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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force **Date:** May 2017

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>							
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	128.492	182.958	210.845	0.000	210.845	84.603	129.930	138.010	121.600	Continuing	Continuing
672983: <i>MM Ground and Comm Equipment</i>	0.000	24.520	114.039	119.384	0.000	119.384	63.381	102.918	122.857	102.311	Continuing	Continuing
672984: <i>MM III Baseline Support</i>	0.000	45.752	40.205	59.812	0.000	59.812	13.342	14.927	9.021	13.033	Continuing	Continuing
672985: <i>MM Support Equip</i>	0.000	27.834	28.714	31.649	0.000	31.649	7.880	12.085	6.132	6.256	Continuing	Continuing
672986: <i>MM Crypto Mods</i>	0.000	30.386	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This program, BA 07 PE 0101213F, project 672984, LGM-30G Arm Disarm Switch Replacement (ADSR), is a new start.

In CY17, BA 07 PE 0101213F, project 672985, LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) was a new start.

In CY17, BA 07 PE 0101213F, project 672985, LGM-30G G6B4 Build Equipment Replacement (G6B4 BER) was a new start.

In CY17, BA 07 PE 0101213F, project 672985, LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) was a new start.

A. Mission Description and Budget Item Justification

The MM Ground and Comm Equipment program replaces obsolete/unsupportable ground-based weapon system equipment located at Launch Control Centers (LCCs) and Launch Facilities (LFs) necessary to continue MM III operations through 2030. These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to GBSD. Current efforts include development, qualification, integration, and testing of replacement equipment such as the LGM-30G Air Launch Control System Replacement (ALCS-R), LGM-30G Automatic Switching Unit (ASU), LGM-30G Fast Rising B-Plug Phase II (FRPB II), LGM-30G Launch Control Center Break-In-Kit (LCCB), LGM-30G Launch Control Center Block Upgrade (LCCBU), and LGM-30G Remote Visual Assessment Phase II (RVA II),

MM III Baseline Support program replaces or upgrades obsolete/unsupportable flight test unique equipment installed on the missile during flight test, used to test MM III systems on the ground, or located at test facilities to collect, process, and analyze test data. Flight test equipment supports test and evaluation of newly developed or modified MM III capabilities and conduct of MM III Operational Test Launches (OTLs) to determine ICBM force readiness, reliability and capability shortfalls. Efforts include development, qualification, integration and testing of replacement equipment such as LGM-30G Flight Test Telemetry and Termination System (FT3), LGM-30G Ground Test Upgrade (GTU), LGM-30G Squadron Data Simulator (SDS) and LGM-30G Arm Disarm Switch Replacement (ADSR). As other similar equipment is identified for replacement, it will be added to this program. MM III Baseline Support also provides for other MM III unique government costs, studies of system performance, contract closeout costs, cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities.

MM Support Equipment program designs, develops, and tests replacement of obsolete/non-serviceable weapon system support equipment. Current efforts include design, development, and testing of support equipment such as LGM-30G Alignment Set Test Set (ASTS), LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT), LGM-30G G6B4 Build Equipment Replacement (G6B4 BER), LGM-30G Performance Assessment Data System Communications Equipment Interface Unit

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(PADS CEIU), LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER), LGM-30G Payload Transporter Replacement (PTR), and LGM-30G Transporter Erector Replacement Program (TERP). As other similar equipment is identified for replacement, it will be added to this program.						
MM Crypto Mods executes USSTRATCOM, Air Force Global Strike Command, and Nuclear Weapon Safety Center requirements by implementing the KS-60 capabilities in the LGM-30G ICBM Cryptography Upgrade II (ICU II) of remote key/code change and irreversible transformations mandated in the approved Capabilities Development Document (dated 4 Jan 05) and addresses Nuclear Weapon System Safety Group Operational Safety Review requirements 98-2, 00-1 and 02-2. As other similar equipment is identified for replacement, it will be added to this program.						
These efforts also includes any needed nuclear surety and certification and system vulnerability assessments.						
This program is in Budget Activity 7, Operational System Development, because this budget activity includes developmental efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal years.						
B. Program Change Summary (\$ in Millions)		FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget		166.729	182.958	186.857	0.000	186.857
Current President's Budget		128.492	182.958	210.845	0.000	210.845
Total Adjustments		-38.237	0.000	23.988	0.000	23.988
• Congressional General Reductions		0.000	0.000			
• Congressional Directed Reductions		0.000	0.000			
• Congressional Rescissions		0.000	0.000			
• Congressional Adds		0.000	0.000			
• Congressional Directed Transfers		0.000	0.000			
• Reprogrammings		-38.237	0.000			
• SBIR/STTR Transfer		0.000	0.000			
• Other Adjustments		0.000	0.000	23.988	0.000	23.988
Change Summary Explanation						
FY 2016 funding reflects \$38.237M reprogrammed to higher Air Force priorities. Changes were made to the following programs: decrease for Project 672983, MM Ground and Comm Equipment, (-\$5.016M); a decrease for Project 672984, MM Baseline Support, (-\$7.071M); a decrease for Project 672985, MM Support Equipment, (-\$12.350M); a decrease for Project 672986, MM Crypto Mods, (-\$13.800M). Total net decrease of \$38.237M.						
FY 2018 funding reflects a change to the following programs: decrease for Project 672983, MM Ground and Comm Equipment, (-\$15.185M); an increase for Project 672984, MM Baseline Support, (+\$33.412M); an increase for Project 672985, MM Support Equipment, (+\$5.761M). Total net increase of \$23.988M.						

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672983 / MM Ground and Comm Equipment			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
672983: MM Ground and Comm Equipment	0.000	24.520	114.039	119.384	0.000	119.384	63.381	102.918	122.857	102.311	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The MM Ground and Comm Equipment program replaces obsolete/unsupportable ground-based weapon system equipment located at Launch Control Centers (LCCs) and Launch Facilities (LFs) necessary to continue MM III operations through 2030. Current efforts include development, qualification, integration, and testing of replacement equipment such as the LGM-30G Air Launch Control System Replacement (ALCS-R), LGM-30G Automatic Switching Unit (ASU), LGM-30G Fast Rising B-Plug Phase II (FRBP II), LGM-30G Launch Control Center Break-In-Kit (LCCB), LGM-30G Launch Control Center Block Upgrade (LCCBU), and LGM-30G Remote Visual Assessment Phase II (RVA II).												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2016	FY 2017	FY 2018	
Title: LGM-30G Air Launch Control System Replacement (ALCS-R)									9.613	65.887	78.492	
Description: ALCS-R will replace the legacy nuclear command and control system that provides the capability to launch ICBMs from an airborne platform, currently the Navy E-6B. The system consists of a nuclear hardened radio and MM III interface at each LF, and a suite of launch equipment and cryptographic equipment that generates and transmits commands from the E-6B. ALCS-R is dependent on the Strategic Air Command Code Processing System for codes data supplied to airborne equipment, and the Navy E-6B radio Command, Control, and Communication data path to transmit signals to the LFs. The approved acquisition strategy will replace ALCS equipment by 2024 to resolve critical sustainment and cryptographic sunset issues and assure survivable, airborne launch capability for current and future ICBMs. ALCS-R will be designed for Ground Based Strategic Deterrent (GBSD) airborne survivable launch platform capability maximizing investment across both ICBM weapon systems.												
FY 2016 Accomplishments:												
• Initiated a source selection to award up to two Technology Maturation and Risk Reduction (TMRR) contracts.												
• Acquired test equipment to install in the ICBM System Directorate's Nuclear Command and Control (NC2) lab to enable low risk weapon system integration, reduce risk for GBSD commonality, and provide a first ever, end-to-end test capability for the ALCS system												
FY 2017 Plans:												
• Award up to two TMRR contracts. Manage contractors to System Requirements Review. Contractors begin full system prototype development, to include: launch facility ground equipment, E-6B airborne equipment, and NC2 cryptographic solution												
• Complete SIL development at the ICBMSD NC2 lab												
• Draft acquisition documentation required for the Development Request for Proposal (RFP) Review Milestone												
• Initiate hardness testing of the National Security Agency (NSA) designed/produced anchor that will be the crypto engine												

