



# Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-492



## **Patriot Advanced Capability-3 Missile Segment Enhancement (PAC-3 MSE)**

As of FY 2017 President's Budget

Defense Acquisition Management  
Information Retrieval  
(DAMIR)

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## Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance  
ACAT - Acquisition Category  
ADM - Acquisition Decision Memorandum  
APB - Acquisition Program Baseline  
APPN - Appropriation  
APUC - Average Procurement Unit Cost  
\$B - Billions of Dollars  
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  
FOC - Full Operational Capability  
FMS - Foreign Military Sales  
FRP - Full Rate Production  
FY - Fiscal Year  
FYDP - Future Years Defense Program  
ICE - Independent Cost Estimate  
IOC - Initial Operational Capability  
Inc - Increment  
JROC - Joint Requirements Oversight Council  
\$K - Thousands of Dollars  
KPP - Key Performance Parameter  
LRIP - Low Rate Initial Production  
\$M - Millions of Dollars  
MDA - Milestone Decision Authority  
MDAP - Major Defense Acquisition Program  
MILCON - Military Construction  
N/A - Not Applicable  
O&M - Operations and Maintenance  
ORD - Operational Requirements Document  
OSD - Office of the Secretary of Defense  
O&S - Operating and Support  
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  
UCR - Unit Cost Reporting  
U.S. - United States  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

## Program Information

**Program Name**

Patriot Advanced Capability-3 Missile Segment Enhancement (PAC-3 MSE)

**DoD Component**

Army

## Responsible Office

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**Date Assigned:** July 24, 2013

## References

**SAR Baseline (Production Estimate)**

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated January 16, 2015

**Approved APB**

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated January 16, 2015

## Mission and Description

The Patriot Advanced Capability-3 Missile Segment Enhancement (PAC-3 MSE) is a high velocity, hit-to-kill, surface-to-air missile capable of intercepting and destroying Tactical Ballistic Missiles (TBM) and air-breathing threats. The PAC-3 MSE is the follow-on variant of the PAC-3 missile. The PAC-3 MSE's improved capability is achieved through a higher performance solid rocket motor, modified lethality enhancer, more responsive control surfaces, upgraded guidance software, and insensitive munitions improvements. The PAC-3 MSE employs kinetic energy to destroy targets through a hit-to-kill capability and provides the range, accuracy, and lethality to effectively defend against TBMs armed with weapons of mass destruction as well as providing expanded battlespace performance against complex threats. The PAC-3 MSE is being integrated into the Patriot system requiring minor modifications to the launching station and using currently fielded system software, Post Deployment Build (PDB)-7. Additional system improvements, Radar Digital Processor and PDB-8 software are in process and, when fielded, enable the system to fully utilize the PAC-3 MSE kinematic capabilities.

## Executive Summary

Since the prior SAR, the FY 2014 and FY 2015 PAC-3 MSE production contract undefinitized contract actions were definitized on October 28, 2015 (with the exception of tooling, obsolescence, and FMS unique contract line items to be definitized no later than 4th Quarter FY 2016). The FY 2016 PAC-3 MSE production priced option was also added to the FY 2014 and FY 2015 production contracts and partially exercised December 14, 2015 with final exercise expected August 2016.

PAC-3 MSE First Unit Equipped was established with 3-2 Air Defense Artillery on October 23, 2015. The Army Conditional Material Release was also approved on October 23, 2015.

On November 19, 2015, the Lower Tier Project Office successfully completed the first of four developmental flight tests for Post Deployment Build (PDB)-8 software using PAC-3 and Guidance Enhanced Missiles. On December 10, 2015, another successful flight test was conducted to demonstrate the capability of the Patriot system, using PDB-8 to detect, track, engage and kill a threat representative Tactical Ballistic Missile (TBM) with PAC-3 MSE missiles. The test demonstrated proper Patriot PDB-8 Battalion interaction (across and within the Information and Coordination Central and Firing Units) before, during and after engagement of a TBM.

The FY 2017 PB includes a program increase of \$100.0M in FY 2016 for procurement of additional MSE missiles to support combatant commanders.

There are no significant software-related issues with this program at this time.

## Threshold Breaches

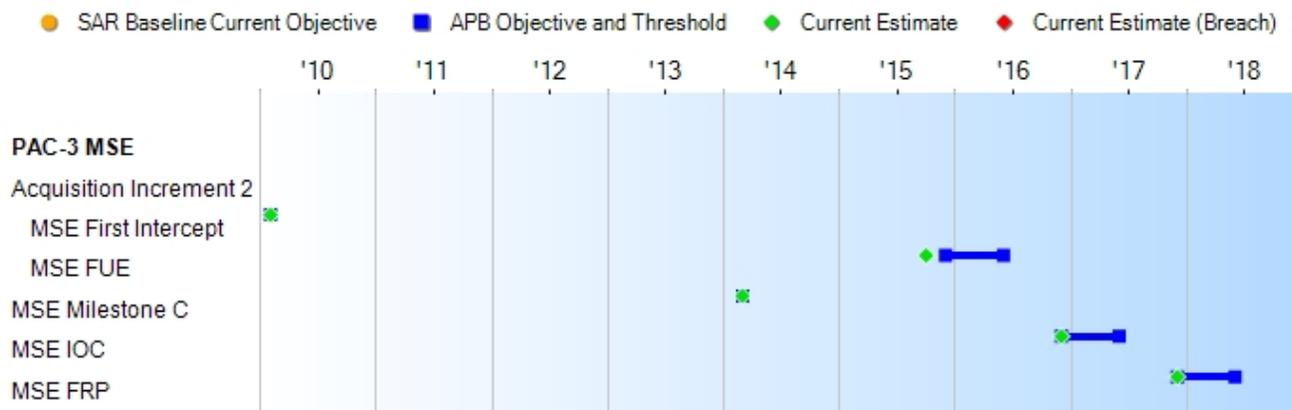
### APB Breaches

<b>Schedule</b>		<input type="checkbox"/>
<b>Performance</b>		<input type="checkbox"/>
<b>Cost</b>	RDT&E	<input type="checkbox"/>
	Procurement	<input type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input type="checkbox"/>
<b>O&amp;S Cost</b>		<input type="checkbox"/>
<b>Unit Cost</b>	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

