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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force **Date:** February 2018

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>
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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	0.000	173.718	210.845	156.047	0.000	156.047	128.961	136.978	120.727	122.926	Continuing	Continuing
672983: <i>MM Ground and Comm Equipment</i>	0.000	53.716	119.384	91.273	0.000	91.273	100.066	121.442	101.576	103.425	Continuing	Continuing
672984: <i>MM III Baseline Support</i>	0.000	74.058	59.812	37.371	0.000	37.371	14.816	8.954	12.940	13.176	Continuing	Continuing
672985: <i>MM Support Equip</i>	0.000	18.658	31.649	12.863	0.000	12.863	11.995	6.086	6.211	6.325	Continuing	Continuing
672986: <i>MM Crypto Mods</i>	0.000	27.286	0.000	14.540	0.000	14.540	2.084	0.496	0.000	0.000	Continuing	Continuing

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 Minuteman III (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 Service Life Extension Program (FRBP SLEP), 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 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 Arm Disarm Switch Replacement (ADSR), 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.

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).

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

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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).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver nuclear weapon support capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

This program is in Budget Activity 07, Operational System Development because this budget activity includes development 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 year.

B. Program Change Summary (\$ in Millions)	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	182.958	210.845	84.603	0.000	84.603
Current President's Budget	173.718	210.845	156.047	0.000	156.047
Total Adjustments	-9.240	0.000	71.444	0.000	71.444
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-4.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-5.240	0.000			
• Other Adjustments	0.000	0.000	71.444	0.000	71.444

Change Summary Explanation

FY 2017 funding reflects a \$4.000M Congressional directed reduction for ASU excess along with \$5.240M for Small Business Innovative Research (SBIR).
FY 2019 funding reflects a \$71.444M increase in order to fully fund ALCS-R, FT3, ICU-II, and TERP risk reduction and development activities.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
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 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
672983: MM Ground and Comm Equipment	0.000	53.716	119.384	91.273	0.000	91.273	100.066	121.442	101.576	103.425	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 Service Life Extension Program (FRBP SLEP), 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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: LGM-30G Air Launch Control System Replacement (ALCS-R)								26.747	78.492	82.974	0.000	82.974
Description: ALCS-R will replace the legacy nuclear command and control system that provides the capability to launch Intercontinental Ballistic Missiles (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 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 2018 Plans:												
• Complete System Functional Review												
• Continue trusted anchor hardness testing												
• Complete hardened LF antenna analysis												
• Complete Phase I Cost Capability Analysis and support CDD finalization												
• Initiate Phase II Cost Capability Analysis												
• Complete Government facility modifications												
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
<ul style="list-style-type: none">• Complete System Preliminary Design Review• Begin Prototype Evaluation• Complete Development Request for Proposal Decision Point• Complete System Requirements Document• Complete System Integration Lab Development• Complete EMD Acquisition Strategy• Complete Phase II Cost Capability Analysis and Support CDD Finalization <p>FY 2019 OCO Plans: N/A</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding increased as risk reduction activities and prototyping ramps up.</p>						
<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 2018 Plans:</p> <ul style="list-style-type: none">• Complete integration testing, finalize design, and validate installation• Complete Critical Design Review• Validate, verify, and publish technical data and drawings• Prepare a technical data package for production <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none">• Conduct Functional Configuration Audit and Physical Configuration Audit• Conduct Production Readiness Review• Complete Milestone C <p>FY 2019 OCO Plans:</p>		5.796	10.185	3.428	0.000	3.428

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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: Funding decreased due to ramping down EMD efforts in preparation for production.						
Title: LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) Description: The Fast Rising B-Plug (FRBP) provides a secondary security element to the Personnel Access System (PAS) of the Launch Facilities (LFs). It is a 14,000 pound cylinder with 12 locking pins used to deny/ delay access to intruders during LF maintenance activities. This effort will include hardware and software modification solutions to a variety of safety and maintenance issues affecting the operational wings. FY 2018 Plans: • Program under revision/assessment due to cost/schedule growth FY 2019 Base Plans: • Perform market research • Prepare pre-acquisition documents to support acquisition strategy review • Prepare development contract documentation FY 2019 OCO Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: Funding increased due to preparation for EMD contract award		0.863	0.400	0.814	0.000	0.814
Title: LGM-30G Launch Control Center Break-In-Kit (LCCB) 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. FY 2018 Plans: • Prepare and conduct Preliminary Design Review • Prepare and conduct Critical Design Review		1.424	3.671	1.094	0.000	1.094

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<ul style="list-style-type: none">• Prepare and conduct Test Readiness Review <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none">• Prepare and conduct Functional and Physical Configuration Audit• Prepare and conduct Production Readiness Review• Prepare and conduct Milestone C <p>FY 2019 OCO Plans:</p> <p>N/A</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p> <p>Funding decreased due to ramp down of EMD in preparation of Milestone C.</p>						
<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 negatively impacting voice communications in the MM missile fields. 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> <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 communication equipment to provide the voice communications quality required to perform the ICBM mission.</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 2018 Plans:</p> <ul style="list-style-type: none">• Complete Critical Design Review		17.354	22.294	2.963	0.000	2.963

