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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force	Date: February 2019
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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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	204.208	154.733	128.961	0.000	128.961	133.978	115.728	117.926	0.000	Continuing	Continuing
672983: <i>MM Ground and Comm Equipment</i>	0.000	115.626	90.459	93.993	0.000	93.993	118.442	99.037	98.425	0.000	Continuing	Continuing
672984: <i>MM III Baseline Support</i>	0.000	57.929	36.871	14.816	0.000	14.816	11.084	12.940	13.176	0.000	Continuing	Continuing
672985: <i>MM Support Equip</i>	0.000	30.653	12.863	6.859	0.000	6.859	0.000	0.000	3.201	0.000	Continuing	Continuing
672986: <i>MM Crypto Mods</i>	0.000	0.000	14.540	13.293	0.000	13.293	4.452	3.750	3.124	0.000	0.000	39.159
672987: <i>MM Ops Equip*</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	Continuing	Continuing

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2020

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) and LGM-30G Flight Test Telemetry and Termination System (FT3). 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 G6B4 Build Equipment Replacement (G6B4 BER), LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT), LGM-30G Transporter Erector Replacement Program (TERP), LGM-30G Payload Transporter Replacement (PTR), LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU), LGM-30G Simulated Electronic Launch Minuteman Replacement (SELM-R), and LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER).

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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).						
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.						
As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.						
This program is in Budget Activity 7, 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)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		210.845	156.047	128.961	0.000	128.961
Current President's Budget		204.208	154.733	128.961	0.000	128.961
Total Adjustments		-6.637	-1.314	0.000	0.000	0.000
• Congressional General Reductions		0.000	0.000			
• Congressional Directed Reductions		0.000	-1.314			
• 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		-6.637	0.000			
• Other Adjustments		0.000	0.000	0.000	0.000	0.000
Change Summary Explanation						
FY 2018 funding reflects a SBIR adjustment of \$6.637M.						
FY 2019 funding reflects a Congressional Directed Reduction of \$1.314M for the Fast Rising B-plug program being under reassessment and the Ground Test Unit program being descope.						
In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7M, not reflected here. The correct total for FY18 is \$197.208M.						

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
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>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
672983: <i>MM Ground and Comm Equipment</i>	0.000	115.626	90.459	93.993	0.000	93.993	118.442	99.037	98.425	0.000	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 2018	FY 2019	FY 2020
Title: LGM-30G Air Launch Control System Replacement (ALCS-R)	52.546	74.531	86.619
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 2019 Plans: <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 • Continue Development Test and Evaluation planning 			

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
<ul style="list-style-type: none"> • Begin Operational Test and Evaluation planning FY 2020 Plans: <ul style="list-style-type: none"> • Continue Prototype Evaluation • Complete Development Request for Proposal Decision Point • Begin EMD/P&D Source Selection • Further Risk Reduction for EMD • Continue Development Test and Evaluation planning • Continue Operational Test and Evaluation planning FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased as EMD risk reduction activities and prototyping ramps up in preparation for EMD contract award					
Title: LGM-30G Automatic Switching Unit (ASU) 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. FY 2019 Plans: <ul style="list-style-type: none"> • Complete integration testing, finalize design and validate installation • Conduct Functional Configuration Audit • Conduct Pre-Production Readiness Review • Complete Milestone C FY 2020 Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to production contract award in FY19 with no further FY20 requirement.			4.559	2.658	0.000
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.			1.204	0.000	4.656

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
This effort will include hardware and software solutions to a variety of safety and maintenance issues affecting the operational wings. FY 2019 Plans: <ul style="list-style-type: none">• Finalize acquisition strategy• Draft and coordinate Milestone B regulatory and statutory documents FY 2020 Plans: <ul style="list-style-type: none">• Release Request For Proposal• Perform Source Selection• Award Engineering & Manufacturing Development (EMD) contract• Complete system functional and requirements reviews• Award independent verification and validation EMD contract FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased due to EMD beginning in FY20.				
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 2019 Plans: <ul style="list-style-type: none">• Complete integration testing, finalize design and validate installation• Prepare and conduct Functional and Physical Configuration Audit• Prepare and conduct Production Readiness Review• Prepare and conduct Milestone C• Award production contract FY 2020 Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to production contract awarded in FY19 with no further FY20 requirement.		1.871	1.363	0.000
Title: Launch Control Center (LCC) Block Upgrade (LCCBU)		52.924	5.386	2.718

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019
<p>Description: The LCCBU program addresses several elements within the LCC experiencing supportability issues. Each component will be procured once development has been completed and installed at each LCC based on availability. It will consist of Journal Memory Loader (JML), Floppy Disk Drive (FDD), Weapon System Control Console (WSCC) Printer, Oxygen Regeneration Unit (ORU), and with possible changes as requirements dictate.</p> <p>All LCCBU efforts will support 45 operational LCCs, 12 trainers, 2 Integration Facilities, 2 Test Launch Facilities, and additional support and test equipment for maintenance locations.</p> <p>The original development strategy was to retrofit production articles into the trainers. To ensure functionality and operational realism, the Program developed the trainer items in conjunction with the operational items making them trainer unique.</p> <p>FY 2019 Plans:</p> <ul style="list-style-type: none"> • Complete Milestone C • Award production contract for FDD & ORU <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> • Complete WSCC printer and JML design activities • Award production contract for WSCC printer and JML. <p>FY 2019 to FY 2020 Increase/Decrease Statement: Production contract award in FY19 resulting in decrease in FY20 requirements.</p>			
<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 increase 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 2019 Plans:</p> <ul style="list-style-type: none"> • Complete functional configuration and physical configuration audits • Complete development testing • Complete Critical Design Review and EMD Phase • Complete Milestone C <p>FY 2020 Plans:</p>		2.522	6.521
			0.000