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018
<ul style="list-style-type: none">Initiate analysis of legacy UHF antenna to assess aging/degradation and performance capabilities for current & future ICBMsInitiate & complete Government facility modifications to enable secure management of TMRR contractorsInitiate Cost Capability Analysis to support AFGSC's final submission of the ALCS-R CDD <p>FY 2018 Plans:</p> <ul style="list-style-type: none">Manage contractors through System Functional Review. Contractors continue full system prototype development, to include: launch facility ground equipment, E-6B airborne equipment, and NC2 cryptographic solutionComplete trusted anchor hardness testing and provide results to program industry competitorsComplete UHF antenna recommendations for long term ICBM Survivable Launch capabilityComplete Cost Capability Analysis and support AFGSC efforts for final ALCS-R CDD validation				
<p>Title: LGM-30G Automatic Switching Unit (ASU)</p> <p>Description: The ASU program will replace the current Minuteman ASU, Diesel Electric Unit (DEU) and Minuteman Power Processor (MPP). The ASU is controlled by the MPP, which contains software and electronics to measure incoming and standby power characteristics. The DEU provides standby power in the event of a loss of the primary power source. Current equipment and lack of repair/reprogram capability causes inadvertent source transfers by the MPP. Technical data does not exist for repair or reprogramming of the MPP making it unsupportable. The ASU contacts have exceeded their service life, and unnecessary source transfers stress mission critical components. The increased power transfers have increased the use and accelerated the wear on the DEU.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none">Awarded TMRR contract on 13 May 2016Conducted Site Surveys <p>FY 2017 Plans:</p> <ul style="list-style-type: none">Conduct a systems requirement review and hold a preliminary design reviewConduct Milestone BAward EMD contractComplete hardness and environmental testing <p>FY 2018 Plans:</p> <ul style="list-style-type: none">Complete integration testing, finalize design, and validate installationComplete Critical Design ReviewValidate, verify, and publish technical data and drawingsPrepare a technical data package for production		4.592	11.096	10.185
<p>Title: LGM-30G Fast Rising B-Plug Phase II (FRBP II)</p>		0.745	0.863	0.400

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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018
<p>Description: The FRBP is a security element that delays access to the Launch Facility. It is a 14,000 pound rising door that obstructs the Personal Access Shaft (PAS). The current system can experience uncommanded Raises (UCR) due to component single point failures and transient voltages. The FRBP II will update hardware and software by redesigning circuitry to decrease susceptibility to UCRs while also addressing maintenance, reliability and sustainment issues.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none">• Completed technical requirements and memorandum of agreement with developer• Began pre-EMD design and development of FRBP II <p>FY 2017 Plans:</p> <ul style="list-style-type: none">• Program under revision/assessment due to cost/schedule growth <p>FY 2018 Plans:</p> <ul style="list-style-type: none">• Program under revision/assessment due to cost/schedule growth				
<p>Title: LGM-30G Launch Control Center Break-In-Kit (LCCB)</p> <p>Description: The LCCB program will develop a kit that will enable personnel to extract incapacitated missile combat crew members in the event the LCC crew becomes unresponsive and cannot open the LCC Blast Door. The LCCB is a new capability and has not been previously fielded.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none">• Began design, development, fabrication, and prototype construction of LCC Break-in-Kits <p>FY 2017 Plans:</p> <ul style="list-style-type: none">• Continue design, development, fabrication, and prototype construction• Conduct a successful Milestone B and begin EMD <p>FY 2018 Plans:</p> <ul style="list-style-type: none">• Conduct a Preliminary Design Review (PDR) / Critical Design Review (CDR)• Prepare test plans for Test Readiness Review (TRR)		0.602	5.833	3.671
<p>Title: Launch Control Center (LCC) Block Upgrade (LCCBU)</p> <p>Description: The LCCBU program will address several elements within the LCC that are experiencing supportability issues and impacting voice communications in the MM missile fields. The LCCBU program is a single modification effort that replaces five components. Components will be procured as a single modification kit and installed as a single kit at each LCC. It will consist of five primary replacement efforts:</p>		8.198	22.880	22.294

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
<p>1) Journal Memory Loader (JML) - replaces the JML with a modern data storage solution which will increase the available memory required to support annual software changes and mitigate Floppy Disk obsolescence concerns.</p> <p>2) Floppy Disk Drive (FDD) - replaces the legacy FDDs which are no longer manufactured with a modern, supportable hardware solution.</p> <p>3) Voice Communications Control Panel (VCCP) - replaces the current deficient equipment to provide the voice communications quality required to perform the ICBM mission and may require additional components to resolve voice communication degradations.</p> <p>4) Weapon System Control Console (WSCC) Printer - replaces the current printer that is no longer produced and is unsupportable due to aging hardware and a lack of qualified vendors for replacement/repair components.</p> <p>5) Oxygen Regeneration Unit (ORU) - replaces the current unsupportable system to provide the crew with breathable air during periods when the LCC is locked down.</p> <p>All LCCBU efforts will support the 45 operational LCCs and additional support equipment/test/maintenance locations.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> • Performed requirements definition and design of each component <p>FY 2017 Plans:</p> <ul style="list-style-type: none"> • Continue design/development of all components • Conduct a Preliminary Design Review • Conduct a Milestone B and begin EMD <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> • Complete Critical Design Review • Complete development • Conduct a Milestone C • Begin Production activities 					
<p>Title: LGM-30G Remote Visual Assessment Phase II (RVA II)</p> <p>Description: RVA II will provide enhanced situational awareness by providing the current remote camera feed to responding security vehicles and helicopters. RVA II will also provide backup power to current remote visual equipment, increase video archival storage, and implement auto-activation of outer and inner zone alarms. RVA II will also implement changes required to meet DoD CyberSecurity requirements.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> • Began design, development and verification of RVA II requirements 			0.770	7.480	4.342

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B. Accomplishments/Planned Programs (\$ in Millions)										FY 2016	FY 2017	FY 2018
<ul style="list-style-type: none"> Conducted Milestone B in Aug 2016 <p>FY 2017 Plans:</p> <ul style="list-style-type: none"> Prepare for verification testing and a Functional and Physical Configuration Audit (FCA/PCA) Begin EMD Phase Conduct Preliminary Design Review <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> Complete Critical Design Review Perform verification testing and an FCA/PCA Prepare and conduct successful Milestone C 												
Accomplishments/Planned Programs Subtotals										24.520	114.039	119.384
C. Other Program Funding Summary (\$ in Millions)												
<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>	
• MPAF: BA 03: Line Item # M30MLG: <i>Minuteman III Modifications BP21</i>	0.000	1.024	33.007	0.000	33.007	54.696	22.543	14.651	49.296	Continuing	Continuing	
• MPAF : BA 01 : Ballistic Missile...: <i>Minuteman III Replacement Eq-Ballistic BP22</i>	11.195	12.123	9.197	0.000	9.197	6.106	3.818	0.000	0.000	Continuing	Continuing	
• MPAF: BA 04: Line Item #000999: <i>Replen Spares/ Repair Parts BP25/26</i>	0.000	0.033	1.348	0.000	1.348	0.000	0.000	0.000	0.000	Continuing	Continuing	
Remarks												
D. Acquisition Strategy												
Ground and Communication equipment replacement efforts are reviewed to determine the best method for execution, including vendor qualification and procurement with no development required, develop and/or modification with organic depot capabilities or development with industry. Industry development for Ground and Communication equipment efforts will be executed through contracts available under the Future ICBM Sustainment and Acquisition Construct (FISAC) or competitive source selections. Nuclear Surety Cross Check Analysis (NSCCA) and Independent Verification and Validation (IV&V) efforts are contracted separately. Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.												

