

UNCLASSIFIED

PE NUMBER: 0603112F

PE TITLE: Advanced Materials for Weapon Systems

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2004
---	------------------------------

BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems
---	---

Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	39.746	61.948	34.284	39.814	46.517	41.390	42.056	Continuing	TBD
2100 Laser Hardened Materials	13.201	17.012	22.551	27.928	35.454	30.138	30.622	Continuing	TBD
3153 Non-Destructive Inspection Development	8.088	9.956	4.069	4.103	4.178	4.249	4.318	Continuing	TBD
3946 Materials Transition	14.739	23.876	5.298	5.397	4.456	4.533	4.606	Continuing	TBD
4918 Deployed Air Base Demonstrations	3.718	11.104	2.366	2.386	2.429	2.470	2.510	Continuing	TBD

Note: In FY 2003, the space unique tasks in Projects 2100 and 3946 were transferred to PE 0603500F, Project 5032, as a result of the Space Commission recommendation to consolidate all space unique activities.

(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) laser hardened materials technologies for the broadband laser 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 2004, Congress added \$2.1 million for Vapor Grown Carbon Fiber, \$1.4 million for Polymer Technology for Agile Combat Support, \$1.4 million for Materials Integrity Management Research (MIMR) for Air Force Systems, \$3.6 million for Quantitative Inspection Techniques for Assessing Aging of Military Aircraft, \$5.0 million for the Metals Affordability Initiative, \$1.5 million for Molecular Marking of Explosives, \$2.0 million for Hybrid Bearings, \$1.7 million for Advanced Laser Program for Plasma Enhanced Chemical Vapor Deposition, \$1.4 million for Advanced Composite Processes for Unmanned Air Vehicle (UAV) Components, \$3.0 million for E-SMART Threat Agent Network, \$3.4 million for Plasma Arc/Waste to Energy Production, \$1.1 million to Educate 21st Century Information Operations (IO) Workforce, \$1.8 million for Ceramic Matrix Composites for Engines, and \$1.0 million for Transparent Conductive Polymer Technology. Additionally, Congress reduced \$1.0 million related to the National Aerospace Initiative.

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 2004

BUDGET ACTIVITY

03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE

0603112F Advanced Materials for Weapon Systems

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Previous President's Budget	41.159	33.079	34.374
(U) Current PBR/President's Budget	39.746	61.948	34.284
(U) Total Adjustments	-1.413	28.869	
(U) Congressional Program Reductions		-1.000	
Congressional Rescissions		-0.531	
Congressional Increases		30.400	
Reprogrammings	-0.386		
SBIR/STTR Transfer	-1.027		
(U) <u>Significant Program Changes:</u>			
Not Applicable.			

Exhibit R-2a, RDT&E Project Justification

DATE
February 2004

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 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
2100 Laser Hardened Materials	13.201	17.012	22.551	27.928	35.454	30.138	30.622	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 enabling materials and concepts for protecting Air Force assets such as aircrews, munitions, and aerospace sensors against laser and high-power microwave directed energy threats. Concepts are demonstrated to provide hardening options for transition to Air Force systems. The goal is to ensure mission capability before, during, and after threat exposure. Current protection schemes are activated by intensity or wavelength and are only capable of countering a specific portion of the laser threat. Recent laser technology developments have increased laser wavelength agility. To harden systems against all potential lasers, the development of a combination of approaches is required.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) MAJOR THRUST: Develop and demonstrate advanced materials technologies that enhance laser hardening for sensors, avionics, and components to increase survivability and mission effectiveness of aerospace systems. Note: Increase in FY 2005 is due to an increased emphasis on sensor protection.	5.823	4.237	12.769
(U) In FY 2003: Demonstrated complete hardening for an electro-optical sensor system. Developed hardening solutions for Charge Coupled Device (CCD) imaging systems.			
(U) In FY 2004: Develop hardening solutions for replacement sensors selected for the electro-optical sensor system. Demonstrate image intensifier tube hardening. Evaluate hardening solutions for CCD imaging systems.			
(U) In FY 2005: Demonstrate hardening solutions for replacement sensor selected for the electro-optical sensor system. Initiate hardening development for multispectral and hyperspectral sensor systems.			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced materials technologies that enhance laser protection for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a laser threat environment. Note: This effort includes Congressional Adds of \$1.7 million in FY 2003 and \$1.7 million in FY 2004 for an Advanced Laser Program for Plasma Enhanced Chemical Vapor Deposition.	7.378	12.775	9.782
(U) In FY 2003: Transitioned flexible filter technology in the form of spectacles for human factors evaluations and design refinement. Transitioned first generation tristimulus filter technology for daytime missions to the Life Support Systems Program Office. Fabricated refined tristimulus filter eyewear based on results from human factors study. Transitioned fixed wavelength filter technology to the night vision goggle (NVG) program for flight tests. Advanced the development of tunable filter technology for NVGs and panoramic NVGs (PNVGs). Identified and evaluated hardening technologies for use in protecting eyes from agile laser threats.			
(U) In FY 2004: Identify next generation technology advancements to improve performance of tristimulus filter			

