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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force										Date: February 2018		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 2: Applied Research					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	192.583	192.695	190.919	0.000	190.919	214.984	213.042	216.885	205.822	Continuing	Continuing
623012: Advanced Propulsion Technology	-	26.750	28.612	26.813	0.000	26.813	32.250	28.628	30.791	29.221	Continuing	Continuing
623048: Combustion and Mechanical Systems	-	10.502	10.833	10.691	0.000	10.691	11.983	12.199	12.414	11.778	Continuing	Continuing
623066: Turbine Engine Technology	-	50.776	55.304	52.429	0.000	52.429	60.891	62.308	63.405	60.167	Continuing	Continuing
623145: Aerospace Power Technology	-	44.703	34.736	39.102	0.000	39.102	40.327	38.861	37.996	36.056	Continuing	Continuing
624847: Rocket Propulsion Technology	-	55.384	58.594	57.340	0.000	57.340	64.432	65.848	66.988	63.575	Continuing	Continuing
625330: Aerospace Fuel Technology	-	4.468	4.616	4.544	0.000	4.544	5.101	5.198	5.291	5.025	Continuing	Continuing
A. Mission Description and Budget Item Justification												
This effort develops propulsion and power technologies to achieve enabling and revolutionary aerospace technology capabilities. The effort has six projects, each focusing on a technology area critical to the Air Force. The Advanced Propulsion Technology project develops high-speed air breathing propulsion engines to include combined cycle, ramjet, and hypersonic scramjet technologies to enable revolutionary propulsion capability for the Air Force. The Combustion and Mechanical Systems project develops engine mechanical system technologies: bearings, seals, drives, and lubricants as well as combustion components, concepts, and technologies for legacy and advanced turbine engines. The Turbine Engine Technology project develops enabling capabilities to enhance performance and affordability of existing weapon systems and develops component technologies for ultra high pressure ratio, substantially improved durability, and adaptive cycle engine architecture to provide optimized performance, fuel efficiency, and life for widely varying mission needs. The Aerospace Power Technology project develops electrical power and thermal control technologies for military applications that remove operational limitations and enable advanced vehicle designs and high-power mission systems. The Rocket Propulsion Technology project develops advances in rocket propulsion technologies for space access, space maneuver, missiles, the sustainment of strategic systems, and tactical rockets. The Aerospace Fuel Technology project evaluates hydrocarbon-based fuels for legacy and advanced turbine engines, scramjets, pulse detonation, and combined-cycle engines. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.												

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This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602204F, 0602601F, 0602602F, 0602605F, 0602788F, 1206601F, and 0602298F.						
This effort is in Budget Activity 2, Applied Research because this budget activity includes studies, investigations, and non-system specific technology efforts directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.						
B. Program Change Summary (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget		185.671	192.695	193.579	0.000	193.579
Current President's Budget		192.583	192.695	190.919	0.000	190.919
Total Adjustments		6.912	0.000	-2.660	0.000	-2.660
• Congressional General Reductions		0.000	0.000			
• Congressional Directed Reductions		0.000	0.000			
• Congressional Rescissions		0.000	0.000			
• Congressional Adds		10.000	0.000			
• Congressional Directed Transfers		0.000	0.000			
• Reprogrammings		0.486	0.000			
• SBIR/STTR Transfer		-3.574	0.000			
• Other Adjustments		0.000	0.000	-2.660	0.000	-2.660
Congressional Add Details (\$ in Millions, and Includes General Reductions)						
Project: 623145: Aerospace Power Technology						
Congressional Add: Program Increase						
Congressional Add: Program Increase - aerospace power technology						
Congressional Add Subtotals for Project: 623145						
Congressional Add Totals for all Projects						
Change Summary Explanation						
Decrease in FY 2019 due to Department of Defense (DoD) non-pay deflation and civilian pay repricing adjustment.						