### Nunn-McCurdy Breaches

<b>Current UCR Baseline</b>		
	PAUC	None
	APUC	None
<b>Original UCR Baseline</b>		
	PAUC	None
	APUC	None

## Schedule



Schedule Events				
Events	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate
Acquisition Increment 2				
MSE First Intercept	Feb 2010	Feb 2010	Feb 2010	Feb 2010
MSE FUE	Dec 2015	Dec 2015	Jun 2016	Oct 2015 (Ch-1)
MSE Milestone C	Mar 2014	Mar 2014	Mar 2014	Mar 2014
MSE IOC	Dec 2016	Dec 2016	Jun 2017	Dec 2016
MSE FRP	Dec 2017	Dec 2017	Jun 2018	Dec 2017

### Change Explanations

(Ch-1) MSE FUE Current Estimate changed from December 2015 to October 2015 based on actual achievement. MSE FUE was established with the 3-2 Air Defense Artillery on October 23, 2015.

### Notes

MSE FUE is considered achieved when the first Patriot Fire Unit is equipped with 12 MSE missiles.

MSE IOC is considered achieved when a Patriot Battalion, consisting of four Fire Units, is equipped with 12 MSE missiles per Fire Unit.

### Acronyms and Abbreviations

FUE - First Unit Equipped

## Performance

Performance Characteristics				
SAR Baseline Production Estimate	Current APB Production Objective/Threshold	Demonstrated Performance	Current Estimate	
<b>System Training</b>				
<b>Proficiency Level</b>				
Soldiers (Operators, Maintainers, and Leaders) are able to perform critical tasks to standard 95% of the time after training.	Soldiers (Operators, Maintainers, and Leaders) are able to perform critical tasks to standard 95% of the time after training.	(T=O) Soldiers (Operators, Maintainers, and Leaders) are able to perform critical tasks to standard 95% of the time after training.	Soldiers (Operators, Maintainers, and Leaders) were able to perform critical tasks to standard 95% of the time after training during logistics demonstration and test unit training.	Soldiers (Operators, Maintainers, and Leaders) are able to perform critical tasks to standard 95% of the time after training.
<b>Time to Train</b>				
Duration of institutional training shall be no more than 20 weeks for AOC 14A and MOSs 14E, H, T, 140A, 35 weeks for MOS 140E to train to use the system capabilities properly.	Duration of institutional training shall be no more than 20 weeks for AOC 14A and MOSs 14E, H, T, 140A, 35 weeks for MOS 140E to train to use the system capabilities properly.	(T=O) Duration of institutional training shall be no more than 20 weeks for AOC 14A and MOSs 14E, H, T, 140A, 35 weeks for MOS 140E to train to use the system capabilities properly.	Fire Centers of Excellence currently conducts AOC 14A in 18 weeks 3 days, 14E in 19 weeks 4 days, 14H in 11 weeks 3 days, 14T in 10 weeks, 140A in 19 weeks 2 days and 140E in 35 weeks and 4 days.	Duration of institutional training shall be no more than 20 weeks for AOC 14A and MOSs 14E, H, T, 140A, 35 weeks for MOS 140E to train to use the system capabilities properly.
<b>Training Retention</b>				
Soldier sustainment training to maintain proficiency shall be required quarterly, semi-annually, and annually.	Soldier sustainment training to maintain proficiency shall be required quarterly, semi-annually, and annually.	(T=O) Soldier sustainment training to maintain proficiency shall be required quarterly, semi-annually, and annually.	Soldier sustainment training to maintain proficiency shall be required quarterly, semi-annually, and annually in accordance with FM 3 -01.86, Air Defense Artillery Patriot Brigade Gunnery Program.	Soldier sustainment training to maintain proficiency shall be required quarterly, semi-annually, and annually.
<b>Training Support</b>				
Training resources shall be capable of providing 95% of training individual and collective critical	Training resources shall be capable of providing 95% of training individual and collective critical	Training resources shall be capable of providing 90% of training individual and collective critical	All training support materials to include preliminary technical manuals, New Equipment Training	Training resources shall be capable of providing 95% of training individual and collective critical

tasks (march-order and emplacement, operations, maintenance, force operations, and engagement operations) related to tactically deployed systems while missiles are loaded.	tasks (march-order and emplacement, operations, maintenance, force operations, and engagement operations) related to tactically deployed systems while missiles are loaded.	tasks (march-order and emplacement, operations, maintenance, force operations, and engagement operations) related to tactically deployed systems while missiles are loaded.	Plans, Task Analysis', and Doctrine Impact Reports were provided to Fires Center of Excellence Directorate of Training Development and Doctrine.	tasks (march-order and emplacement, operations, maintenance, force operations, and engagement operations) related to tactically deployed systems while missiles are loaded.
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**Training Interoperability**