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B. Accomplishments/Planned Programs (\$ in Millions)										FY 2018	FY 2019	FY 2020
N/A												
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to development completion in FY19 with no further FY20 requirement.												
Accomplishments/Planned Programs Subtotals										115.626	90.459	93.993
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• MPAF 03 Line Item M30MLG: Minuteman III Modifications BP21	23.976	41.228	26.402	-	26.402	32.120	20.982	81.260	41.132	Continuing	Continuing	
• MPAF 01 Ballistic Missiles/ BSA 3...: Minuteman III Replacement Eq-Ballistic BP22	9.197	1.967	0.100	-	0.100	0.000	0.000	0.000	0.000	Continuing	Continuing	
• MPAF 04 Line Item 000999: Replen Spares/ Repair Parts BP25/26	0.355	0.000	0.000	-	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 2020 Air Force												Date: February 2019			
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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-R) TMRR Contractor A	C/FPIF	Lockheed Martin : Littleton, CO	0.000	21.043	Dec 2017	27.465	Oct 2018	24.212	Dec 2019	-		24.212	Continuing	Continuing	-
LGM-30G Airborne Launch Control System Replacement (ALCS-R) TMRR Contractor B	C/FPIF	Rockwell Collins : Cedar Rapids, IA	0.000	16.880	Dec 2017	20.720	Oct 2018	26.766	Dec 2019	-		26.766	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) SIL	MIPR	Aerospace : El Segundo, CA	0.000	0.300	May 2018	0.110	May 2019	0.100	May 2020	-		0.100	Continuing	Continuing	0.000
LGM-30G Automatic Switching Unit (ASU) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	4.231	Oct 2017	2.308	Dec 2018	-		-		-	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) EMD	C/TBD	TBD : TBD	0.000	-		-		5.018	Jan 2020	-		5.018	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit EMD	MIPR	Navy Crane : Crane, IN	0.000	1.521	Apr 2018	0.713	Apr 2019	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	51.011	Jul 2018	3.670	Oct 2018	1.000	Oct 2019	-		1.000	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD	C/CPFF	Sentry View Systems : Melbourne, FL	0.000	1.167	Jan 2018	4.165	Nov 2018	-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment Phase II (RVA II) EMD Other Development	Various	Various : Various	0.000	0.004	Apr 2018	0.850	Jan 2019	-		-		-	Continuing	Continuing	0.000
Subtotal			0.000	96.157		60.001		57.096		-		57.096	Continuing	Continuing	N/A

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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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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-R) MITRE	MIPR	MITRE : Bedford, MA	0.000	1.528	Mar 2018	2.769	Oct 2018	4.724	Oct 2019	-		4.724	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Aerospace	MIPR	Aerospace Corporation : El Segundo, CA	0.000	2.874	Jan 2018	3.895	Oct 2018	4.011	Oct 2019	-		4.011	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Navy Crane	MIPR	Naval Surface War Ctr : Crane, IN	0.000	1.800	Nov 2017	1.450	Feb 2019	2.285	Oct 2019	-		2.285	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) NSCCA/PATE IV&V	C/CPFF	Northrop Grumman : Herndon, VA	0.000	-		0.515	May 2019	2.080	Oct 2019	-		2.080	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) Design Support	Various	Various : Various	0.000	1.806	Oct 2017	4.156	Jan 2019	5.955	Oct 2019	-		5.955	Continuing	Continuing	0.000
LGM-30G Launch Control Center Break-In-Kit Test Support	Various	Various : Various	0.000	-		0.060	Sep 2019	-		-		-	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) Support	Various	Various : Various	0.000	-		0.494	Feb 2019	-		-		-	Continuing	Continuing	-
Subtotal			0.000	8.008		13.339		19.055		-		19.055	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	Various : Various	0.000	0.448	Jan 2018	1.042	Jan 2019	1.546	Dec 2019	-		1.546	Continuing	Continuing	0.000

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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Replacement (ALCS-R) Testing															
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) Testing	C/TBD	Various : TBD	0.000	-		-		0.078	Jun 2020	-		0.078	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit Test Repair	PO	Naval Surface Warfare Ctr : Crane, IN	0.000	0.008	Sep 2018	0.233	Apr 2019	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade Test & Evaluation	Various	Various : Various	0.000	1.017	Jul 2018	0.779	Oct 2018	-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment II (RVA II) Test & Evaluation	Various	Various : Various	0.000	0.087	Oct 2018	-		-		-		-	Continuing	Continuing	0.000
Subtotal			0.000	1.560		2.054		1.624		-		1.624	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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-R) Integration Support Contract	C/FP	BAE : Layton, UT	0.000	4.967	Jan 2018	7.158	Oct 2018	7.383	Oct 2019	-		7.383	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) A&AS	C/FPIF	Peerless Technologies : Fairborn, OH	0.000	-		1.446	Oct 2018	2.214	Oct 2019	-		2.214	Continuing	Continuing	0.000
LGM-30G Airborne Launch Control System Replacement (ALCS-R) PMA	Various	Various : Various	0.000	0.900	Oct 2017	3.805	Jan 2019	5.343	Oct 2019	-		5.343	Continuing	Continuing	0.000