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<div>• Complete testing</div> <div>FY 2019 Base Plans:<div>• Complete Milestone C</div><div>• Begin production</div></div> <div>FY 2019 OCO Plans: NA</div> <div>FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to concluding EMD activities in preparation for Production and Deployment Phase</div>						
<div>Title: LGM-30G Remote Visual Assessment Phase II (RVA II)</div> <div>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.</div> <div>FY 2018 Plans:<div>• Complete Critical Design Review</div><div>• Complete development testing</div><div>• Complete all required documentation</div><div>• Complete EMD Phase II</div><div>• Release Request For Proposal for Production Contract</div></div> <div>FY 2019 Base Plans:<div>• Complete functional configuration and physical configuration audits</div><div>• Complete Milestone C</div><div>• Development completed</div></div> <div>FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to the completion of EMD phase in FY2018</div>		1.532	4.342	0.000	-	0.000
Accomplishments/Planned Programs Subtotals		53.716	119.384	91.273	0.000	91.273

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF Line Item M30MLG: <i>Minuteman III Modifications BP21</i>	23.682	39.031	48.651	-	48.651	39.327	32.120	20.982	70.872	Continuing	Continuing
• MPAF Ballistic Missiles/ BSA 3, M...: <i>Minuteman III</i> <i>Replacement Eq-Ballistic BP22</i>	7.655	9.197	6.106	-	6.106	3.818	0.000	0.000	-	Continuing	Continuing
• MPAF Line Item 000999: <i>Replen</i> <i>Spares/Repair Parts BP25/26</i>	0.033	1.348	0.000	-	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.

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: PB 2019 Air Force												Date: February 2018			
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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) TMRR Contractor A	C/FPIF	Lockheed Martin : Littleton, CO	0.000	2.590	Oct 2017	29.176	Nov 2017	31.130	Oct 2018	-		31.130	Continuing	Continuing	-
LGM-30G Airborne Launch Control System (ALCS) TMRR Contractor B	C/FPIF	Rockwell Collins : Cedar Rapids, IA	0.000	2.900	Oct 2017	29.175	Nov 2017	29.342	Oct 2018	-		29.342	Continuing	Continuing	-
LGM-30G Airborne Launch Control System (ALCS) SIL	MIPR	Aerospace : El Segundo, CA	-	4.282	Mar 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Automatic Switching Unit (ASU) TMRR/EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	-	4.427	May 2017	8.976	Dec 2017	3.001	Dec 2018	-		3.001	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit EMD	MIPR	Navy Crane : Crane, IN	-	0.757	Apr 2017	3.671	Apr 2018	0.769	Apr 2019	-		0.769	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade TMRR/EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	-	17.138	Jul 2017	21.744	Jul 2018	2.645	Oct 2018	-		2.645	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD	C/CPFF	Sentry View Systems : Melbourne, FL	-	0.811	Mar 2017	2.939	Nov 2017	-		-		-	Continuing	Continuing	-
Subtotal			0.000	32.905		95.681		66.887		-		66.887	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) ISC	SS/FP	BAE : Layton, UT	-	5.901	Nov 2016	3.314	May 2018	7.037	Oct 2018	-		7.037	Continuing	Continuing	-
LGM-30G Airborne Launch Control System (ALCS) MITRE	MIPR	MITRE : Bedford, MA	-	2.765	Dec 2016	3.113	Dec 2017	2.967	Oct 2018	-		2.967	Continuing	Continuing	-

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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) Aerospace	MIPR	Aerospace : El Segundo, CA	-	2.176	Apr 2017	1.891	Jan 2018	1.931	Oct 2018	-		1.931	Continuing	Continuing	-
LGM-30G Airborne Launch Control System (ALCS) Design Support	Various	Various : Various	0.000	2.491	Mar 2017	4.184	Jan 2018	5.279	Oct 2018	-		5.279	Continuing	Continuing	-
LGM-30G Automatic Switching Unit A&AS Support	C/FP	BAE : Layton, UT	-	0.540	Oct 2016	0.689	Oct 2017	0.347	Oct 2018	-		0.347	Continuing	Continuing	-
LGM-30G Remote Visual Assessment II (RVA II) Engineering Support	Various	Various : Various	0.000	0.130	Dec 2017	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	14.003		13.191		17.561		-		17.561	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) Testing	Various	Various : Various	-	0.183	Feb 2017	1.349	Jan 2018	0.820	Oct 2018	-		0.820	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade TMRR/EMD	Various	Various : Various	0.000	-		-		0.100	Oct 2018	-		0.100	Continuing	Continuing	-
Subtotal			0.000	0.183		1.349		0.920		-		0.920	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) PMA	Various	Various : Various	-	3.459	Mar 2017	6.290	Jan 2018	4.468	Dec 2018	-		4.468	Continuing	Continuing	-

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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Automatic Switching Unit PMA	Various	Various : Various	-	0.829	Nov 2016	0.520	Oct 2017	0.080	Oct 2018	-		0.080	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit PMA	Various	Various : Various	-	0.667	Feb 2017	-		0.325	Feb 2019	-		0.325	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade TMRR/EMD	Various	Various : Various	-	0.216	Jul 2017	0.550	Jul 2018	0.218	Jul 2019	-		0.218	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) A&AS Support	C/FP	BAE : Layton, UT	-	0.863	Dec 2016	0.400	Dec 2017	0.814	Dec 2018	-		0.814	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) PMA	Various	Various : Various	-	0.022	Mar 2017	0.753	Feb 2018	-		-		-	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) A&AS	C/FP	BAE : Layton, UT	-	0.569	Jan 2017	0.650	Jan 2018	-		-		-	Continuing	Continuing	-
Subtotal			-	6.625		9.163		5.905		-		5.905	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	53.716		119.384		91.273		-		91.273	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force			Date: February 2018		
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>