Exhibit R-2a, RDT&E Project Justification	DATE February 2004
--	------------------------------

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
---	---	---

technology. Transition in-band interim agile protection for NVGs. Characterize tunable filter technology in a representative PNVG prototype system. Develop optical limiter devices to protect eyes from agile laser threats.

(U) In FY 2005: Transition candidate materials technology advancements to improve performance of tristimulus filter technology. Demonstrate night vision goggle (NVG) compatible peripheral protection eyewear. Characterize the performance of brassboard panoramic NVG (PNVG)/NVG systems utilizing tunable filter technology. Continue to develop optical limiter technologies for agile protection of PNVG/NVG systems.

(U) Total Cost 13.201 17.012 22.551

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) Related Activities:									
(U) PE 0602102F, Materials.									
(U) PE 0602202F, Human									
Effectiveness Applied Research.									
(U) PE 0603231F, Crew Systems									
(U) and Personnel Protection									
Technology.									
(U) PE 0603500F,									
Multi-Disciplinary Advanced									
(U) Development Space									
Technology.									
(U) PE 0604706F, Life Support									
Systems.									
(U) This project has been									
coordinated through the									
(U) 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									
(U) Reliance process to harmonize									
efforts and eliminate									

Exhibit R-2a, RDT&E Project Justification

DATE

February 2004

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

duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE
February 2004

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 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
3153 Non-Destructive Inspection Development	8.088	9.956	4.069	4.103	4.178	4.249	4.318	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 Non-Destructive 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. Reduction in the number of fighter wings and the need for rapid sortie generation demand an ability to perform real-time NDI/E more rapidly than is currently possible. 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)

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</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 Adds of \$1.4 million in FY 2003 for Assessing Aging of Military Aircraft and \$3.6 million in FY 2004 for Quantitative Inspection Techniques for Assessing Aging of Military Aircraft.	2.420	5.276	1.170
(U) In FY 2003: Developed and demonstrated advanced technologies for improved capabilities in detection and characterization of corrosion of joints in aging aircraft. Developed and demonstrated advanced methods to detect cracks in multiple layers in order to meet aging aircraft life extension requirements.			
(U) In FY 2004: Demonstrate and validate pulsed eddy current automated scanner technology for improved capabilities in detection and characterization of corrosion of joints in aging aircraft. Validate low-frequency electromagnetic probe methods to detect cracks in multiple layers in order to meet aging aircraft life extension requirements.			
(U) In FY 2005: Transition advanced technologies for improved capabilities in detection and characterization of corrosion of joints in aging aircraft. Transition advanced methods to detect cracks in multiple layers to meet aging aircraft life extension requirements.			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced technologies for improved capabilities to inspect for cracks and other damage to extend the total safe life of turbine engines. Note: This effort includes a Congressional Add of \$2.5 million in FY 2003 for Quantitative Inspection Techniques for Assessing Aging of Military Aircraft.	3.726	2.003	1.595
(U) In FY 2003: Completed transition of non-destructive evaluation (NDE) benchmarks. Tested automated inspection			