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Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 (ASU) PMA	Various	Various : Various	0.000	0.044	Oct 2017	0.050	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Automatic Switching Unit (ASU) A&AS	C/FP	BAE : Layton, UT	0.000	0.284	Oct 2017	0.300	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Break-In-Kit PMA	Various	Various : Various	0.000	0.017	Jun 2018	0.043	Feb 2019	-		-		-	Continuing	Continuing	0.000
LGM-30G Launch Control Center Break-In-Kit A&AS	C/FP	BAE : Layton, UT	0.000	0.325	Mar 2018	0.314	Nov 2018	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade PMA	Various	Various : Various	0.000	0.030	Feb 2018	0.230	Jul 2019	-		-		-	Continuing	Continuing	-
LGM-30G Launch Control Center Block Upgrade A&AS	C/FP	BAE : Layton, UT	0.000	0.866	Jan 2018	0.707		-		-		-	Continuing	Continuing	-
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) A&AS	C/FP	BAE : Layton, UT	0.000	1.204	Feb 2018	-		0.807	Dec 2019	-		0.807	Continuing	Continuing	0.000
LGM-30G Fast Rising B-Plug Service Life Extension Program (FRBP SLEP) PMA	Various	Various : Various	0.000	-		-		0.471	Dec 2019	-		0.471	Continuing	Continuing	-
LGM-30G Remote Visual Assessment Phase II (RVA II) PMA	Various	Various : Various	0.000	0.347	Nov 2017	0.056		-		-		-	Continuing	Continuing	0.000
LGM-30G Remote Visual Assessment Phase II (RVA II) A&AS	C/FP	BAE : Layton, UT	0.000	0.917	Jan 2018	0.956		-		-		-	Continuing	Continuing	0.000
Subtotal			0.000	9.901		15.065		16.218		-		16.218	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	115.626		90.459		93.993		-		93.993	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force							Date: February 2019			
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Remarks In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.										

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force

Date: February 2019

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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Air Launched Control System Replacement (ALCS-R)																												
ALCS-R Technology Maturation and Risk Reduction Phase																												
ALCS-R PDR (Sep 2019)																												
ALCS-R Development RFP Release Decision Point (Oct 2019)																												
ALCS-R Milestone B (Nov 2020)																												
ALCS-R Engineering and Manufacturing Development Phase																												
ALCS-R CDR (May 2021)																												
ALCS-R Milestone C (Nov 2022)																												
ALCS-R Production and Deployment Phase																												
ALCS-R IOC																												
ASU Engineering and Manufacturing Development Phase																												
ASU CDR (Jul 2018)																												
ASU Milestone C (Mar 2019)																												
ASU Production and Deployment Phase																												
FRBP SLEP Milestone B (Jan 2020)																												
FRBP SLEP Engineering & Manufacturing Development Phase																												
FRBP SLEP Milestone C (Aug 2022)																												
FRBP SLEP Production & Deployment Phase																												
FRBP SLEP RAA																												
LCCB Engineering and Manufacturing Development Phase																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force																Date: February 2019			
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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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 CDR (Mar 2018)																												
LCCB Milestone C (Feb 2019)																												
LCCB Production and Deployment Phase																												
LCCB RAA (Aug 2019)																												
LCCBU Engineering and Manufacturing Development Phase																												
LCCBU CDR (Mar 2018)																												
LCCBU Milestone C (Jul 2019)																												
LCCBU Production and Deployment Phase																												
LCCBU RAA (Jan 2021)																												
RVA II Engineering and Manufacturing Development Phase I																												
RVA II PDR (Oct 2017)																												
RVA II Engineering and Manufacturing Development Phase II																												
RVA II CDR (Feb 2019)																												
RVA II Milestone C (Sep 2019)																												
RVA II Production and Deployment Phase																												
RVA II IOC (Dec 2020)																												
RVA II FOC (Dec 2023)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
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>Air Launched Control System Replacement (ALCS-R)</i>				
ALCS-R Technology Maturation and Risk Reduction Phase	1	2018	1	2021
ALCS-R PDR (Sep 2019)	4	2019	4	2019
ALCS-R Development RFP Release Decision Point (Oct 2019)	1	2020	1	2020
ALCS-R Milestone B (Nov 2020)	1	2021	1	2021
ALCS-R Engineering and Manufacturing Development Phase	1	2021	1	2023
ALCS-R CDR (May 2021)	3	2021	3	2021
ALCS-R Milestone C (Nov 2022)	1	2023	1	2023
ALCS-R Production and Deployment Phase	1	2023	4	2024
ALCS-R IOC	1	2024	1	2024
ASU Engineering and Manufacturing Development Phase	1	2018	2	2019
ASU CDR (Jul 2018)	4	2018	4	2018
ASU Milestone C (Mar 2019)	2	2019	2	2019
ASU Production and Deployment Phase	3	2019	4	2024
FRBP SLEP Milestone B (Jan 2020)	2	2020	3	2020
FRBP SLEP Engineering & Manufacturing Development Phase	3	2020	4	2022
FRBP SLEP Milestone C (Aug 2022)	4	2022	4	2022
FRBP SLEP Production & Deployment Phase	1	2023	4	2024
FRBP SLEP RAA	2	2024	2	2024
LCCB Engineering and Manufacturing Development Phase	1	2018	2	2019
LCCB CDR (Mar 2018)	2	2018	2	2018
LCCB Milestone C (Feb 2019)	2	2019	2	2019
LCCB Production and Deployment Phase	2	2019	4	2019