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion				Project (Number/Name) 623012 / Advanced Propulsion Technology			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
623012: Advanced Propulsion Technology	-	26.750	28.612	26.813	0.000	26.813	32.250	28.628	30.791	29.221	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops combined/advanced cycle air breathing high-speed (up to Mach 5) and hypersonic (Mach 5 to 7) propulsion technologies to provide revolutionary propulsion options for the Air Force. These new engine technologies will enable future high-speed/hypersonic weapons and aircraft concepts. The primary focus is on hydrocarbon-fueled engines capable of operating over a broad range of flight Mach numbers. Efforts include modeling, simulations, and proof of concept demonstrations of critical components; advanced component development; and ground-based demonstrations.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Hypersonic Scramjet Technologies	26.750	28.612	26.813	0.000	26.813
Description: Develop robust hydrocarbon fueled scramjet engine components and technologies to improve performance, operability, durability, and scalability for future platforms.					
FY 2018 Plans: Complete scramjet engine controls development as part of the high speed strike weapon technology maturation program. Complete mapping of scramjet isolator operability for distorted in-flow conditions. Continue to develop advanced engine components to improve scramjet operating margin and to refine scramjet scaling laws for reusable applications. Continue to develop techniques to decrease scramjet take-over from Mach 4.5 to Mach 3.5 to provide robust options for Combined Cycle Engines (CCEs). Continue to develop low internal drag flame stabilization devices and flight test engine components.					
FY 2019 Base Plans: Continue to develop and demonstrate advanced engine components to improve scramjet operating margin and to refine scramjet scaling laws for reusable applications. Continue to develop techniques to decrease scramjet take-over from Mach 4.5 to Mach 3.5 to provide robust options for CCEs. Continue to develop low internal drag flame stabilization devices and flight test engine components.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / <i>Aerospace Propulsion</i>		Project (Number/Name) 623012 / <i>Advanced Propulsion Technology</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO
FY 2019 decreased compared to FY 2018 by \$1.799 million. Justification for the decrease is civilian pay deflation and the acceleration of hypersonics technology maturation effort.					
Accomplishments/Planned Programs Subtotals		26.750	28.612	26.813	0.000
C. Other Program Funding Summary (\$ in Millions) N/A					
Remarks					
D. Acquisition Strategy N/A					
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.					

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Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion				Project (Number/Name) 623048 / Combustion and Mechanical Systems			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
623048: Combustion and Mechanical Systems	-	10.502	10.833	10.691	0.000	10.691	11.983	12.199	12.414	11.778	Continuing	Continuing
A. Mission Description and Budget Item Justification												
This project evaluates lubricants, mechanical systems, and combustion concepts for advanced turbine engines, pulse detonation engines, and combined cycle engines. This project also develops technologies to increase turbine engine operational reliability, durability, mission flexibility, maintainability, and performance while reducing weight, fuel consumption, and cost of ownership. Applications include: missiles, aircraft, and re-usable high-speed vehicles. Analytical and experimental areas of emphasis include: lubricants, bearings, mechanical systems diagnostics, mechanical systems prognostics, rotor dynamics, oil-less engine technology, optical diagnostics, fundamental combustion, detonations, combustors, and afterburners. Lubricants for these engines must be thermally stable, cost-effective, and operate over a broad range of conditions. Advanced combustion concepts must be cost-effective, durable, and reduce pollutant emissions. A portion of this project supports adaptive cycle technologies. Adaptive cycle technologies develops component technology for an adaptive cycle engine architecture that provides both optimized performance and fuel efficiency for widely varying mission needs.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Combustion Technologies								4.372	4.510	4.451	0.000	4.451
Description: Develop, test, and evaluate revolutionary combustion and propulsion concepts for gas turbine, pulse detonation, and combined cycle engines for missiles, manned and unmanned systems.												
FY 2018 Plans: Continue to explore interactions and effects of compressor and turbine components on the combustor and combustor materials to reduce engine weight and increase efficiency. Continue using advanced diagnostics to obtain high-quality datasets that can be made available to and used by academia and industry for model development and verification. Continue the determination of necessary reference performance and operability combustion systems and metrics to decrease the cost of certifying new and alternative fuels in weapon systems. Continue to support development of advanced computational fluid dynamics (CFD) models to reduce combustor and augmentor design costs. Continue development of computations, modeling and simulation, and research experimentation of advanced combustion concepts including pressure gain combustion components and system level architectures. Continue to explore advanced combustion and flameholding concepts working towards improved understanding at relevant operating conditions such as sub-atmospheric (less than 1 atmosphere) and high pressure (greater than 10 atmospheres).												
FY 2019 Base Plans:												

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B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Continue to explore interactions and effects of compressor and turbine components on the combustor and combustor materials to reduce engine weight and increase efficiency. Continue using advanced diagnostics to obtain high-quality datasets that can be made available to and used by academia and industry for model development and verification. Continue the determination of necessary reference performance and operability combustion systems and metrics to decrease the cost of certifying new and alternative fuels in weapon systems. Continue to support development of advanced CFD models to reduce combustor and augmentor design costs. Continue development of computations, modeling and simulation, and research experimentation of advanced combustion concepts including pressure gain combustion components and system level architectures. Continue to explore advanced combustion and flameholding concepts working towards improved understanding at relevant operating conditions such as sub-atmospheric (less than 1 atmosphere) and high pressure (greater than 10 atmospheres). FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.059 million. Justification for the decrease is described in the plans above.						
Title: Diagnostic Technologies Description: Develop and demonstrate optical, electromechanical, and laser diagnostic tools and sensors for application to revolutionary propulsion technologies. FY 2018 Plans: Continue development and demonstration of diagnostic systems for high-bandwidth kHz-MHz measurements of combustion chemistry and physics. Efforts seek to increase time scales of interest, size of regions explored, and increasing the number of species and their concentrations. Diagnostics techniques should include 1) time-division-multiplexed hyperspectral absorption spectroscopy, 2) pulse-burst lasers, and 3) ultrashort-pulse (picosecond, femtosecond) lasers. Continue application of the insights gained to engine test cells and fielded systems. Continue to provide sufficient data to support computational fluid dynamics (CFD) combustion model development. Specific efforts include development and application of fast laser systems and various atomic tracers for high-speed, planar visualization of mixing as applied in gas-turbine and hypersonic/scramjet propulsion systems. Further development of diagnostic tools/methods will provide robust measurement		0.695	0.717	0.708	0.000	0.708

