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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	1,152.734	115.200	98.376	71.732	0.000	71.732	10.390	0.000	0.000	0.000	0.000	1,448.432
655082: <i>ICBM FUZE SUPPORT</i>	1,152.734	115.200	98.376	71.732	0.000	71.732	10.390	0.000	0.000	0.000	0.000	1,448.432
Quantity of RDT&E Articles	46	27	5	10	-	10	-	-	-	-		

Program MDAP/MAIS Code: 0498

Note
 • Prior year RDT&E includes 9.740M in PE 0604222F FY11 and 39.717M in PE 0604851F FY12

A. Mission Description and Budget Item Justification

The Intercontinental Ballistic Missile (ICBM) Fuze Modernization Program is designing and producing a form, fit and functionally equivalent replacement for the Mk21 fuze that will provide a 30-year objective design life. Currently available Mk21/W87-0 legacy fuze quantities do not meet United States Strategic Command (USSTRATCOM) requirements and the legacy fuze is three times beyond its original ten year design life. The Mk21 reentry vehicle and fuze is designed to be deployed on the current Minuteman III (MM III) and Sentinel (GBSD) weapon system.

The US Air Force (USAF) will develop the modernized Mk21 fuze using the Department of Energy National Nuclear Security Administration (DOE/NNSA) complex and a weapons system integration contractor. The DOE/NNSA complex consists of Sandia National Labs-California (SNL-CA), Sandia National Labs-New Mexico (SNL-NM) and Kansas City National Security Campus (KCNSC). The ICBM Fuze Modernization program will leverage technologies, parts, components, and development/production capabilities resulting from extensive fuze work performed by the US Navy (USN) and DOE/NNSA on the Mk5/W88 Alt 370 Fuze program. The Radar Module remains entirely common with Mk5/W88 Alt 370, while the Pathlength Module and Thermal Battery Assembly designs and qualification activities remain highly leveraged and only contain minor differences from USN counterparts. Significant design aspects of the Missile Interface Controller Module, Launch Safety Device, and the Terminal Protection Device are also similar to USN counterparts. The Firing Set Interface Module shares common technology with the Mk5/W88 Alt 370 Firing Set.

The ICBM Fuze Modernization Program replacement fuze is designed to integrate into the MM III and the Sentinel (GBSD) weapon systems, to include support/test equipment, data, flight test hardware, and training materials. The program will also conduct required system testing (including ground and flight tests). The program is coordinating Mk21 fuze replacement development efforts with the DOE/NNSA to synchronize USAF arming and fuze development activities with DOE/NNSA warhead requirements. When prudent, the program will conduct trade studies and initiate conceptual designs to address operational system issues and meet future requirements.

The Fiscal Year 2024 budget request continues cooperative efforts with the USN to leverage common components; conduct qualification tests; and continue development of lab, ground, and flight test assets. This program also includes any needed nuclear surety and certification and system vulnerability assessments.

As a cooperative USAF, USN and DOE/NNSA acquisition, the USAF is executing the program using Department of Defense (DoD)-DOE Manual 5030.55 Joint Nuclear Weapons Life Cycle Activities (Phase 6.X process) while using the DOD 5000-series instructions to meet Major Defense Acquisition Program (MDAP) statutory

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and regulatory requirements. The DOE/NNSA 6.X process is an iterative process that drives overlap and concurrency between activities and events that occur during the Engineering and Manufacturing Development (EMD) and Production and Deployment phases of the DoD 5000 Instruction Series.

This program entered Phase 6.4 Production Engineering of the Phase 6.X process in Jan 2019. The program received Milestone C approval in October 2021. The program will conduct production engineering tasks required to progress to the DOE/NNSA Phase 6.5 and DoD Full Rate Production Decision milestones.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY2022 0.000M was expended for civilian pay expenses in this program element, and in FY2023 0.000M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	129.709	98.376	72.756	0.000	72.756
Current President's Budget	115.200	98.376	71.732	0.000	71.732
Total Adjustments	-14.509	0.000	-1.024	0.000	-1.024
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-9.999	0.000			
• SBIR/STTR Transfer	-4.510	0.000			
• Other Adjustments	0.000	0.000	-1.024	0.000	-1.024