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019	
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
LCCB RAA (Aug 2019)	4	2019	4	2019
LCCBU Engineering and Manufacturing Development Phase	1	2018	1	2020
LCCBU CDR (Mar 2018)	2	2018	2	2018
LCCBU Milestone C (Jul 2019)	4	2019	4	2019
LCCBU Production and Deployment Phase	4	2019	1	2021
LCCBU RAA (Jan 2021)	2	2021	2	2021
RVA II Engineering and Manufacturing Development Phase I	1	2018	1	2018
RVA II PDR (Oct 2017)	1	2018	1	2018
RVA II Engineering and Manufacturing Development Phase II	2	2018	4	2019
RVA II CDR (Feb 2019)	2	2019	2	2019
RVA II Milestone C (Sep 2019)	4	2019	4	2019
RVA II Production and Deployment Phase	2	2020	1	2024
RVA II IOC (Dec 2020)	1	2021	1	2021
RVA II FOC (Dec 2023)	1	2024	1	2024

Note

ASU Engineering and Manufacturing Development Phase started 3QFY17.
 LCCB Engineering and Manufacturing Development Phase started 2QFY17.
 LCCBU Engineering and Manufacturing Development Phase started 3QFY17.
 RVA II Engineering and Manufacturing Development Phase I started 2QFY17.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
672984: MM III Baseline Support	0.000	57.929	36.871	14.816	0.000	14.816	11.084	12.940	13.176	0.000	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 Ground Based Strategic Deterrent (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 2018	FY 2019	FY 2020
Title: LGM-30G Arm Disarm Switch Replacement (ADSR)	0.146	0.948	2.820
<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 2019 Plans:</p> <ul style="list-style-type: none"> • Complete Milestone B • Award EMD contract • Initiate design development <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> • Conduct System Requirement Review/System Functional Review 			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019			
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 2018	FY 2019	FY 2020
<ul style="list-style-type: none">• Complete Integrated Baseline Review• Complete Preliminary Design Review• Complete Critical Design Review <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p> <ul style="list-style-type: none">• Funding increase due to ramp-up of design activities in FY20.						
<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 (AFGSC) 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 AFGSC Operational Test Launches (OTL) starting in FY22 based on current USSTRATCOM requirements.</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 2019 Plans:</p> <ul style="list-style-type: none">• Conduct System of Systems Critical Design Reviews• Prepare for and conduct component level qualification testing <p>FY 2020 Plans:</p> <ul style="list-style-type: none">• Continue component level qualification testing <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p> <p>Funding decreases in FY20 due to higher Air Force priorities.</p>				50.260	33.923	9.996
<p>Title: LGM-30G Baseline Support</p>				5.000	2.000	2.000

