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Department of Defense
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

Selected Acquisition Report (SAR)



Air Force Intercontinental Ballistic Missile Fuze Modernization (ICBM Fuze Mod)

FY 2024 President's Budget

**Defense Acquisition Visibility Environment
(DAVE)**

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Common Acronyms and Abbreviations

\$B - Billions of Dollars
\$K - Thousands of Dollars
\$M - Millions of Dollars
ACAT - Acquisition Category
Acq O&M - Acquisition-Related Operations and Maintenance
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
BA - Budget Authority/Budget Activity
Blk - Block
BY - Base Year
CAPE - Cost Assessment and Program Evaluation
CARD - Cost Analysis Requirements Description
CDD - Capability Development Document
CLIN - Contract Line Item Number
CPD - Capability Production Document
CY - Calendar Year
DAB - Defense Acquisition Board
DAE - Defense Acquisition Executive
DAMIR - Defense Acquisition Management Information Retrieval
DoD - Department of Defense
DSN - Defense Switched Network
EMD - Engineering and Manufacturing Development
EVM - Earned Value Management
FMS - Foreign Military Sales
FOC - Full Operational Capability
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
Inc - Increment
IOC - Initial Operational Capability
JROC - Joint Requirements Oversight Council
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
O&S - Operating and Support
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
PAUC - Program Acquisition Unit Cost
PB - President's Budget

PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
U.S. - United States
UCR - Unit Cost Reporting
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

Program Information

Program Name

Air Force Intercontinental Ballistic Missile Fuze Modernization (ICBM Fuze Mod)

DoD Component

Air Force

Responsible Office

Program Manager

Name: Charles A. Clegg

Date Assigned: August, 2022

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Mission and Description

The Intercontinental Ballistic Missile Fuze Modernization (ICBM Fuze Mod) Program is providing a replacement Arming and Fuzing Assembly (AFA) for the Mk21/W87 Reentry Vehicle/Warhead. The program is executing a tailored acquisition utilizing Department of Defense (DoD) Manual 5030.55 and DoD Instruction 5000.85, in addition to Procedures for Joint DoD-Department of Energy (DOE) Nuclear Weapons Life-Cycle Activities (Phase 6.X Process), as the governing acquisition directive for program milestones and activities while meeting MDAP statutory requirements.

The ICBM Fuze Mod Program is providing a form, fit, and functionally equivalent replacement for the Mk21 AFA. The fuzes require recapitalization due to the currently fielded fuze being three times past the original design life. The current Mk21 Fuze has completed a refurbishment program; however, this activity does not meet fuze quantity requirements under the current known force structure. The ICBM Fuze Mod is being developed with a 30-year design life to meet current and future Combatant Command ICBM needs for Minuteman III (MMIII) and Sentinel (formerly Ground Based Strategic Deterrent (GBSD)). The Air Force is leveraging the Navy's Mk5 Alteration 370 program to develop and produce fuzes with common technology and components achieving cost savings and cost avoidance over the lifecycle.

Executive Summary

ICBM Fuze Mod

Program Highlights Since Last Report

The program is executing a tailored acquisition utilizing Department of Defense (DoD) Manual 5030.55 and DoD Instruction 5000.85. The program is in the DOE Phase 6.4 Production Engineering and DoD Production and Deployment phase executing efforts to meet statutory and regulatory requirements and milestones. The next major milestones are First Production Unit (FPU), Full Rate Production, and Phase 6.5 Low Scale Production in FY 2024. The ICBM Fuze Mod program has executed several recent efforts to progress the program towards the major milestones in FY 2024. All seven major components of the modernized fuze achieved FPU approval and Qualification Evaluation Release (QER) in CY22. These achievements led to the execution of the final Fuze Mod Production Readiness Review three months ahead of schedule and was approved with conditions. All conditions are on track to be resolved prior to Fuze Mod top level QER in FY 2024. Further, Flight Test Unit 3 successfully launched on August 16, 2022. The test provided key weapon system integration data in support of the AFA QER.