System specific training capabilities shall interoperate with and support collective training with existing live, virtual, and constructive training environments throughout the system lifecycle.	System specific training capabilities shall interoperate with and support collective training with existing live, virtual, and constructive training environments throughout the system lifecycle.	(T=O) System specific training capabilities shall interoperate with and support collective training with existing live, virtual, and constructive training environments throughout the system lifecycle.	The Patriot weapons system supports live, virtual and constructive training environments by using TADSS to conduct multi-level training for both operators and maintenance personnel. With the addition of DIS and TADiL-J demonstrated the ability to participate in a virtual environment in both AC-12 and JC-14. The constructive environment was demonstrated during PoP Test 1 (connected two PCOFT labs in different states) and PoP Test 2 (connected two PCOFT labs in different countries.)	System specific training capabilities shall interoperate with and support collective training with existing live, virtual, and constructive training environments throughout the system lifecycle.
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**Net Ready**

The PAC-3 Increment 2 system must fully support execution of all operational activities and information exchanges identified in the DoD Enterprise Architecture and solution architectures based on integrated DoDAF content, and	The PAC-3 Increment 2 system must fully support execution of all operational activities and information exchanges identified in the DoD Enterprise Architecture and solution architectures based on integrated DoDAF content, and	The PAC-3 Increment 2 system must fully support execution of joint critical operational activities and information exchanges identified in the DoD Enterprise Architecture and solution architectures based on integrated DoDAF content, and	TBD	The PAC-3 Increment 2 system must fully support execution of all operational activities and information exchanges identified in the DoD Enterprise Architecture and solution architectures based on integrated DoDAF content, and
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<p>must satisfy the technical requirements for transition to Net-Centric military operations to include: (1) Solution architecture products; (2) Compliant with Net-Centric data strategy and Net-Centric Services strategy; (3) Compliant with GIG Technical Guidance; (4) Information assurance requirements; (5) Supportability requirements.</p>	<p>must satisfy the technical requirements for transition to Net-Centric military operations to include: (1) Solution architecture products; (2) Compliant with Net-Centric data strategy and Net-Centric Services strategy; (3) Compliant with GIG Technical Guidance; (4) Information assurance requirements; (5) Supportability requirements.</p>	<p>must satisfy the technical requirements for transition to Net-Centric military operations to include: (1) Solution architecture products; (2) Compliant with Net-Centric data strategy and Net-Centric Services strategy; (3) Compliant with GIG Technical Guidance; (4) Information assurance requirements; (5) Supportability requirements.</p>		<p>must satisfy the technical requirements for transition to Net-Centric military operations to include: (1) Solution architecture products; (2) Compliant with Net-Centric data strategy and Net-Centric Services strategy; (3) Compliant with GIG Technical Guidance; (4) Information assurance requirements; (5) Supportability requirements.</p>
<b>Sustainment Reliability</b>				
<p>The material sustainment reliability will exceed 41 hours MTBCMF.</p>	<p>The material sustainment reliability will exceed 41 hours MTBCMF.</p>	<p>The material sustainment reliability will exceed 20 hours MTBCMF.</p>	<p>Will be demonstrated during Post Deployment Build-8 and Radar Digital Processor-Configuration Operational testing.</p>	<p>The material sustainment reliability will exceed 20 hours MTBCMF.</p>

Classified Performance information is provided in the classified annex to this submission.

**Requirements Reference**

Patriot Advanced Capability-3 (PAC-3) Increment 2 CPD dated January 24, 2013

**Change Explanations**

None

**Notes**

## Acronyms and Abbreviations

AC-12 - Austere Challenge 2012  
AOC - Area of Concentration  
DIS - Distributive Interactive Simulation  
DoDAF - Department of Defense Architecture Format  
FM - Field Manual  
GIG - Global Information Grid  
JC-14 - Juniper Cobra 2014  
MOS - Military Occupational Specialty  
MTBCMF - Mean Time Between Critical Mission Failure  
O - Objective  
PCOFT - Patriot Conduct of Fire Trainer  
PoP - Proof of Principle  
T - Threshold  
TADiL-J - Tactical Digital Information Link-Joint  
TADSS - Training Aids, Devices, Simulators, and Simulations

## Track to Budget

### RDT&E

Appn	BA	PE
Army	2040 05	0605456A
	Project	Name
	PA3	PATRIOT PAC-3/Missile Segment Enhancement (Shared)

### Procurement

Appn	BA	PE
Army	2032 02	0605456A
	Line Item	Name
	C53101	MSE Missile

### MILCON

Appn	BA	PE
Army	2050	
	Project	Name

### Notes

A budget activity code for MILCON is not yet established.

## Cost and Funding

### Cost Summary

Total Acquisition Cost							
Appropriation	BY 2014 \$M			BY 2014 \$M	TY \$M		
	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	SAR Baseline Production Estimate	Current APB Production Objective	Current Estimate
RDT&E	940.8	940.8	1034.9	932.8	871.1	871.1	869.8
Procurement	5087.2	5087.2	5595.9	5334.9	5840.7	5840.7	6020.0
Flyaway	--	--	--	4883.5	--	--	5507.4
Recurring	--	--	--	4802.1	--	--	5426.2
Non Recurring	--	--	--	81.4	--	--	81.2
Support	--	--	--	451.4	--	--	512.6
Other Support	--	--	--	451.4	--	--	512.6
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	9.0	9.0	9.9	9.2	10.5	10.5	10.5
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	6037.0	6037.0	N/A	6276.9	6722.3	6722.3	6900.3

#### Current APB Cost Estimate Reference

Army Cost Position dated February 28, 2014

#### Confidence Level

Confidence Level of cost estimate for current APB: 85%

The PAC-3 MSE missile Program Office Estimate is estimated at a confidence level of 85%. Over 90% of the RDT&E costs are sunk; however, there are still Initial Operational Test and Evaluation flight tests remaining that are planned through FY 2017. The PAC-3 MSE missile is a variation of the current PAC-3 missile; therefore, there was substantial PAC-3 cost data available to support the PAC-3 MSE missile cost estimate. There are design changes to several components of the missile, which prevent using a higher confidence level.