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
MM Ground and Comm Equipment																												
ALCS Technology Maturation and Risk Reduction Phase																												
ALCS PDR (Apr 2019)																												
ALCS Development RFP Release Decision Point (Oct 2019)																												
ALCS Milestone B (Nov 2020)																												
ALCS Engineering and Manufacturing Development Phase																												
ALCS CDR (May 2021)																												
ALCS Milestone C (Nov 2022)																												
ASU Technology Maturation and Risk Reduction phase																												
ASU PDR (Mar 2017)																												
ASU Milestone B (May 2017)																												
ASU Engineering and Manufacturing Development Phase																												
ASU CDR (May 2018)																												
ASU Milestone C (Mar 2019)																												
ASU Production and Deployment Phase																												
FRBP SLEP Material Solution Analysis Phase																												
LCCB Milestone B (Mar 2017)																												
LCCB Engineering and Manufacturing Development Phase																												
LCCB CDR (Mar 2018)																												
LCCB Milestone C (Mar 2019)																												
LCCB Production and Deployment Phase																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force																Date: February 2018			
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>			

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 RAA (Jun 2019)																												
LCCBU Pre Milestone-B Phase																												
LCCBU PDR (Apr 2017)																												
LCCBU Milestone B (Jul 2017)																												
LCCBU Engineering and Manufacturing Development Phase																												
LCCBU CDR (Jan 2018)																												
LCCBU Milestone C (Dec 2018)																												
LCCBU Production and Deployment Phase																												
LCCBU RAA (Jul 2020)																												
RVA II Engineering and Manufacturing Development Phase I																												
RVA II PDR (Oct 2017)																												
RVA II Engineering and Manufacturing Development Phase II																												
RVA II CDR (Jun 2018)																												
RVA II Milestone C (Dec 2018)																												
RVA II Production and Deployment Phase																												
RVA II IOC (Jun 2020)																												
RVA II FOC (May 2022)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force			Date: February 2018
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 by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM Ground and Comm Equipment</i>				
ALCS Technology Maturation and Risk Reduction Phase	1	2018	1	2021
ALCS PDR (Apr 2019)	3	2019	3	2019
ALCS Development RFP Release Decision Point (Oct 2019)	1	2020	1	2020
ALCS Milestone B (Nov 2020)	1	2021	1	2021
ALCS Engineering and Manufacturing Development Phase	1	2021	1	2023
ALCS CDR (May 2021)	3	2021	3	2021
ALCS Milestone C (Nov 2022)	1	2023	1	2023
ASU Technology Maturation and Risk Reduction phase	1	2017	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 (May 2018)	3	2018	3	2018
ASU Milestone C (Mar 2019)	2	2019	2	2019
ASU Production and Deployment Phase	3	2019	4	2023
FRBP SLEP Material Solution Analysis Phase	1	2017	4	2019
LCCB Milestone B (Mar 2017)	2	2017	2	2017
LCCB Engineering and Manufacturing Development Phase	2	2017	2	2019
LCCB CDR (Mar 2018)	2	2018	2	2018
LCCB Milestone C (Mar 2019)	2	2019	2	2019
LCCB Production and Deployment Phase	2	2019	3	2019
LCCB RAA (Jun 2019)	3	2019	3	2019
LCCBU Pre Milestone-B Phase	1	2017	3	2017

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force			Date: February 2018
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>	