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment

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-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672983 / MM Ground and Comm Equipment					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Airborne Launch Control System (ALCS-R) TMRR	C/TBD	TBD : TBD	0.000	0.140	Jan 2017	49.306	Aug 2017	53.842	Jun 2018	0.000		53.842	Continuing	Continuing	-
LGM-30G ALCS SIL	MIPR	Aerospace : El Segundo, CA	0.000	0.214	Jan 2016	5.699	Jan 2017	5.709	Jan 2018	0.000		5.709	Continuing	Continuing	-
LGM-30G Automatic Switching Unit (ASU) TMRR/EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	3.627	May 2016	8.546	Apr 2017	7.635	Dec 2017	0.000		7.635	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Phase II (FRBP II)	PO	TBD : TBD	0.000	0.100	May 2016	0.000		0.000		0.000		0.000	0.000	0.100	-
LGM-30G Launch Control Center Break-In-Kit EMD	MIPR	Navy Crane : Crane, IN	0.000	0.210	Aug 2016	5.036	Apr 2017	3.671	Jul 2018	0.000		3.671	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade TMRR/EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	7.647	Mar 2016	22.564	Apr 2017	21.894	Apr 2018	0.000		21.894	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD	C/CPFF	Sentry View Systems : Melbourne, FL	0.000	0.000		6.323	Mar 2017	3.173	May 2018	0.000		3.173	Continuing	Continuing	-
Subtotal			0.000	11.938		97.474		95.924		0.000		95.924	-	-	-
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Airborne Launch Control System Replacement (ALCS)	MIPR	MITRE : Bedford, MA	0.000	3.981	Jan 2016	2.867	Jan 2017	2.930	Jan 2018	0.000		2.930	Continuing	Continuing	-
LGM-30G Automatic Switching Unit A&AS Support	C/FP	BAE : Layton, UT	0.000	0.622	Oct 2015	0.550	Oct 2016	0.550	Oct 2017	0.000		0.550	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Phase II (FRBP II) A&AS Support	C/FP	BAE : Layton, UT	0.000	0.645	Dec 2015	0.863	Dec 2016	0.400	Dec 2017	0.000		0.400	0.000	1.908	-

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Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672983 / MM Ground and Comm Equipment					
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Remote Visual Assessment II (RVA II) A&AS Support	C/FP	BAE : Layton, UT	0.000	0.612	Feb 2016	0.484	Oct 2016	0.484	Oct 2018	0.000		0.484	Continuing	Continuing	-
Subtotal			0.000	5.860		4.764		4.364		0.000		4.364	-	-	-
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Air Launch Control System Replacement (ALCS) FFRDC	MIPR	Aerospace : El Segundo, CA	0.000	1.682	Jan 2016	1.656	Jan 2017	1.651	Jan 2018	0.000		1.651	Continuing	Continuing	-
LGM-30G Air Launch Control System Replacement (ALCS) PMA	Various	Various : Various	0.000	3.596	Mar 2016	6.359	Jan 2017	14.360	Jan 2018	0.000		14.360	Continuing	Continuing	-
LGM-30G Automatic Switching Unit PMA	Various	Various : Various	0.000	0.343	Nov 2015	2.000	Nov 2016	2.000	Nov 2017	0.000		2.000	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit PMA	Various	Various : Various	0.000	0.392	Jan 2016	0.797	Apr 2017	0.000		0.000		0.000	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade (LCCBU) PMA	Various	Various : Various	0.000	0.551	Feb 2016	0.316	Feb 2017	0.400	Feb 2018	0.000		0.400	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) PMA	Various	Various : Various	0.000	0.158	Feb 2016	0.673	Feb 2017	0.685	Feb 2018	0.000		0.685	Continuing	Continuing	-
Subtotal			0.000	6.722		11.801		19.096		0.000		19.096	-	-	-

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Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons					Project (Number/Name) 672983 / MM Ground and Comm Equipment							
					Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals					0.000	24.520		114.039		119.384		0.000		119.384	-	-	-

Remarks

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force

Date: May 2017

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672983 / MM Ground and Comm Equipment

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ALCS-R Requirements Development																												
ALCS-R Technology Maturation and Risk Reduction Phase																												
ALCS-R PDR (Oct 2018)																												
ALCS-R Milestone B (Apr 2020)																												
ALCS-R Engineering and Manufacturing Development Phase (Jun 2020)																												
ALCS-R CDR (Dec 2020)																												
ALCS-R Milestone C (May 2022)																												
ALCS-R Production and Development Phase																												
ASU Technology Maturation and Risk Reduction phase																												
ASU PDR (Mar 2017)																												
ASU Milestone B (May 2017)																												
ASU Engineering and Manufacturing Development Phase																												
ASU CDR (Nov 2018)																												
ASU Milestone C (Mar 2019)																												
ASU IOC (Apr 2022)																												
ASU Production and Deployment Phase																												
FRBP II Milestone B (Aug 2016)																												
FRBP II Material Solution Analysis Phase																												
LCCB Milestone B (Mar 2017)																												
LCCB Engineering and Manufacturing Development Phase																												
LCCB CDR (Jan 2018)																												

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force																Date: May 2017			
Appropriation/Budget Activity 3600 / 7								R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons								Project (Number/Name) 672983 / MM Ground and Comm Equipment			

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LCCB Milestone C (Jan 2019)																												
LCCB Production and Deployment Phase																												
LCCB IOC (Jun 2019)																												
LCCBU Technology Maturation & Risk Reduction Phase																												
LCCBU PDR (Apr 2017)																												
LCCBU Milestone B (May 2017)																												
LCCBU Engineering and Manufacturing Development Phase																												
LCCBU CDR (Oct 2017)																												
LCCBU Milestone C (Jun 2018)																												
LCCBU Production and Deployment Phase																												
LCCBU Required Assets Available (Jan 2020)																												
RVA II PDR (Jul 2017)																												
RVA II Milestone B (Aug 2016)																												
RVA II Engineering and Manufacturing Development Phase																												
RVA II CDR (Mar 2018)																												
RVA II Milestone C (Sep 2018)																												
RVA II Production and Deployment Phase																												
RVA II IOC (Feb 2019)																												
RVA II FOC (Feb 2022)																												

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672983 / <i>MM Ground and Comm Equipment</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ALCS-R Requirements Development	1	2016	4	2016
ALCS-R Technology Maturation and Risk Reduction Phase	1	2016	3	2020
ALCS-R PDR (Oct 2018)	1	2019	1	2019
ALCS-R Milestone B (Apr 2020)	3	2020	3	2020
ALCS-R Engineering and Manufacturing Development Phase (Jun 2020)	3	2020	3	2022
ALCS-R CDR (Dec 2020)	1	2021	1	2021
ALCS-R Milestone C (May 2022)	3	2020	3	2020
ALCS-R Production and Development Phase	2	2022	4	2022
ASU Technology Maturation and Risk Reduction phase	3	2016	3	2017
ASU PDR (Mar 2017)	2	2017	2	2017
ASU Milestone B (May 2017)	3	2017	3	2017
ASU Engineering and Manufacturing Development Phase	3	2017	2	2019
ASU CDR (Nov 2018)	1	2019	1	2019
ASU Milestone C (Mar 2019)	2	2019	2	2019
ASU IOC (Apr 2022)	3	2022	3	2022
ASU Production and Deployment Phase	3	2019	4	2022
FRBP II Milestone B (Aug 2016)	4	2016	4	2016
FRBP II Material Solution Analysis Phase	1	2017	4	2018
LCCB Milestone B (Mar 2017)	2	2017	2	2017
LCCB Engineering and Manufacturing Development Phase	2	2017	4	2018
LCCB CDR (Jan 2018)	1	2018	1	2018
LCCB Milestone C (Jan 2019)	1	2019	1	2019
LCCB Production and Deployment Phase	1	2019	2	2019

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672983 / MM Ground and Comm Equipment	

Events	Start		End	
	Quarter	Year	Quarter	Year
LCCB IOC (Jun 2019)	3	2019	3	2019
LCCBU Technology Maturation & Risk Reduction Phase	1	2016	3	2017
LCCBU PDR (Apr 2017)	3	2017	3	2017
LCCBU Milestone B (May 2017)	3	2017	3	2017
LCCBU Engineering and Manufacturing Development Phase	3	2017	3	2018
LCCBU CDR (Oct 2017)	1	2018	1	2018
LCCBU Milestone C (Jun 2018)	3	2018	3	2018
LCCBU Production and Deployment Phase	3	2018	2	2020
LCCBU Required Assets Available (Jan 2020)	2	2019	2	2020
RVA II PDR (Jul 2017)	4	2017	4	2017
RVA II Milestone B (Aug 2016)	4	2016	4	2016
RVA II Engineering and Manufacturing Development Phase	2	2017	2	2019
RVA II CDR (Mar 2018)	2	2018	2	2018
RVA II Milestone C (Sep 2018)	4	2018	4	2018
RVA II Production and Deployment Phase	2	2019	2	2022
RVA II IOC (Feb 2019)	2	2019	2	2019
RVA II FOC (Feb 2022)	2	2022	2	2022

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672984 / MM III Baseline Support			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
672984: MM III Baseline Support	0.000	45.752	40.205	59.812	0.000	59.812	13.342	14.927	9.021	13.033	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 07 PE 0101213F, project 672984, LGM-30G Arm Disarm Switch Replacement (ADSR), is a new start.