#### Cost Notes

The PAC-3 MSE APB objective Cost and Quantity represent total Army requirements with planned procurement from FY 2014 to FY 2025. The Army will continue to assess complex threats, technology improvements, and material obsolescence for impacts and implementation to the current product configuration baseline.

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	0	0	0
Procurement	1057	1057	1125
Total	1057	1057	1125

## Cost and Funding

### Funding Summary

Appropriation Summary									
FY 2017 President's Budget / December 2015 SAR (TY\$ M)									
Appropriation	Prior	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	To Complete	Total
RDT&E	867.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0	869.8
Procurement	1161.8	514.9	423.2	459.1	497.0	529.8	520.5	1913.7	6020.0
MILCON	0.0	0.0	0.0	0.0	10.5	0.0	0.0	0.0	10.5
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2017 Total	2029.3	517.2	423.2	459.1	507.5	529.8	520.5	1913.7	6900.3
PB 2016 Total	2030.6	417.2	430.6	462.7	504.1	569.5	519.4	1892.1	6826.2
Delta	-1.3	100.0	-7.4	-3.6	3.4	-39.7	1.1	21.6	74.1

Quantity Summary										
FY 2017 President's Budget / December 2015 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	200	112	85	93	95	95	95	350	1125
PB 2017 Total	0	200	112	85	93	95	95	95	350	1125
PB 2016 Total	0	200	80	85	93	95	104	90	346	1093
Delta	0	0	32	0	0	0	-9	5	4	32

## Cost and Funding

### Annual Funding By Appropriation

Annual Funding							
2040   RDT&E   Research, Development, Test, and Evaluation, Army							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2004	--	--	--	--	--	--	62.5
2005	--	--	--	--	--	--	53.2
2006	--	--	--	--	--	--	101.8
2007	--	--	--	--	--	--	113.9
2008	--	--	--	--	--	--	60.5
2009	--	--	--	--	--	--	75.6
2010	--	--	--	--	--	--	115.7
2011	--	--	--	--	--	--	125.1
2012	--	--	--	--	--	--	67.2
2013	--	--	--	--	--	--	25.3
2014	--	--	--	--	--	--	33.0
2015	--	--	--	--	--	--	33.7
2016	--	--	--	--	--	--	2.3
Subtotal	--	--	--	--	--	--	869.8

Annual Funding							
2040   RDT&E   Research, Development, Test, and Evaluation, Army							
Fiscal Year	Quantity	BY 2014 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2004	--	--	--	--	--	--	74.5
2005	--	--	--	--	--	--	61.6
2006	--	--	--	--	--	--	114.7
2007	--	--	--	--	--	--	125.4
2008	--	--	--	--	--	--	65.3
2009	--	--	--	--	--	--	80.6
2010	--	--	--	--	--	--	121.5
2011	--	--	--	--	--	--	128.9
2012	--	--	--	--	--	--	68.2
2013	--	--	--	--	--	--	25.2
2014	--	--	--	--	--	--	32.3
2015	--	--	--	--	--	--	32.4
2016	--	--	--	--	--	--	2.2
Subtotal	--	--	--	--	--	--	932.8

Annual Funding 2032   Procurement   Missile Procurement, Army							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	70.4	70.4	--	70.4
2013	--	--	--	10.8	10.8	--	10.8
2014	92	508.9	--	--	508.9	39.1	548.0
2015	108	492.7	--	--	492.7	39.9	532.6
2016	112	474.3	--	--	474.3	40.6	514.9
2017	85	381.8	--	--	381.8	41.4	423.2
2018	93	416.9	--	--	416.9	42.2	459.1
2019	95	454.0	--	--	454.0	43.0	497.0
2020	95	486.0	--	--	486.0	43.8	529.8
2021	95	475.9	--	--	475.9	44.6	520.5
2022	90	468.9	--	--	468.9	45.5	514.4
2023	90	448.2	--	--	448.2	46.4	494.6
2024	90	424.9	--	--	424.9	47.2	472.1
2025	80	393.7	--	--	393.7	38.9	432.6
Subtotal	1125	5426.2	--	81.2	5507.4	512.6	6020.0

Annual Funding 2032   Procurement   Missile Procurement, Army							
Fiscal Year	Quantity	BY 2014 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2012	--	--	--	70.8	70.8	--	70.8
2013	--	--	--	10.6	10.6	--	10.6
2014	92	496.4	--	--	496.4	38.1	534.5
2015	108	473.9	--	--	473.9	38.3	512.2
2016	112	447.7	--	--	447.7	38.4	486.1
2017	85	353.6	--	--	353.6	38.4	392.0
2018	93	378.6	--	--	378.6	38.4	417.0
2019	95	404.2	--	--	404.2	38.3	442.5
2020	95	424.3	--	--	424.3	38.2	462.5
2021	95	407.3	--	--	407.3	38.2	445.5
2022	90	393.4	--	--	393.4	38.2	431.6
2023	90	368.7	--	--	368.7	38.2	406.9
2024	90	342.7	--	--	342.7	38.0	380.7
2025	80	311.3	--	--	311.3	30.7	342.0
Subtotal	1125	4802.1	--	81.4	4883.5	451.4	5334.9