Change Summary Explanation

FY22: \$2.500M transferred to Minuteman III PEC 0101213F and \$7.499M transferred to Mk21A Re-entry Vehicle PE 0101328F on Below Threshold Reprogramming actions.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
Title: Fuze Design and Development	93.674	79.076	59.782
Description: Design and develop the Mk21 fuze required to support the ICBM W87-0 warhead. Coordinate design and development efforts with the ICBM weapon system integrator and support flight testing.			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>FY 2023 Plans:</p> <ul style="list-style-type: none"> Analyze Flight Test Unit 3 data and author Flight Test Unit 3 Test Report Conduct Ground Test Unit 4 Test Conduct Radiation Test Qualification Analyze and report Ground Test Unit 4 test results Release Qualification Evaluation for Arming and Fuzing Assembly testers (PT3800 and PT3945) Complete Weapons Effects Test Lab Process-Prove-In unit destructive testing and assessment Complete final reports for qualification tests conducted in FY2022 Update Arming and Fuzing Assembly requirement verification to include Arming and Fuzing Assembly qualification test results Complete developmental requirements for major components Complete Arming and Fuzing Assembly Production Readiness Review Prepare for Full Rate Production Milestone Further develop analytical, information technology, and data management capabilities. <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> Analyze Flight Test Unit 4 data and author Flight Test Unit 4 Test Report Conduct AFA Qualification Evaluation Review Conduct FTU-4 Operational Test Complete DoD Independent Peer Review Conduct Full Rate Production Decision Point Complete entrance criteria and garner approval to enter DOE/NSA Phase 6.5 Low Scale Production Phase Complete required qualification activities and garner First Production Unit approval. Further develop analytical, information technology, and data management capabilities. <p>FY 2023 to FY 2024 Increase/Decrease Statement: Funding decreased due to ramp down of development efforts and ramp up of production efforts.</p>				
<p>Title: Weapon System Integration/Systems Engineering</p> <p>Description: Integrate the Mk21 fuze into the Intercontinental Ballistic Missile weapon system. Validate designs through ground tests on an Integrated Test Bed (ITB). Plan and conduct necessary ground and flight testing. Coordinate design, development and test efforts.</p> <p>FY 2023 Plans:</p> <ul style="list-style-type: none"> Continue Basic Nuclear Safety Assessment Report updates Continue Nuclear Surety Evaluation Report updates 		21.526	19.300	11.950

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<ul style="list-style-type: none"> • Continue ICBM Compatibility Certification Report updates • Support Flight Test Unit 3 data analysis and reporting • Support Ground Test Unit 4 Integrated Test Bed test • Support Ground Test Unit 4 data analysis and reporting • Chair and conduct Survivability Task Team (STT) efforts • Perform Comparative Analysis between Legacy Fuze and Modernized Fuze • Validate Fuze performance against all simulated and predicted environments • Continue various task team support • Initiate USSTRATCOM Survivability Certification • Continue Red Team Performance Assessment of SNL Radar <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> • Complete Nuclear Certification efforts including Basic Nuclear Safety Assessment Report and Nuclear Surety Evaluation Report • Complete ICBM Compatibility Certification Report • Support Flight Test Unit 4 data analysis and reporting • Perform Phase III of comparative analysis between Legacy Fuze and Modernized Fuze • Continue various task team support • Complete Survivability Task Team (STT) efforts • Complete USSTRATCOM Survivability Certification • Continue Red Team Performance Assessment of SNL Radar <p>FY 2023 to FY 2024 Increase/Decrease Statement: Funding decreased due to ramp down of development efforts and ramp up of production efforts.</p>			
Accomplishments/Planned Programs Subtotals	115.200	98.376	71.732

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> <u>Base</u>	<u>FY 2024</u> <u>OCO</u>	<u>FY 2024</u> <u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 Line Item	100.770	137.364	158.789	-	158.789	161.424	99.820	97.436	89.042	143.400	988.045
M30FLH: <i>ICBM Fuze Mod</i>											
• RDTE 04 PE 0605230F: <i>Ground Based Strategic Deterrent</i>	2,464.875	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2,464.875
• RDTE 05 PE 0605238F: <i>Ground Based Strategic Deterrent EMD</i>	0.000	3,614.290	3,746.935	-	3,746.935	3,401.679	3,246.870	2,610.928	1,855.302	2,168.865	20,644.869

