technology.									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) This project has been									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4347 Materials for Structures, Propulsion, and Subsystems**

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

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: 02 Applied Research	PE NUMBER AND TITLE: 0602102F Materials	PROJECT NUMBER AND TITLE: 4348 Materials for Electronics, Optics, and Survivability	

	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
4348	Materials for Electronics, Optics, and Survivability	21.763	19.260	18.119	12.630	13.324	13.466	13.612	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 materials technologies for surveillance and situational awareness systems and subsystems for aircraft and missile applications, including sensor, microwave, and infrared detection and countermeasures devices used for targeting, electronic warfare, and active aircraft protection. Materials for protection of aircrews, sensors, and aircraft from laser and high-power microwave directed energy threats are also developed. Electronic and optical materials are being developed to enable surveillance and situational awareness with faster operating speeds, greater tunability, higher power output, improved thermal management (including higher operating temperatures), greater sensitivity, and extended dynamic range. New materials are being developed to counter the most prominent laser threats and to respond to emerging and agile threat wavelengths without impairing mission effectiveness.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop, evaluate, and mature infrared (IR) detector materials and materials processing technologies to enable improved performance, affordability, and operational capability of Air Force surveillance, tracking, targeting, and situational awareness systems.	0.842	0.651	1.322

(U) In FY 2005: Continued development of complex IR detector materials that are responsive to multiple wavelengths within and between spectral bands. Validated the materials properties of complex IR detector materials that require control on an atomic level to structure their detection properties. Developed promising innovative nano-scale materials as potential IR materials for a broad range of Air Force sensing needs including the detection of chemical threats.

(U) In FY 2006: Provide prototype growth, characterization, and analyses of potential IR materials systems to determine unique properties of interest to Air Force users. Develop the process control to enable ordered growth of two-dimensional, abrupt compositional interfaces in multiple wavelength materials. Validate the optical properties of advanced IR materials by optical characterization and evaluation of complex IR detector materials that have been produced by atomic level control. Explore methods of controlling materials composition, shape, and size on a nano-scale level and validate by structural characterization.

(U) In FY 2007: Validate optical, structural, and electronic properties of innovative IR materials to determine their ability to provide unique IR detection properties of interest to the Air Force. Characterize and evaluate the utility of single element multispectral IR materials with responses to more than two discrete wavelengths. Investigate the potential for three-dimensional material growth to exploit unique detection properties of complex IR materials. Validate promising materials growth technologies for nano-scale IR detection materials.

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4348 Materials for Electronics, Optics, and Survivability**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)				
(U)	MAJOR THRUST: Develop and demonstrate enabling materials technologies to enhance the survivability and mission effectiveness of Air Force sensors and viewing systems. Note: In FY 2007, efforts in this major thrust will merge into the survivability thrust below.	1.539	1.776	0.000
(U)	In FY 2005: Designed a representative brassboard protection system using liquid crystal-based tunable filters. Characterized the optical performance of high optical density, multiple-wavelength switchable filter stacks.			
(U)	In FY 2006: Develop photorefractive materials for passive protection applications and develop device concepts that utilize photorefractive materials. Optimize the performance of high optical density, multiple-wavelength switchable filter technology for Air Force applications.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate enabling materials technologies to enhance the safety, survivability, and mission effectiveness of aircrews, sensors, viewing systems, and related assets. Note: This effort includes Congressional Add funding of $1.0 million in FY 2005 for Non-Linear Optical Materials.	7.327	4.855	8.502
(U)	In FY 2005: Developed growth and processing techniques for nonlinear optical crystals for generating radiation at significantly higher energies. Characterized the performance of the optimized nonlinear absorbing materials in candidate host materials and document the test results obtained for the protection of personnel eyes and viewing systems.			
(U)	In FY 2006: Continue to characterize the performance of optimized nonlinear absorbing materials into device concepts for eye and sensor system protection.			
(U)	In FY 2007: Incorporate optimized nonlinear optical limiter materials for damage protection of eyes and sensor systems. Optimize photorefractive materials properties for Air Force passive protection applications. Incorporate switchable filter technology into device concepts for eye and sensor system protection.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate materials and process technologies for power generation, power control, and microwave components to provide improved performance, affordability, and operational capability for Air Force surveillance, tracking, targeting, situational awareness, and lethal and non-lethal weapon systems. Note: This effort includes Congressional Add funding of $8.9 million in FY 2005 ($2.6 million for Advanced Wide Bandgap Materials, $2.5 million for Gallium Nitrate RF Power Technology, $1.7 million for Advanced Silicon Carbide Device Technology, and $2.1 million for Advanced Magnetic Random Access Memory Modules) and $6.3 million in FY 2006 ($3.2 million for Power Electronics Reliability, $2.1 million for Large Area, APVT Materials for Hi-Powered Devices, and $1.0 million for Advanced Materials Deposition for Semiconductor).	12.055	10.894	8.295