A. Mission Description and Budget Item Justification

MM III Baseline Support program replaces or upgrades obsolete/unsupportable flight test unique equipment installed on the missile during flight test, used to test MM III systems on the ground, or located at test facilities to collect, process, and analyze test data. Flight test equipment supports test and evaluation of newly developed or modified MM III capabilities, and MM III Operational Test Launches (OTLs) to determine ICBM force readiness, reliability and capability shortfalls. Efforts include development, qualification, integration and testing of replacement equipment such as LGM-30G Flight Test Telemetry and Termination System (FT3), LGM-30G Ground Test Upgrade (GTU), and LGM-30G Squadron Data Simulator (SDS). These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to GBSD. As other similar equipment is identified for replacement, it will be added to this program. MM III Baseline Support also provides for other MM III unique government costs, studies of system performance, contract closeout costs, cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities.

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

	FY 2016	FY 2017	FY 2018
Title: LGM-30G Arm Disarm Switch Replacement (ADSR)	0.000	0.000	0.272
Description: The ADSR program (FY18 New Start) designs, develops, fabricates and tests replacements for the aging Arm/Disarm (A/D) switches currently on the MM III Missile fleet. The A/D switch is responsible for completing or interrupting ordnance electrical circuits. A/D switches are placed at five key locations in the system: Interstage I-II, Stage II Liquid Injection Thrust Vector Control (LITVC) and Roll Control, Interstage II-III, PSRE Staging, and PSRE Isolation Valves. Aging and surveillance is an ongoing study to generate a tradeoff curve between reliability/availability and cost. Reliability/availability are monitored by periodic testing to discover unforeseen issues. Because all existing A/D switches cannot be repaired/refurbished, the number in inventory will eventually be inadequate to meet the need of the PDM cycle. Supply is estimated to deplete in FY18 without a repair/refurbish mitigation and by approximately FY22 with repair/refurbish mitigation. Repair/refurbish is a reliable mitigation plan to meet the ongoing needs of the fleet while a manufacturer is selected and the manufacturing system is selected to develop a new, more reliable A/D switch that meets requirements and PDM production quantities. ADSR is required to continue Booster and PSRE PDMs through 2030.			
FY 2016 Accomplishments: N/A			
FY 2017 Plans:			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017	
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017
N/A			
FY 2018 Plans: <ul style="list-style-type: none"> Develop acquisition documentation, prepare for Milestone B 			
Title: LGM-30G Cadmium Replacement Program (CaDRP) Description: Program was cancelled in FY16. Cadmium plating is used in the LF and LCC Motor Generators. Motor generator parts are coated with the material to inhibit corrosion, ensure a low electrical signature (bonding and grounding) and aide in the ability to withstand a nuclear environment. Cadmium is one of the EPA-17 chemicals selected for reduction. Executive Directive 13148 and FAR part 23.703 states, "eliminate or reduce the generation of hazardous waste and the need for special material processing." CaDRP will provide a cadmium replacement coating with the same properties for corrosion inhibiting, bonding and grounding, and nuclear event survivability to meet these directives. Process must meet the weapon system parameters for form, fit, function, system safety, and hardness. FY 2016 Accomplishments: <ul style="list-style-type: none"> Program canceled. FY 2017 Plans: N/A FY 2018 Plans: N/A	2.443	0.000	0.000
Title: LGM-30G Flight Test Telemetry and Termination System (FT3) Description: FT3 designs, develops, fabricates and tests replacements for the Mod 7 Instrumentation Wafer, associated Signal Conditioner Monitor Group (SCMG), as well as the Integrated Instrumentation System (IIS), Flight Destruct System (FDS) and the Launch Safety System (LSS). This will replace the unsupportable instrumentation wafer and FDS that do not meet current Range Safety Standards. The Mod 7 instrumentation wafer transmits missile performance telemetry and position data and receives command destruct messages during MM III Operational Test Launches (OTLs) and developmental flight test evaluations. The SCMG and associated cabling capture Reentry System performance data during OTLs and developmental flight tests. FT3 will replace the current MM III OTL flight destruct capability used in the event of a flight anomaly where it would be necessary to destroy the missile. LSS replaces the current unique, specialized test system at Vandenberg AFB used to monitor and control test launch flights and ground support equipment. The current LSS is over 15-years old and experiencing major supportability issues. LSS failure trends are increasing due to hardware aging and obsolescence creating a need for workarounds, waivers and contractor intervention. A new Instrumentation Wafer and FDS are required to continue OTLs through 2030. A new LSS is required to field the Instrumentation Wafer and the FDS.	35.259	20.076	39.868

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672984 / MM III Baseline Support		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: <ul style="list-style-type: none">• Conducted System Requirements Review• Conducted the Preliminary Design Review FY 2017 Plans: <ul style="list-style-type: none">. Conduct Milestone B to gain entry into the Engineering Manufacturing Development (EMD) phase. Design, develop, fabricate and test prototypes of the IIS, FDS and LSS. Conduct system design and integrate/ verify at component and system level through ground testing. Prepare for Critical Design Review FY 2018 Plans: <ul style="list-style-type: none">. Conduct CDR. Procure long lead items. Build qualification hardware and conduct qualification testing. Prepare for Production Readiness Review. Conduct Test Readiness Reviews. Conduct Production Readiness Review.					
Title: LGM-30G Baseline Support Description: This program provides for other MM III unique government costs, studies of system performance, contract closeout costs, cost trades, and acquisition planning activities, up to and including proposal preparation, for future capabilities. FY 2016 Accomplishments: <ul style="list-style-type: none">• Conducted studies of system performance.• Paid contract closeout costs.• Conducted cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. FY 2017 Plans: <ul style="list-style-type: none">• Conduct studies of system performance.• Pay contract closeout costs.• Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. FY 2018 Plans: <ul style="list-style-type: none">• Conduct studies of system performance.			1.343	0.100	5.000

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017	
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017
<ul style="list-style-type: none"> • Pay contract closeout costs. • Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. 			
Title: LGM-30G Ground Test Upgrade (GTU) Description: GTU will address parts obsolescence through a design that replaces the Simulated Electronic Launch Minuteman (SELM) and Guided Missile Launcher Electronic Circuit (GMLEC) test sets, and the Re-entry System Simulator. Modifications being added include Reentry System (RS) Fuze Simulator, and A4 drawer interface change. GTU supports AFGSC Force Development Evaluation testing by enabling operational checkout and test of LFs up to the point of an actual MM III launch. FY 2016 Accomplishments: <ul style="list-style-type: none"> • Completed contract modifications • Continued with Technology Maturation Risk Reduction (TMRR) Phase FY 2017 Plans: <ul style="list-style-type: none"> • Complete TMRR phase with an approved Preliminary Design Review (PDR) • Prepare and conduct successful Milestone B • Begin Engineering and Manufacturing Development (EMD) phase FY 2018 Plans: <ul style="list-style-type: none"> • Complete Critical Design Review • Develop 3 SELM Prototypes • Develop 3 GMLEC Prototypes • Develop RS Simulator Fix 		0.452	3.530
Title: LGM-30G Squadron Data Simulator (SDS) Description: Design and develop the SDS to replace the current test set. SDS will increase the Mean Time Between Failures (MTBF), improve user interface, and meet DoD Cyber Security requirements. Additionally, this modeling and simulation tool is used to replicate the message traffic for a selectable number of Launch Control Centers and Launch Facilities within an ICBM squadron. FY 2016 Accomplishments: <ul style="list-style-type: none"> • Continued Technology Maturation and Risk Reduction (TMRR) Phase • Continued design, development, verification of SDS requirements FY 2017 Plans: <ul style="list-style-type: none"> • Conduct Preliminary Design Review (PDR) • Complete Milestone B 		6.255	16.499
			10.318