Annual Funding 2050   MILCON   Military Construction, Army	
Fiscal Year	TY \$M
	Total Program
2019	10.5
Subtotal	10.5

Annual Funding 2050   MILCON   Military Construction, Army	
Fiscal Year	BY 2014 \$M
	Total Program
2019	9.2
Subtotal	9.2

## Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
<b>Approval Date</b>	8/6/2004	3/27/2014
<b>Approved Quantity</b>	148	330
<b>Reference</b>	Milestone B ADM	Milestone C ADM
<b>Start Year</b>	2010	2014
<b>End Year</b>	2011	2018

The Current Total LRIP Quantity is more than 10% of the total production quantity in accordance with the March 27, 2014 ADM which approved a PAC-3 MSE LRIP quantity of 330 based on an Army Acquisition Objective (AAO) of 3,376 missiles. Procurement is expected to continue beyond the approved program with current or future MSE variants to meet the AAO.

## **Foreign Military Sales**

None

## **Nuclear Costs**

None

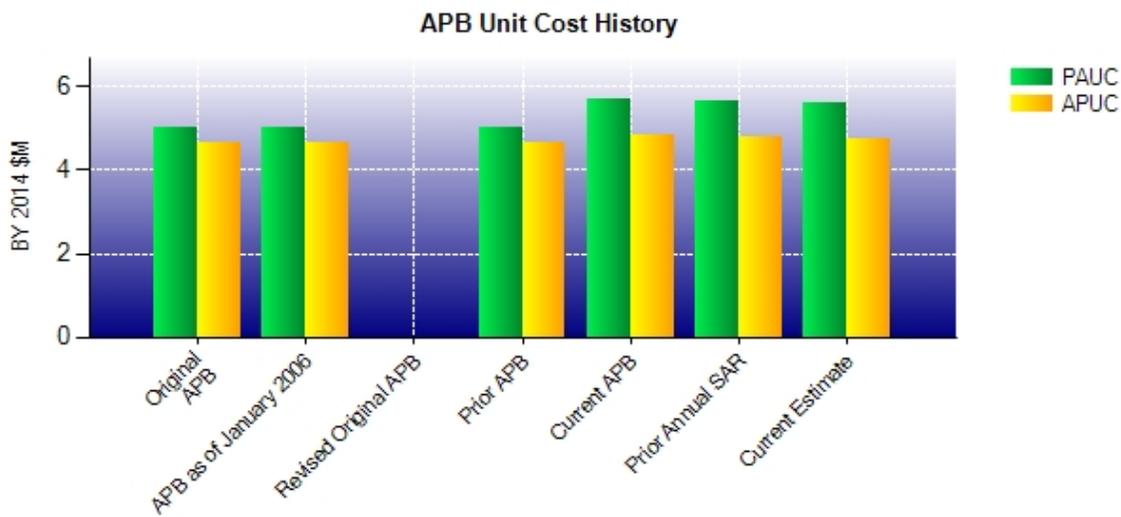
## Unit Cost

### Unit Cost Report

Item	BY 2014 \$M	BY 2014 \$M	% Change
	Current UCR Baseline (Jan 2015 APB)	Current Estimate (Dec 2015 SAR)	
<b>Program Acquisition Unit Cost</b>			
Cost	6037.0	6276.9	
Quantity	1057	1125	
Unit Cost	5.711	5.579	-2.32
<b>Average Procurement Unit Cost</b>			
Cost	5087.2	5334.9	
Quantity	1057	1125	
Unit Cost	4.813	4.742	-1.47

Item	BY 2014 \$M	BY 2014 \$M	% Change
	Original UCR Baseline (Aug 2004 APB)	Current Estimate (Dec 2015 SAR)	
<b>Program Acquisition Unit Cost</b>			
Cost	7664.0	6276.9	
Quantity	1528	1125	
Unit Cost	5.016	5.579	+11.23
<b>Average Procurement Unit Cost</b>			
Cost	7096.2	5334.9	
Quantity	1528	1125	
Unit Cost	4.644	4.742	+2.11

**Unit Cost History**



Item	Date	BY 2014 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Aug 2004	5.016	4.644	5.272	4.957
APB as of January 2006	Aug 2004	5.016	4.644	5.272	4.957
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	Aug 2004	5.016	4.644	5.272	4.957
Current APB	Jan 2015	5.711	4.813	6.360	5.526
Prior Annual SAR	Dec 2014	5.643	4.781	6.245	5.439
Current Estimate	Dec 2015	5.579	4.742	6.134	5.351

**SAR Unit Cost History**

Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial PAUC Development Estimate	Changes								PAUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
5.272	0.311	0.411	0.398	0.000	0.126	0.000	-0.158	1.088	6.360

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Production Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
6.360	-0.040	-0.240	-0.022	0.000	0.072	0.000	0.004	-0.226	6.134

Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
4.957	0.287	0.286	0.398	0.000	-0.244	0.000	-0.158	0.569	5.526

Current SAR Baseline to Current Estimate (TY \$M)									
APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
5.526	-0.039	-0.191	-0.022	0.000	0.073	0.000	0.004	-0.175	5.351

