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# AGM-88E ADVANCED ANTI-RADIATION GUIDED MISSILE (AGM-88E AARGM)

**December 2021 Selected Acquisition Report (SAR)**



**CLEARED AS AMENDED  
For Open Publication**

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**Common Acronyms and Abbreviations**

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(A&S) - Under Secretary of Defense (Acquisition and Sustainment)  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

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## Program Manager

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## Mission and Description

The AGM-88E Advanced Anti-Radiation Guided Missile (AGM-88E AARGM) program fields a major system upgrade to the AGM-88 High Speed Anti-Radiation Missile (HARM) inventory. The AGM-88E AARGM provides a significant enhancement to Naval operational capability in the Offensive Counter Air/Suppression of Enemy Air Defenses (SEAD) mission area by technological upgrade to the HARM guidance system to counter enemy use of simple and cheap countermeasures and tactics such as mobility and radar shutdown. The AGM-88E AARGM is employed in the Offensive Counter Air/SEAD role in direct support of all mission areas within the objective force (e.g., Strike Warfare, Amphibious Warfare, Anti-Surface Ship Warfare, Command and Control Warfare and Information Warfare) providing a rapid, organic response to air defense threats ranging from Smaller Scale Contingencies to Major Theater War. It is employed by Naval aircraft operating from both sea and land bases.

The AGM-88E AARGM missile provides a new multi-mode guidance section and modified control section mated with existing HARM propulsion and warhead sections. The new guidance section has a passive Anti-Radiation Homing receiver and associated antennae, a Global Positioning System/Inertial Navigation System, and Millimeter Wave radar for terminal guidance capability. The AGM-88E AARGM also has the capability to transmit terminal (end game) data via a Weapon Impact Assessment transmitter to national satellites just before AGM-88E AARGM impacts its target.

The AGM-88E AARGM is the acquisition upgrade and complement to HARM, the Navy's only Defense Suppression missile. Acquisition of AGM-88E AARGM is critical to addressing the limitations and shortcomings of HARM, which include counter shutdown capability, limited lethality against advanced threat air defense units, limited captive carry life and no impact reporting capability.

The AGM-88E AARGM is fielded on the F/A-18C-F, EA-18G and the Tornado Electronic Combat/Reconnaissance (Italian Air Force).

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## Executive Summary

The AGM-88E AARGM program is executing the production and sustainment phases of the program. FRP lot 7 deliveries were completed for Department of the Navy (DoN) on March 15, 2021. FRP lot 7 Italian Air Force builds were completed September 22, 2021. FRP lot 8 deliveries began on April 1, 2021 and have been extended through June 30, 2022 to offset delays due to FRP lot 9 hardware availability. FRP lot 9 deliveries are planned to begin in the end of June 2022. FRP lot 10 awarded on August 3, 2021 and will be the last DoN FRP contract for the AGM-88E AARGM Program. FRP lot 11 option awarded on November 16, 2021 for FMS only. U.S. Department of Defense and Italy Ministry of Defense agreed to a 10 year extension of the Production Sustainment Follow-on Development Memorandum of Agreement. Production Sustainment and Follow-on Development efforts will continue from November 2021 to November 2031.

This is the final submission of the Selected Acquisition Report (SAR) for the AGM-88E AARGM program.

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

## History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	Significant Development Description
Jun 2003	The AARGM AGM-88E program received Milestone B approval to enter the System Development and Demonstration (SD&D) acquisition phase.
Jun 2003	ATK Missile Systems Company (AMSC) was awarded the SD&D phase contract. A total of 40 development missiles were produced.
Jul 2003	Navy Acquisition Executive (NAE) approved the Development APB.
Oct 2003	The System Design Review was conducted.
Apr 2005	The System Preliminary Design Review was conducted.
Nov 2005	The Cooperative Development Memorandum of Agreement (MOA) between the U.S. and Italy was signed.
Feb 2006	The Critical Design Review was conducted.
May 2007	Completed Developmental Test (DT)-1 firing.
Oct 2007	NAE approved the Development APB Change 1.
Jul 2008	The AARGM Capabilities Production Document (CPD) was approved by JROC (152-08).
Sep 2008	The Milestone C Review was conducted. The Milestone C ADM granted LRIP authority with a not-to-exceed quantity of 187 units.
Sep 2008	The Operational Assessment (OA) was completed.
Dec 2008	The LRIP I contract was awarded.
Jan 2009	NAE approved the Production APB.
Nov 2009	A Cooperative Production, Sustainment and Follow-on Development MOA between the U.S. and Italy was signed.
Apr 2010	NAE approved the Production APB Change 1.
Apr 2010	OPNAV approved the AARGM CPD Change 1, serial number 808-88-10.