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019		
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 2018	FY 2019	FY 2020
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 2019 Plans: <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. FY 2020 Plans: <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. FY 2019 to FY 2020 Increase/Decrease Statement: N/A					
Title: LGM-30G Ground Test Upgrade (GTU) 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. FY 2019 Plans: <ul style="list-style-type: none">• Program was cancelled in FY18 FY 2020 Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: N/A			0.125	0.000	0.000
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 2019 Plans: <ul style="list-style-type: none">• Program was cancelled in FY18 FY 2020 Plans:			2.398	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
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 2018	FY 2019	FY 2020
N/A												
FY 2019 to FY 2020 Increase/Decrease Statement: N/A												
Accomplishments/Planned Programs Subtotals										57.929	36.871	14.816
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• MPAF 03 M30MLG: <i>Minuteman III Modifications BP21</i>	0.000	0.000	0.000	-	0.000	0.000	14.551	10.460	0.000	Continuing	Continuing	
• MPAF 01 00099L: <i>Missile Replacement Eq-Ballistic BP22</i>	5.200	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing	
• MPAF 04 000999: <i>Replen Spares/Repair Parts BP25/26</i>	2.752	0.000	20.333	-	20.333	13.815	14.163	0.000	0.000	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.												
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 2020 Air Force												Date: February 2019			
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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/CPFF	TBD : TBD	0.000	-		0.848	Aug 2019	1.964	Aug 2020	-		1.964	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) TMRR/EMD	C/CPIF	Boeing : Clearfield, UT	0.000	39.805	Sep 2018	27.333	Nov 2018	8.013	Nov 2019	-		8.013	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) MOTP	C/CPIF	Northrop Grumman : Clearfield, UT	0.000	3.798	Jan 2018	3.319	Aug 2019	0.998	Aug 2020	-		0.998	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) TMRR/EMD	C/CPFF	Lockheed Martin : Bethesda, MD	0.000	2.263	Sep 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	45.866		31.500		10.975		-		10.975	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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) Support	TBD	TBD : TBD	0.000	-		-		0.290	Mar 2020	-		0.290	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) Support	C/Various	BAE : Clearfield, UT	0.000	1.243	Oct 2017	1.021	Oct 2018	0.306	Oct 2019	-		0.306	Continuing	Continuing	-
LGM-30G Baseline Support	C/Various	Various : TBD	0.000	5.000	Mar 2018	2.000	Mar 2019	2.000	Mar 2020	-		2.000	Continuing	Continuing	-
Subtotal			0.000	6.243		3.021		2.596		-		2.596	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	0.275	Jun 2018	0.410	Jun 2019	0.060	Jun 2020	-		0.060	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) Lead Developmental Test Organization	MIPR	AEDC/TST : AAFB, TN	0.000	0.408	Dec 2017	-		0.066	Dec 2019	-		0.066	Continuing	Continuing	-
Subtotal			0.000	0.683		0.410		0.126		-		0.126	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Peerless Tech Corp : Fairborn, OH	0.000	0.131	May 2018	0.100	Oct 2018	0.429	Oct 2019	-		0.429	Continuing	Continuing	-
LGM-30G Arm Disarm Switch Replacement (ADSR) PMA	Various	Various : Various	0.000	0.015	Feb 2019	-		0.137	Nov 2019	-		0.137	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) PMA	Various	Various : Various	0.000	3.000	Oct 2017	1.840	Oct 2018	0.553	Oct 2019	-		0.553	Continuing	Continuing	-
LGM-30G Flight Test Telemetry and Termination System (FT3) A&AS	C/FFP	BAE : Clearfield, UT	0.000	1.731	Oct 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Ground Test Upgrade (GTU) A&AS	C/FFP	BAE : Clearfield, UT	0.000	0.125	Oct 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Squadron Data Simulator (SDS) A&AS	C/FFP	BAE : Clearfield, UT	0.000	0.135	Nov 2017	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	5.137		1.940		1.119		-		1.119	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force											Date: February 2019				
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	57.929		36.871		14.816		-		14.816	Continuing	Continuing	N/A

Remarks
 In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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 (Jun 2019)																												
ADSR Engineering and Manufacturing Development Phase																												
ADSR PDR (Jan 2020)																												
ADSR CDR (Apr 2020)																												
ADSR Milestone C (Sep 2021)																												
ADSR Production and Deployment Phase																												
FT3 Engineering and Manufacturing Development Phase																												
FT3 CDR (Dec 2018)																												
FT3 PRR (Nov 2021)																												
FT3 Milestone C (Dec 2021)																												
FT3 Production and Deployment Phase																												
FT3 RAA (Feb 2022)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
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 by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MM III Baseline Support</i>				
ADSR Milestone B (Jun 2019)	3	2019	3	2019
ADSR Engineering and Manufacturing Development Phase	3	2019	1	2022
ADSR PDR (Jan 2020)	2	2020	2	2020
ADSR CDR (Apr 2020)	3	2020	3	2020
ADSR Milestone C (Sep 2021)	4	2021	4	2021
ADSR Production and Deployment Phase	1	2022	4	2023
FT3 Engineering and Manufacturing Development Phase	1	2018	2	2023
FT3 CDR (Dec 2018)	1	2019	1	2019
FT3 PRR (Nov 2021)	1	2021	1	2021
FT3 Milestone C (Dec 2021)	1	2022	1	2022
FT3 Production and Deployment Phase	1	2022	2	2024
FT3 RAA (Feb 2022)	2	2022	2	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
672985: MM Support Equip	0.000	30.653	12.863	6.859	0.000	6.859	0.000	0.000	3.201	0.000	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 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), LGM-30G Simulated Electronic Launch Minuteman Replacement (SELM-R), and LGM-30G Transporter Erector Replacement Program (TERP).

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

	FY 2018	FY 2019	FY 2020
Title: LGM-30G G6B4 Build Equipment Replacement (G6B4 BER)	1.007	1.515	0.954
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. 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 2019 Plans: <ul style="list-style-type: none"> • Prepare and conduct MS B • Begin Engineering and Manufacturing Development (EMD) Phase • Prepare and conduct Critical Design Review #1 • Prepare and conduct Test Readiness Review #1 			
FY 2020 Plans: <ul style="list-style-type: none"> • Prepare and conduct Critical Design Review #2 • Prepare and conduct Functional and Physical Configuration Audit #1 • Prepare and conduct Production Readiness Review #1 			
FY 2019 to FY 2020 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019		
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 2018	FY 2019	FY 2020
Program decrease due to completion of CDR Event #2					
Title: LGM-30G Pendulous Integrated 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 the Digital Pickoff Alignment station, Electrical Alignment stations, Alignment Test stations, a Torque Test station, a Temperature Probe Calibration station, Fluid Fill stations and a Slip Ring/Module Test station. FY 2019 Plans: <ul style="list-style-type: none"> • Prepare and conduct MS B • Begin Engineering and Manufacturing Development (EMD) Phase • Prepare and conduct Critical Design Review #1 • Prepare and conduct Test Readiness Review #1 FY 2020 Plans: <ul style="list-style-type: none"> • Prepare and conduct Critical Design Review #2 • Prepare and conduct Functional and Physical Configuration Audit #1 • Prepare and conduct Production Readiness Review #1 FY 2019 to FY 2020 Increase/Decrease Statement: Program decrease due to completion of CDR Event #2			1.425	5.250	3.164
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 2019 Plans: <ul style="list-style-type: none"> • Prepare for Test Readiness Review • Prepare and conduct Critical Design Review FY 2020 Plans: <ul style="list-style-type: none"> • Prepare and conduct MS C • Conduct Test Readiness Review 			2.215	2.800	2.741