SAR Baseline History					
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate	
Milestone A	N/A	N/A	N/A	N/A	
Milestone B	N/A	N/A	N/A	N/A	
Milestone C	N/A	Mar 2014	Mar 2014	Mar 2014	
IOC	N/A	Dec 2016	Dec 2016	Dec 2016	
Total Cost (TY \$M)	N/A	8056.0	6722.3	6900.3	
Total Quantity	N/A	1528	1057	1125	
PAUC	N/A	5.272	6.360	6.134	

## Cost Variance

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	871.1	5840.7	10.5	6722.3
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	+114.6	--	+114.6
Other	--	--	--	--
Support	--	-10.7	--	-10.7
Subtotal	--	+103.9	--	+103.9
Current Changes				
Economic	-0.6	-43.8	-0.1	-44.5
Quantity	--	+161.1	--	+161.1
Schedule	--	-24.9	--	-24.9
Engineering	--	--	--	--
Estimating	-0.7	-32.7	+0.1	-33.3
Other	--	--	--	--
Support	--	+15.7	--	+15.7
Subtotal	-1.3	+75.4	--	+74.1
Adjustments	--	--	--	--
Total Changes	-1.3	+179.3	--	+178.0
CE - Cost Variance	869.8	6020.0	10.5	6900.3
CE - Cost & Funding	869.8	6020.0	10.5	6900.3

Summary BY 2014 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	940.8	5087.2	9.0	6037.0
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-7.3	+152.6	+0.1	+145.4
Other	--	--	--	--
Support	--	-14.2	--	-14.2
Subtotal	-7.3	+138.4	+0.1	+131.2
Current Changes				
Economic	--	--	--	--
Quantity	--	+127.4	--	+127.4
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	-0.7	-30.9	+0.1	-31.5
Other	--	--	--	--
Support	--	+12.8	--	+12.8
Subtotal	-0.7	+109.3	+0.1	+108.7
Adjustments	--	--	--	--
Total Changes	-8.0	+247.7	+0.2	+239.9
CE - Cost Variance	932.8	5334.9	9.2	6276.9
CE - Cost & Funding	932.8	5334.9	9.2	6276.9

Previous Estimate: December 2014

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-0.6
Change in estimating assumptions due to application of new escalation indices. (Estimating)	-1.3	-1.3
Adjustment for current and prior escalation. (Estimating)	+0.6	+0.6
<b>RDT&amp;E Subtotal</b>	<b>-0.7</b>	<b>-1.3</b>

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-43.8
Quantity variance resulting from an increase of 32 missiles from 1,093 to 1,125. (Subtotal)	+127.9	+161.8
Quantity variance resulting from an increase of 32 missiles from 1,093 to 1,125. (Quantity)	(+127.4)	(+161.1)
Allocation to Estimating resulting from Quantity change. (Estimating) (QR)	(+0.5)	(+0.7)
Acceleration of procurement buy profile to reflect increase in missile quantity in FY 2016. (Schedule) (QR)	0.0	-24.9
Allocation to Estimating resulting from program quantity increase in FY 2016. (Estimating) (QR)	-39.9	-42.1
Adjustment for current and prior escalation. (Estimating)	+8.5	+8.7
Adjustment for current and prior escalation. (Support)	+0.6	+0.8
Increase in Other Support due to revised estimate to reflect program quantity increase in FY 2016. (Support) (QR)	+12.2	+14.9
<b>Procurement Subtotal</b>	<b>+109.3</b>	<b>+75.4</b>

(QR) Quantity Related

MILCON	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-0.1
Change in estimating assumptions due to application of new escalation indices. (Estimating)	+0.1	+0.1
<b>MILCON Subtotal</b>	<b>+0.1</b>	<b>0.0</b>

## Contracts

### Contract Identification

**Appropriation:** Procurement  
**Contract Name:** MSE IPF  
**Contractor:** Lockheed Martin Missiles and Fire Control  
**Contractor Location:** P.O. Box 650003  
 Dallas, TX 75265-0003  
**Contract Number:** W31P4Q-12-C-0001  
**Contract Type:** Cost Plus Incentive Fee (CPIF)  
**Award Date:** July 02, 2012  
**Definitization Date:** July 02, 2012

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
69.0	N/A	0	76.3	N/A	0	77.9	79.0

### Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to a contract modification to extend the period of performance to fabricate four missile assemblies and purchase several major subcontractor components (ignition safety devices, lethality enhancers, batteries, and thermally initiated venting systems).

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (8/31/2015)	-4.3	+0.4
Previous Cumulative Variances	-3.9	+0.4
Net Change	-0.4	+0.0

### Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to delay in receipt of replacement thermal batteries.

### Notes

The purpose of the effort is to set forth the requirements for the manufacture, modification, and/or procurement of production special tooling, special test equipment, and special inspection equipment to support the PAC-3 MSE missile program. The Initial Production Facilities (IPF) equipment is to be proven out and in place 24 months following contract award. The PAC-3 MSE IPF contract stresses production of MSE missiles at the lowest feasible life cycle cost. The objective of the PAC-3 MSE IPF is to establish and sustain the capability to produce PAC-3 MSE missiles at a rate of up to 20 per month. The contract was awarded and definitized on July 2, 2012, with a total contract value of \$69.0M. The contract was completed on August 31, 2015.

This contract is more than 90% complete; therefore, this is the final report for this contract.