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification		DATE February 2004	
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	
<p>capability of rotary components for planned life extension of engine rotors. Selected optimal NDE approaches to extend the life of fracture-critical gas turbine engine components and identified protocols for component inspections. Developed residual stress gradient measurement technologies to increase measurement on shot peened surfaces.</p>			
<p>(U) In FY 2004: Characterize optimal non-destructive evaluation (NDE) approaches to extend the life of fracture-critical gas turbine engine components and establish protocols for component inspections.</p>			
<p>(U) In FY 2005: Develop methods to detect and characterize damage in repaired (linear friction welded) turbine engine components. Demonstrate and begin transition of optimal NDE approaches to extend the life of fracture-critical gas turbine engine components.</p>			
<p>(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced inspection technologies supporting low-observable (LO) systems to enhance affordability and ensure full performance and survivability. Note: This effort includes a Congressional Add of \$1.1 million in FY 2003 for Handheld Holographic Radar Gun.</p>	1.942	0.000	1.304
<p>(U) In FY 2003: Transitioned to the field an advanced multispectral LO NDE tool for assessing radio frequency signature (zone versus whole aircraft) that is real-time, small, lightweight, portable, user-friendly, and covers multiple frequency bands.</p>			
<p>(U) In FY 2004: Not Applicable. Note: FY 2004 efforts were delayed until FY 2005 due to higher Air Force priorities.</p>			
<p>(U) In FY 2005: Initiate the development of a portable diagnostic probe that is broadband and will provide complex electromagnetic material properties. Initiate development of a portable, multi-functional, multi-platform diagnostics tool for use in battle damage repair of LO materials and structures.</p>			
<p>(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: In FY 2004, this effort includes a Congressional Add of \$1.4 million for Materials Integrity Management Research (MIMR) for Air Force Systems and a Congressional Reduction of \$0.7 million related to the National Aerospace Initiative.</p>	0.000	2.677	0.000
<p>(U) In FY 2003: Not Applicable.</p>			
<p>(U) In FY 2004: Develop optimal approaches and methodologies to address the continuous monitoring of materials integrity and status for critical elements of structures/airframes, propulsion systems, high temperature protection, tankage, and wiring.</p>			
<p>(U) In FY 2005: Not Applicable.</p>			
<p>(U) Total Cost</p>	8.088	9.956	4.069

Exhibit R-2a, RDT&E Project Justification

DATE

February 2004

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	

(U) Related Activities:

(U) PE 0602102F, Materials.

This project has been coordinated through the

(U) Reliance process to harmonize efforts and eliminate duplication.

(U) **D. Acquisition Strategy**

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE
February 2004

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 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
3946 Materials Transition	14.739	23.876	5.298	5.397	4.456	4.533	4.606	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 and processing technologies for fielded and planned Air Force weapon, airframe, and engine 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. This design and scale-up data enhances overall affordability of promising materials and processing technologies, providing needed initial incentives for their industrial development.