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LCCBU PDR (Apr 2017)	3	2017	3	2017
LCCBU Milestone B (Jul 2017)	4	2017	4	2017
LCCBU Engineering and Manufacturing Development Phase	4	2017	2	2019
LCCBU CDR (Jan 2018)	2	2018	2	2018
LCCBU Milestone C (Dec 2018)	1	2019	1	2019
LCCBU Production and Deployment Phase	1	2019	4	2020
LCCBU RAA (Jul 2020)	4	2020	4	2020
RVA II Engineering and Manufacturing Development Phase I	2	2017	1	2018
RVA II PDR (Oct 2017)	1	2018	1	2018
RVA II Engineering and Manufacturing Development Phase II	2	2018	1	2019
RVA II CDR (Jun 2018)	3	2018	3	2018
RVA II Milestone C (Dec 2018)	1	2019	1	2019
RVA II Production and Deployment Phase	1	2019	3	2022
RVA II IOC (Jun 2020)	3	2020	3	2020
RVA II FOC (May 2022)	3	2022	3	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
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 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
672984: MM III Baseline Support	0.000	74.058	59.812	37.371	0.000	37.371	14.816	8.954	12.940	13.176	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 Arm Disarm Switch Replacement (ADSR), 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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: LGM-30G Arm Disarm Switch Replacement (ADSR)	-	0.272	1.142	-	1.142
<p>Description: The ADSR program 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.</p> <p>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 by approximately FY24 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 replacement A/D switch that meets requirements and production quantities through 2036.</p> <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> • Develop acquisition documentation <p>FY 2019 Base Plans:</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force				Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<ul style="list-style-type: none">• Complete Milestone B• Award EMD contract• Initiate design development <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding increased due to EMD contract award</p>						
<p>Title: LGM-30G Flight Test Telemetry and Termination System (FT3)</p> <p>Description: The FT3 Program replaces the Mod 7 Instrumentation Wafer (Mod 7) and associated Signal Conditioner Monitor Group, and All Ordnance Destruct System (AODS) with a flight test kit. In addition, a replacement of the current Launch Support System (LSS) is required to deploy the flight test kit. The flight test kit which consists of the Flight Destruct System (FDS) and a wafer-less Integrated Instrumentation System (IIS), along with an upgraded LSS, will meet 30th Space Wing Range Safety and Air Force Global Strike Command requirements and resolve obsolescence concerns.</p> <p>The AODS, Mod 7 Instrumentation Wafer, and current LSS include many components that are not economically available, are no longer compliant with applicable Range Safety requirements, or are in need of technical modernization. Replacement of the Vandenberg Air Force Base flight test unique equipment is necessary to sustain future Operational Test Launches (OTL).</p> <p>The OTLs are critical to validating the continued accuracy and reliability of the MM III ICBM Weapon System and providing valuable data to ensure a safe, secure, and effective nuclear deterrent. The FT3 System of Systems (SoS) will perform the same function as the existing systems with upgraded design features in order to comply with Air Force Space Command Manual (AFSPCMAN) 91 710, Range Safety User Requirements, Range Commanders Council 319, Flight Termination Systems Commonality Standard, and RCC-324, Global Positioning and Inertial Measurements Range Safety Tracking Systems' Commonality Standard.</p> <p>FY 2018 Plans:</p> <ul style="list-style-type: none">• Conduct SoS Critical Design Review• Build qualification hardware and conduct qualification testing• Conduct component level Test Readiness Reviews• Procure long lead items <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none">• Prepare for SoS Test Readiness Reviews		60.958	39.868	33.229	-	33.229

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force				Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<ul style="list-style-type: none">• Conduct SoS qualification testing• Prepare for SoS Production Readiness Review <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to EMD activities nearing completion</p>						
<p>Title: LGM-30G Baseline Support</p> <p>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.</p> <p>FY 2018 Plans:</p> <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. <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none">• Conduct studies of system performance.• Conduct cost trades and acquisition planning activities, up to and including proposal preparation, for future capabilities. <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to paying contract closeout costs in FY18</p>		0.100	5.000	2.000	-	2.000
<p>Title: LGM-30G Ground Test Upgrade (GTU)</p> <p>Description: GTU will address parts obsolescence and an A4 drawer interface change through a design that replaces the Guided Missile Launcher Electronic Circuit (GMLEC) test sets. GTU supports Operational Force Development Evaluation testing by enabling operational checkout and test of LFs up to the point of a launch.</p> <p>FY 2018 Plans:</p> <ul style="list-style-type: none">• Build requirement package for GMLEC• Conduct Cost analysis on GMLEC requirements <p>FY 2019 Base Plans:</p>		2.000	4.354	0.500	-	0.500

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force									Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
• Prepare program documentation											
FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to de-scoping GTU program to just GMLEC.											
Title: LGM-30G Squadron Data Simulator (SDS)							11.000	10.318	0.500	-	0.500
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 2018 Plans: • Complete Critical Design Review • Program placed on strategic pause											
FY 2019 Base Plans: • Conducting studies regarding program affordability and acquisition strategy											
FY 2018 to FY 2019 Increase/Decrease Statement: • Funding decreased due to program pause post Critical Design Review											
Accomplishments/Planned Programs Subtotals							74.058	59.812	37.371	-	37.371
C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• MPAF 03 M30MLG: Minuteman III Modifications BP21	0.000	0.000	0.000	0.000	0.000	0.000	6.190	8.361	10.460	Continuing	Continuing
• MPAF 01 00099L: Missile Replacement Eq-Ballistic BP22	0.000	5.205	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• MPAF 04 000999: Replen Spares/Repair Parts BP25/26	0.805	0.224	0.000	0.000	0.000	13.544	13.815	14.163	0.000	Continuing	Continuing
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
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>	

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.