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Jun 2010	Initiated Operation Evaluation (OPEVAL) (Initial Operational Test & Evaluation (IOT&E).
Jul 2010	The LRIP II contract was awarded.
Nov 2010	A Verification of Correction of Deficiencies (VCD) period was conducted to address anomalies identified in IOT&E.
Feb 2011	NAE approved the Production APB Change 2.
Jul 2011	The AARGM program held a successful Operational Test Readiness Review (OTRR) and received approval to continue IOT&E.
Oct 2011	The LRIP III contract was awarded.
Nov 2011	NAE approved the Production APB Change 3.
Apr 2012	IOT&E was completed.
Jun 2012	A VCD period was conducted to address anomalies identified in IOT&E.
Jul 2012	IOC declared effective July 2012.
Aug 2012	The FRP Decision Review was conducted.
Sep 2012	The FRP lot 1 contract was awarded.
Nov 2012	ASN(RD&A) approved the Production APB Change 4.
May 2013	Letter of Offer and Acceptance between the U.S. and Australia was signed.
Sep 2013	The FRP lot 2 contract was awarded.
Apr 2014	The FRP lot 3 contract was awarded.
Sep 2015	The FRP lot 4 contract was awarded.
Feb 2016	PB 2017 increased the total quantity objective from 1,879 to 2,435 AGM-88E AARGM and extended production through FY 2023.
Apr 2016	The FRP lot 5 contract was awarded.
Jun 2016	ASN(RD&A) approved the Production APB Change 5.
May 2017	Fleet release of the Block 1 Upgrade was initiated.
Aug 2017	The FRP lot 6 contract was awarded.
Sep 2017	Letter of Offer and Acceptance between the U.S. and Australia was signed.
Oct 2017	The FRP lot 6 contract for Italy was awarded.
Jan 2018	Fielding of the Block 1 Upgrade was completed.
Apr 2018	Integration of AARGM on the Italian Air Force's Tornado aircraft was completed with successful Operational Testing.
May 2018	The FRP lot 7 contract was awarded for U.S. and Australia.
Sep 2018	The FRP lot 7 contract for Italy was awarded.
Jan 2019	Letter of Offer and Acceptance between the U.S. and Federal Republic of Germany was signed.
Jul 2019	The FRP lot 8 contract was awarded.
Sep 2019	The FRP lot 8 contract for Italy was awarded.
Sep 2019	The FRP lot 9 option was established.

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Dec 2019	Letter of Offer and Acceptance between the U.S. and Federal Republic of Germany was signed.
Jan 2020	ASN(RD&A) approved the Production APB Change 6.
Mar 2020	The FRP lot 9 contract was awarded.
Mar 2020	DoN notified the Congressional Committees of the significant Nunn-McCurdy breach.
Aug 2021	The FRP lot 10 was awarded.
Oct 2021	An amendment to the Cooperative Production, Sustainment and Follow-on Development MOA between the U.S. and Italy was signed.
Nov 2021	The FRP 11 option was awarded.

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## Schedule

### Schedule Events

Schedule Events					
Events	Development APB Objective	Current APB Development Objective/Threshold		Current Estimate/Actual	Deviation
Milestone B Decision	Apr 2003	Apr 2003	Oct 2003	Jun 2003	
SD&D Contract Award	May 2003	May 2003	Nov 2003	Jun 2003	
Beginning of TECH EVAL	Mar 2007	Mar 2007	Sep 2007	Mar 2007	
Milestone C Decision (LRIP)	Mar 2008	Mar 2008	Sep 2008	Sep 2008	
Beginning of OPEVAL	Mar 2009	Mar 2010	Sep 2010	Jun 2010	
IOC	Nov 2010	Feb 2012	Aug 2012	Jul 2012	
FRP Decision	Jul 2010	Mar 2012	Sep 2012	Aug 2012	
FRP Contract Award	Dec 2010	Apr 2012	Oct 2012	Sep 2012	

### Significant Schedule Risks

Significant Schedule Risks	
Current Estimate (December 2021)	
1.	Technical: Millimeter Wave (MMW) (Milestone B (June 2003))
2.	Schedule: Test Schedule (Milestone C (September 2008))
3.	Cost, Schedule and Technical: Block 1 Upgrade (The FRP Decision (August 2012))
4.	Cost and Schedule: Obsolescence Management (Current Estimate (June 2021))