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
capability in engine test cells and full-annular ground-test environments. Developing systems to provide portable measurement capability throughout engine development and testing. FY 2019 Base Plans: Continue development and demonstration of diagnostic systems for high-bandwidth kHz-MHz measurements of combustion chemistry and physics. Continue to seek to increase time scales of interest, size of regions explored, and increasing the number of species and their concentrations. Continue the development of diagnostic techniques to include 1) time-division-multiplexed hyperspectral absorption spectroscopy, 2) pulse-burst lasers, and 3) ultrashort-pulse (picosecond, femtosecond) lasers. Continue application of the insights gained to engine test cells and fielded systems. Continue to provide sufficient data to support CFD combustion model development, including development and application of fast laser systems and various atomic tracers for high-speed, planar visualization of mixing as applied in gas-turbine and hypersonic/scramjet propulsion systems. Continue development of diagnostic tools/methods for robust measurement capability in engine test cells and full annular ground test environments. Continue development of portable measurement capability for engine testing. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.009 million. Justification for the decrease is described in the plans above.						
Title: Lubricant Technologies Description: Develop, test, and qualify advanced turbine engine lubricants. Generate and maintain military specifications for aviation engine lubricants. FY 2018 Plans: Continue developing innovative fluids (i.e., ionic fluids/additives) as potential high temperature lubricants for high-Mach and future high performance engines. Demonstrate Enhanced Ester (EE) oils in rig testing and design studies of turbine engines. Continue transitioning EE oil to F-35 and F-22 fleet. Continue developing on-line mechanical system health monitoring technologies. Continue implementation of new lubricant traction models into updated bearing design codes. Continue supporting the warfighter on field-related mechanical system issues. FY 2019 Base Plans:		2.683	2.767	2.731	0.000	2.731

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Continue developing innovative fluids (i.e., ionic fluids/additives) as potential high temperature lubricants for high-Mach and future high performance engines. Demonstrate Enhanced Ester (EE) oils in rig testing and design studies of turbine engines. Continue transitioning EE oil to F-35 and F-22 fleet. Continue developing on-line mechanical system health monitoring technologies. Continue the implementation of new lubricant traction models into updated bearing design codes. Continue supporting the warfighter on field-related mechanical system issues. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.036 million. Justification for the decrease is described in the plans above.						
Title: Bearing Technologies Description: Develop and test advanced bearing material technology and bearing concepts for small, intermediate, and large-scale turbine engine applications. FY 2018 Plans: Continue developing physics-based bearing life model based on bearing alloy fatigue & microstructural investigations, including bearing life factors for advanced bearing materials. Continue work on small magnetic bearings & oil-free bearings for small & medium scale unmanned aircraft system (UAS), hi-Mach cruise missile and low-cost engines. Initiate the integration of new bearing modeling simulation tools into full-engine design models. Continue development of active thrust-balance/prognostic health management (PHM) system for large man-rated and medium-scale propulsion. FY 2019 Base Plans: Continue developing physics-based bearing life model based on bearing alloy fatigue & microstructural investigations, including bearing life factors for advanced bearing materials. Continue work on small magnetic bearings & oil-free bearings for small & medium scale UAS, hi-Mach cruise missile and low-cost engines. Continue the integration of new bearing modeling simulation tools into full-engine design models. Continue development of active thrust-balance/PHM system for large man-rated and medium-scale propulsion. FY 2019 OCO Plans:		2.752	2.839	2.801	0.000	2.801

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO
N/A					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> FY 2019 decreased compared to FY 2018 by \$0.038 million. Justification for the decrease is described in the plans above.					
Accomplishments/Planned Programs Subtotals		10.502	10.833	10.691	0.000
C. Other Program Funding Summary (\$ in Millions) N/A					
Remarks					
D. Acquisition Strategy N/A					
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.					