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>				Project (Number/Name) 672984 / <i>MM III Baseline Support</i>				
B. Accomplishments/Planned Programs (\$ in Millions)										FY 2016	FY 2017	FY 2018
<ul style="list-style-type: none"> • Begin the Engineering and Manufacturing Development phase and complete Critical Design Review • Complete test readiness review, qualification testing, weapon system testing,electromagnetic interference testing, and TMRR phase <p><i>FY 2018 Plans:</i></p> <ul style="list-style-type: none"> . Conduct CDR . Build qualification hardware and conduct qualification testing . Prepare for Production Readiness Review . Conduct Test Readiness Reviews . Conduct Production Readiness Review 												
Accomplishments/Planned Programs Subtotals										45.752	40.205	59.812
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost	
• MPAF: BA 03: Line Item #M30MLG: <i>Minuteman III Modifications BP21</i>	5.069	21.867	0.000	0.000	0.000	0.000	0.000	6.600	8.000	Continuing	Continuing	
• MPAF: BA 01: Line Item #00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	0.000	0.000	5.205	0.000	5.205	9.623	0.000	0.000	0.000	Continuing	Continuing	
• MPAF: BA 04: Line IItem #000999: <i>Replen Spares/ Repair Parts BP25/26</i>	0.000	0.805	0.224	0.000	0.224	0.000	13.544	13.815	14.163	Continuing	Continuing	
Remarks												
D. Acquisition Strategy												
Baseline Support equipment replacement efforts are reviewed to determine the best method for execution, including vendor qualification and procurement with no development required, develop and/or modification with organic depot capabilities or development with industry. Industry development for Baseline Support equipment efforts will be executed through contracts available under the Future ICBM Sustainment and Acquisition Construct (FISAC) or competitive source selections. Nuclear Surety Cross Check Analysis (NSCCA) and Independent Verification and Validation (IV&V) efforts are contracted separately. Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.												

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</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-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672984 / MM III Baseline Support					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Cadmium Replacement Program EMD	C/CPAF	Northrop Grumman : Clearfield, UT	0.000	2.443	Apr 2016	0.000		0.000		0.000		0.000	0.000	2.443	-
LGM-30G Flight Test Telemetry and Termination System (FT3) TMRR/EMD	C/CPIF	Boeing : Clearfield, UT	0.000	32.049	Oct 2016	18.856	Oct 2017	36.055	Oct 2018	0.000		36.055	Continuing	Continuing	-
LGM-30G Ground Test Upgrade (GTU) TMRR/EMD	C/CPAF	Northrop Grumman Technical Services : Clearfield, UT	0.000	0.042	Mar 2016	2.202	Mar 2017	2.999	Mar 2018	0.000		2.999	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) TMRR/EMD	C/CPFF	Lockheed Martin : Bethesda, MD	0.000	5.350	Sep 2016	12.569	Sep 2017	6.651	Sep 2018	0.000		6.651	Continuing	Continuing	-
Subtotal			0.000	39.884		33.627		45.705		0.000		45.705	-	-	
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Flight Test Telemetry and Termination System (FT3)	C/Various	Boeing : Clearfield, UT	0.000	0.959	Oct 2016	0.600	Oct 2017	0.600	Oct 2018	0.000		0.600	Continuing	Continuing	-
LGM-30G Baseline Support	C/Various	BAE : Clearfield, UT	0.000	1.343	Mar 2016	0.100	Mar 2017	5.000	Mar 2018	0.000		5.000	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS)	C/FFP	BAE : Clearfield, UT	0.000	0.446	Dec 2015	0.495	Sep 2017	0.505	Sep 2018	0.000		0.505	Continuing	Continuing	-
Subtotal			0.000	2.748		1.195		6.105		0.000		6.105	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672984 / MM III Baseline Support					
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Flight Test Telemetry and Termination System (FT3)	C/CPIF	Boeing : Clearfield, UT	0.000	1.289	Oct 2016	0.000		0.347	Sep 2018	0.000		0.347	Continuing	Continuing	-
LGM-30G Ground Test Upgrades NSCCA-PATE / IV&V	C/CPFF	Northrop Grumman Information Technology : Clearfield, UT	0.000	0.000		0.209	May 2017	0.225	May 2018	0.000		0.225	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS)	TBD	TBD : TBD	0.000	0.000		1.535	Nov 2016	1.245	Nov 2017	0.000		1.245	Continuing	Continuing	-
Subtotal			0.000	1.289		1.744		1.817		0.000		1.817	-	-	-
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Arm Disarm Switch Replacement (ADSR)	C/FFP	BAE Systems : Clearfield, UT	0.000	0.000		0.000		0.272	Mar 2018	0.000		0.272	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) PMA	Various	Various : Various	0.000	0.962	Oct 2016	0.620	Oct 2017	2.866	Oct 2018	0.000		2.866	Continuing	Continuing	-
LGM-30G Ground Test Upgrades A&AS	C/FFP	BAE System : Clearfield, UT	0.000	0.410	Jun 2016	0.549	Jun 2017	0.550	Jun 2018	0.000		0.550	Continuing	Continuing	-
LGM-30G Ground Test Upgrades PMA	Various	Various : Various	0.000	0.000		0.570	Mar 2017	0.580	Mar 2018	0.000		0.580	Continuing	Continuing	-
LGM-30G Squadron Data Simulator PMA	Various	Various : Various	0.000	0.459	Apr 2016	1.900	Sep 2017	1.917	Sep 2018	0.000		1.917	Continuing	Continuing	-
Subtotal			0.000	1.831		3.639		6.185		0.000		6.185	-	-	-
			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	45.752		40.205		59.812		0.000		59.812	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force							Date: May 2017			
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons		Project (Number/Name) 672984 / MM III Baseline Support				
	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract	
Remarks										

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force			Date: May 2017		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>		Project (Number/Name) 672984 / <i>MM III Baseline Support</i>	

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ADSR Milestone B (Jan 2019)																												
ADSR Engineering and Manufacturing Development Phase																												
ADSR Milestone C (Jan 2021)																												
ADSR Production and Deployment Phase																												
GTU Technology Maturation and Risk Reduction Phase																												
GTU PDR (Mar 2017)																												
GTU Milestone B (May 2017)																												
GTU Engineering and Manufacturing Development Phase																												
GTU CDR (Nov 2017)																												
GTU Milestone C (May 2019)																												
GTU Production and Deployment Phase																												
GTU IOC (Oct 2019)																												
GTU FOC (Mar 2020)																												
FT3 Technology Maturation and Risk Reduction Phase																												
FT3 PDR (Dec 2016)																												
FT3 Milestone B (Feb 2017)																												
FT3 Engineering and Manufacturing Development Phase																												
FT3 CDR (Nov 2017)																												
FT3 Milestone C (March 2019)																												
FT3 Production and Deployment Phase																												
FT3 RAA (Nov 2019)																												

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force

Date: May 2017

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)	Start Date	End Date	Status	Manager	Budget (USD)	Actual Cost (USD)	Progress (%)	Risk Level	Notes
101	2023-01-15	2023-03-31	Completed	John Doe	150000	148000	100	Low	Project completed ahead of schedule.
102	2023-02-01	2023-05-15	In Progress	Jane Smith	200000	180000	90	Medium	Minor delays in procurement.
103	2023-03-01	2023-06-30	On Hold	Mike Johnson	180000	0	0	High	Waiting for client approval.
104	2023-04-01	2023-07-31	Planned	Sarah Lee	220000	0	0	Medium	Initial planning phase.
105	2023-05-01	2023-08-31	On Hold	David Kim	190000	0	0	Low	Resource allocation pending.
106	2023-06-01	2023-09-30	Planned	Emily White	210000	0	0	Medium	Market research in progress.
107	2023-07-01	2023-10-31	Planned	Chris Brown	230000	0	0	High	Complex project with many dependencies.
108	2023-08-01	2023-11-30	Planned	Alex Green	200000	0	0	Medium	Vendor selection underway.
109	2023-09-01	2023-12-31	Planned	Olivia Black	170000	0	0	Low	Initial meeting with stakeholders.
110	2023-10-01	2024-01-31	Planned	Noah Grey	240000	0	0	High	Strategic importance, high risk.