As the program transitions most of the scope of work from developmental efforts to production efforts, the ICBM Fuze Mod Program Management Office (PMO) conducted Integrated Baseline Reviews (IBR) on production efforts at Sandia National Laboratory Production Agency (SNL-PA) and Kansas City National Security Campus (KCNSC) in November 2022. The IBRs evaluated whether the program management baselines were executable, and each team had sufficient resources to complete the scope of work. Also, the PMO reviewed SNL-PA and KCNSC's supply chain risk management systems to evaluate potential risks associated with COVID-19 impacts on needed supply chains. The Air Force approved SNL-PA and KCNSC's IBR, and re-baselined KCNSC's production Program Management Baseline.

ICBM Fuze Modernization Software: The Fuze Mod does not contain software and was granted a waiver from the Clinger-Cohen Act by SAF-CIO A6 in FY 2015.

History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	Significant Development Description
Oct - 2022	The ICBM Fuze Mod program successfully completed final PRR on October 26, 2022, and final AFA Trainer PRR on October 27, 2022.
Aug - 2022	The program successfully completed Flight Test Unit 3 on 16 Aug 2022.
Jun - 2022	The program successfully completed AFA Production Readiness Review (PRR) Phase II, 2 June, 2022.
Oct - 2021	A new APB for the program was signed October 4, 2021, establishing the program's Production and Deployment (P&D) phase baseline. The MDA signed the Milestone C ADM October 29, 2021, codifying Milestone C decisions and enabling formal entrance into the P&D phase of the program.
Sep - 2021	The program successfully completed AFA Production Readiness Review (PRR) Phase I, September 2, 2021.
Dec - 2020	A new APB for the program was signed December 11, 2020, which incorporated an updated SCP, updated Advance Procurement strategy, new schedule and threshold dates for Milestone C and FRP decision points.
Sep - 2020	Significant Nunn-McCurdy unit cost breaches officially declared.

Date	Significant Development Description
Aug - 2020	The Air Force Cost Analysis Agency and the Air Force Nuclear Weapons Center developed cost estimates for the ICBM Fuze Mod program. As part of the Air Force SCP process, the two estimates were compared and reconciled consistent with the program's technical baseline. The SCP shows significant Nunn-McCurdy unit cost breaches compared to the original program APB. The updated Program Acquisition Unit Cost of \$2.70M BY 2014 and the Average Procurement Unit Cost of \$1.14M BY 2014 exceed the current baseline estimates of \$2.32M BY 2014 and \$0.96M BY 2014 by 16 and 20 percent, respectively. After this detailed re-assessment of the cost estimate including recent pre-production actuals, the PAUC and APUC breach occurred due to the increased cost estimate of future Model XI accelerometer production.
Feb - 2020	The Fuze program declared additional schedule breaches to Required Assets Available and DOE Phase 6.6 Milestone Decision (Full Scale Production). The delays were caused by a failure of a Base Metal Electrode capacitor during the Navy's W88 Alt370 qualification testing. The capacitor failure requires a redesign to change capacitors in four of the seven major components in the Arming and Fuzing Assembly.
Aug - 2019	The Fuze program declared a schedule breach to FDR, PRR and DOE Phase 6.5 Milestone Decision FPU due to the FY 2019 funding reduction. The Fuze program began re-baseline activities including updating the schedule and cost estimate.
Jan - 2019	The Fuze program successfully completed Phase 6.3 (Development Engineering) and entered Phase 6.4 (Production Engineering). Phase 6.4 covers those activities that adopt the development or sustainment design into a manufacturing system that can produce components on a production basis.
May - 2017	Program successfully executed the Baseline Design Review on May 25, 2017.
Sep - 2015	ADM dated September 22, 2015 directed the Air Force to continue to plan and execute the program based on Nuclear Weapons Council, Phase 6.X guidelines while also ensuring all MDAP statutory requirements are met. Since this decision was made after the Phase 6.X equivalent of Milestone B, the program worked to meet or determine equivalency for all Milestone B relevant statutory requirements.
Feb - 2015	The government executed an Integrated Baseline Review jointly with the Navy from February 26, 2015 - March 6, 2015. Upon the final concurrence of the executable baseline, the Design Agent (Sandia National Laboratories) began to officially report EVM data.
Sep - 2014	DAE approved APB dated September 29, 2014.
Dec - 2013	ICBM Fuze Modernization Program Requirements Traceability Memorandum, dated December 12, 2013, established the performance parameters and capability characteristics objectives and thresholds. These fuze performance parameters were derived from existing Legacy Mk21 Fuze performance specifications/requirements, as well as from the requirements memorandum from AFGSC A5/8 ICBM Fuze Modernization Requirements, dated July 8, 2011.
Aug - 2013	The USD(AT&L), as the Chairman of the Nuclear Weapons Council, authorized use of the joint DoD/DOE Instruction 5030.55 for the implementation of the ICBM Fuze Mod program and entry into Phase 6.3 Development Engineering. This decision is documented in the ADM, dated August 18, 2013, entitled "Air Force Intercontinental Ballistic Missile Fuze Program Phase 6.3 Development Engineering Authorization.
Aug - 2011	National Nuclear Security Administration's (NNSA) contractors were designing, developing, and producing the Mark 21 (Mk21) 2A3660 AFA. A Determinations & Findings (D&F) was signed on August 22, 2011 to go to Sandia for the design of the 2A3660 AFA. The Production D&F was assigned on December 28, 2012 indicating that the production of the fuze would be through NNSA's Kansas City Plant.

