

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	62.070	67.856	33.414	0.000	33.414	40.341	42.098	44.191	43.239	Continuing	Continuing
632100: Laser Hardened Materials	22.377	24.177	19.853	0.000	19.853	23.399	22.714	24.228	25.617	Continuing	Continuing
633153: Non-Destructive Inspection Development	8.081	4.038	2.260	0.000	2.260	5.379	7.509	7.580	5.444	Continuing	Continuing
633946: Materials Transition	16.412	28.502	9.039	0.000	9.039	9.167	8.945	9.331	9.612	Continuing	Continuing
634918: Deployed Air Base Demonstrations	11.232	11.139	2.262	0.000	2.262	2.396	2.930	3.052	2.566	Continuing	Continuing
6377SP: Advanced Space Materials	3.968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Note Note: In FY 2010, funds from Project 77SP have been moved to Project 2100 within this Program Element to more accurately align efforts. In FY 2011, funds moved from Project 2100 to Project 4348 to increase emphasis in applied research.											
A. Mission Description and Budget Item Justification This program develops and demonstrates materials technology for transition into Air Force systems. The program has five 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; (4) airbase operations technologies including deployable base infrastructure, force protection, and fire fighting capabilities; and (5) advanced materials for space applications. 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.											

UNCLASSIFIED

R-1 Line Item #15

Page 1 of 24

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force				DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY		R-1 ITEM NOMENCLATURE			
3600: Research, Development, Test & Evaluation, Air Force		PE 0603112F: Advanced Materials for Weapon Systems			
BA 3: Advanced Technology Development (ATD)					
B. Program Change Summary (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	62.676	37.901	0.000	0.000	0.000
Current President's Budget	62.070	67.856	33.414	0.000	33.414
Total Adjustments	-0.606	29.955	33.414	0.000	33.414
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.285			
• Congressional Adds		30.240			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.606	0.000	33.414	0.000	33.414
Congressional Add Details (\$ in Millions, and Includes General Reductions)					
Project: 633153: Non-Destructive Inspection Development				FY 2009	FY 2010
Congressional Add: Materials Integrity Management Research for Air Force Systems.				0.798	0.000
Congressional Add: Sonic Infrared Imaging Technology Development.				0.798	0.000
Congressional Add: Aircraft Evaluation Readiness Initiative (AERI).				2.394	2.390
Congressional Add Subtotals for Project: 633153				3.990	2.390
Project: 633946: Materials Transition					
Congressional Add: Metals Affordability Initiative.				3.989	9.958
Congressional Add: EMI Grid Fabrication Technology.				2.713	2.390
Congressional Add: Silicon Carbide Electronics Material Producibility Initiative.				4.787	5.019
Congressional Add: SiC-RF Power for Avionics Systems.				0.000	1.593
Congressional Add Subtotals for Project: 633946				11.489	18.960

UNCLASSIFIED

R-1 Line Item #15

Page 2 of 24

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force		DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>		R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>	
<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>		FY 2009	FY 2010
Project: 634918: <i>Deployed Air Base Demonstrations</i>			
Congressional Add: <i>Body Armor Improved Ballistic Protection.</i>		1.995	1.753
Congressional Add: <i>Strategic Biofuels Supply System.</i>		0.997	1.593
Congressional Add: <i>Sewage-Derived Biofuels Program.</i>		2.393	3.824
Congressional Add: <i>Military Waste-to-Energy Project Using the Hydro-Thermal Energy Conversion (Hy-TEC) Process.</i>		0.000	1.593
Congressional Add Subtotals for Project: 634918		5.385	8.763
Congressional Add Totals for all Projects		20.864	30.113
Change Summary Explanation			
The FY 2010 President's Budget submittal did not reflect FY 2011 through FY 2015 funding. A detailed explanation of changes between the two budget positions is not provided because it cannot be made in a relevant manner.			
In FY 2010, Congress added \$2.4 million for Aircraft Evaluation Readiness Initiative, \$1.76 million for Body Armor Improved Ballistic Protection, Research and Development, \$2.4 million for EMI Grid Fabrication Technology, \$10.0 million for Metals Affordability Initiative, \$1.6 million for Military Waste-to-Energy Project Using the Hydro-Thermal Energy Conversion (Hy-TEC) Process, \$3.84 million for Sewage-Derived Biofuels Program, \$1.6 million for SiC-RF Power for Avionics Systems, \$5.04 million for Silicon Carbide Electronics Material Producibility Initiative, and \$1.6 million for Strategic Biofuels Supply System.			
C. Performance Metrics Under Development.			