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

<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> <u>Base</u>	<u>FY 2024</u> <u>OCO</u>	<u>FY 2024</u> <u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 01 Line Item MGBSD0: <i>Ground Based Strategic Deterrent</i>	8.895	0.000	539.300	-	539.300	502.720	5,735.106	6,456.735	6,172.571	41,252.826	60,668.153
• RDTE 07 PE 0101328F <i>674920: ICBM Reentry Vehicles W87-1/M21A</i>	100.463	115.616	459.880	-	459.880	641.529	687.664	642.804	544.771	0.000	3,192.727
• RDTE 07 PE 0101328F 675920: <i>ICBM Reentry Vehicles Next Generation Reentry Vehicle</i>	0.000	0.000	15.535	-	15.535	16.094	79.282	231.767	319.091	Continuing	Continuing

Remarks

E. Acquisition Strategy

The ICBM Fuze Modernization program is executing a full cost reimbursable Strategic Partnership Project (SPP) with the DOE/NNSA complex using SNL-CA as the design agent and KCNSC as the production agent. The program is a collaborative effort with the USN reducing total program cost and development time by leveraging commonality between the ICBM and Submarine Launched Ballistic Missile fuze components. The USN Mk5/W88 Alt 370 fuze is being developed first, with the USAF Mk21 fuze effort following. Both services participate in all design and development efforts to ensure maximum use of common components, subassemblies and technologies. Both services are using DOE/NNSA SNL-CA to perform fuze design and development. The USAF, as lead systems integrator for the Mk21 fuze, competed a separate weapon system integration contract for integration support to assist the government with MM III unique modifications and fuze integration efforts. Both services are using KCNSC to produce fuzes.

The program completed a Milestone C decision in October 2021 and is forecasted to complete a Full Rate Production Decision in 2QFY2024.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization	Project (Number/Name) 655082 / ICBM FUZE SUPPORT
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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Preliminary Design Development	MIPR	Sandia National Labs : Albuquerque, NM	672.990	37.090	Nov 2021	41.611	Nov 2022	13.200	Nov 2023	-		13.200	1.912	766.803	775.406
Fuze EMD	Various	Various : Various	10.884	6.050	Nov 2021	3.664	Nov 2022	2.770	Nov 2023	-		2.770	0.401	23.769	24.914
Fuze Engineering Change Orders	Various	Various : Various	12.674	1.870	Nov 2021	1.528	Nov 2022	1.562	Nov 2023	-		1.562	0.226	17.860	18.651
Fuze National Security Campus (formerly Kansas City Plant)	MIPR	National Security Campus : Kansas City, MO	247.411	42.443	Nov 2021	27.633	Nov 2022	37.410	Nov 2023	-		37.410	5.419	360.316	364.098
Fuze Weapon System Integration - ICBM Prime	C/CPAF	Northrop Grumman : Clearfield, UT	25.937	-		-		-		-		-	0.000	25.937	25.937
Fuze Weapon System Integration - RS/RV Sub-System Contract (SSC)	C/CPAF	Lockheed Martin : Valley Forge, UT	84.691	-		-		-		-		-	0.000	84.691	84.691
Fuze Weapon System Integration Contract (WSIC)	C/CPFF	Lockheed Martin : Valley Forge, PA	22.702	21.526	Jan 2022	18.500	Jan 2023	11.950	Jan 2024	-		11.950	1.731	76.409	76.151
Subtotal			1,077.289	108.979		92.936		66.892		-		66.892	9.689	1,355.785	N/A

Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Engineering Support - BAH	C/FP	Booz Allen Hamilton : Clearfield, UT	2.757	-		-		-		-		-	0.000	2.757	2.757
Fuze Engineering Support - BAE	C/FFP	BAE : Clearfield, UT	17.391	2.615	Nov 2021	1.000	Nov 2022	-		-		-	0.000	21.006	19.856
Fuze Engineering Support - ISC	C/TBD	TBD : TBD	0.000	-		1.220	Apr 2023	1.620	Nov 2023	-		1.620	0.235	3.075	4.760
Subtotal			20.148	2.615		2.220		1.620		-		1.620	0.235	26.838	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization	Project (Number/Name) 655082 / ICBM FUZE SUPPORT
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Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Lead Project Office Support	MIPR	AFNWC : Albuquerque, NM	10.480	-		-		-		-		-	0.000	10.480	10.480
Fuze Finite Element Model Validation	C/CPFF	LMTF : Little Mountain, UT	1.843	-		-		-		-		-	0.000	1.843	1.843
Fuze Flight Test Support and Evaluation	Various	Various : Various	10.669	-		-		-		-		-	0.000	10.669	10.669
Subtotal			22.992	-		-		-		-		-	0.000	22.992	N/A

Remarks
The design agent, Sandia National Laboratories (listed as Fuze Preliminary Design Development in the R-3 Development section), is executing the test and evaluation efforts within the main design effort. There are no discretely funded test and evaluation efforts outside of the design agent's activities.

Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Cost and Financial Management	C/FFP	Tecolote : Salt Lake City, UT	5.157	-		-		-		-		-	0.000	5.157	5.157
Fuze FFRDC Support	MIPR	Aerospace : Los Angeles, CA	7.642	1.186	Nov 2021	0.780	Nov 2022	0.780	Nov 2023	-		0.780	0.113	10.501	10.040
Fuze Program Support	C/FFP	BAE : Clearfield, UT	1.285	-		-		-		-		-	0.000	1.285	1.285
Fuze Program Management Administration	Various	Various : Various	18.221	2.420	Nov 2021	2.440	Nov 2022	2.440	Nov 2023	-		2.440	0.353	25.874	384.664
Subtotal			32.305	3.606		3.220		3.220		-		3.220	0.466	42.817	N/A

	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		1,152.734	115.200	98.376	71.732	-	71.732	10.390	1,448.432	N/A

Remarks
Prior year RDT&E includes \$9.740M in PE 0604222F FY11 and \$39.717M in PE 0604851F FY12

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force **Date:** March 2023

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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	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

AF ICBM Fuze Modernization Program																												
Engineering and Manufacturing Development																												
Milestone C Review (Oct 2021)																												
Production and Deployment																												
Flight Test 3 (Aug 2022)																												
Production Readiness Review (Oct 2022)																												
Flight Test 4 (Feb 2024)																												
Full Rate Production Decision (Mar 2024)																												
DOE/NNSA Phase 6.5 Milestone Decision (May 2024)																												
First Production Unit (May 2024)																												
Initial Operating Capability (Feb 2025)																												
DOE/NNSA Phase 6.6 Milestone Decision (May 2025)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force **Date:** March 2023

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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AF ICBM Fuze Modernization Program				
Engineering and Manufacturing Development	1	2022	3	2025
Milestone C Review (Oct 2021)	1	2022	1	2022
Production and Deployment	1	2022	4	2028
Flight Test 3 (Aug 2022)	4	2022	4	2022
Production Readiness Review (Oct 2022)	1	2023	1	2023
Flight Test 4 (Feb 2024)	2	2024	2	2024
Full Rate Production Decision (Mar 2024)	2	2024	2	2024
DOE/NNSA Phase 6.5 Milestone Decision (May 2024)	3	2024	3	2024
First Production Unit (May 2024)	3	2024	3	2024
Initial Operating Capability (Feb 2025)	2	2025	2	2025
DOE/NNSA Phase 6.6 Milestone Decision (May 2025)	3	2025	3	2025

Note

The ICBM Fuze Mod Program discovered the need to de-couple Milestone C and Full Rate Production (FRP) Decision from Phase 6.5 and Phase 6.6 respectively. At the time of the initial baseline in 2014, Phase 6.5 and Phase 6.6 were selected as the surrogates for the DoD milestones. Since that time differences between the DOE Phase 6.x process and the DoDI 5000 series, as it relates to funding of Title 10 programs, drove a de-coupling of these milestones into the Acquisition Program Baseline. This program is still being managed according to the Phase 6.x process but Milestone C and FRP have been added as milestones that will be accomplished to satisfy statutory requirements of a Major Defense acquisition program.