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Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion				Project (Number/Name) 623066 / Turbine Engine Technology			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
623066: Turbine Engine Technology	-	50.776	55.304	52.429	0.000	52.429	60.891	62.308	63.405	60.167	Continuing	Continuing
A. Mission Description and Budget Item Justification												
This project develops technology to increase turbine engine operational reliability, durability, mission flexibility, and performance, while reducing weight, fuel consumption, and cost of ownership. Analytical and experimental areas of emphasis are fans and compressors, high temperature combustors, turbines, internal flow systems, controls, augmentor and exhaust systems, integrated power and thermal management systems, engine inlet integration, mechanical systems, adaptive cycle technologies, and structural design. This project develops component technology for an adaptive cycle engine architecture that provides both optimized performance and fuel efficiency for widely varying mission needs. This project supports joint DoD, agency, and industry efforts to focus turbine propulsion technology on national needs. The project plan is relevant across capability areas for global responsive strike, tactical and global mobility, responsive space lift, and persistent intelligence, surveillance, and reconnaissance (ISR).												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Turbofan/Turbojet Engine Core Technologies								22.742	24.770	23.482	0.000	23.482
Description: Develop core turbofan/turbojet engine components (i.e., compressors, combustors, and turbines) for fighters, bombers, sustained supersonic/hypersonic cruise vehicles, and transports.												
FY 2018 Plans: Develop and validate modeling and simulation tools for the design and analysis of advanced turbine components with improved durability for adaptive cycle engines. Continue development of improved compressor aerodynamic design tools and analysis methods to extend engine operability and efficiency.												
FY 2019 Base Plans: Develop and validate modeling and simulation tools for the design and analysis of advanced turbine components with improved durability for adaptive cycle engines. Continue development of improved compressor aerodynamic design tools and analysis methods to extend engine operability and efficiency.												
FY 2019 OCO Plans: N/A												
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$1.288 million. Justification for the decrease is civilian pay deflation and the acceleration of hypersonics technology maturation effort.												
Title: Turbofan/Turbojet Engine Fan, Low Pressure Turbine, and Integration Technologies								22.807	24.840	23.550	0.000	23.550

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Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion		Project (Number/Name) 623066 / Turbine Engine Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Develop turbofan/turbojet engine components (i.e., fans, nozzles, etc.) used in engines for fighters, bombers, sustained supersonic strike and hypersonic cruise vehicles, and transports.</p> <p>FY 2018 Plans: Continue development of modeling and simulation tools, including methods to predict behavior of serpentine inlets and nozzles. Continue development and validation of modeling and simulation tools for the design and analysis of advanced low pressure turbine components to enable lower cost/weight systems with improved aero-performance for increased range and endurance at altitude. Initiate the identification of control technology elements applicable to integrated propulsion/power/thermal solutions. Initiate the definition of actionable indicators and assess interface control gaps to enable decision-based informed lifecycle tools.</p> <p>FY 2019 Base Plans: Continue development of modeling and simulation tools, including methods to predict behavior of serpentine inlets and nozzles. Develop and validate modeling and simulation tools for the design and analysis of advanced low pressure turbine components to enable lower cost/weight systems with improved aero-performance for increased range and endurance at altitude. Continue to identify control technology elements applicable to integrated propulsion/power/thermal solutions. Define actionable indicators and assess interface control gaps to enable decision-based informed life cycle tools</p> <p>FY 2019 OCO Plans: N/A</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$1.290 million. Justification for the decrease is civilian pay deflation and acceleration of the hypersonics technology maturation effort.</p>						
<p>Title: Missile and Remotely Piloted Aircraft Engine Technologies</p> <p>Description: Develop limited life engine components for missile and remotely piloted aircraft (RPA) applications, including long-range supersonic and hypersonic vehicles.</p> <p>FY 2018 Plans: Continue to demonstrate advanced component designs in rig testing. Continue to utilize validation data to develop improved test protocol for small engine augmentor designs. Continue development and validation of modeling and simulation tools for the design and analysis of turbine components with mission-tailored aero-performance and highly efficient cooling geometries. Initiate the development and validation of parameter,</p>		4.277	4.659	4.417	0.000	4.417

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Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion		Project (Number/Name) 623066 / Turbine Engine Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
process, and performance modeling for components manufactured through additive technologies. Initiate the development and validation of rules and tools to enable flexible design for targeted life. FY 2019 Base Plans: Continue to demonstrate advanced component designs in rig testing. Continue to utilize validation data to develop improved test protocol for small engine augmentor designs. Continue development and validation of modeling and simulation tools for the design and analysis of turbine components with mission-tailored aero-performance and highly efficient cooling geometries. Continue to develop and validate parameter, process, and performance modeling for components manufactured through additive technologies. Continue to develop and validate rules and tools to enable flexible design for targeted life applications. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.242 million. Justification for the decrease is described in the plans above.						
Title: Turboshaft/Turboprop and Small Turbofan Engine Technologies Description: Develop components for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. FY 2018 Plans: Continue development and validation of modeling and simulation tools to achieve very high levels of loading for advanced low pressure turbine components. Initiate the exploration of advanced integrated engine controls with potential for synergistic airframe system level benefits. FY 2019 Base Plans: Continue development and validation of modeling and simulation tools to achieve very high levels of loading for advanced low pressure turbine components. Continue the exploration of advanced integrated engine controls with potential for synergistic airframe system level benefits. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement:		0.950	1.035	0.980	0.000	0.980

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO
FY 2019 decreased compared to FY 2018 by \$0.055 million. Justification for the decrease is described in the plans above.					
Accomplishments/Planned Programs Subtotals		50.776	55.304	52.429	0.000
C. Other Program Funding Summary (\$ in Millions) N/A					
Remarks					
D. Acquisition Strategy N/A					
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.					