UNCLASSIFIED

R-1 Line Item #15

Page 3 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force								DATE: February 2010															
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>				PROJECT 632100: <i>Laser Hardened Materials</i>															
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost												
632100: <i>Laser Hardened Materials</i>	22.377	24.177	19.853	0.000	19.853	23.399	22.714	24.228	25.617	Continuing	Continuing												
<p>Note Note: Funds from Project 77SP have been moved to Project 2100 within this Program Element to more accurately align efforts. Note: Beginning in FY 2011, funds from Project 2100 have been moved to Program Element 0602102F BPAC 4348 to increase emphasis on applied research.</p> <p>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.</p> <p>B. Accomplishments/Planned Program (\$ in Millions)</p> <table border="1"> <thead> <tr> <th></th> <th>FY 2009</th> <th>FY 2010</th> <th>FY 2011 Base</th> <th>FY 2011 OCO</th> <th>FY 2011 Total</th> </tr> </thead> <tbody> <tr> <td> <p>Major Thrust: Develop and demonstrate materials technologies that enhance hardening for sensors, avionics, and components to increase survivability and mission effectiveness of aerospace systems.</p> <p><i>FY 2009 Accomplishments:</i> In FY 2009: Transitioned mature hardening materials technology for an Air Force tactical system. Demonstrated performance of dual band limiter materials in tactical systems.</p> <p><i>FY 2010 Plans:</i> In FY 2010: Investigate performance of dual band limiter materials in tactical systems. Demonstrate protection strategies for large format multi-chip CCDs. Fabricate and demonstrate solid state limiter and filter technology for protection of space systems. Evaluate materials survivability for space environments. Analyze the effect of laser energy on optical materials and electro-optical sensors and space structural materials.</p> </td> <td align="right">16.568</td> <td align="right">20.010</td> <td align="right">16.792</td> <td align="right">0.000</td> <td align="right">16.792</td> </tr> </tbody> </table>													FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	<p>Major Thrust: Develop and demonstrate materials technologies that enhance hardening for sensors, avionics, and components to increase survivability and mission effectiveness of aerospace systems.</p> <p><i>FY 2009 Accomplishments:</i> In FY 2009: Transitioned mature hardening materials technology for an Air Force tactical system. Demonstrated performance of dual band limiter materials in tactical systems.</p> <p><i>FY 2010 Plans:</i> In FY 2010: Investigate performance of dual band limiter materials in tactical systems. Demonstrate protection strategies for large format multi-chip CCDs. Fabricate and demonstrate solid state limiter and filter technology for protection of space systems. Evaluate materials survivability for space environments. Analyze the effect of laser energy on optical materials and electro-optical sensors and space structural materials.</p>	16.568	20.010	16.792	0.000	16.792
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total																		
<p>Major Thrust: Develop and demonstrate materials technologies that enhance hardening for sensors, avionics, and components to increase survivability and mission effectiveness of aerospace systems.</p> <p><i>FY 2009 Accomplishments:</i> In FY 2009: Transitioned mature hardening materials technology for an Air Force tactical system. Demonstrated performance of dual band limiter materials in tactical systems.</p> <p><i>FY 2010 Plans:</i> In FY 2010: Investigate performance of dual band limiter materials in tactical systems. Demonstrate protection strategies for large format multi-chip CCDs. Fabricate and demonstrate solid state limiter and filter technology for protection of space systems. Evaluate materials survivability for space environments. Analyze the effect of laser energy on optical materials and electro-optical sensors and space structural materials.</p>	16.568	20.010	16.792	0.000	16.792																		