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4348 Materials for Electronics, Optics, and Survivability**

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

	FY 2005	FY 2006	FY 2007

(U) In FY 2005: Enhanced specific baseline materials and materials processing technologies to enable increased Air Force systems reliability and temperature capability, while reducing power consumption, weight, cost, cooling, complexity, and size. Investigated advanced materials and materials processing technologies to provide capabilities beyond those achievable with baseline materials. Optimized and scaled up materials and materials processes to provide presently unattainable performance for power control systems, advanced radar, and electronic countermeasures. Completed assessment of baseline materials and materials process technologies for ultra-lightweight, ultra-high-power aircraft electrical generators enabling airborne lethal and non-lethal directed energy weapons in fighter-sized aircraft. Developed advanced materials and materials process technologies to provide improvements and additional capabilities relative to baseline materials/processes. Developed and analyzed materials and materials process technologies for Terahertz components to provide the bandwidth required for the next order of magnitude leap in speed of Air Force sensor and communication systems.

(U) In FY 2006: Demonstrate scale-up of materials and materials processes for power control systems, advanced radar, and electronic countermeasures. Continue development of advanced materials and materials process technologies to enable airborne lethal and non-lethal directed energy weapons in fighter-sized aircraft, and an order of magnitude improvement in speed for Air Force sensor and communication systems. Demonstrate scale-up of materials and materials processes to provide presently unattainable performance for power control systems, advanced radar, and electronic countermeasures. Continue development of advanced materials and materials process technologies to provide improvements and additional capabilities relative to baseline materials/processes for ultra-lightweight, ultra-high-power aircraft electrical generators enabling airborne lethal and non-lethal directed energy weapons in fighter-sized aircraft. Continue development of materials and materials process technologies for Terahertz components supporting order of magnitude improvement in speed for Air Force sensor and communication systems. Identify most promising materials approaches for application to initial prototype evaluation.

(U) In FY 2007: Demonstrate capabilities of advanced materials and materials process technologies to enable airborne lethal and non-lethal directed energy weapons in fighter-sized aircraft. Validate and demonstrate selected materials and materials process technologies for use in Terahertz components. Continue to demonstrate scale-up of materials and materials processes to provide presently unattainable performance for power control systems, advanced radar, and electronic countermeasures. Demonstrate capabilities of advanced materials and materials process technologies to provide improvements and additional capabilities relative to baseline materials/processes for ultra-lightweight, ultra-high-power aircraft electrical generators enabling airborne lethal and non-lethal directed energy weapons in fighter-sized aircraft. Validate and demonstrate selected materials and materials process technologies for use in Terahertz components, supporting high speed communications and advanced sensors.