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Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion				Project (Number/Name) 623145 / Aerospace Power Technology			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
623145: Aerospace Power Technology	-	44.703	34.736	39.102	0.000	39.102	40.327	38.861	37.996	36.056	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops integrated electrical and thermal management components, controls and systems for military aerospace applications. Power component technologies are developed to increase reliability, maintainability, commonality, affordability, and supportability of aircraft and flight line equipment. Research is conducted in energy storage and hybrid power system technologies to enable special purpose applications. Electrical power and thermal management technologies enable future military megawatt level power and thermal management needs. Controls and system integration technologies ensure the interoperability of aircraft, power, thermal, engine and other systems and subsystems. This project supports development of electrical power and thermal management components, controls and systems suitable for applications to legacy and future aircraft platforms including strike and mobility concepts. Lightweight power systems suitable for other aerospace applications are also developed.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: High Power System Technologies	34.879	34.736	39.102	0.000	39.102
Description: Develop integrated system architecture, controls, and component technologies to provide for the large amounts of electrical power needed, and concurrent thermal mitigation required, by current and future manned and unmanned systems.					
FY 2018 Plans: Continue development of system and component electrical power, electro-mechanical, and thermal technologies for high-power applications. Continue development of hybrid approaches to power generation, storage, and application as well as thermal management. Continue testing of subsystems hardware in conjunction with continued platform level tip-to-tail modeling and simulation energy optimization. Continue development of advanced, safe energy storage, power distribution, and management systems to include Silicon Carbide applications and batteries. Continue power and thermal development toward demonstration of tactical aircraft high-power payload capability, e.g. laser weapon system. Continue analysis and development of adaptive power and thermal control systems for high-power aircraft. Initiate development of advanced power options for small unmanned aircraft.					
FY 2019 Base Plans: Continue development of system and component electrical power, electro-mechanical, and thermal technologies for high-power applications. Continue development of hybrid approaches to power generation, storage, and application as well as thermal management. Continue testing of subsystems hardware in conjunction with					

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B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>continued platform level tip-to-tail modeling and simulation energy optimization. Continue development of advanced, safe energy storage, power distribution, and management systems to include Silicon Carbide applications and batteries. Continue power and thermal development toward demonstration of tactical aircraft high-power payload capability, e.g. laser weapon system. Continue analysis and development of adaptive power and thermal control systems for high-power aircraft. Continue the development of advanced power options for small unmanned aircraft. Initiate weapon system contractor support for platform integration of advanced power and thermal system architectures.</p> <p>FY 2019 OCO Plans: N/A</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increased compared to FY 2018 by \$4.366 million. Justification for the acceleration of the hypersonics technology maturation effort.</p>						
Accomplishments/Planned Programs Subtotals		34.879	34.736	39.102	0.000	39.102
		FY 2017	FY 2018			
Congressional Add: Program Increase		4.912	0.000			
FY 2017 Accomplishments: Conducted Congressionally-directed efforts						
FY 2018 Plans: N/A						
Congressional Add: Program Increase - aerospace power technology		4.912	0.000			
FY 2017 Accomplishments: Conducted Congressionally-directed efforts						
FY 2018 Plans: N/A						
Congressional Adds Subtotals		9.824	0.000			
C. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						
D. Acquisition Strategy						
N/A						

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602203F / <i>Aerospace Propulsion</i>	Project (Number/Name) 623145 / <i>Aerospace Power Technology</i>
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.		