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: PB 2019 Air Force												Date: February 2018			
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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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/TBD	TBD : TBD	-	-		-		0.842	Jul 2019	-		0.842	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) TMRR/EMD	C/CPIF	Boeing : Clearfield, UT	-	53.981	Nov 2016	36.055	Sep 2018	26.639	Nov 2018	-		26.639	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) MOTP	C/CPIF	Northrop Grumman : Clearfield, UT	-	2.000	Aug 2017	-		3.319	Aug 2019	-		3.319	Continuing	Continuing	-
LGM-30G Ground Test Upgrade (GTU) TMRR/EMD	C/CPAF	Northrop Grumman : Clearfield, UT	-	1.000	Nov 2016	2.999	Dec 2017	-		-		-	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) TMRR/EMD	C/CPFF	Lockheed Martin : Bethesda, MD	-	8.886	Feb 2017	7.214	Sep 2018	-		-		-	Continuing	Continuing	-
Subtotal			-	65.867		46.268		30.800		-		30.800	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	BAE Systems : Clearfield, UT	-	1.444	Oct 2016	0.600	Oct 2017	1.021	Oct 2018	-		1.021	Continuing	Continuing	-
LGM-30G Baseline Support	C/Various	BAE Systems : Clearfield, UT	-	0.100	Mar 2017	5.000	Mar 2018	2.000	Mar 2019	-		2.000	Continuing	Continuing	-
Subtotal			-	1.544		5.600		3.021		-		3.021	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force												Date: February 2018			
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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) NSCCA-PATE	C/Various	Northrop Grumman : Clearfield, UT	-	0.500	Jul 2017	0.347	Sep 2018	0.410	Sep 2019	-		0.410	Continuing	Continuing	-
LGM-30G Ground Test Upgrade (GTU) NSCCA-PATE	C/CPIF	Northrop Grumman : Clearfield, UT	-	-		0.225	May 2018	-		-		-	Continuing	Continuing	-
Subtotal			-	0.500		0.572		0.410		-		0.410	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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/FPIF	Various : Clearfield, UT	-	-		0.272	May 2018	0.300	May 2019	-		0.300	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) PMA	Various	Various : Various	-	2.002	Oct 2017	2.866	Oct 2018	1.840	Oct 2019	-		1.840	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) Cyber Security	C/FFP	BAE Systems : Clearfield, UT	0.000	1.031	Mar 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Ground Test Upgrade (GTU) PMA	Various	Various : Various	-	1.000	Jun 2017	1.130	Mar 2018	0.500	Mar 2019	-		0.500	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) PMA	Various	Various : Various	-	2.114	Sep 2017	3.104	Mar 2018	0.500	Mar 2019	-		0.500	Continuing	Continuing	-
Subtotal			0.000	6.147		7.372		3.140		-		3.140	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	74.058		59.812		37.371		-		37.371	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force							Date: February 2018			
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Remarks										

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force

Date: February 2018

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672984 / MM III Baseline Support

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
MM III Baseline Support																												
ADSR Milestone B (Oct 2018)																												
ADSR Engineering and Manufacturing Development Phase																												
ADSR PDR (Jul 2020)																												
ADSR CDR (Jan 2021)																												
ADSR Milestone C (Jul 2022)																												
ADSR Production and Deployment Phase																												
GTU Program Rescope Activities																												
FT3 Technology Maturation and RiskReduction Phase																												
FT3 Milestone B (Apr 2017)																												
FT3 Engineering and ManufacturingDevelopment Phase																												
FT3 CDR (May 2018)																												
FT3 Milestone C (Jan 2020)																												
FT3 Production and Deployment Phase																												
FT3 RAA (Apr 2020)																												
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 (Dec 2017)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force

Date: February 2018

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672984 / MM III Baseline Support

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MM III Baseline Support				
ADSR Milestone B (Oct 2018)	1	2019	1	2019
ADSR Engineering and Manufacturing Development Phase	1	2019	3	2022
ADSR PDR (Jul 2020)	4	2020	4	2020
ADSR CDR (Jan 2021)	2	2021	2	2021
ADSR Milestone C (Jul 2022)	4	2022	4	2022
ADSR Production and Deployment Phase	4	2022	4	2023
GTU Program Rescope Activities	1	2017	4	2019
FT3 Technology Maturation and RiskReduction Phase	1	2017	3	2017
FT3 Milestone B (Apr 2017)	3	2017	3	2017
FT3 Engineering and ManufacturingDevelopment Phase	3	2017	3	2021
FT3 CDR (May 2018)	3	2018	3	2018
FT3 Milestone C (Jan 2020)	2	2020	2	2020
FT3 Production and Deployment Phase	2	2020	3	2022
FT3 RAA (Apr 2020)	3	2020	3	2020
SDS Technology Maturation and Risk Reduction Phase	1	2017	2	2017
SDS Preliminary Design Review (Oct 2016)	1	2017	1	2017
SDS Milestone B (Mar 2017)	2	2017	2	2017
SDS Engineering and Manufacturing Development Phase	2	2017	3	2021
SDS Critical Design Review (Dec 2017)	1	2018	1	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
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 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
672985: MM Support Equip	0.000	18.658	31.649	12.863	0.000	12.863	11.995	6.086	6.211	6.325	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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: LGM-30G G6B4 Build Equipment Replacement (G6B4 BER)	0.404	6.353	2.530	0.000	2.530
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 2018 Plans: <ul style="list-style-type: none"> • Purchase commercial off-the-shelf items • Continue drawing updates for the integration of the commercial off-the-shelf items • Conduct Preliminary Design Review 					
FY 2019 Base Plans: <ul style="list-style-type: none"> • Complete Milestone B • Begin Engineering and Manufacturing Development (EMD) Phase • Prepare and conduct Critical Design Review • Prepare and conduct Test Readiness Review 					
FY 2019 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018			
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
NA						
FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to development hardware purchases in FY18 not reoccurring in FY19.						
Title: LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) 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 2018 Plans: • Initiate Engineering and Manufacturing Development contract award • Conduct Preliminary Design Review FY 2019 Base Plans: • Prepare for Test Readiness Review • Prepare and conduct Critical Design Review FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to ramp down of EMD working towards Milestone C.		0.556	5.974	2.800	-	2.800
Title: LGM-30G Transporter Erector Replacement Program (TERP) 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 2018 Plans: • Conduct developmental and qualification testing FY 2019 Base Plans: • Conduct root cause analysis		4.942	0.000	1.503	-	1.503