(U)

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4348 Materials for Electronics, Optics, and Survivability**

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

	FY 2005	FY 2006	FY 2007
(U) CONGRESSIONAL ADD: Engineered Optical Materials for High Energy Laser Development.	0.000	1.084	0.000
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Conduct Congressionally-directed effort for Engineered Optical Materials for High Energy Laser Development.			
(U) In FY 2007: Not Applicable.			
(U) Total Cost	21.763	19.260	18.119

(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 0603112F, Advanced Materials for Weapon Systems.									
(U) PE 0602202F, Human Effectiveness Applied Research.									
(U) PE 0602204F, Aerospace Sensors.									
(U) PE 0603231F, Crew Systems and Personnel Protection Technology.									
(U) PE 0603211F, Aerospace Technology Dev/Demo.									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(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: 02 Applied Research	PE NUMBER AND TITLE: 0602102F Materials	PROJECT NUMBER AND TITLE: 4349 Materials Technology for Sustainment	

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
4349	Materials Technology for Sustainment	17.365	16.817	18.417	17.516	18.456	18.631	18.774	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 materials and materials processing technologies to support operational Air Force mission areas by providing the ability to inspect the quality of delivered systems, transitioning more reliable and maintainable materials, establishing a capability to detect and characterize performance threatening defects, characterizing materials processes and properties necessary for materials transition, and providing quick reaction support and failure analysis to the operational commands and repair centers. Repair techniques and nondestructive inspection/evaluation (NDI/E) methods are developed that are needed for metallic and non-metallic structures, coatings, corrosion control processes, and to support integration of composite structures for aerospace systems. Various NDI/E methods are essential to ensure optimum quality in the design and production of aircraft, propulsion, and missile systems. These NDI/E methods are also essential to monitor and detect the onset of any service-initiated damage and/or deterioration due to aging of operational systems.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop NDI/E technologies to identify and characterize damage in aging aerospace structures, propulsion systems, and complex, low-observable (LO) materials and structures.	3.691	3.693	5.806

(U) In FY 2005: Evaluated electromagnetic methods to rapidly detect and characterize multi-site damage and cracks in large area, aging structures. Evaluated computer simulations and models of NDI/E technique response, which will enable the development of improved inspections in a virtual environment to permit the depots to rapidly assess the potential of new corrosion and crack detection NDI/E methods. Developed sensor technologies for measuring complex electromagnetic material properties beneath dielectric tiles. Developed a residual stress gradient measurement capability for selected turbine engine materials for shot peened surfaces.

(U) In FY 2006: Demonstrate electromagnetic technology to detect and characterize multi-site damage and cracks in large area, aging structures. Develop computer simulations and models of NDI/E technique response to enable rapid assessment of multiple NDI/E technologies for depot level inspections. Initiate efforts to explore and develop NDI/E technologies for inspection of thick (multi-layer) aging aircraft structures with complex geometries. Evaluate feasibility of advanced LO NDI/E methods and systems for use in battle damage assessment and for inspection following battle damage repair. Transition sensor technology for measuring complex electromagnetic material properties beneath dielectric tiles.

(U) In FY 2007: Continue to develop computer simulations and models of NDI/E technique response to enable rapid assessment of multiple NDI/E technologies for depot level inspections. Develop NDI/E technologies for inspection of thick (multi-layer) aging aircraft structures with complex geometries. Develop advanced LO NDI/E methods and systems for use in battle damage assessment and for inspection following battle damage repair.

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602102F Materials**	PROJECT NUMBER AND TITLE **4349 Materials Technology for Sustainment**