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019	
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 2018	FY 2019
<ul style="list-style-type: none"> • Prepare and conduct Functional and Physical Configuration Audit • Begin Production and Deployment phase <p><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Funding decreased due to ramp down of EMD</p>			
<p><i>Title:</i> LGM-30G Transporter Erector Replacement Program (TERP)</p> <p><i>Description:</i> 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.</p> <p><i>FY 2019 Plans:</i></p> <ul style="list-style-type: none"> • Complete Functional Configuration Audit • Complete Operational Test • Complete Physical Configuration Audit • Conduct Milestone C • Award production option <p><i>FY 2020 Plans:</i></p> <ul style="list-style-type: none"> • Program in production <p><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></p> <ul style="list-style-type: none"> • Decrease of funds due to completion of EMD and production start FY19 	17.674	1.133	0.000
<p><i>Title:</i> LGM-30G Payload Transporter Replacement (PTR)</p> <p><i>Description:</i> 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><i>FY 2019 Plans:</i></p> <ul style="list-style-type: none"> • Conduct delta qualification of tractor • Conduct milestone C <p><i>FY 2020 Plans:</i></p>	3.691	1.465	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
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 2018	FY 2019	FY 2020
• Program in production												
FY 2019 to FY 2020 Increase/Decrease Statement:												
• Decrease of funds due to completion of EMD and production start FY19												
Title: LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU)										4.641	0.700	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 2019 Plans:												
• Complete Milestone C												
• Begin Production and Deployment Phase												
FY 2020 Plans:												
• Program in production												
FY 2019 to FY 2020 Increase/Decrease Statement:												
Decrease of funds due to completion of EMD and production start in FY19.												
Accomplishments/Planned Programs Subtotals										30.653	12.863	6.859
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• MPAF 03 Line Item M30MLG: MM III Modifications BP21	0.000	0.000	0.859	-	0.859	0.000	0.000	0.000	0.000	Continuing	Continuing	
• MPAF 01 Line Item 00099L: Missile Replacement Eq-Ballistic BP22	78.094	8.960	55.683	-	55.683	12.645	14.050	14.135	4.870	Continuing	Continuing	
• MPAF 04 Line Item 000999: Replen Spares/ Repair Parts BP25/26	0.029	0.000	0.410	-	0.410	0.000	0.000	0.000	0.000	Continuing	Continuing	
Remarks												

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672985 / MM Support Equip
<p>D. Acquisition Strategy</p> <p>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.</p> <p>E. Performance Metrics</p> <p>Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	1.002	May 2018	1.490	May 2019	0.747	Nov 2019	-		0.747	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) EMD	PO	309th SMXG : Hill AFB, UT	0.000	1.682	Dec 2017	2.500	Dec 2018	2.265	Dec 2019	-		2.265	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) EMD	SS/FPIF	Boeing : Layton, UT	0.000	1.349	May 2018	4.944	May 2019	2.672	Nov 2019	-		2.672	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) EMD	C/FPIF	DRS Environmental Systems : Cincinnati, OH	0.000	16.744	Dec 2017	0.473	Dec 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) EMD	C/CPIF	Northrop Grumman : Salt Lake City, UT	0.000	2.417	Oct 2017	1.050	May 2019	-		-		-	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) Software Development	SS/CPIF	Boeing : Layton, UT	0.000	4.631	Apr 2018	0.630		-		-		-	Continuing	Continuing	-
Subtotal			0.000	27.825		11.087		5.684		-		5.684	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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) Organic Support	PO	OOALC : Hill AFB, UT	0.000	0.104	Nov 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Performance Assessment Data	Various	Various : Various	0.000	-		0.070	Mar 2019	-		-		-	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
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>			
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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) Support															
Subtotal			0.000	0.104		0.070		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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) Delta Qualification Testing	MIPR	586 FLTS : WSMR, NM	0.000	-		0.300	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) Qualification Testing	MIPR	AEDS/TSTS : Arnold AFB, TN	0.000	0.234	Dec 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) Delta Qualification Testing	MIPR	586 FLTS : WSMR, NM	0.000	-		0.067	May 2019	-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) Qualification Testing	MIPR	AEDS/TSTS : Arnold AFB, TN	0.000	0.086	Dec 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER)	TBD	TBD : TBD	0.000	-		-		0.330	Nov 2019	-		0.330	Continuing	Continuing	-
Subtotal			0.000	0.320		0.367		0.330		-		0.330	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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)PMA	Various	Various : Various	0.000	0.005	May 2018	0.025	May 2019	0.207	May 2020	-		0.207	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) PMA	Various	Various : Various	0.000	0.038	Nov 2017	0.032	Apr 2019	-		-		-	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) PMA	Various	Various : Various	0.000	0.243	Jan 2018	0.300	Jan 2019	0.291	Jan 2020	-		0.291	Continuing	Continuing	-
LGM-30G Control Monitor Procedure Trainer Upgrade (CMPT) A&AS	C/FFP	BAE : Clearfield, UT	0.000	0.290	Dec 2017	-		0.185	Dec 2019	-		0.185	Continuing	Continuing	-
LGM-30G Pendulous Integrating Gyroscopic Accelerometer Build Equipment Replacement (PIGA BER) PMA	Various	Various : Various	0.000	0.076	May 2018	0.306	May 2019	0.162	May 2020	-		0.162	Continuing	Continuing	-
LGM-30G Performance Assessment Data System Communications Equipment Interface Unit (PADS CEIU) PMA	Various	Various : Various	0.000	0.010	Apr 2018	-		-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) PMA	Various	Various : Various	0.000	0.206	Nov 2017	0.115	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G Payload Transporter Replacement (PTR) A&AS Support	C/FFP	BAE Systems : Clearfield	0.000	0.834	Dec 2017	-		-		-		-	Continuing	Continuing	-
LGM-30G Transporter Erector Replacement Program (TERP) A&AS Support	C/FFP	BAE Systems : Clearfield, UT	0.000	0.702	Oct 2017	0.561	Oct 2018	-		-		-	Continuing	Continuing	-
Subtotal			0.000	2.404		1.339		0.845		-		0.845	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force											Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672985 / MM Support Equip				
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	30.653		12.863		6.859		-		6.859	Continuing	Continuing	N/A