Schedule

ICBM Fuze Mod

Events	APB Category	APB Objective/Threshold		Current Estimate	Actual
DOE Phase 6.3 Milestone Decision (Program Initiation)	MS B	Aug 2013	Aug 2013		19 Aug 2013
Component Conceptual Design Review	PDR	Oct 2014	Oct 2014		15 Oct 2014
Baseline Design Review	Other	May 2017	May 2017		23 May 2017
Prototype Design Review	Other	May 2018	May 2018		1 May 2018
DOE Phase 6.4 Milestone Decision (Production Engineering)	Other	Jan 2019	Jan 2019		21 Jan 2019
Final Design Review	Other	Aug 2020	Aug 2020		19 Aug 2020
Milestone C	MS C	Oct 2021	Oct 2021		29 Oct 2021
Production Readiness Review	Other	Jan 2023	Jan 2024		26 Oct 2022
Full Rate Production	FRP	Mar 2024	Mar 2025	Mar 2024	
DOE Phase 6.5 Milestone Decision (First Production)	Other	May 2024	May 2025	May 2024	
RAA	IOC	Feb 2025	Feb 2026	Feb 2025	
DOE Phase 6.6 Milestone Decision (Full Scale Production)	FRP Decision	May 2025	May 2026	May 2025	

Schedule Note

1. The Under Secretary of Defense for Acquisition, Technology and Logistics, as the Chairman of the Nuclear Weapons Council, authorized use of the joint DoD/DOE Instruction 5030.55 for the implementation of the ICBM Fuze Mod program and entry into Phase 6.3 Development Engineering. This decision is documented in the ADM, dated August 18, 2013, entitled "Air Force Intercontinental Ballistic Missile Fuze Program Phase 6.3 Development Engineering Authorization.
2. RAA is being used as a surrogate for IOC. RAA is defined as 10 Mk21 fuzes available for deployment with the technical data, test equipment, and technical training materials required to support wing operations.
3. Decision Point #1 and Decision Point #2 have been removed. Decision Point #1 has been replaced by Milestone C and Decision Point #2 has been replaced by FRP. This decision was approved by the SAE and documented in the ADM dated June 24, 2021. FRP decision is driven by the completion of initial operational testing and completion of entrance criteria.
4. The current estimates for PRR, DOE Phase 6.5, RAA and DOE Phase 6.6 have been adjusted to reflect impacts of the APB schedule breach and Nunn-McCurdy breach.