**Contract Identification**

**Appropriation:** Procurement  
**Contract Name:** FY 2014 PAC-3/MSE Production  
**Contractor:** Lockheed Martin Missiles and Fire Control  
**Contractor Location:** P.O. Box 650003  
 Dallas, TX 75265-0003  
**Contract Number:** W31P4Q-14-C-0034  
**Contract Type:** Fixed Price Incentive(Firm Target) (FPIF)  
**Award Date:** December 31, 2013  
**Definitization Date:** December 28, 2015

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
263.4	N/A	56	1305.7	1379.2	300	1305.7	1305.7

**Target Price Change Explanation**

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to contract modifications to add U.S. PAC-3 MSE missiles, PAC-3 FMS missile quantities, and FMS ground support equipment.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/31/2015)	+2.1	-2.1
Previous Cumulative Variances	0.0	0.0
Net Change	+2.1	-2.1

**Cost and Schedule Variance Explanations**

The favorable cumulative cost variance is due to less than planned expenditure dependent on the return of reworked MSE actuators by the subcontractor.

The unfavorable cumulative schedule variance is due to all MSE actuators being returned to the subcontractor for rework because of a component qualification failure; continuation of efforts to develop a path for compliant MSE batteries from both subcontractors; and a Lot Acceptance Test failure of thermally initiated venting system units to determine root cause of failure and corrective action.

**Notes**

The FY 2014 PAC-3 Cost Reduction Initiative (CRI) missile and PAC-3 MSE Production contract was awarded on December 31, 2013 to Lockheed Martin Missiles and Fire Control, Dallas, Texas, as a Not to Exceed letter contract valued at \$263.4M (\$203.9M U.S. and \$59.5M FMS). The original effort includes 56 PAC-3 CRI missiles for the U.S. Army, seven Launcher Modification Kits (LMK), one portable four-pack test set and FMS initial spares, and missile/LMK production tooling.

On March 28, 2014, the contract was modified to change the contract type from Firm Fixed Price to FPIF. The modification added 92 PAC-3 MSE missiles, 50 LMKs, associated hardware, and initial spares. The PAC-3 CRI and PAC-3 MSE missiles share a high degree of commonality, therefore, combining requirements on a single production contract yields cost synergies.

On October 14, 2014, the contract was modified to add FMS case requirements for 152 PAC-3 CRI missiles, 15 LMKs, and other associated ground support equipment.

On October 28, 2015, the FY 2014 PAC-3 MSE production contract was modified to definitize all FY 2014 requirements.

PAC-3 MSE deliveries began in 4th Quarter FY 2015.

**Contract Identification**

**Appropriation:** Procurement  
**Contract Name:** FY 2015 PAC-3/MSE Production  
**Contractor:** Lockheed Martin Missiles and Fire Control  
**Contractor Location:** P.O. Box 650003  
 Dallas, TX 75265-0003  
**Contract Number:** W31P4Q-14-C-0034/2  
**Contract Type:** Fixed Price Incentive(Firm Target) (FPIF)  
**Award Date:** July 23, 2015  
**Definitization Date:**

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
1314.1	N/A	108	1314.1	1467.7	330	1314.1	1314.1

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date	0.0	0.0
Previous Cumulative Variances	--	--
Net Change	+0.0	+0.0

**Cost and Schedule Variance Explanations**

None

**General Contract Variance Explanation**

Cost and schedule variances are not reported for this contract because EVM reporting has not commenced due to on-going negotiations. The majority of the contract requirements were definitized on October 28, 2015; however, the remaining Not to Exceed (NTE) requirements remain in negotiation and are projected to be complete in 4th Quarter FY 2016. EVM reporting on the contract will begin when all contract requirements are definitized.

**Notes**

This is the first time this contract is being reported.

On July 23, 2015, the contract was modified to add the FY 2015 production requirements. The modification added the following requirements: 108 U.S. PAC-3 MSE missiles (to include four test missiles) and other associated ground support equipment, 16 U.S. PAC-3 Cost Reduction Initiative (CRI) missiles, 206 FMS PAC-3 CRI missiles, other associated ground support equipment, and 36 FMS Launcher Modification Kits. This modification also included NTEs for tooling and obsolescence requirements.

FY 2015 PAC-3 MSE deliveries are scheduled to begin in 2nd Quarter FY 2017.

**Contract Identification**

**Appropriation:** Procurement  
**Contract Name:** FY 2016 PAC-3/MSE Production  
**Contractor:** Lockheed Martin Missiles and Fire Control  
**Contractor Location:** P.O. Box 650003  
 Dallas, TX 75265-0003  
**Contract Number:** W31P4Q-14-C-0034/3  
**Contract Type:** Fixed Price Incentive(Firm Target) (FPIF)  
**Award Date:** December 16, 2015  
**Definitization Date:**

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
1210.0	N/A	336	1210.0	1455.7	336	1210.0	1210.0

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date	0.0	0.0
Previous Cumulative Variances	--	--
Net Change	+0.0	+0.0

**Cost and Schedule Variance Explanations**

None

**General Contract Variance Explanation**

Cost and schedule variances are not reported for this contract, because EVM reporting has not commenced due to on-going negotiations. The majority of the contract requirements were definitized on December 16, 2015; however, the remaining Not to Exceed requirements remain in negotiation and are projected to be complete in 4th Quarter FY 2016. EVM reporting on the contract will begin when all contract requirements are definitized.

**Notes**

This is the first time this contract is being reported.

On December 16, 2015, the contract was modified to exercise the FY 2016 option production requirements. The modification added only a part of total requirements due to being under continuing resolution at the time of the modification. Contract requirements include: 48 U.S. PAC-3 MSE missiles (to include four test missiles) and other associated ground support equipment, 288 FMS PAC-3 Cost Reduction Initiative missiles and associated ground support equipment, and 37 FMS PAC-3 Launcher Modification Kits.