UNCLASSIFIED

R-1 Line Item #15

Page 4 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 632100: Laser Hardened Materials		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Evaluate hardening performance of current materials and technologies to threats. Demonstrate detector hardening for next generation USAF targeting platforms. Develop new persistent surveillance detectors with increased survivability. Design more robust Vis/NIR detectors. Incorporate materials in optical test bed configuration and test performance in relevant environments. Demonstrate optimized nonlinear optical limiter materials for damage protection. Demonstrate semiconductor optical limiter materials performance for damage protection. Verify performance of hardening SWIR sensor systems. Evaluate materials survivability for relevant environments. Develop advanced thin film concepts for enhanced fixed filter performance.						
FY 2011 OCO Plans: In FY2011 OCO: N/A.						
Major Thrust: Develop and demonstrate materials technologies that enhance protection for Air Force aircrews to ensure safety and to enable aircrew to perform required missions in a threat environment.		5.809	4.167	3.061	0.000	3.061
FY 2009 Accomplishments: In FY 2009: Transitioned advanced agile filters and optical power limiters technologies in a system configuration. Demonstrated agile filter and optical limiter devices for Air Force applications.						
FY 2010 Plans: In FY 2010: Integrate fixed optical coatings within visor applications for demonstration.						
FY 2011 Base Plans: In FY 2011: Investigate susceptibility of candidate detectors for HMD systems. Demonstrate enhanced photorefractive hybrid materials concepts for Air Force passive protection applications. Identify personnel protection technologies for the visible and SWIR. Evaluate performance of optical coatings within visor applications.						

UNCLASSIFIED

R-1 Line Item #15

Page 5 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force							DATE: February 2010				
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)			R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems			PROJECT 632100: Laser Hardened Materials					
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 OCO Plans: In FY2011 OCO: N/A.											
Accomplishments/Planned Programs Subtotals							22.377	24.177	19.853	0.000	19.853
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0602102F: Materials.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0602202F: Human Effectiveness Applied Research.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603231F: Crew Systems and Personnel Protection Technology.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0604706F: Life Support Systems.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D. Acquisition Strategy Not Applicable.											
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											

UNCLASSIFIED

UNCLASSIFIED

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
633153: <i>Non-Destructive Inspection Development</i>	8.081	4.038	2.260	0.000	2.260	5.379	7.509	7.580	5.444	Continuing	Continuing
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.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
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. <i>FY 2009 Accomplishments:</i> In FY 2009: Demonstrated NDI/E approaches to extend the life of fracture-critical gas turbine engine components. <i>FY 2010 Plans:</i> In FY 2010: Validate NDI/E approaches to extend the life of fracture-critical gas turbine engine components. <i>FY 2011 Base Plans:</i> In FY 2011: Transition NDI/E approaches to extend the life of fracture-critical gas turbine engine components.							0.527	0.200	0.650	0.000	0.650

UNCLASSIFIED

R-1 Line Item #15

Page 7 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 633153: Non-Destructive Inspection Development		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 OCO Plans: In FY 2011 OCO: N/A.						
MAJOR THRUST: Develop and demonstrate advanced inspection technologies supporting low-observable (LO) systems to enhance affordability and ensure full performance and survivability. FY 2009 Accomplishments: In FY 2009: Developed and demonstrated a multiuse, multiplatform LO NDI/E hand tool that meets user requirements. FY 2010 Plans: In FY 2010: Transition a common, multiuse, multiplatform, handheld LO NDI/E point inspection tool/ sensor system. FY 2011 Base Plans: In FY 2011: Develop inspection methods and sensor technology for signature and material integrity of next generation LO material systems. FY 2011 OCO Plans: In FY 2011 OCO: N/A.		0.339	0.779	0.351	0.000	0.351
MAJOR THRUST: Develop and demonstrate technologies for improved capabilities in corrosion, fatigue monitoring, and testing of aircraft to reduce operations, maintenance costs. FY 2009 Accomplishments: In FY 2009: Transitioned application-focused NDI/E technologies to meet emerging inspection requirements for aging aircraft. FY 2010 Plans: In FY 2010: Not Applicable.		1.645	0.000	0.000	0.000	0.000