Performance

ICBM Fuze Mod

Performance Characteristics					
Milestone Baseline	Current Baseline Objective/Threshold		Demonstrated Performance	Current Estimate/Actual	Deviation
(KPP) - System Qualification Attribute 4: Fuze Replacement Design Life					
30-year design life upon DoD custody.	30-year design life upon DoD custody.	20-year design life upon DoD custody.	TBD	30-year design life upon DoD custody.	

Requirement Source

ICBM Fuze Mod Performance Specification dated September 16, 2022
AFGSC Requirements Memorandum dated July 15, 2021

Performance Note

The Intercontinental Ballistic Missile Fuze Modernization (ICBM Fuze Mod) Program is providing a replacement Arming and Fuzing Assembly (AFA) for the Mk21/W87 Reentry Vehicle/Warhead. The program is executing a tailored acquisition utilizing DoD Manual 5030.55 and DoD Instruction 5000.85, Procedures for Joint DOE Nuclear Weapons Life-Cycle Activities (6.X Process), as the governing acquisition directives for program milestones and activities while meeting MDAP statutory requirements.

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Acquisition Budget Estimate

ICBM Fuze Mod

Total Acquisition Cost

		Milestone APB	Current Baseline		Budget Estimate PB 2024		
Category	Base Year	Objective (BY\$M)	Objective (BY\$M)	Threshold (BY\$M)	BY\$M	TY\$M	Deviation
RDT&E	2021	1285.3	1508.6	1,659.5	1,489.9	1,448.5	
Procurement	2021	740.7	870.9	957.6	870.7	960.1	
MILCON							
Acq. O&M							
Total		2026.0	2379.5		2,360.6	2,408.6	
PAUC	2021	2.594	3.203	3.523	3.177	3.242	
APUC	2021	1.069	1.330	1.463	1.329	1.466	

Budget Note

The current Research, Development Test and Evaluation (RDT&E) and Procurement estimates are done at the mean, accounting for unforeseen future technical and schedule risks. The ICBM Fuze Mod program is being executed via a Strategic Partnership Project (SPP) agreement with the National Nuclear Security Administration and is 100% funded by the Air Force. There are no Department of Energy funds being used to support the design and production of the ICBM Fuze Mod program.

Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	88	88
Procurement	655	655
O&M-Acquired	--	--

Quantity Note

The funded quantity of 743 includes all the units necessary for development, qualification, certification, operational fielding, aging/surveillance, and replenishment spares.

Unit Cost

ICBM Fuze Mod

Current Baseline compared with Current Estimate			
Category (2021 BY\$M)	Current APB (BY\$)	Current Estimate (BY\$)	% Change
Program Acquisition Unit Cost			
Cost	2,379.5	2,360.6	
Quantity	743	743	
Unit Cost	3.203	3.177	-0.8
Average Procurement Unit Cost			
Cost	870.9	870.7	
Quantity	655	655	
Unit Cost	1.330	1.329	-0.003

Original Baseline compared with Current Estimate			
Category (2014 BY\$M)	Original APB (BY\$)	Current Estimate (BY\$)	% Change
Program Acquisition Unit Cost			
Cost	2026.0	2,085.8	
Quantity	781	743	
Unit Cost	2.594	2.807	20.78%
Average Procurement Unit Cost			
Cost	740.7	769.3	
Quantity	693	655	
Unit Cost	1.069	1.175	22.78%

For Base year to Base Year comparison the Current Estimate Base Year 2021 dollars have been back converted to Base Year 2014 dollars using the Greenbook FY 2022.

Cost Growth Details

Unit Cost Note

Fuze quantities are aligned to reflect the procurement needs of the program. Total quantities include the destructive production testing units required to verify operational integrity throughout the production cycle.

The ICBM Fuze Mod program is being executed via a Strategic Partnership Project (SPP) agreement with the National Nuclear Security Administration and is 100% funded by the Air Force. There are no Department of Energy funds being used to support the design and production of the ICBM Fuze Mod program.