(U)	**B. Accomplishments/Planned Program ($ in Millions)**	FY 2005	FY 2006	FY 2007
(U)				
(U)	MAJOR THRUST: Develop support capabilities, information, and processes to resolve problems with materials in the repair of aircraft structures and to reduce aircraft corrosion.	5.795	5.066	7.110
(U)	In FY 2005: Matured methodologies to evaluate corrosion and erosion resistance of new and emerging materials used in operationally fielded Air Force systems. Evaluated methodologies to test failure limits for MEMS structures and subsystems. Developed specification for laser additive manufacturing of non flight-critical parts. Demonstrated effectiveness of low plasticity burnishing of landing gear components. Assessed effectiveness of corrosive preventative compounds for various Air Force applications.			
(U)	In FY 2006: Apply methodologies to evaluate corrosion and erosion resistance of new and emerging materials used in operationally fielded Air Force systems. Continue to evaluate methodologies to test failure limits for MEMS structures and subsystems. Evaluate effects of defects in laser additive manufactured parts.			
(U)	In FY 2007: Continue to evaluate corrosion and erosion resistance of new and emerging materials used in operationally fielded Air Force systems. Continue to evaluate methodologies to test failure limits for MEMS structures and subsystems. Validate effects of defects in laser additive manufactured parts.			
(U)				
(U)	MAJOR THRUST: Develop support capabilities, information, and processes to resolve materials problems and provide electronic and structural failure analysis of components.	3.936	4.050	4.712
(U)	In FY 2005: Performed failure analysis and materials investigations for field, acquisition, and depot organizations. Developed electrostatic discharge protection technologies for emerging avionics subsystems. Validated new test methodologies for analyzing structural failures of replacement materials for aging Air Force systems. Developed materials technologies effort to replace aging wiring in Air Force aircraft subsystems.			
(U)	In FY 2006: Continue performing failure analysis and materials investigations for field, acquisition, and depot organizations. Demonstrate electrostatic discharge protection technologies and procedures for emerging avionics subsystems. Evaluate new test methodologies for analyzing structural failures of emerging materials for Air Force systems. Evaluate wiring materials technologies to replace aging wiring systems and new wiring technologies for emerging weapons systems.			
(U)	In FY 2007: Continue performing failure analysis and materials investigations for field, acquisition, and depot organizations. Continue demonstration of electrostatic discharge protection technologies and procedures for emerging avionics subsystems. Validate new test methodologies for analyzing structural failures of emerging materials for Air Force systems. Evaluate/validate wiring materials technologies to replace aging wiring systems and new wiring technologies for emerging weapons systems.			
(U)				

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials	PROJECT NUMBER AND TITLE 4349 Materials Technology for Sustainment

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

		FY 2005	FY 2006	FY 2007
(U)	MAJOR THRUST: Develop enabling technologies to reduce the Air Force LO maintenance burden.	3.943	4.008	0.789
(U)	In FY 2005: Optimized technologies for an integrated, standardized LO repair kit that includes conductive gap fillers, radar absorbing material (RAM) repair materials, RAM removal equipment, radar absorbing structure (RAS) repair materials, and NDI/E equipment and software.			
(U)	In FY 2006: Develop multispectral/multipurpose tool for inspection of LO systems on aircraft. Investigate program for improved maintainability of advanced LO materials and designs including conductive outer-mold-line, applique, door edges and seals, multifunctional systems, and embedded LO NDI/E.			
(U)	In FY 2007: Develop technologies for improved maintainability of advanced LO materials and designs, such as conductive outer-mold-line, applique, door edges and seals, multifunctional systems, and embedded LO NDI/E.			
(U)	Total Cost	17.365	16.817	18.417

(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 0603112F, Advanced Materials for Weapons Systems.									
(U) PE 0603211F, Aerospace Technology Dev/Demo.									
(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: 02 Applied Research

PE NUMBER AND TITLE: 0602102F Materials

PROJECT NUMBER AND TITLE: 4915 Deployed Air Base 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
4915 Deployed Air Base Technology	7.058	10.802	2.662	2.552	2.701	2.732	2.761	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Funds for the FY 2006 Congressionally-directed Carbon Nanostructured Material for Fluid Purification in the amount of $5.0 million are in the process of being moved to PE 0602202F, Human Effectiveness Applied Research, from PE 0602102F, Materials, for execution.