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018			
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
• Conduct delta qualification testing						
FY 2018 to FY 2019 Increase/Decrease Statement: Funding increased to support delta qualification testing.						
Title: LGM-30G Payload Transporter Replacement (PTR)		7.557	4.000	0.415	-	0.415
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.						
FY 2018 Plans: • Conduct Milestone C • Initiate Production and Deployment Phase						
FY 2019 Base Plans: Conduct Delta Qualification testing on first article						
FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due ramp down of EMD and award of production contract.						
Title: LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU)		2.186	7.704	0.000	-	0.000
Description: The current Communications Equipment Interface Unit (CEIU) is used to transmit MM III Inertial Measurement Unit (IMU) Performance Data (IPD) from MM III LCC to the Performance Assessment Data System (PADS) at the support base via telephone lines. The CEIU is unclassified equipment but interfaces with both classified and non-classified systems. The update will utilize more secure and reliable internet protocol transmission methods. The update effort consists of rewriting the CEIU imbedded software language using secure coding practices and changes the CEIU design from telephony to internet protocol. In addition, the PADS interfacing system is to be updated to interface with the updated CEIU design.						
FY 2018 Plans: • Conduct Critical Design Review • Complete Milestone C • Begin Production and Deployment Phase						
FY 2019 Base Plans:						

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force				Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A						
FY 2018 to FY 2019 Increase/Decrease Statement: Funding decreased due to completion of EMD and award of production contract						
Title: LGM-30G Alignment Set Test Set (ASTS) 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. FY 2018 Plans: • Development Completed FY 2019 Base Plans: N/A FY 2018 to FY 2019 Increase/Decrease Statement: N/A		2.362	0.000	0.000	-	0.000
Title: LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) 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 Fluid Fill stations and one Slip Ring/Module Test station. FY 2018 Plans: • Purchase commercial off-the-shelf items • Continue drawing updates for the integration of the commercial off-the-shelf items • Conduct Preliminary Design Review • Prepare and Conduct System Requirement Review and System Functional Review FY 2019 Base Plans: • Complete Milestone B • Begin Engineering and Manufacturing Development (EMD) Phase • Prepare and conduct Critical Design Review		0.651	7.618	5.615	-	5.615

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018	
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total			
• Prepare and conduct Test Readiness Review											
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Funding decreased due to development hardware purchases in FY18 not reoccurring in FY19.											
Accomplishments/Planned Programs Subtotals				18.658	31.649	12.863	0.000	12.863			
C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• MPAF 03 Line Item M30MLG: <i>MM III Modifications BP21</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• MPAF 01 Line Item 00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	40.484	76.011	27.680	-	27.680	67.770	9.645	1.700	1.785	Continuing	Continuing
• MPAF 04 Line Item 000999: <i>Replen Spares/ Repair Parts BP25/26</i>	3.413	0.326	0.000	-	0.000	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: PB 2019 Air Force												Date: February 2018			
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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 G6B4 Build Equipment Replacement (G6B4 BER)	SS/FPIF	Boeing : Layton, UT	-	0.404	Aug 2017	5.956	May 2018	2.000	May 2019	-		2.000	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) EMD	PO	309th SMXG : Hill AFB, UT	-	-		4.948	Dec 2017	2.500	Dec 2018	-		2.500	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) EMD	SS/FPIF	Boeing : Layton, UT	-	0.651	Aug 2017	7.283	May 2018	5.092	May 2019	-		5.092	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) EMD	C/FPIF	DRS Environmental Systems : Cincinnati, OH	-	3.981	May 2017	-		0.896	Dec 2018	-		0.896	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	6.421	May 2017	4.000	Oct 2017	-		-		-	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) Software Development	SS/CPIF	Boeing : Layton, UT	-	1.879	Jul 2017	7.284	Apr 2018	-		-		-	Continuing	Continuing	-
LGM-30G Alignment Set Test Set (ASTS) Engineering Development	SS/CPAF	Boeing : Heath, OH	-	2.362	Jan 2017	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	15.698		29.471		10.488		-		10.488	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	MIPR	586 FLTS : WSMR, NM	0.000	-		-		0.300	Oct 2018	-		0.300	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force												Date: February 2018			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672985 / MM Support Equip					
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
(PTR) Delta Qualification Testing															
LGM-30G Transporter Erector Replacement Program (TERP) Delta Qualification Testing	MIPR	586 FLTS : WSMR, NM	0.000	-		-		0.300	May 2019	-		0.300	Continuing	Continuing	-
Subtotal			0.000	-		-		0.600		-		0.600	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 G6B4 Build Equipment Replacement (G6B4 BER)	Various	Various : Various	-	-		0.397	May 2018	0.530	May 2019	-		0.530	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) PMA	Various	Various : Various	0.000	0.556	Aug 2017	1.026	Jan 2018	0.300	Jan 2019	-		0.300	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) PMA	Various	Various : Various	-	0.961	Feb 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) PMA	Various	Various : Various	-	-		0.335	May 2018	0.523	May 2019	-		0.523	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) PMA	Various	Various : Various	-	0.307	Jul 2017	0.420	Apr 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) PMA	Various	Various : Various	-	1.136	Jul 2017	-		0.115	Oct 2018	-		0.115	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force												Date: February 2018			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672985 / MM Support Equip					
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Transporter Erector Replacement Program (TERP) A&AS Support	C/FFP	BAE Systems : Clearfield, UT	-	-		-		0.307	Oct 2018	-		0.307	Continuing	Continuing	-
Subtotal			0.000	2.960		2.178		1.775		-		1.775	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	18.658		31.649		12.863		-		12.863	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force