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion				Project (Number/Name) 624847 / Rocket Propulsion Technology			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
624847: Rocket Propulsion Technology	-	55.384	58.594	57.340	0.000	57.340	64.432	65.848	66.988	63.575	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops rocket propulsion technologies for space access, space maneuver, the sustainment of strategic systems (including solid boost/missile propulsion, post boost control, aging and surveillance efforts), and tactical missiles. Analytical and experimental areas of emphasis are propellants, propellant management, combustion, rocket material applications, technology for sustainment of strategic systems, and innovative space propulsion concepts. Technologies of interest will improve reliability, performance, survivability, affordability, and environmental compatibility of these systems. Develop technologies to reduce the weight and cost of components using new materials and improved designs and manufacturing techniques. All thrusts in this project contribute to the sustainment of the rocket propulsion industry, providing rocket propulsion technology for the entire DoD. Technologies under this project enable capabilities of interest to both DoD and National Aeronautics and Space Administration (NASA). Tasks include: modeling and simulation; proof of concept tests of critical components; advanced component development; and ground-based tests. Aging and surveillance tasks could reduce lifetime prediction uncertainties for individual motors by 50%, enabling motor replacement for cause. All thrusts are part of the Rocket Propulsion 21 (RP21) collaboration and are reviewed by a DoD level steering committee yearly for relevance to DoD missions and achieve RP21 Goals.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Fuel Technologies	6.745	7.136	10.791	0.000	10.791
Description: Develop, characterize, and test advanced hydrocarbons, energetics, solid propellants, and monopropellants to increase space launch payload capability and refine new synthesis methods.					
FY 2018 Plans: Continue developing solid rocket propellant binder systems for intended use across a variety operationally relevant conditions. Initiate conception, synthesis, scale-up, and characterize novel energetic ingredients, including both fuels and oxidizers, for use across the span of space and missile applications from strategic and tactical boost through in-space thrust and attitude control. Initiate transfer of knowledge for making green monopropellants to the United States industrial base. Initiate the formulation, scale-up, and evaluate formulations of solid and liquid rocket propellants. Initiate the identification, evaluation, and adaption of 21st century material processing equipment to enable more rapid and agile development and more precise products. Continue support for NASA's Green Propellant Infusion mission to demonstrate a non-toxic ionic liquid based propulsion system in space. Continue research in high-temperature resins, insulators, and composite case					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force				Date: February 2018		
Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion		Project (Number/Name) 624847 / Rocket Propulsion Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
fabrication techniques to enable high mass-fraction rocket motor cases. Initiate high-performance bi-propellant synthesis and formulation. FY 2019 Base Plans: Continue developing solid rocket propellant binder systems for intended use across a variety operationally relevant conditions. Continue to conceive, synthesize, scale-up, and characterize novel energetic ingredients, including both fuels and oxidizers, for use across the span of space and missile applications from strategic and tactical boost through in-space thrust and attitude control. Continue transferring knowledge for making green mono-propellants to the United States industrial base. Continue to formulate, scale-up, and evaluate formulations of solid and liquid rocket propellants. Continue to identify, evaluate, and adapt 21st century material processing equipment to enable more rapid and agile development and more precise products. Continue support for NASAs Green Propellant Infusion mission to demonstrate a non-toxic ionic liquid based propulsion system in space. Continue research in high-temperature resins, insulators, and composite case fabrication techniques to enable high mass-fraction rocket motor cases. Continue high-performance bi-propellant synthesis and formulation. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increased compared to FY 2018 by \$3.655 million. Justification for the increase is increased emphasis in fuel technologies.						
Title: Liquid Engine Combustion Technologies Description: Develop advanced liquid engine combustion technology for improved performance, while preserving chamber lifetime and reliability needs for engine uses in heavy lift space vehicles. FY 2018 Plans: Complete the testing plan for the program to assess the potential payoff of, and technical barriers to, Rotating Detonation Engines as a reliable and lower-cost advanced propulsion approach for both launch and in-space applications. Continue evaluation of methane multi-injector designs in hot-fire conditions. Complete the delivery of high-fidelity injector simulations that complement experimental data. Continue hot fire tests in combustion stability rig. Continue combustion stability modeling critical future hydrocarbon fueled liquid rocket engines. Continue the delivery of combustion stability codes with nearly-complete set of validation data to rocket community, enabling more robust and stable engine designs. Continue developing understanding of hydrocarbon fuel production, expanding testing in to methane fuels and other cryogenic cooling. Continue the		6.728	7.118	8.601	0.000	8.601

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force				Date: February 2018		
Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion		Project (Number/Name) 624847 / Rocket Propulsion Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
employment new fuel and material operating limitations, manufacturing processes, and launch goals in cycle analysis to identify trade space for future engines. Continue to evaluate and develop advanced material solutions for high temperature components in rocket engines. Initiate installation of new test facility that will fill the current capability gap and allow for fast, low-cost testing of multi-injector designs and stability strategies at conditions relevant to the demands of both DoD and industry for next-generation engines (including use of liquid oxygen and higher pressures and thrust). FY 2019 Base Plans: Continue evaluation of methane multi-injector designs in hot-fire conditions. Continue hot fire tests in combustion stability rig. Continue combustion stability modeling critical future hydrocarbon fueled liquid rocket engines. Continue the delivery combustion stability codes with nearly-complete set of validation data to rocket community, enabling more robust and stable engine designs. Continue developing understanding of hydrocarbon fuel production, expanding testing in to methane fuels and other cryogenic cooling. Continue the employment of new fuel and material operating limitations, manufacturing processes, and launch goals in cycle analysis to identify trade space for future engines. Continue to evaluate and develop advanced material solutions for high temperature components in rocket engines. Continue installation of new test facility that will fill the current capability gap and allow for fast, low-cost testing of multi-injector designs and stability strategies at conditions relevant to the demands of both DoD and industry for next-generation engines (including use of liquid oxygen and higher pressures and thrust). FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increased compared to FY 2018 by \$1.483 million. Justification for the increase is increased emphasis in liquid engine combustion technologies.						
Title: Advanced Liquid Engine Technologies Description: Develop advanced liquid engine technologies for improved performance, while increasing life and reliability needs for engine uses in expendable and reusable launch vehicles. FY 2018 Plans: Complete architecture and cost-benefit study for next generation liquid propulsion, with efforts focused on modularity and cost reduction. Continue to develop enabling Hydrocarbon Boost (HCB) technology for future spacelift concepts and continue risk reduction activities for the development of HCB technologies. Continue exploring engine concepts for next generation, beyond 2035, launch vehicles and concepts to effect cost		17.623	18.644	12.615	0.000	12.615