(U) A. Mission Description and Budget Item Justification

This project develops new deployable airbase technologies to reduce airlift and manpower requirements, setup times, and sustainment costs, and to improve protection and survivability of deployed Air Expeditionary Force (AEF) warfighters. Affordable, efficient technologies are developed for base infrastructure, fire fighting, and force protection to improve deployed operations.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop new deployable airbase technologies to reduce airlift and manpower requirements, setup times, and sustainment costs in support of AEF operations.	1.211	1.261	1.382
(U) In FY 2005: Developed high-efficiency, solid state solar cell technology. Developed advanced heat and mass transfer technologies and thin film catalytic technologies to improve deployed energy system performance. Developed an advanced work-recovery rotary expansion device to improve deployed air conditioning performance. Developed polymer-clay stabilization agents for rapid airfield expansion that will reduce time to prepare aircraft operating surfaces. Evaluated catalysis and degradation technologies to provide cleaner, lower cost advanced materials.			
(U) In FY 2006: Investigate fabrication techniques to integrate solid state solar cell technology into deployable shelter fabrics. Continue to develop advanced heat and mass transfer technologies and thin film catalysis for logistic fuel processing planar technology. Continue to develop an advanced work-recovery rotary expansion device to improve deployed air conditioning performance. Demonstrate polymer-clay stabilization agents for rapid airfield expansion. Refine ground penetrating radar interpretation capability to improve man-portable rapid airfield assessment. Develop biomaterials that produce similar effects as chemical catalysts for improved reactive production of aerospace materials.			
(U) In FY 2007: Develop high-efficiency solar shelter fabrics. Continue development of advanced heat and mass transfer technologies and demonstrate logistic fuel processing planar technology. Investigate behavior of soil and stabilizer interaction with airfield matting and begin model development. Develop non-radar wave methods of nondestructive inspection of airfield surface anomalies. Synthesize polymer materials using biocatalysts and reagents for producing reduced cost, tailored characteristics in aerospace materials.			
(U)			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop affordable technologies to provide force protection and	5.847	4.612	1.280

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials	PROJECT NUMBER AND TITLE 4915 Deployed Air Base Technology

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	survivability to AEF deployed warfighters and infrastructure. Note: This effort includes Congressional Add funding of $4.5 million in FY 2005 ($2.4 million for Blast Resistant Barriers for Homeland Defense and $2.1 million for Thermal Sprays for Structural Protection) and $1.7 million in FY 2006 ($1.7 million for Blast Resistant Barriers for Homeland Defense and $2.1 million for Thermal Sprays for Structural Blast Mitigation).			
(U)	In FY 2005: Developed more effective fire fighting agents and application methodologies for protection of warfighters. Developed technologies for increased firefighter situational awareness, improved synergy, and greater on-site duration. Initiated research on resilient infrastructure technologies for more effective protection of structures and inhabitants. Characterized ballistic and fragmentation aspects of improvise explosive device threats for development of protective measures. Characterized the atmospheric and surface action and interaction of asymmetric threat agents for protection of aerospace warfighters and equipment.			
(U)	In FY 2006: Develop fire fighting agents with increased versatility by combining agents and application methodologies. Continue developing technologies for increased fire fighter situational awareness, improved synergy, and greater on-site duration. Continue research on resilient infrastructure technologies for more effective protection of structures and inhabitants. Develop technologies to protect against the ballistic and fragmentation effects of improvised explosive device threats and characterize high energy weapons threats. Model atmospheric and surface phenomenon of in-theater chemicals and asymmetric threats for tailored response protection.			
(U)	In FY 2007: Demonstrate emerging fire suppression technologies for integrated crash/rescue capability. Integrate individual fire fighter effectiveness technologies for a combined technology demonstration. Demonstrate resilient structural materials and methodologies for improved protection of structures and inhabitants. Continue developing technologies to protect against the ballistic and fragmentation effects of improvised explosive device threats, and initiate protective material development against high energy threats. Develop characterization data for atmospheric models for protection of deployed warfighters from asymmetric threats.			
(U)				
(U)	CONGRESSIONAL ADD: Carbon Nanostructured Material for Fluid Purification.	0.000	4.929	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Initiate Congressionally-directed effort for Carbon Nanostructured Material for Fluid Purification.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	7.058	10.802	2.662

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602102F Materials	PROJECT NUMBER AND TITLE 4915 Deployed Air Base Technology

(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 0603112F, Advanced Materials for Weapon Systems.

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

(U) D. Acquisition Strategy

Not Applicable.