Date: February 2018

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672985 / MM Support Equip

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
MM Support Equipment																												
G6B4 BER TMRR Phase																												
G6B4 BER Milestone B (Nov 2018)																												
G6B4 BER Engineering and Manufacturing Development Phase																												
G6B4 BER PDR (Jul 2018)																												
G6B4 BER CDR (Mar 2019)																												
G6B4 BER Milestone C (Dec 2019)																												
G6B4 BER Production and DeploymentPhase																												
G6B4 BER RAA (Oct 2020)																												
CMPT Milestone B (Oct 2017)																												
CMPT Engineering and Manufacturing Development Phase																												
CMPT PDR (Mar 2018)																												
CMPT CDR (Dec 2018)																												
CMPT Milestone C (Mar 2020)																												
CMPT Production and Deployment Phase																												
CMPT RAA (Sep 2020)																												
PTR Engineering and Manufacturing Development Phase																												
PTR Milestone C (Jan 2018)																												
PTR Production and Deployment Phase																												
PTR RAA (Jan 2023)																												
TERP Engineering and Manufacturing Development Phase																												
TERP Milestone C (Apr 2018)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force																	Date: February 2018											
Appropriation/Budget Activity 3600 / 7										R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons								Project (Number/Name) 672985 / MM Support Equip										
	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 Production and Deployment Phase																												
TERP RAA (Dec 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 (Nov 2017)																												
PADS CEIU Milestone C (Sep 2018)																												
PADS CEIU Production and Deployment Phase																												
PADS CEIU RAA (Oct 2019)																												
PIGA BER TMRR Phase																												
PIGA BER Milestone B (Nov 2018)																												
PIGA BER Engineering and Manufacturing Development Phase																												
PIGA BER PDR (Jul 2018)																												
PIGA BER CDR (Mar2019)																												
PIGA BER Milestone C (Dec 2019)																												
PIGA BER Production and Deployment Phase																												
PIGA BER RAA (Oct 2020)																												
ASTS Engineering and Manufacturing Development Phase																												
ASTS Production and Deployment Phase																												
ASTS FCA/PCA (Aug 2017)																												
ASTS TRR (Feb 2017)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force																				Date: February 2018																	
Appropriation/Budget Activity 3600 / 7										R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons								Project (Number/Name) 672985 / MM Support Equip																			
										FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
										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 RAA (Sep 2017)										<div></div>																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force			Date: February 2018
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 by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM Support Equipment</i>				
G6B4 BER TMRR Phase	4	2017	1	2019
G6B4 BER Milestone B (Nov 2018)	1	2019	1	2019
G6B4 BER Engineering and Manufacturing Development Phase	1	2019	3	2020
G6B4 BER PDR (Jul 2018)	3	2018	3	2018
G6B4 BER CDR (Mar 2019)	2	2019	2	2019
G6B4 BER Milestone C (Dec 2019)	1	2020	1	2020
G6B4 BER Production and DeploymentPhase	1	2020	1	2021
G6B4 BER RAA (Oct 2020)	1	2021	1	2021
CMPT Milestone B (Oct 2017)	1	2018	1	2018
CMPT Engineering and Manufacturing Development Phase	1	2018	2	2020
CMPT PDR (Mar 2018)	2	2018	2	2018
CMPT CDR (Dec 2018)	1	2019	1	2019
CMPT Milestone C (Mar 2020)	2	2020	2	2020
CMPT Production and Deployment Phase	2	2020	4	2020
CMPT RAA (Sep 2020)	4	2020	4	2020
PTR Engineering and Manufacturing Development Phase	1	2017	1	2019
PTR Milestone C (Jan 2018)	2	2018	2	2018
PTR Production and Deployment Phase	2	2018	2	2023
PTR RAA (Jan 2023)	2	2023	2	2023
TERP Engineering and Manufacturing Development Phase	1	2017	3	2018
TERP Milestone C (Apr 2018)	3	2018	3	2018
TERP Production and Deployment Phase	3	2018	1	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force	Date: February 2018
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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>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
TERP RAA (Dec 2020)	1	2021	1	2021
PADS CEIU Technology Maturation and Risk Reduction (TMRR) Phase	1	2017	4	2017
PADS CEIU Milestone B (Aug 2017)	4	2017	4	2017
PADS CEIU Engineering and Manufacturing Development Phase	4	2017	4	2018
PADS CEIU PDR (Jan 2017)	2	2017	2	2017
PADS CEIU CDR (Nov 2017)	1	2018	1	2018
PADS CEIU Milestone C (Sep 2018)	4	2018	4	2018
PADS CEIU Production and Deployment Phase	4	2018	1	2020
PADS CEIU RAA (Oct 2019)	1	2020	1	2020
PIGA BER TMRR Phase	4	2017	1	2019
PIGA BER Milestone B (Nov 2018)	1	2019	1	2019
PIGA BER Engineering and Manufacturing Development Phase	1	2019	3	2020
PIGA BER PDR (Jul 2018)	4	2018	4	2018
PIGA BER CDR (Mar2019)	2	2019	2	2019
PIGA BER Milestone C (Dec 2019)	1	2020	1	2020
PIGA BER Production and Deployment Phase	1	2020	1	2021
PIGA BER RAA (Oct 2020)	1	2021	1	2021
ASTS Engineering and Manufacturing Development Phase	1	2017	4	2017
ASTS Production and Deployment Phase	3	2017	4	2017
ASTS FCA/PCA (Aug 2017)	4	2017	4	2017
ASTS TRR (Feb 2017)	2	2017	2	2017
ASTS RAA (Sep 2017)	4	2017	4	2017