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force				Date: February 2018		
Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion		Project (Number/Name) 624847 / Rocket Propulsion Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
reductions. Initiate sub-scale risk mitigation and technology maturation activities to transition to next generation engine concepts. FY 2019 Base Plans: Continue to develop enabling HCB technology for future spacelift concepts and continue risk reduction activities for the development of HCB technologies. Continue exploring engine concepts for next generation, beyond 2035, launch vehicles and concepts to effect cost reductions. Initiate sub-scale risk mitigation and technology maturation activities to transition to next generation engine concepts. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decrease compared to FY 2018 by \$6.029 million. Justification for the decrease is decreased emphasis in advanced liquid combustion technologies.						
Title: On-Orbit Propulsion Technologies Description: Develop solar electric, solar thermal, chemical, and advanced propulsion technologies for station-keeping, repositioning, and orbit transfer for satellites and satellite constellations. FY 2018 Plans: Continue scale-up research of advanced chemical propellants with particular focus on transition of numerical tools and experimental methodologies for advanced monopropellants to spacecraft industry. Continue to support the maturation of advanced plume diagnostics for both chemical and electric propulsion thrusters with potential for integrated state-of-health application. Continue to expand the validation and verification programs (both experimental and flight) to quantify accuracy of modeling and simulation tools developed to support thruster-spacecraft integration. Continue transition and support of thruster/plume modeling framework to spacecraft industry, with addition of advanced electric propulsion (EP) thruster models, to industry partners. Continue to explore advanced EP and chemical thruster concepts and assess new spacecraft propulsion requirements. FY 2019 Base Plans: Continue scale-up research of advanced chemical propellants with particular focus on transition of numerical tools and experimental methodologies for advanced mono-propellants to spacecraft industry. Continue to support the maturation of advanced plume diagnostics for both chemical and electric propulsion thrusters with potential for integrated state-of-health application. Continue to expand the validation and verification programs (both experimental and flight) to quantify accuracy of modeling and simulation tools developed to		12.980	13.732	13.865	0.000	13.865

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018			
Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion		Project (Number/Name) 624847 / Rocket Propulsion Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
support thruster-spacecraft integration. Continue transition and support of thruster/plume modeling framework to spacecraft industry, with addition of advanced electric propulsion (EP) thruster models, to industry partners. Continue to explore advanced EP and chemical thruster concepts and assess new spacecraft propulsion requirements. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increased compared to FY 2018 by \$0.133 million. Justification for the increase is described in the plans above.						
Title: Space Access and Strike Applications Description: Develop missile propulsion and boost technologies for space access and strike applications. FY 2018 Plans: Continue to develop advanced tactical propulsion. Continue development and evaluation of next generation of updated, physics-based modeling, simulation, and analysis tools for missile propulsion components and applications. Complete the use of tools in missile propulsion demonstration. Continue to develop advanced component technologies for missile propulsion applications for strategic and strike systems helping to ensure their long-term sustainment, to include an altitude hot fire. Continue development of technology options for post-boost systems exploring cost reductions, performance improvements, and potential for commonality among Air Force, Navy, and Missile Defense Agency. Continue propellant development efforts including long-life propellants. FY 2019 Base Plans: Continue to develop advanced tactical propulsion. Continue development and evaluation of next generation of updated, physics- based modeling, simulation, and analysis tools for missile propulsion components and applications. Continue to develop advanced component technologies for missile propulsion applications for strategic and strike systems helping to ensure their long-term sustainment. Continue development of technology options for post-boost systems exploring cost reductions, performance improvements, and potential for commonality among Air Force, Navy, and Missile Defense Agency. Continue propellant development efforts including long-life propellants. FY 2019 OCO Plans:		7.032	7.440	6.307	0.000	6.307

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018		
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion	Project (Number/Name) 624847 / Rocket Propulsion Technology			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$1.133 million. Justification for the decrease is decreased emphasis in space access and strike applications.					
Title: Ballistic Missile Technologies	4.276	4.524	5.161	0.000	5.161
Description: Develop missile propulsion technologies and aging and surveillance technologies for ballistic missiles.					
FY 2018 Plans: Continue to apply next generation of chemical and aging mechanism modeling, simulation, and analysis tools, sensor schemes and tools, to user needs and unique problems. Initiate development of advanced sensor, non-destructive evaluation, modeling and supporting technology development efforts to detect and explain phenomena further improve data acquisition and reduce uncertainty in ballistic and tactical missile solid rocket motor life predictions. Continue long-term validation of tools through long-term aging of sub-scale motors. Continue to monitor and periodically test sub-scale motors to validate the sensor and analytical analysis of each motor.					
FY 2019 Base Plans: Continue to apply next generation of chemical and aging mechanism modeling, simulation, and analysis tools, sensor schemes and tools, to user needs and unique problems. Continue development of advanced sensor, non-destructive evaluation, modeling and supporting technology development efforts to detect and explain phenomena further improve data acquisition and reduce uncertainty in ballistic and tactical missile solid rocket motor life predictions. Continue long-term validation of tools through long- term aging of sub-scale motors. Continue to monitor and periodically test sub-scale motors to validate the sensor and analytical analysis of each motor.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increased compared to FY 2018 by \$0.637 million. Justification for the increase is described in the plans above.					
Accomplishments/Planned Programs Subtotals	55.384	58.594	57.340	0.000	57.340