672984 / MM III Baseline Support

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SDS Technology Maturation and Risk Reduction Phase																												
SDS Preliminary Design Review (Oct 2016)																												
SDS Milestone B (Mar 2017)																												
SDS Engineering and Manufacturing Development Phase																												
SDS Critical Design Review (Sep 2017)																												
SDS Milestone C (Jan 2019)																												
SDS Production and Deployment Phase																												
SDS RAA (May 2020)																												

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ADSR Milestone B (Jan 2019)	2	2019	2	2019
ADSR Engineering and Manufacturing Development Phase	2	2019	1	2021
ADSR Milestone C (Jan 2021)	2	2021	2	2021
ADSR Production and Deployment Phase	2	2021	4	2022
GTU Technology Maturation and Risk Reduction Phase	1	2016	2	2017
GTU PDR (Mar 2017)	2	2017	2	2017
GTU Milestone B (May 2017)	3	2017	3	2017
GTU Engineering and Manufacturing Development Phase	3	2017	2	2019
GTU CDR (Nov 2017)	1	2018	1	2018
GTU Milestone C (May 2019)	3	2019	3	2019
GTU Production and Deployment Phase	3	2019	2	2020
GTU IOC (Oct 2019)	1	2020	1	2020
GTU FOC (Mar 2020)	2	2020	2	2020
FT3 Technology Maturation and Risk Reduction Phase	1	2016	3	2016
FT3 PDR (Dec 2016)	1	2017	1	2017
FT3 Milestone B (Feb 2017)	2	2017	2	2017
FT3 Engineering and Manufacturing Development Phase	2	2017	4	2020
FT3 CDR (Nov 2017)	1	2018	1	2018
FT3 Milestone C (March 2019)	2	2019	2	2019
FT3 Production and Deployment Phase	2	2019	4	2022
FT3 RAA (Nov 2019)	1	2020	1	2020
SDS Technology Maturation and Risk Reduction Phase	1	2016	1	2017
SDS Preliminary Design Review (Oct 2016)	1	2017	1	2017

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force	Date: May 2017
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672984 / <i>MM III Baseline Support</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
SDS Milestone B (Mar 2017)	2	2017	2	2017
SDS Engineering and Manufacturing Development Phase	2	2017	1	2019
SDS Critical Design Review (Sep 2017)	4	2017	4	2017
SDS Milestone C (Jan 2019)	2	2019	2	2019
SDS Production and Deployment Phase	2	2019	4	2020
SDS RAA (May 2020)	3	2020	3	2020

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672985 / MM Support Equip			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
672985: MM Support Equip	0.000	27.834	28.714	31.649	0.000	31.649	7.880	12.085	6.132	6.256	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MM Support Equipment program designs, develops, and tests replacement of obsolete/non-serviceable weapon system support equipment. These programs will also implement processes, procedures and data systems to mitigate the transition risk from MM III to Ground Based Strategic Deterrent (GBSD). Current efforts include design, development, and testing of support equipment such as LGM-30G Alignment Set Test Set (ASTS), LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT), LGM-30G G6B4 Build Equipment Replacement (G6B4 BER), LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU), LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER), LGM-30G Payload Transporter Replacement (PTR), and LGM-30G Transporter Erector Replacement Program (TERP).

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

	FY 2016	FY 2017	FY 2018
Title: LGM-30G G6B4 Build Equipment Replacement (G6B4 BER)	0.000	1.289	6.353
Description: The G6B4 BER program impacts three stations: the G6B4 Rotor Balance Test Station, the G6B4 Hydrogen Fill Station, and the Gyro F-coefficient Station (GFS). The G6B4 Rotor Balance Test Station (S-133-18024) is used to determine radial and dynamic balance of the G6B4 gyro rotor after repair, and it needs to have the obsolete Schenk balancer and console replaced. Two copies of the G6B4 Rotor Balance Test Station will be delivered. The G6B4 Hydrogen Fill Station (S-133-132-4-384) is used to fill the G6B4 with hydrogen gas following repairs, and it needs to have obsolete and failing gauges, plumbing and valves replaced. The Gyro F-coefficient Station (GFS) (S-133-18038) is used to calibrate the F-coefficient of the G6B4 gyro after repairs are complete; it needs its obsolete hydraulic and electrical power systems replaced.			
FY 2016 Accomplishments: N/A			
FY 2017 Plans: <ul style="list-style-type: none"> • Award TMRR contract and begin design and build of replacement Hydrogen Fill Station, Rotor Balance Test Station, and the Gyro F-coefficient Station non-computer components • Conduct Preliminary Design Review and Milestone B 			
FY 2018 Plans: <ul style="list-style-type: none"> • Continue build and start test of replacement Hydrogen Fill Station and the Gyro F-coefficient Station non-computer components • Continue build and test of the first Rotor Balance Test Station 			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>		Project (Number/Name) 672985 / <i>MM Support Equip</i>	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
• Conduct Test Readiness Review, Production Readiness Review, Functional Configuration Audit, Physical Configuration Audit, and Critical Design Review					
Title: LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT)			0.000	0.745	5.974
Description: CMPT replaces the classroom trainer supporting start-up and shut-down of the MM III LF and missile, computer memory loading operations, and maintenance procedures. The program will update software, outdated operating systems, and obsolete/unsupportable hardware (desktop computers, motherboards, simulated programmer group, drivers, simulated cable sets, tape sets, and other miscellaneous parts) located at each Missile Wing and Vandenberg AFB necessary to continue the training capability of the CMPTs through 2030.					
FY 2016 Accomplishments: N/A					
FY 2017 Plans: • Prepare and conduct successful Milestone B • Conduct Source Selection					
FY 2018 Plans: • Initiate Engineering and Manufacturing Development (EMD) contract award actions to validate the design of new software and begin code development. • Conduct Preliminary Design Review (PDR) and Critical Design Review (CDR)					
Title: LGM-30G Transporter Erector Replacement Program (TERP)			3.142	6.984	0.000
Description: Design and develop the capabilities necessary to replace the current Transporter Erector (TE). The TE is used to emplace, extract and transport Minuteman III boosters to and from the launch facilities. TERP will update existing drawings, specifications and technical orders to eliminate parts obsolescence and address intended usage through 2030 and will qualify the new system prior to production.					
FY 2016 Accomplishments: • Determined maneuverability and axle weight requirements. • Drafted and sent "Contract Modification Request for Propopsal" to contractor. • Evaluated contractors proposal. • Negotiated and awarded contract modification.					
FY 2017 Plans: • Conduct delta CDR for tractor redesign. • Complete tractor redesign, development, and fabrication.					

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017	
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017
<ul style="list-style-type: none"> • Complete delta Test Readiness Review, delta system qualification testing, and tractor redesign qualification testing. • Verification and delivery of tech data to accompany First Article Test and Evaluations accomplished. • Certify design readiness for Full Rate Production decision. • Conduct Milestone C. <p>FY 2018 Plans: N/A</p>			
<p>Title: LGM-30G Reentry Support Equipment Replacement Program (RSERP)</p> <p>Description: Program cancelled at the end of FY16. Design, develop, fabricate and test the RSERP to modify or replace the over 30 year old suite of test equipment necessary to continue checkout, screening, repair, and refurbishment of Mk12A/Mk21 Arming Fuzing Assemblies.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> • RSERP was canceled at the end of FY2016 <p>FY 2017 Plans: N/A</p> <p>FY 2018 Plans: N/A</p>		9.480	0.000
<p>Title: LGM-30G Payload Transporter Replacement (PTR)</p> <p>Description: Designs and develops the capabilities necessary to replace the current Payload Transporter tractor and trailer, mitigating emerging threat technologies and methods. The PTR emplaces, extracts, and transports the MM III reentry system, propulsion system rocket engine, and missile guidance set. The new PTR design increases safety and security during transport activities and improves maintenance operations.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> • Completed fabrication of two PTR prototypes. • Conducted Test Readiness Review. • Conducted over 500 system qualification tests. • Closed 140 Test Anomaly Reports. • Completed initial review of 3000 Level three drawings. <p>FY 2017 Plans:</p> <ul style="list-style-type: none"> • Continue Supporting Engineering and Manufacturing Phase 		9.951	10.938
			4.000