Remarks
In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force

Date: February 2019

Appropriation/Budget Activity

3600 / 7

R-1 Program Element (Number/Name)

PE 0101213F / Minuteman Squadrons

Project (Number/Name)

672985 / MM Support Equip

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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 PDR (Jul 2018)																												
G6B4 BER Milestone B (Jun 2019)																												
G6B4 BER Engineering and Manufacturing Development Phase																												
G6B4 BER CDR #1 (Jun 2019)																												
G6B4 BER CDR #2 (Sep 2020)																												
G6B4 BER Milestone C (Mar 2021)																												
G6B4 BER Production and Deployment Phase																												
G6B4 BER RAA (Jun 2022)																												
CMPT Milestone B (Oct 2017)																												
CMPT Engineering and Manufacturing Development Phase																												
CMPT PDR (Feb 2018)																												
CMPT CDR (Dec 2018)																												
CMPT Milestone C (Jun 2020)																												
CMPT Production and Deployment Phase																												
CMPT RAA (Sep 2020)																												
PTR Engineering and Manufacturing Development Phase																												
PTR Milestone C (Mar 2019)																												
PTR Production and Deployment Phase																												
TERP Engineering and Manufacturing Development Phase																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force																				Date: February 2019								
Appropriation/Budget Activity										R-1 Program Element (Number/Name)										Project (Number/Name)								
3600 / 7										PE 0101213F / Minuteman Squadrons										672985 / MM Support Equip								
	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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 Milestone C (Apr 2019)																												
TERP Production and Deployment Phase																												
TERP RAA (Apr 2022)																												
PADS CEIU Technology Maturation and Risk Reduction (TMRR) Phase																												
PADS CEIU Milestone B (Dec 2017)																												
PADS CEIU Engineering and Manufacturing Development Phase																												
PADS CEIU CDR (Nov 2017)																												
PADS CEIU Milestone C (Mar 2019)																												
PADS CEIU Production and Deployment Phase																												
PADS CEIU RAA (Jul 2020)																												
PIGA BER TMRR Phase																												
PIGA BER PDR (Jul 2018)																												
PIGA BER Milestone B (Jun 2019)																												
PIGA BER Engineering and Manufacturing Development Phase																												
PIGA BER CDR #1 (Jun 2019)																												
PIGA BER CDR #2 (Sep 2020)																												
PIGA BER Milestone C (Mar 2021)																												
PIGA BER Production and Deployment Phase																												
PIGA BER RAA (Jun 2022)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
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	1	2018	3	2019
G6B4 BER PDR (Jul 2018)	4	2018	4	2018
G6B4 BER Milestone B (Jun 2019)	3	2019	3	2019
G6B4 BER Engineering and Manufacturing Development Phase	3	2019	2	2021
G6B4 BER CDR #1 (Jun 2019)	3	2019	3	2019
G6B4 BER CDR #2 (Sep 2020)	4	2020	4	2020
G6B4 BER Milestone C (Mar 2021)	2	2021	2	2021
G6B4 BER Production and Deployment Phase	2	2021	2	2022
G6B4 BER RAA (Jun 2022)	3	2022	3	2022
CMPT Milestone B (Oct 2017)	1	2018	1	2018
CMPT Engineering and Manufacturing Development Phase	1	2018	3	2020
CMPT PDR (Feb 2018)	2	2018	2	2018
CMPT CDR (Dec 2018)	1	2019	1	2019
CMPT Milestone C (Jun 2020)	3	2020	3	2020
CMPT Production and Deployment Phase	3	2020	1	2021
CMPT RAA (Sep 2020)	4	2020	4	2020
PTR Engineering and Manufacturing Development Phase	1	2018	3	2019
PTR Milestone C (Mar 2019)	2	2019	2	2019
PTR Production and Deployment Phase	2	2019	4	2024
TERP Engineering and Manufacturing Development Phase	1	2018	3	2019
TERP Milestone C (Apr 2019)	3	2019	3	2019
TERP Production and Deployment Phase	3	2019	3	2022