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

- | | | | |
|---|----------------|----------------|----------------|
| | <u>FY 2003</u> | <u>FY 2004</u> | <u>FY 2005</u> |
| (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 (LO) performance, and overall affordability of air vehicles. Note: In FY 2003, this effort includes Congressional Adds of \$4.0 million for Powdered Programmable Process, \$3.5 million for Ceramic Matrix Composites for Engines, \$1.2 million for Hybrid Bearing, and \$1.1 million for Vapor Grown Carbon Fiber. In FY 2004, this effort includes Congressional Adds of \$5.0 million for the Metals Affordability Initiative, \$1.4 million for Advanced Composite Processes for Unmanned Air Vehicle (UAV) Components, \$2.1 million for Vapor Grown Carbon Fiber, \$1.8 million for Ceramic Matrix Composites for Engines, \$2.0 million for Hybrid Bearings, and \$1.0 million for Transparent Conductive Polymer Technology and a Congressional Reduction of \$0.3 million related to the National Aerospace Initiative. | 11.661 | 22.292 | 4.968 |
- (U) In FY 2003: Fabricated and characterized integrated composite structure assemblies for aircraft with reduced part count and assembly costs. Completed the demonstration of advanced non-linear optical materials for aircraft infrared (IR) countermeasures against far-IR laser sources and then transitioned results. Conducted characterization of materials and processes for enhancing the reliability and maintainability of LO systems. Accelerated the development of advanced bearing materials for gas turbine engines.
- (U) In FY 2004: Develop an affordable high-temperature composite process that enables the fabrication of turbine engine components for future air vehicles to meet cost and performance criteria. Demonstrate fabrication processes and properties of ceramic composite materials for turbine engine exhaust components. Identify materials and their properties for a mid-infrared laser source enabling aircraft infrared countermeasures. Demonstrate improved materials and inspection tools/processes to enhance reliability and maintainability of low-observable platforms. Develop and evaluate advanced fluids, lubricants, and surface treatments for combined cycle engine components in high-speed vehicle applications. Develop and assess advanced metallic materials and processing technologies for weapon system development and sustainment, and for application to cryogenic structures and scramjet and

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification		DATE February 2004	
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603112F Advanced Materials for Weapon Systems	PROJECT NUMBER AND TITLE 3946 Materials Transition	
<p>combined-cycle engine components and structures. Accelerate the development of advanced bearing materials for gas turbine engines. Demonstrate the capability of injection molded aircraft transparencies loaded with various levels of carbon nanotubes to replace the conductivity currently provided by brittle exterior coatings.</p>			
<p>(U) In FY 2005: Develop and demonstrate reliable life extension capabilities for turbine engine rotors. Demonstrate a high temperature composite for turbine engine components. Validate performance in a turbine engine environment of ceramic composite materials for exhaust components. Develop and characterize advanced materials and materials process capabilities for ultra-lightweight, ultra-high power generation for airborne directed energy weapons. Develop materials and demonstrate their properties for a mid-infrared laser source enabling aircraft infrared countermeasures. Validate and transition improved materials and inspection tools/processes for low-observable systems to enable higher mission capable rates.</p>			
<p>(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: In FY 2003, this effort includes a Congressional Add of \$1.0 million for Advanced Material Corrosion Research for Liquid Metal Alloys.</p>		3.078	0.493 0.330
<p>(U) In FY 2003: Initiated efforts to develop and characterize corrosion resistant coatings and corrosion prevention compounds for aging aircraft structures applications.</p>			
<p>(U) In FY 2004: Evaluate corrosion resistant coatings and corrosion prevention compounds for aging aircraft structures applications. Initiate effort to determine durability and failure mechanisms of hybrid structures in unmanned air vehicles (UAVs).</p>			
<p>(U) In FY 2005: Transition corrosion resistant coatings and corrosion prevention compounds for aging aircraft structures applications. Develop test methodologies and evaluation techniques to determine durability and characterize failure mechanisms of hybrid structures in UAVs.</p>			
<p>(U) CONGRESSIONAL ADD: Educate 21st Century Information Operations (IO) Workforce.</p>		0.000	1.091 0.000
<p>(U) In FY 2003: Not Applicable.</p>			
<p>(U) In FY 2004: Establish an Information Operations curriculum at New Mexico State University to educate graduate and undergraduate students.</p>			
<p>(U) In FY 2005: Not Applicable.</p>			
<p>(U) Total Cost</p>		14.739	23.876 5.298

Exhibit R-2a, RDT&E Project Justification

DATE

February 2004

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)(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE
February 2004