PAC-3 MSE deliveries are scheduled to begin in 3rd Quarter FY 2018.

**Contract Identification**

**Appropriation:** Procurement  
**Contract Name:** PAC-3 MSE MRT/ERT  
**Contractor:** Lockheed Martin Missiles and Fire Control  
**Contractor Location:** 1401 West Marshall Drive  
 Grand Prairie, TX 75051-2806  
**Contract Number:** W31P4Q-15-C-0039  
**Contract Type:** Fixed Price Incentive(Firm Target) (FPIF)  
**Award Date:** December 03, 2014  
**Definitization Date:** October 30, 2015

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
46.2	48.8	132	46.2	48.8	132	46.9	48.8

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/20/2015)	-4.5	-2.1
Previous Cumulative Variances	--	--
Net Change	-4.5	-2.1

**Cost and Schedule Variance Explanations**

The unfavorable cumulative cost variance is due to hardware requirements costing more than originally budgeted, issues with tube vendor requiring development of testing procedures and fixtures, issues with machined skid support casting vendor requiring tooling rework, engineering redesign efforts, and tooling issues.

The unfavorable cumulative schedule variance is due to design engineering, supplier parts, tooling issues and planning, programming, and control efforts being behind schedule due to fabrication of tactical Missile Round Trainers (MRT) and Empty Round Trainers (ERT) being behind schedule.

**Notes**

This is the first time this contract is being reported.

The PAC-3 MSE MRT and ERT production effort was awarded with a Not to Exceed value of \$49.96M on December 3, 2014 to Lockheed Martin Missiles and Fire Control. The contract was definitized on October 30, 2015. The MRT/ERT program objective is to provide MSE canister training capability by delivering 132 total units. This effort also includes production rate tooling and test equipment.

## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	15	27	1125	2.40%
Total Program Quantity Delivered	15	27	1125	2.40%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	6900.3	Years Appropriated	13
Expended to Date	1207.5	Percent Years Appropriated	59.09%
Percent Expended	17.50%	Appropriated to Date	2546.5
Total Funding Years	22	Percent Appropriated	36.90%

The above data is current as of February 09, 2016.

## Operating and Support Cost

### Cost Estimate Details

<b>Date of Estimate:</b>	January 19, 2016
<b>Source of Estimate:</b>	POE
<b>Quantity to Sustain:</b>	1125
<b>Unit of Measure:</b>	Total Quantity
<b>Service Life per Unit:</b>	30.00 Years
<b>Fiscal Years in Service:</b>	FY 2015 - FY 2057

The PAC-3 MSE approved APB procurement quantity is 1,057 missiles; however, the program received Congressional plus-ups in FY 2015 and FY 2016 to buy additional missiles and the program's current estimate is now 1,125 missiles.

The current O&S cost estimate for the PAC-3 MSE missile was updated since APB approval to reflect the program procurement quantity current estimate. The estimate includes the repair and recertification of PAC-3 MSE missiles. In addition, it includes all sustainment tasks needed to maintain the missile.

### Sustainment Strategy

The missile is transported and operates in a sealed container as a self-contained major end item and does not require sustainment in the field. The missile will be certified twice, at ten-year intervals, within its 30-year planned service life. Interim Contractor Support will be the sustainment strategy until an organic capability is established in FY 2021 (IOC plus four years). Once established, missiles will be shipped to Letterkenny Army Depot for diagnosis/testing, de-canning, repair and return of faulty or degraded missile subassemblies, reassembly, re-coating, and re-canning. Checkout and fault detection/isolation will be accomplished using depot test, measurement, and diagnostic equipment and peculiar test/support equipment. Missile sub-assemblies (five major sections) are returned to the original equipment manufacturer for repair. After the missile is repaired, an inspection will be performed prior to inserting the missile back into its tube to verify that current tactical software was uploaded as required.

### Antecedent Information

No Antecedent

Cost Element	Annual O&S Costs BY2014 \$M	
	PAC-3 MSE Average Annual Cost Per Total Quantity	No Antecedent (Antecedent)
Unit-Level Manpower	--	--
Unit Operations	--	--
Maintenance	35.744	--
Sustaining Support	14.660	--
Continuing System Improvements	14.058	--
Indirect Support	--	--
Other	--	--
<b>Total</b>	<b>64.462</b>	<b>--</b>

Item	Total O&S Cost \$M			
	PAC-3 MSE		Current Estimate	No Antecedent (Antecedent)
	Current Production APB Objective/Threshold			
<b>Base Year</b>	2660.6	2926.7	2771.9	N/A
<b>Then Year</b>	4354.3	N/A	4574.7	N/A

Disposal Cost is included in the Operating and Support Cost of the current APB objective and threshold for this program.

**Equation to Translate Annual Cost to Total Cost**

Total Missile O&S = \$64.462 (Average Annual O&S Cost) x 43 (years of service life) = \$2771.9M

O&S Cost Variance		
Category	BY 2014 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2014 SAR	2702.5	
Programmatic/Planning Factors	69.4	O&S cost estimate revised to reflect program increase of 32 missiles from 1,093 to 1,125.
Cost Estimating Methodology	0.0	
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
<b>Total Changes</b>	<b>69.4</b>	
Current Estimate	2771.9	

**Disposal Estimate Details**

**Date of Estimate:** January 19, 2016  
**Source of Estimate:** POE  
**Disposal/Demilitarization Total Cost (BY 2014 \$M):** Total costs for disposal of all Total Quantity are 13.8

Demilitarization costs were provided by Army Environmental Command.