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion	Project (Number/Name) 624847 / Rocket Propulsion Technology
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy N/A		
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.		

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion				Project (Number/Name) 625330 / Aerospace Fuel Technology			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
625330: Aerospace Fuel Technology	-	4.468	4.616	4.544	0.000	4.544	5.101	5.198	5.291	5.025	Continuing	Continuing
A. Mission Description and Budget Item Justification												
This project evaluates hydrocarbon-based fuels for legacy and advanced turbine engines, scramjets, pulse detonation and combined cycle engines. This project also considers fuel related concepts that can increase turbine engine operational reliability, durability, mission flexibility, energy efficiency, and performance while reducing weight, fuel consumption, and cost of ownership. Applications include missiles, aircraft, sustained high-speed vehicles, and responsive space launch. Analytical and experimental areas of emphasis include evaluations of fuel properties and characteristics of alternative fuels developed from unconventional sources (such as coal, natural gas, biomass, and combinations thereof), unique/alternate fuels and components used in integrated thermal and energy management systems including high heat sink fuel capability, fuels logistics and associated vulnerabilities, and combustion diagnostics and engine emissions measurements.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Alternative Fuels								0.099	0.102	0.100	0.000	0.100
Description: Conduct evaluations and perform technical assessments of alternative hydrocarbon fuels derived from coal, natural gas, and biomass for use in legacy and advanced aerospace systems.												
FY 2018 Plans: Initiate evaluation of fully-synthetic jet fuels produced from alcohol and triglyceride feedstocks.												
FY 2019 Base Plans: Continue evaluation of fully-synthetic jet fuels produced from alcohol and triglyceride feedstocks.												
FY 2019 OCO Plans: N/A												
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.002 million. Justification for the decrease is described in the plans above.												
Title: Integrated Thermal and Energy Management								1.390	1.437	1.415	0.000	1.415
Description: Develop and demonstrate advanced components and conduct performance assessments of advanced aircraft integrated thermal and energy management systems for engines and aircraft.												
FY 2018 Plans:												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018			
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602203F / Aerospace Propulsion	Project (Number/Name) 625330 / Aerospace Fuel Technology				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Continue the evaluation of advanced additives, catalysts, and fuel composition approaches to minimize endothermic fuel coking. FY 2019 Base Plans: Continue the evaluation of advanced additives, catalysts, and fuel composition approaches to minimize endothermic fuel coking. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.022 million. Justification for the decrease is described in the plans above.						
Title: Fuel Logistics Description: Study and evaluate low-cost approaches to reduce fuel logistics footprint to reduce cost. Study fuel logistics vulnerabilities and develop detection and mitigation technologies. FY 2018 Plans: Initiate the development of fuel temperature limits for full-life fuel systems as part of integrated power and thermal management systems FY 2019 Base Plans: Continue the development of fuel temperature limits for full-life fuel systems as part of integrated power and thermal management systems. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.022 million. Justification for the decrease is described in the plans above.		1.390	1.437	1.415	0.000	1.415
Title: Combustion Emissions and Performance Description: Develop and test advanced emissions diagnostic techniques for airbreathing propulsion systems. Conduct evaluations of the combustion and emissions characteristics of aviation fuels. FY 2018 Plans:		1.589	1.640	1.614	0.000	1.614

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Appropriation/Budget Activity 3600 / 2		R-1 Program Element (Number/Name) PE 0602203F / <i>Aerospace Propulsion</i>		Project (Number/Name) 625330 / <i>Aerospace Fuel Technology</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO
Initiate the development of Aerospace Recommended Practice (ARP) for particulate emissions measurements for engine certification, joint with Federal Aviation Administration (FAA), NASA, and industry. FY 2019 Base Plans: Complete the development of Aerospace Recommended Practice (ARP) for particulate emissions measurements for engine certification, joint with Federal Aviation Administration (FAA), NASA, and industry. FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$0.026 million. Justification for the decrease is described in the plans above.					
Accomplishments/Planned Programs Subtotals		4.468	4.616	4.544	0.000
C. Other Program Funding Summary (\$ in Millions)					
N/A					
Remarks					
D. Acquisition Strategy					
N/A					
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.					