Note

Due to IDECS software constraints, R-4 events can only span years 2017 - 2023. The following events have occurred:

PTR EMD Phase : 1QFY2016-3QFY2018

TERP EMD Phase : 1QFY2016-2QFY2018

PADS CEIU TMRR Phase : 4QFY2016-4QFY2017

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672985 / MM Support Equip
ASTS EMD Phase : 4QFY2018-1QFY2018		

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force										Date: February 2018		
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 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
672986: MM Crypto Mods	0.000	27.286	0.000	14.540	0.000	14.540	2.084	0.496	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MM Crypto Mods executes USSTRATCOM, Air Force Global Strike Command, and Air Force 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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: LGM-30G ICBM Cryptography Upgrade II (ICU II)	27.286	0.000	14.540	-	14.540
Description: ICU II completes design and development, implements KS-60 remote key/code change, irreversible transformation capabilities, and prevents continuous signal lockout.					
FY 2018 Plans:					
• Conduct user training					
• Prepare and conduct successful Test Readiness Review					
• Complete Milestone C					
FY 2019 Base Plans:					
• Develop Support Equipment					
FY 2018 to FY 2019 Increase/Decrease Statement:					
• Funding increased to support continuing EMD activities.					
Accomplishments/Planned Programs Subtotals	27.286	0.000	14.540	-	14.540

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

Line Item	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
• MPAF 03 Line Item M30MLG: MM III Modifications BP21	31.639	29.559	63.880	-	63.880	29.280	14.304	50.494	0.000	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
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 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 04 Line Item 000999: <i>Replen Spares/ Repair Parts BP25/26</i>	2.367	1.231	4.190	-	4.190	0.150	0.000	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 Safety Cross Check Analysis/Performance Analysis and Technical Evaluation (NSCCA/PATE) Independent Validation & Verification (IV&V). This contract is driven by critical nuclear safety requirements to perform an independent assessment of all modifications to nuclear-certified software. The FY16 Pre-Production contract will be awarded on the Ground Subsystems Support Contract (GSSC). Nuclear Safety 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: PB 2019 Air Force												Date: February 2018			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672986 / MM Crypto Mods					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 ICBM Cryptography Upgrade II EMD	C/CPIF	Northrop Grumman : Clearfield, UT	-	23.063	Mar 2017	-		6.801	Oct 2018	-		6.801	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II EMD Extension	C/CPAF	Northrop Grumman : Clearfield, UT	-	0.103	Mar 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Support Equipment	C/CPFF	Northrop Grumman : Clearfield, UT	-	0.021	Apr 2017	-		2.673	Oct 2018	-		2.673	Continuing	Continuing	-
Subtotal			-	23.187		-		9.474		-		9.474	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 ICBM Cryptography Upgrade II Nuclear Safety Support (NSCCA)	C/CPIF	Northrop Grumman : Clearfield, UT	-	0.986	Mar 2017	-		1.818	Oct 2018	-		1.818	Continuing	Continuing	-
Subtotal			-	0.986		-		1.818		-		1.818	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 ICBM Cryptography Upgrade II PMA	Various	Various : Various	-	2.168	Mar 2017	-		3.248	Dec 2018	-		3.248	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II A&AS	C/FFP	BAE Systems : Clearfield, UT	-	0.945	Mar 2017	-		-		-		-	Continuing	Continuing	-
Subtotal			-	3.113		-		3.248		-		3.248	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force										Date: February 2018			
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>			
	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	27.286		0.000		14.540		-		14.540	Continuing	Continuing	N/A
Remarks													

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force																Date: February 2018			
Appropriation/Budget Activity								R-1 Program Element (Number/Name)								Project (Number/Name)			
3600 / 7								PE 0101213F / Minuteman Squadrons								672986 / MM Crypto Mods			

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
MM Crypto Mods																												
ICU II Engineering and Manufacturing Development Phase																												
ICU II Milestone C (Aug 2018)																												
ICU II Production and Deployment Phase																												
ICU II RAA (May 2023)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force			Date: February 2018
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>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM Crypto Mods</i>				
ICU II Engineering and Manufacturing Development Phase	1	2017	3	2020
ICU II Milestone C (Aug 2018)	4	2018	4	2018
ICU II Production and Deployment Phase	4	2018	3	2023
ICU II RAA (May 2023)	3	2023	3	2023