UNCLASSIFIED

R-1 Line Item #15

Page 8 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 633153: Non-Destructive Inspection Development		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Not Applicable.						
FY 2011 OCO Plans: In FY11 OCO: N/A.						
MAJOR THRUST: 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.		1.580	0.669	1.259	0.000	1.259
FY 2009 Accomplishments: In FY 2009: Developed optimal sensing approaches for real-time health monitoring of high-temperature protection systems and characterize power scavenging and signal transmission issues. Transitioned smart sensor technologies for wiring health analysis. Transitioned total field-level inspection tool for assessing the structural health of airframes.						
FY 2010 Plans: In FY 2010: Develop and demonstrate optimal sensing approaches for real-time health monitoring of high-temperature protection and advanced material systems and characterize power scavenging and signal transmission issues. Validate smart sensor technologies for wiring health analysis. Validate field- and depot-level inspection tools for assessing the structural health of airframes.						
FY 2011 Base Plans: In FY 2011: Demonstrate optimal sensing approaches for real-time health monitoring of high-temperature protection and advanced material systems and characterize power scavenging and signal transmission issues. Transition smart sensor technologies for wiring health analysis. Transition field- and depot-level inspection tools for assessing the structural health of airframes.						
FY 2011 OCO Plans: In FY 2011 OCO: N/A.						

UNCLASSIFIED

R-1 Line Item #15

Page 9 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 633153: Non-Destructive Inspection Development		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Accomplishments/Planned Programs Subtotals		4.091	1.648	2.260	0.000	2.260
		FY 2009	FY 2010			
Congressional Add: Materials Integrity Management Research for Air Force Systems. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Materials Integrity Management Research for Air Force Systems. FY 2010 Plans: In FY 2010: Not Applicable.		0.798	0.000			
Congressional Add: Sonic Infrared Imaging Technology Development. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Sonic Infrared Imaging Technology Development. FY 2010 Plans: In FY 2010: Not Applicable.		0.798	0.000			
Congressional Add: Aircraft Evaluation Readiness Initiative (AERI). FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for AERI.		2.394	2.390			

UNCLASSIFIED

R-1 Line Item #15

Page 10 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force							DATE: February 2010				
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B. Accomplishments/Planned Program (\$ in Millions)											
						FY 2009	FY 2010				
<i>FY 2010 Plans:</i> In FY 2010: Conduct Congressionally-directed effort for AERI.											
Congressional Adds Subtotals						3.990	2.390				
C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u> <u>Base</u>	<u>FY 2011</u> <u>OCO</u>	<u>FY 2011</u> <u>Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• PE 0602102F: <i>Materials.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D. Acquisition Strategy Not Applicable.											
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											

UNCLASSIFIED

UNCLASSIFIED

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
633946: <i>Materials Transition</i>	16.412	28.502	9.039	0.000	9.039	9.167	8.945	9.331	9.612	Continuing	Continuing
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.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MAJOR THRUST: Develop & demonstrate M&P technologies for air vehicle & subsystems to enhance lift, propulsion, low-observable performance, power generation management, & affordability of air vehicles. <i>FY 2009 Accomplishments:</i> In FY 2009: Validated materials-damage predictive approaches for engine health determination and life extension capability. Transitioned advanced materials and processing technologies to fielded and planned Air Force weapon, airframe, and propulsion applications as well as support systems including AFMC center infrastructure. Evaluated domestic lithium ion precursor materials, active materials, associated testing, and battery-cell manufacturing for acceleration of industrial development. <i>FY 2010 Plans:</i> In FY 2010: Refine processes for producing large area, high-quality diamond windows for airborne high power microwave directed energy weapons. Initially develop nanostructured materials using multiple approaches for high energy density capacitors for pulsed power applications. Transition and validate the methodology to characterize LO materials during production for process control and process validation.							3.692	3.140	4.254	0.000	4.254