Risks

Significant Schedule Risk

ICBM Fuze Mod

Risk and Sensitivity Analysis
Current Procurement Cost (December - 2022)
1. There are no discrete risks identified with the current estimate, but general uncertainty and tailored cost risk were applied to accommodate the production risks associated with the reduction in production quantity, AP strategy and Life of Program Buy (LOPB) refinements.
Original Baseline Estimate (September - 2014)
1. Re-baseline APB in coordination. 2. General uncertainty and tailored cost risk was applied to the Original Baseline Estimate while taking into consideration reduced risk in leveraging Navy commonality.
Current Baseline Estimate (October - 2021)
1. There are no discrete risks identified with the current baseline estimate.

Significant Schedule Risk

Significant Schedule Risks
Current Estimate (December - 2022)
1. Application Specific Integrated Circuits (ASIC) Production Yield—If ASIC production yield cannot meet Integrated Contract Order Schedule (ICOS) demand, then the program will continue to see slips to the ASIC delivery schedule which could ultimately effect Arming and Fuzing Assembly (AFA) critical path. 2. Launch Safety Device (LSD) Monitor Reset Plating—If the LSD Reset Monitor continues to see non-conforming plating variation that does not meet requirements, then the program will see schedule delays in the LSD Monitor Reset delivery schedule which could ultimately effect AFA critical path. 3. Stockpile-to-Target Sequence (STS) Update and Impact on Replacement Fuze Test Program—If the W87 STS environmental requirement updates are determined to significantly alter replacement Fuze Operational Safety, Suitability, and/or Effectiveness (OSS&E), then those requirements may be included in the replacement Fuze performance specification and result in cost and schedule impacts to Development Agency and Production Agency activities. 4. ICBM Qualification Changes and First Production Unit Schedule - IF the AFA fails qualification testing (Specifically During Radiation at updated Levels), THEN additional analysis and possible retesting maybe required requiring additional resources and assets to accomplish work thus delaying program FPU and causing an Acquisition Program Baseline Breach.

Technologies and Systems Engineering

Significant Technical Risks
Current Estimate (December - 2022)
1. There are no known risks with this program at this time.

Low Rate Initial Production

ICBM Fuze Mod

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	05/19/2018	06/24/2021
Approved Quantity	26	202
Reference	ICBM Fuze Mod Program ADM	ICBM Fuze Mod Program ADM
Start Year	2020	2022
End Year	2021	2026

Rationale if Current Total LRIP Quantity exceeds 10% of the total Procurement quantities:

The Current Total LRIP quantity was updated from 26 to 202 by an ADM dated June 24, 2021. The new LRIP quantity will: (1) establish an initial production base for the program; (2) maintain continuity in production pending completion of initial operational testing; and (3) provide an efficient ramp-up to Full-Rate Production.

LRIP Note

The 202 units include: 3 RDT&E funded for Operational Test and Evaluation (OT&E) and 199 Production funded units. The 199 Production units will be funded as followed: 35 units in FY 2022, 65 units in FY 2023, and 99 units in FY 2024. LRIP unit deliveries are scheduled from FY 2024 through FY 2026.

Contracts & Efforts

Contracts

The ICBM Fuze program has no contracts that meet the statutory definition of Major contract.

Deliveries and Expenditures

ICBM Fuze Mod

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	46	46	88	52.27%
Production	0	0	655	0.00%
Total Program Quantity Delivered	46	46	743	6.19%

Expended and Appropriated (TY \$M)

Years Appropriated to date: 12

Total Years Appropriated Funding (Current Baseline): 17

Percent Years Appropriated: 70.59%

Then-Year Funding Appropriated as Percentage of Total Acquisition Estimate: 81.03%

Then-Year Funding Expended as Percentage of Total Acquisition Estimate: 77.60%

Total Acquisition Cost: \$2,408.6

Deliveries and Expenditures Note

The funded quantity of 743 includes all the units necessary for development, qualification, certification, operational fielding, aging/surveillance, and replenishment spares.