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 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
4918 Deployed Air Base Demonstrations	3.718	11.104	2.366	2.386	2.429	2.470	2.510	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project supports the Aerospace Expeditionary Forces (AEF) through development and demonstration of advanced, rapidly deployable airbase technologies that reduce airlift and manpower requirements, setup times, and sustainment costs and improve protection and survivability of deployed AEF warfighters. Efficient and cost-effective technologies are developed and demonstrated to provide deployable infrastructure, advanced weapon system support, force protection, and fire fighting capability for deployed AEF warfighters.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) MAJOR THRUST: Demonstrate and transition affordable, rapid deployment technologies that ensure military readiness, maintain aerospace missions, support advanced weapon systems, and enable peacetime training operations. Note: In FY 2004, remaining activities in this thrust will be integrated into the other major thrusts in this project.	0.101	0.000	0.000
(U) In FY 2003: Furthered the development of advanced waste reactor technologies to support emerging weapons. Demonstrated rapidly deployable full-scale mixed-base hydrogen peroxide production plant.			
(U) In FY 2004: Not Applicable.			
(U) In FY 2005: Not Applicable.			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Demonstrate and transition advanced rapid deployment airbase technologies that reduce airlift and manpower requirements, setup times, and sustainment costs in support of AEF operations. Note: In FY 2003, this effort includes a Congressional Add of \$1.8 million for Tyndall Air Force Research Laboratory. In FY 2004, this effort includes Congressional Adds of \$3.4 million for Plasma Arc/Waste to Energy Production and \$1.4 million for Polymer Technology for Agile Combat Support.	2.215	6.500	1.432
(U) In FY 2003: Enhanced the development of shelters, power, and rapid airfield assessment technologies that improve system performance and reduce airlift requirements in support of AEF operations. Developed advanced aircraft firefighting technologies such as firefighting agents and equipment. Transitioned a highly effective, deployable crash/rescue system based on three-dimensional foam technology to support AEF operations. Note: In FY 2003, the deployable firefighting technology activities in this major thrust were moved to the force protection major thrust in this project.			
(U) In FY 2004: Transition air-inflatable shelter technology to support logistics footprint reduction in AEF operations. Develop 10KW fuel cell power system that improves deployable power system performance and reduces airlift requirements for AEF operations. Demonstrate rapid airfield assessment and repair technologies that improve			

Exhibit R-2a, RDT&E Project Justification	DATE February 2004
--	------------------------------

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
---	---	---

performance and enhance AEF operations support. (U) In FY 2005: Continue development of a 10KW fuel cell power system that improves deployable systems performance and reduces airlift requirements for support of Aerospace Expeditionary Forces (AEF) operations. Transition rapid airfield assessment and repair technologies that improve deployable systems performance and reduce airlift requirements for support of AEF operations. (U) (U) MAJOR THRUST/CONGRESSIONAL ADD: Demonstrate and transition efficient and cost-effective technologies to provide force protection to deployed AEF warfighters and infrastructure. Note: In FY 2004, this effort includes Congressional Adds of \$3.0 million for Environmental Sensing and Monitoring Systems (E-SMART) Threat Agent Network and \$1.5 million for Molecular Marking of Explosives. (U) In FY 2003: Developed deployable protective and advanced blast suppression technologies to protect deployed warfighters. (U) In FY 2004: Demonstrate deployable protective and advanced blast suppression technologies to protect deployed warfighters. Develop a reduced-size full-capability firefighting vehicle for deployed operations. Develop self-sterilizing coatings and laminates for expeditionary structures. Demonstrate system to integrate threat sensor data for airbase protection. Evaluate molecular tagging technology for explosive materials. Note: In FY 2003, the deployable firefighting technology activities were moved into this major thrust. (U) In FY 2005: Transition deployable protective and advanced blast suppression technologies to protect deployed warfighters. Demonstrate a reduced-size full-capability firefighting vehicle for deployed operations. Demonstrate self-sterilizing coatings and laminates for expeditionary structures. (U) Total Cost	1.402	4.604	0.934
	3.718	11.104	2.366

(U) C. Other Program Funding Summary (\$ in Millions)		<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) Related Activities:										
(U) PE 0602102F, Materials.										
(U) PE 0604617F, Agile Combat Support.										
This project has been coordinated through the										
(U) Reliance process to harmonize efforts and eliminate duplication.										

Exhibit R-2a, RDT&E Project Justification

DATE

February 2004

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) D. Acquisition Strategy
Not Applicable.