UNCLASSIFIED

R-1 Line Item #15

Page 12 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 633946: Materials Transition		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Develop and transition production-level capable processes for producing large area, high-quality diamond windows for airborne high power microwave directed energy weapons. Demonstrate and compare advantages of approaches for high energy density capacitors for pulsed power applications. Initiate validation of processing methods and lifing tools for hybrid disk concepts. Initiate validation of processing methods and lifing methodologies for advanced SiC/SiC composites. Develop and demonstrate methodology for process control and validation of next generation LO material systems.						
FY 2011 OCO Plans: In FY2011 OCO: N/A.						
MAJOR THRUST: Develop & demonstrate M&P technologies to enhance the sustainability of aerospace systems by lowering O&M costs to ensure the full operability and safety of systems and personnel.		1.231	4.402	0.711	0.000	0.711
FY 2009 Accomplishments: In FY 2009: Developed test methodologies and evaluation techniques to facilitate transition of emerging materials and processes for sustainment of Air Force systems.						
FY 2010 Plans: In FY 2010: Demonstrate innovative technologies for bare base utilities. Develop new design and manufacturing processes to achieve dramatic reductions in nonrecurring fabrication and assembly tooling costs and schedules for composite and metallic aircraft utilizing bonded structures and friction stir welding.						
FY 2011 Base Plans: In FY 2011: Demonstrate and transition innovative technologies for bare base utilities.						

UNCLASSIFIED

R-1 Line Item #15

Page 13 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 633946: Materials Transition		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 OCO Plans: In FY2011 OCO: N/A.						
MAJOR THRUST: Develop & demonstrate affordable, novel high temperature materials/structures and thermal management concepts to enable future defense capabilities for prompt global strike concepts. FY 2009 Accomplishments: In FY 2009: Not Applicable. FY 2010 Plans: In FY 2010: Identify key issues and structural concepts for hot structure and thermal protection systems to be fabricated from advanced ceramics, ceramic matrix composites, hybrids, and advanced metals and intermetallics. FY 2011 Base Plans: In FY 2011: Explore fabrication techniques for hot structure and thermal protection systems from advanced ceramics, CMCs, hybrids and advanced metals and intermetallics. FY 2011 OCO Plans: In FY2011 OCO: N/A.		0.000	2.000	4.074	0.000	4.074
Accomplishments/Planned Programs Subtotals		4.923	9.542	9.039	0.000	9.039
		FY 2009	FY 2010			
Congressional Add: Metals Affordability Initiative. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Metals Affordability Initiative.		3.989	9.958			

UNCLASSIFIED

R-1 Line Item #15

Page 14 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>	R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>	PROJECT 633946: <i>Materials Transition</i>
B. Accomplishments/Planned Program (\$ in Millions)		
	FY 2009	FY 2010
<i>FY 2010 Plans:</i> In FY 2010: Conduct Congressionally-directed effort for Metals Affordability Initiative.		
Congressional Add: EMI Grid Fabrication Technology. <i>FY 2009 Accomplishments:</i> In FY 2009: Conducted Congressionally-directed effort for EMI Grid Fabrication Technology. <i>FY 2010 Plans:</i> In FY 2010: Conduct Congressionally-directed effort for EMI Grid Fabrication Technology.	2.713	2.390
Congressional Add: Silicon Carbide Electronics Material Producibility Initiative. <i>FY 2009 Accomplishments:</i> In FY 2009: Conducted Congressionally-directed effort for Silicon Carbide Electronics Material Producibility Initiative. <i>FY 2010 Plans:</i> In FY 2010: Conduct Congressionally-directed effort for Silicon Carbide Electronics Material Producibility Initiative.	4.787	5.019
Congressional Add: SiC-RF Power for Avionics Systems. <i>FY 2009 Accomplishments:</i> In FY 2009: Not Applicable. <i>FY 2010 Plans:</i> In FY 2010: Conduct Congressionally-directed effort for SiC-RF Power for Avionics Systems.	0.000	1.593

UNCLASSIFIED

R-1 Line Item #15

Page 15 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>				PROJECT 633946: <i>Materials Transition</i>			
B. Accomplishments/Planned Program (\$ in Millions)											
										FY 2009	FY 2010
Congressional Adds Subtotals										11.489	18.960
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0602102F: <i>Materials.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603203F: <i>Advanced Aerospace Sensors.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603211F: <i>Aerospace Technology Dev/Demo.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603216F: <i>Aerospace Propulsion and Power Technology.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D. Acquisition Strategy Not Applicable.											
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											