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force **Date:** February 2019

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
672986: MM Crypto Mods	0.000	0.000	14.540	13.293	0.000	13.293	4.452	3.750	3.124	0.000	0.000	39.159
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 2018	FY 2019	FY 2020
Title: LGM-30G ICBM Cryptography Upgrade II (ICU II)	0.000	14.540	13.293
Description: ICU II completes design and development, implements KS-60 remote key/code change, irreversible transformation capabilities, and prevents continuous signal lockout.			
FY 2019 Plans:			
<ul style="list-style-type: none"> • Develop Depot Support Equipment (DSE) • Perform Independent Validation and Verification (IV&V) 			
FY 2020 Plans:			
<ul style="list-style-type: none"> • Continue DSE development • Continue IV&V • Develop Guided Missile Launcher Electronic Circuit (GMLEC) interface modification 			
FY 2019 to FY 2020 Increase/Decrease Statement:			
Funding decreased due to ramp down of support equipment and GMLEC development activities.			
Accomplishments/Planned Programs Subtotals			
	0.000	14.540	13.293

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• MPAF 03 Line Item M30MLG: <i>MM III Modifications BP21</i>	30.483	69.060	23.570	-	23.570	20.494	54.192	0.000	0.000	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019
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 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</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>	-	4.190	-	-	-	1.936	3.081	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 Support Equipment effort includes EMD development of depot support equipment, Guided Missile Launch Electronic Circuit(GMLEC) interface modification, and acoustic microscope system. 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 2020 Air Force												Date: February 2019			
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	0.000	Dec 2017	2.700	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II EMD Extension	C/CPAF	Northrop Grumman : Clearfield, UT	0.000	0.000	Jan 2018	0.300	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Support Equipment development	C/CPFF	Northrop Grumman : Clearfield, UT	0.000	0.000	Jun 2018	8.840	Oct 2018	10.408	Oct 2019	-		10.408	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Support GMLEC	C/CPAF	Northrop Grumman : Clearfield, UT	0.000	-		-		0.000	Oct 2019	-		0.000	Continuing	Continuing	-
Subtotal			0.000	0.000		11.840		10.408		-		10.408	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	0.000	Mar 2018	1.418	Oct 2018	-		-		-	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II Nuclear TopVue	C/FFP	Compusearch Software Sys : Dulles, VA	0.000	0.000	Nov 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	0.000		1.418		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	Various	TBD : TBD	0.000	0.000	Mar 2018	-		1.183	Dec 2019	-		1.183	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons				Project (Number/Name) 672986 / MM Crypto Mods					
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Hardware, Software, and components testing															
LGM-30G ICBM Cryptography Upgrade II LDTO	PO	AEDC/TSTS : Arnold AFB, TN	0.000	0.000	Feb 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			0.000	0.000		-		1.183		-		1.183	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	0.000	0.000	Nov 2017	0.500	Dec 2018	0.924	Jan 2020	-		0.924	Continuing	Continuing	-
LGM-30G ICBM Cryptography Upgrade II A&AS	C/FFP	BAE Systems : Clearfield, UT	0.000	0.000	Jan 2018	0.782	Nov 2018	0.778	Oct 2019	-		0.778	Continuing	Continuing	-
Subtotal			0.000	0.000		1.282		1.702		-		1.702	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	0.000		14.540		13.293		-		13.293	Continuing	Continuing	N/A
Remarks In the FY 2019 budget, Minuteman Squadrons received an FY18 Congressional rescission of \$7.000M. The correct total for FY18 is \$197.208M.															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force	Date: February 2019
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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>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
<i>MM Crypto Mods</i>																												
ICU II Engineering and Manufacturing Development Phase																												
ICU II Engineering and Manufacturing Development Phase (GMLEC)																												
ICU II Milestone C (Aug 2018)																												
ICU II Production and Deployment Phase																												
ICU II Initial Operational Capability (Jun 2021)																												
ICU II Full Operational Capability (Mar 2024)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101213F / Minuteman Squadrons	Project (Number/Name) 672986 / MM Crypto Mods	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MM Crypto Mods				
ICU II Engineering and Manufacturing Development Phase	1	2018	1	2020
ICU II Engineering and Manufacturing Development Phase (GMLEC)	1	2020	2	2024
ICU II Milestone C (Aug 2018)	4	2018	4	2018
ICU II Production and Deployment Phase	1	2019	2	2024
ICU II Initial Operational Capability (Jun 2021)	3	2021	3	2021
ICU II Full Operational Capability (Mar 2024)	2	2024	2	2024