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672985 / MM Support Equip		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2016	FY 2017	FY 2018
<ul style="list-style-type: none">Develop trainer requirements <p>FY 2018 Plans:</p> <ul style="list-style-type: none">Conduct Milestone CInitiate Production and Development Phase					
<p>Title: LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU)</p> <p>Description: Designs and develops the capabilities to replace the current PADS CEIU mitigating obsolescence and upgrading the system to transmit over the internet using Internet Protocols (IP). The system transmits MM III Inertial Measurement Unit (IMU) Performance Data (IPD) from Launch Control Centers to the PADS located at the support base. The new system will use the more reliable and secure IP transmission method. The update effort consists of rewriting the CEIU embedded software to a robust language using secure coding practices, and change the CEIU design from telephone to IP transmission. In addition, the PADS interfacing system is to be updated to interface with the updated CEIU design.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none">Began Technology Maturation and Risk Reduction Phase (TMRR) <p>FY 2017 Plans:</p> <ul style="list-style-type: none">Conduct a preliminary design review (PDR)Prepare for and conduct a successful Milestone BBegin Engineering Manufacturing Development (EMD) Phase <p>FY 2018 Plans:</p> <ul style="list-style-type: none">Conduct a Critical Design review (CDR).Prepare for and conduct a successful Milestone CBegin Production and Development Phase			1.259	4.834	7.704
<p>Title: LGM-30G Alignment Set Test Set (ASTS)</p> <p>Description: The ASTS is a one of a kind station built for the repair and calibration of the Alignment Set on a MM III guidance platform. ASTS completes the design, development, fabrication and installation of two operational systems and support equipment along with a Level III data package and source data as required for Technical Order (TO) creation.</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none">Performed re-calibration of hardware on Engineering Development Unit (EDU)Resumed software development effort for ASTS software suiteConducted software integration testing on EDUCompleted assembly of Production Representative Prototype Unit (PRPU)			4.002	1.307	0.000

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017	
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017
<ul style="list-style-type: none"> Conducted confidence testing/integration efforts and perform accuracy verification testing on PRPU <p>FY 2017 Plans:</p> <ul style="list-style-type: none"> Complete Test Readiness Review and qualification and acceptance testing on PRPU Complete the build and testing of second PRPU unit <p>FY 2018 Plans: N/A</p>			
<p>Title: LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER)</p> <p>Description: The Missile Guidance Set (MGS) repair is dependent on the proper functioning of the PIGA build equipment. The PIGA build and test equipment used at the repair facility is well over twenty years old and is becoming unsustainable due to obsolescence issues. This program will modify or replace two Digital Pickoff Alignment stations, two Electrical Alignment stations, two Alignment Test stations, one Torque Test station, one Temperature Probe Calibration station, two Fill stations and one Slip Ring/Module Test station.</p> <p>FY 2016 Accomplishments: N/A</p> <p>FY 2017 Plans:</p> <ul style="list-style-type: none"> Begin evaluation of the seven PIGA Test and Repair stations Purchase Commercial off the Shelf (COTS) items for all 7 test stations Begin drawing updates for the integration of the COTS items <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> Purchase more COTS items for all 7 test stations Continue drawing updates for the integration of the COTS items Conduct Preliminary Design Review Prepare and conduct successful Milestone B Begin Engineering and Manufacturing Development (EMD) Phase Prepare and conduct successful Critical Design Review 		0.000	2.617
Accomplishments/Planned Programs Subtotals		27.834	28.714
			31.649

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force								Date: May 2017			
Appropriation/Budget Activity 3600 / 7				R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>				Project (Number/Name) 672985 / <i>MM Support Equip</i>			

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

<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF: BA03: Line Item # M30MLG: <i>MM III Modifications BP21</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.526	0.000	0.000	Continuing	Continuing
• MPAF: BA01: Line Item# 00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	54.523	56.016	76.001	0.000	76.001	34.770	15.231	9.757	0.000	Continuing	Continuing
• MPAF: BA04: Line Item #000999: <i>Replen Spares/ Repair Parts BP25/26</i>	0.000	3.413	0.326	0.000	0.326	0.000	0.000	0.000	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

Support and test equipment replacement efforts are reviewed to determine the best method for execution including vendor qualification and procurement with no development required, develop and/or modification with organic depot capabilities or development with industry. Industry development efforts for support equipment will be executed through contracts available under the Future ICBM Sustainment and Acquisition Construct (FISAC) or competitive source selections. Nuclear Surety Cross Check Analysis (NSCCA) and Independent Verification and Validation (IV&V) efforts are contracted separately. Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.

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-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672985 / MM Support Equip					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Reentry Support Equipment Replacement Program (RSERP) TPS	C/TBD	TBD : TBD	0.000	8.056	Jan 2017	0.000		0.000		0.000		0.000	0.000	8.056	-
LGM-30G G6B4 Build Equipment Replacement (G6B4 BER)	SS/FPIF	Boeing : Clearfield, UT	0.000	0.000		1.180	Mar 2017	5.577	Oct 2017	0.000		5.577	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) EMD	C/FFP	TBD : TBD	0.000	0.000		0.547	Jun 2017	5.828	Dec 2017	0.000		5.828	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) EMD	TBD	TBD : TBD	0.000	0.000		2.355	May 2017	7.283	May 2018	0.000		7.283	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) EMD	C/FPIF	DRS Environmental Systems : Cincinnati, OH	0.000	2.546	May 2016	3.484	May 2017	0.000		0.000		0.000	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	6.557	Nov 2015	10.938	May 2017	4.000	Oct 2017	0.000		4.000	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) Software Development	SS/CPIF	Boeing : Layton, UT	0.000	1.226	Jul 2016	4.321	Apr 2017	7.284	Apr 2018	0.000		7.284	Continuing	Continuing	-
LGM-30G Alignment Set Test Set (ASTS) Engineering Development	SS/CPAF	Boeing : Heath, OH	0.000	4.000	Jan 2016	1.287	Jan 2017	0.000		0.000		0.000	Continuing	Continuing	-
Subtotal			0.000	22.385		24.112		29.972		0.000		29.972	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672985 / MM Support Equip					
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Payload Transporter Replacement (PTR) Survivability Testing	MIPR	Various : Various	0.000	1.988	Apr 2016	0.000		0.000		0.000		0.000	Continuing	Continuing	-
Subtotal			0.000	1.988		0.000		0.000		0.000		0.000	-	-	-
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LGM-30G Reentry Support Equipment Replacement Program (RSERP) TPS	Various	Various : Various	0.000	1.424	Mar 2016	0.000		0.000		0.000		0.000	0.000	1.424	-
LGM-30G G6B4 Build Equipment Replacement (G6B4 BER)	C/TBD	BAE Systems : Layton, UT	0.000	0.000		0.109	Mar 2017	0.397	Oct 2017	0.000		0.397	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) PMA	Various	Various : Various	0.000	0.000		0.198	Jan 2017	0.525	Jan 2018	0.000		0.525	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) PMA	Various	Various : Various	0.000	0.596	Dec 2015	3.500	Feb 2017	0.000		0.000		0.000	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) PMA	TBD	TBD : TBD	0.000	0.000		0.262	May 2017	0.335	May 2018	0.000		0.335	Continuing	Continuing	-
LGM-30G Performance Assessment Data	Various	Various : Various	0.000	0.033	Apr 2016	0.513	Apr 2017	0.420	Apr 2018	0.000		0.420	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>				Project (Number/Name) 672985 / <i>MM Support Equip</i>					

Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Communications Equipment Interface Unit (PADS CEIU) PMA															
LGM-30G Payload Transporter Replacement (PTR) PMA	Various	Various : Various	0.000	1.406	Feb 2016	0.000		0.000		0.000		0.000	Continuing	Continuing	-
LGM-30G Alignment Set Test Set (ASTS) PMA	Various	Various : Various	0.000	0.002	Dec 2016	0.020	Feb 2017	0.000		0.000		0.000	0.000	0.022	-
Subtotal			0.000	3.461		4.602		1.677		0.000		1.677	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	27.834		28.714		31.649		0.000		31.649	-	-	-

Remarks

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force

Date: May 2017

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672985 / MM Support Equip

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
G6B4 BER TMRR Phase (Mar 2017)																												
G6B4 BER PDR (Jul 2017)																												
G6B4 BER Milestone B (Sep 2017)																												
G6B4 BER Engineering and Manufacturing Development Phase (Oct 2017)																												
G6B4 BER CDR (Apr 2018)																												
G6B4 BER Milestone C (Jun 2019)																												
G6B4 BER Production and Deployment Phase (Jun 2019)																												
G6B4 BER FCA/PCA (Jun 2019)																												
G6B4 BER Required Assets Available (Sep 2020)																												
CMPT Milestone B (Apr 2017)																												
CMPT Engineering and Manufacturing Development Phase																												
CMPT PDR (Oct 2017)																												
CMPT CDR (May 2018)																												
CMPT Milestone C (Dec 2019)																												
CMPT Production and Deployment Phase																												
CMPT RAA (Jun 2020)																												
PTR Engineering and Manufacturing Development Phase																												
PTR Milestone C (Oct 2017)																												
PTR Production and Deployment Phase																												
PTR IOC (Jul 2019)																												
PTR FOC (Dec 2022)																												