UNCLASSIFIED

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force								DATE: February 2010			
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>				PROJECT 634918: <i>Deployed Air Base Demonstrations</i>			
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
634918: <i>Deployed Air Base Demonstrations</i>	11.232	11.139	2.262	0.000	2.262	2.396	2.930	3.052	2.566	Continuing	Continuing
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.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MAJOR THRUST: Demonstrate & transition deployable infrastructure airbase technologies, to reduce airlift & manpower requirements, setup time, & sustainment costs in support of AEF operations. <i>FY 2009 Accomplishments:</i> In FY 2009: Developed best methods for integration of advanced power generation and distribution. Characterized and made ensure processes for innovative technologies. Began development and demonstration of airfield damage repair and matting technologies that address field critical conditions, represented by key performance parameters, including issues like reduced weight and ease of installation and repair in the field. <i>FY 2010 Plans:</i> In FY 2010: Demonstrate and transition methods for integrated, advanced power generation and distribution. Demonstrate methods and technologies for performing aircraft operating surface evaluations for ability to sustain aircraft operations. Demonstrate and analyze rapid temporary and permanent high temperature operating surface repairs.							4.338	1.157	1.074	0.000	1.074

UNCLASSIFIED

R-1 Line Item #15

Page 17 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 634918: Deployed Air Base Demonstrations		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Demonstrate and transition integrated, advanced power generation and distribution methods. Demonstrate methods and technologies to evaluate operating surfaces for ability to sustain remote and autonomous aircraft operations. Demonstrate and optimize rapid temporary and permanent high temperature operating surface repairs.						
FY 2011 OCO Plans: In FY2011 OCO: N/A.						
MAJOR THRUST: Demonstrate and transition technologies to provide force protection and fire fighting capability for deployed AEF operations.		1.509	1.219	1.188	0.000	1.188
FY 2009 Accomplishments: In FY 2009: Validated and fabricated improved blast suppression technologies and fragmentation protection materials for new and existing structures. Demonstrated and validated explosives detection technologies. Evaluated and characterize improved fire fighter safety technologies and transition technology to operational units. Characterized and analyzed/evaluated ultrahigh pressure, standoff nozzles, and other innovative technologies with test bed vehicles. Characterized air filtration and model/evaluate reactive filtration effectiveness for expeditionary structures.						
FY 2010 Plans: In FY 2010: Demonstrate agile and lightweight adaptive blast suppression materials in representative structures. Integrate and demonstrate candidate fire fighter safety technologies against representative environments and threats. Integrate and demonstrate candidate ultrahigh pressure, nozzles, and other technologies in fire safety systems. Demonstrate air filtration and reactive filtration effectiveness for expeditionary structures and personnel protection.						

UNCLASSIFIED

R-1 Line Item #15

Page 18 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 634918: Deployed Air Base Demonstrations		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Demonstrate and transition agile, lightweight adaptive blast suppression materials in representative structures. Demonstrate and optimize candidate fire fighter safety technologies against representative environments and threats. Demonstrate and transition candidate ultrahigh pressure, nozzles, and other technologies in fire safety systems. Develop and demonstrate reactive and responsive materials for platforms, expeditionary structures and personnel protection.						
FY 2011 OCO Plans: IN FY 2011 OCO: N/A.						
Accomplishments/Planned Programs Subtotals		5.847	2.376	2.262	0.000	2.262
		FY 2009	FY 2010			
Congressional Add: Body Armor Improved Ballistic Protection. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Body Armor Improved Ballistic Protection. FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Body Armor Improved Ballistic Protection.		1.995	1.753			
Congressional Add: Strategic Biofuels Supply System. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Strategic Biofuels Supply System.		0.997	1.593			

UNCLASSIFIED

R-1 Line Item #15

Page 19 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems				PROJECT 634918: Deployed Air Base Demonstrations			
B. Accomplishments/Planned Program (\$ in Millions)											
								FY 2009	FY 2010		
FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Strategic Biofuels Supply System.											
Congressional Add: Sewage-Derived Biofuels Program. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Sewage-Derived Biofuels Program. FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Sewage-Derived Biofuels Program.								2.393	3.824		
Congressional Add: Military Waste-to-Energy Project Using the Hydro-Thermal Energy Conversion (Hy-TEC) Process. FY 2009 Accomplishments: In FY 2009: Not Applicable. FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Military Waste-to-Energy Project Using the Hydro-Thermal Energy Conversion (Hy-TEC) Process.								0.000	1.593		
Congressional Adds Subtotals								5.385	8.763		
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0602102F: Materials.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603287F: Physical Security Equipment.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