Operating and Support Costs

ICBM Fuze Mod

O&S Cost Breakdown:

Category (BY2021\$ Million)	ICBM Fuze Mod
Unit-Level Manpower	\$0.0
Unit Operations	\$2.1
Maintenance	\$0.0
Sustaining Support	\$359.7
Continued System Improvements	\$0.0
Other	\$5.7
Total	\$367.5

Cost Estimate Source: ICE dated October 21, 2021

Cost Estimate Source Note: The Milestone C Independent Cost Estimate (ICE) was developed by SAF/FMC to support ICBM Fuze Mod program entry into the Production & Deployment phase. OSD CAPE delegated the Milestone C ICE to SAF/FMC per delegation memorandum dated March 9, 2021 and concurred on the ICE as the SCP on October 22, 2021.

O&S Cost Note: Disposal Cost is included in the Operating and Support Cost of the current APB objective and threshold for this program.

The fuze is a relatively small component within the framework of the much larger Minuteman III or Sentinel weapon systems. Therefore, it is not expected that there will be any change to unit level manpower, continuing system improvements, or indirect support at the wings or depot.

Total Program O&S Cost Compared with Baseline

	Current Baseline		Current Estimate (BY\$M)	Current Estimate (TY\$M)	Deviation
	Objective (BY\$M)	Threshold (BY\$M)			
Base Year: 2021					
Total O&S	\$367.5	\$404.3	\$373.2	\$592.1	

Operating and Support Costs - Disposal and Unitized Costs

ICBM Fuze Mod

Annual Unitized O&S Cost Definition and Calculation Relative to Total O&S Cost:

The ICBM Fuze Modernization program does not have an annual unitized cost assessment. The costs provided instead represent total O&S service life. There is no depot level maintenance required due to the design being permanently sealed, and does not require maintenance/repair. The majority of the O&S scope is sustaining engineering and aging surveillance. Note: number of operational years and final year is classified.

Sustainment Factors	System Name: ICBM Fuze Modernization	Antecedent System Name:
Quantity to Sustain	624	
Unit of Measure	Each	
Unit Expected Service Life	30	

Base Year: 2021

Annual Unitized O&S Cost by Category Base Year \$ Unit:(\$M)	System Name: ICBM Fuze Modernization	Antecedent System Name:
Unit-Level Manpower	\$0.0	
Unit Operations	\$1.5	
Maintenance	\$0.0	
Sustaining Support	\$249.5	
Continued System Improvements	\$0.0	
Other	\$0.7	
Total O&S	\$251.7	0.0

Disposal/Demilitarization Cost Estimate

(BY2021\$M)	System Name: ICBM Fuze Modernization	Antecedent System Name:
Total Disposal	\$4.5	

Cost Estimate Source - Disposal	
Type:	Program Office Estimate
Approval Authority and Date:	AFNWC/FM 10/04/2022
Note:	
None	
Disposal Cost Note:	
Disposal cost estimate methodology based on analogous program Mk12A.	

Additional O&S Estimate Assumptions:

Fuze Modernization O&S scope is primarily sustaining engineering and aging surveillance. No depot level maintenance required. Engineering Build-up methodology based on NNSA lab surveillance plan.

Sustainment Strategy:

The Fuze Mod is a drop in replacement for the current Mk21 fuze and no additional field manpower is required. It's hermetically sealed with a 30 year design life. No depot or field maintenance will be performed beyond remove and install on the Reentry Vehicle. Sustaining engineering and aging surveillance support and testing will be provided by the FFRDC design agency (SNL) and production agency (KCNSC) through a MIPR to NNSA. Supply support is provided by the 414th SCMS (as is all ICBM flight hardware). FPU and RAA (representing IOC) is in FY24. Expected fielded life is classified.

Antecedent Estimate Assumptions:

Antecedent estimates are not available as similar ICBM reentry vehicle fuzes have significantly different sustainment strategies.