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force

Date: May 2017

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672985 / MM Support Equip

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
TERP Engineering and Manufacturing Development Phase																												
TERP Milestone C (Nov 2017)																												
TERP Production and Deployment Phase																												
TERP IOC (Nov 2018)																												
TERP FOC (Apr 2020)																												
PADS CEIU Technology Maturation and Risk Reduction (TMRR) Phase																												
PADS CEIU Milestone B (Aug 2017)																												
PADS CEIU Engineering and Manufacturing Development Phase																												
PADS CEIU PDR (Jan 2017)																												
PADS CEIU CDR (Dec 2017)																												
PADS CEIU Milestone C (Jun 2018)																												
PADS CEIU Production and Deployment Phase																												
PADS CEIU RAA (Jul 2019)																												
PIGA BER TMRR Phase																												
PIGA BER Milestone B (Jun 2018)																												
PIGA BER Engineering and Manufacturing Development Phase																												
PIGA BER PDR (Mar 2018)																												
PIGA BER CDR (Sep 2018)																												
PIGA BER Milestone C (Jul 2019)																												
PIGA BER Production and Deployment Phase																												
PIGA BER RAA (Sep 2020)																												
ASTS Engineering and Manufacturing Development Phase																												

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force																							Date: May 2017					
Appropriation/Budget Activity 3600 / 7										R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons								Project (Number/Name) 672985 / MM Support Equip										
	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ASTS Production and Deployment Phase	<div></div>																											
ASTS FCA/PCA (Jul 2017)	<div></div>																											
ASTS TRR (Feb 2017)	<div></div>																											
ASTS RAA (Sep 2017)	<div></div>																											

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672985 / <i>MM Support Equip</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
G6B4 BER TMRR Phase (Mar 2017)	2	2017	4	2017
G6B4 BER PDR (Jul 2017)	4	2017	4	2017
G6B4 BER Milestone B (Sep 2017)	4	2017	4	2017
G6B4 BER Engineering and Manufacturing Development Phase (Oct 2017)	1	2018	2	2020
G6B4 BER CDR (Apr 2018)	3	2018	3	2018
G6B4 BER Milestone C (Jun 2019)	3	2019	3	2019
G6B4 BER Production and Deployment Phase (Jun 2019)	3	2019	4	2020
G6B4 BER FCA/PCA (Jun 2019)	3	2019	3	2019
G6B4 BER Required Assets Available (Sep 2020)	4	2020	4	2020
CMPT Milestone B (Apr 2017)	3	2017	3	2017
CMPT Engineering and Manufacturing Development Phase	3	2017	1	2020
CMPT PDR (Oct 2017)	1	2018	1	2018
CMPT CDR (May 2018)	3	2018	3	2018
CMPT Milestone C (Dec 2019)	1	2020	1	2020
CMPT Production and Deployment Phase	2	2020	4	2020
CMPT RAA (Jun 2020)	3	2020	3	2020
PTR Engineering and Manufacturing Development Phase	1	2016	1	2018
PTR Milestone C (Oct 2017)	1	2018	1	2018
PTR Production and Deployment Phase	1	2018	4	2022
PTR IOC (Jul 2019)	2	2019	2	2019
PTR FOC (Dec 2022)	3	2022	3	2022
TERP Engineering and Manufacturing Development Phase	1	2016	1	2018
TERP Milestone C (Nov 2017)	1	2018	1	2018

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force

Date: May 2017

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672985 / MM Support Equip

Events	Start		End	
	Quarter	Year	Quarter	Year
TERP Production and Deployment Phase	2	2018	3	2020
TERP IOC (Nov 2018)	1	2019	1	2019
TERP FOC (Apr 2020)	3	2020	3	2020
PADS CEIU Technology Maturation and Risk Reduction (TMRR) Phase	4	2016	4	2017
PADS CEIU Milestone B (Aug 2017)	4	2017	4	2017
PADS CEIU Engineering and Manufacturing Development Phase	4	2017	3	2018
PADS CEIU PDR (Jan 2017)	2	2017	2	2017
PADS CEIU CDR (Dec 2017)	1	2018	1	2018
PADS CEIU Milestone C (Jun 2018)	3	2018	3	2018
PADS CEIU Production and Deployment Phase	4	2018	4	2019
PADS CEIU RAA (Jul 2019)	4	2019	4	2019
PIGA BER TMRR Phase	2	2017	3	2018
PIGA BER Milestone B (Jun 2018)	3	2018	3	2018
PIGA BER Engineering and Manufacturing Development Phase	3	2018	1	2020
PIGA BER PDR (Mar 2018)	2	2018	2	2018
PIGA BER CDR (Sep 2018)	4	2018	4	2018
PIGA BER Milestone C (Jul 2019)	4	2019	4	2019
PIGA BER Production and Deployment Phase	4	2019	4	2020
PIGA BER RAA (Sep 2020)	4	2020	4	2020
ASTS Engineering and Manufacturing Development Phase	1	2016	3	2017
ASTS Production and Deployment Phase	3	2017	4	2017
ASTS FCA/PCA (Jul 2017)	4	2017	4	2017
ASTS TRR (Feb 2017)	2	2017	2	2017
ASTS RAA (Sep 2017)	4	2017	4	2017

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force										Date: May 2017		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672986 / MM Crypto Mods			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
672986: MM Crypto Mods	0.000	30.386	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	12	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MM Crypto Mods executes USSTRATCOM, Air Force Global Strike Command, and Nuclear Weapon Safety Center requirements by implementing the KS-60 capabilities in LGM-30G ICBM Cryptography Upgrade II (ICU II) of remote key/code change and irreversible transformation as mandated in the approved Capabilities Development Document (dated 4 Jan 05) and addresses Nuclear Weapon System Safety Group Operational Safety Review requirements 98-2, 00-1 and 02-2. It also incorporates continuous signal lockout capabilities to prevent the widespread loss of status monitoring. These features will greatly increase security during code changes by reducing the frequency of open sites 75 days annually and will reduce associated resource costs for 450 Launch Facilities (LFs) and 45 Launch Control Centers (LCCs).

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

	FY 2016	FY 2017	FY 2018
Title: LGM-30G ICBM Cryptography Upgrade II (ICU II)	30.386	0.000	0.000
Description: ICU II completes design and development, implements KS-60 remote key/code change, irreversible transformation capabilities, and prevents continuous signal lockout.			
FY 2016 Accomplishments: <ul style="list-style-type: none"> Continued weapon system testing with final central processor, nuclear certification for A4 Drawer. Continued development, testing, certification of related system software. Began contract effort to develop Support Equipment (SE) and package manufactured processors for safe storage. 			
FY 2017 Plans: <ul style="list-style-type: none"> Continue to support Engineering and Manufacturing Development Phase 			
FY 2018 Plans: <ul style="list-style-type: none"> Conduct user training Prepare and conduct successful TRR and Milestone C 			
Accomplishments/Planned Programs Subtotals			
	30.386	0.000	0.000

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

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• MPAF: BA 03: Line Item# M30MLG: <i>MM III Modifications BP21</i>	0.000	31.639	29.559	0.000	29.559	58.378	46.082	31.847	3.264	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / <i>Minuteman Squadrons</i>	Project (Number/Name) 672986 / <i>MM Crypto Mods</i>	

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

<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF: BA 04: Line Item #000999: <i>Replen Spares/ Repair Parts BP25/26</i>	0.000	2.367	1.231	0.000	1.231	4.190	0.150	0.000	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

LGM-30G ICBM Cryptography Upgrade II (ICU II) Program utilizes the ICBM Prime Integration Contract (IPIC) services of Northrop Grumman (NG), which were competitively awarded for the design and development of the ICU II capability. The contract type of the ICU II Engineering and Manufacturing Development (EMD) Contract is Cost Plus Incentive Fee. Also, ICU II EMD uses a separate contract for Nuclear Surety Cross Check Analysis/Performance Analysis and Technical Evaluation (NSCCA/PATE) Independent Validation & Verification (IV&V). This contract is driven by critical nuclear surety requirements to perform an independent assessment of all modifications to nuclear-certified software. The FY16 Pre-Production contract will be awarded on the Ground Systems Sustainment Contract (GSSC). Nuclear Surety and Vulnerability analysis requirements are covered in the Acquisition Strategy.

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.