UNCLASSIFIED

R-1 Line Item #15

Page 20 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force								DATE: February 2010			
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>				PROJECT 634918: <i>Deployed Air Base Demonstrations</i>			
<u>C. Other Program Funding Summary (\$ in Millions)</u>											
<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u> <u>Base</u>	<u>FY 2011</u> <u>OCO</u>	<u>FY 2011</u> <u>Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• PE 0604617F: <i>Agile Combat Support.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<u>D. Acquisition Strategy</u> Not Applicable.											
<u>E. Performance Metrics</u> Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											

UNCLASSIFIED

UNCLASSIFIED

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APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>				PROJECT 6377SP: <i>Advanced Space Materials</i>			
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
6377SP: <i>Advanced Space Materials</i>	3.968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

Note: Funds from Project 77SP have been moved to Project 2100 within this Program Element to more accurately align efforts.

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.

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MAJOR THRUST: Develop & demonstrate advanced M&P technologies to enable revolutionary improvements in the performance of air-breathing and rocket-based aerospace vehicles and weapons. FY 2009 Accomplishments: In FY 2009: Utilized newly developed materials approaches, fabricate thermal protection system sub-components for high temperature testing. Developed a sub-component cryogenic tank article and demonstrate the integration of ceramic, metallic, and carbon-carbon thermal protection system components. FY 2010 Plans: In FY 2010: Not Applicable.	1.853	0.000	0.000	0.000	0.000

UNCLASSIFIED

R-1 Line Item #15

Page 22 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force				DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603112F: Advanced Materials for Weapon Systems		PROJECT 6377SP: Advanced Space Materials		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Not Applicable.						
FY 2011 OCO Plans: In FY 2011 OCO: N/A.						
MAJOR THRUST: Develop and demonstrate advanced materials technologies that enhance hardening for space systems. FY 2009 Accomplishments: In FY 2009: Fabricated and demonstrated limiter and filter technology for protection of space systems. Investigated impact of inserting state-of-the-art filters and optical power limiters into a realistic system configuration. FY 2010 Plans: In FY 2010: Not Applicable. FY 2011 Base Plans: In FY 2011: Not Applicable. FY 2011 OCO Plans: In FY 2011 OCO: N/A.		2.115	0.000	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals		3.968	0.000	0.000	0.000	0.000

UNCLASSIFIED

R-1 Line Item #15

Page 23 of 24

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force								DATE: February 2010																										
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603112F: <i>Advanced Materials for Weapon Systems</i>			PROJECT 6377SP: <i>Advanced Space Materials</i>																											
<p><u>C. Other Program Funding Summary (\$ in Millions)</u></p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Line Item</u></th> <th style="text-align: right;"><u>FY 2009</u></th> <th style="text-align: right;"><u>FY 2010</u></th> <th style="text-align: right;"><u>FY 2011</u> <u>Base</u></th> <th style="text-align: right;"><u>FY 2011</u> <u>OCO</u></th> <th style="text-align: right;"><u>FY 2011</u> <u>Total</u></th> <th style="text-align: right;"><u>FY 2012</u></th> <th style="text-align: right;"><u>FY 2013</u></th> <th style="text-align: right;"><u>FY 2014</u></th> <th style="text-align: right;"><u>FY 2015</u></th> <th style="text-align: right;"><u>Cost To</u> <u>Complete</u></th> <th style="text-align: right;"><u>Total Cost</u></th> </tr> </thead> <tbody> <tr> <td>• PE Not Provided (1248): <i>Activity Not Provided</i></td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> <td style="text-align: right;">0.000</td> </tr> </tbody> </table> <p><u>D. Acquisition Strategy</u> Not Applicable.</p> <p><u>E. Performance Metrics</u> Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.</p>											<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u> <u>Base</u>	<u>FY 2011</u> <u>OCO</u>	<u>FY 2011</u> <u>Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>	• PE Not Provided (1248): <i>Activity Not Provided</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u> <u>Base</u>	<u>FY 2011</u> <u>OCO</u>	<u>FY 2011</u> <u>Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>																							
• PE Not Provided (1248): <i>Activity Not Provided</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																							

UNCLASSIFIED

R-1 Line Item #15

Page 24 of 24