## Performance

Performance Characteristics				
Development APB Objective	Current APB Development Objective/Threshold	Demonstrated Performance (include Date of Demonstration)	Current Estimate/Actual	Deviation
<b>Material Availability</b>				
>=0.95	>=0.95	>=0.9	.98	.96
<b>Net Ready</b>				
The system must fully support execution of all operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for Net -Centric military operations to include (1) DISR-mandated GIG IT standards and profiles identified in the TV-1; (2) DISR -man dated GIG KIPs identified in the KIP declaration table; (3) NCOW RM Enterprise Services; (4) IA requirements including availability, integrity, authentication, confidentiality, and non-repudiation, and issuance of an ATO by the DAA; and 5) Operationally effective IEs, and mission critical performance and IA attributes, data correctness, data availability, and	The system must fully support execution of all operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for Net -Centric military operations to include (1) DISR-mandated GIG IT standards and profiles identified in the TV-1; (2) DISR -mandated GIG KIPs identified in the KIP declaration table; (3) NCOW RM Enterprise Services; (4) IA requirements including availability, and	The system must fully support execution of joint critical operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for transition to Net-Centric military operations to include 1) DISR-mandated GIG IT standards and profiles identified in the TV-1; 2) DISRmandated GIG KIPs identified in the KIP declaration table; 3) NCOW RM Enterprise Services; 4) IA requirements including availability, integrity,	The system must fully support execution of joint critical operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for transition to Net-Centric military operations to include 1) DISR - mandated GIG IT standards and profiles identified in the TV-1; 2) DISR mandated GIG KIPs identified in the KIP declaration table; 3) NCOW RM Enterprise Services; 4) IA requirements including availability, integrity, authentication, confidentiality, and non-repudiation, and issuance of an IATO by the DAA; and 5) Operation-ally effective IEs; and mission critical performance and IA attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views.	The system must fully support execution of joint critical operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for transition to Net-Centric military operations to include 1) DISR - mandated GIG IT standards and profiles identified in the TV-1; 2) DISR mandated GIG KIPs identified in the KIP declaration table; 3) NCOW RM Enterprise Services; 4) IA requirements including availability, integrity, authentication, confidentiality, and nonrepudiation, and issuance of an IATO by the DAA; and 5) Operationally effective IEs; and mission critical performance and IA attributes, data correctness, data availability, and consistent data processing specified in joint and system integrated architecture views.

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Performance Characteristics					
Development APB Objective	Current APB Development Objective/Threshold		Demonstrated Performance (include Date of Demonstration)	Current Estimate/Actual	Deviation
consistent data processing specified in the applicable joint and system integrated architecture views.	integrity, authentication, confidentiality, and non-repudiation, and issuance of an ATO by the DAA; and 5) Operationally effective IEs, and mission critical performance and IA attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views.	authentication, confidentiality and non-repudiation, and issuance of an IATO by the DAA; and 5) Operationally effective IEs; and mission critical performance and IA attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views.			
<b>Probability of Correct Identification (PCID) of a Target Emmitter</b>					
>=0.99 PCID for all emitters in the AARGM CPD Appendix D	>=0.99 PCID for all emitters in the AARGM CPD Appendix D	>=0.95 PCID of available threshold emitters in the AARGM CPD Appendix D	0.95 PCID of available threshold emitters in the AARGM CPD Appendix D	0.95 PCID for all emitters in the AARGM CPD Appendix D	

**Performance Notes:**

Classified Performance information is provided in the Classified Annex to this submission.

**Requirements Source:**

Capability Production Document: JROC, Dated April 1, 2010

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## Acquisition Budget Estimate

### Total Acquisition Cost

Category	Base Year	Development APB	Current Production APB 01/31/2020		Budget Estimate PB 2023		Deviation
		Objective (BY\$)	Objective (BY\$)	Threshold (BY\$)	BY\$	TY\$	
RDT&E	2003	533.3	673.1	734.4	673.1	716.7	
Procurement	2003	806.5	1123.0	1203.3	1114.1	1485.0	
MILCON	2003	0.0	0.0	0.0	0.0	0.0	
Acq. O&M	2003	0.0	0.0	0.0	0.0	0.0	
<b>Total</b>							
PAUC	2003	0.748	0.975	1.051	0.968	1.192	
APUC	2003	0.461	0.623	0.667	0.617	0.822	

### Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	40	40
Procurement	1803	1807*

**Budget Notes:**

Current APB Cost reflects the POE, dated December 04, 2019

**Quantity Notes:**

\*During FRP 10 procurement, negotiated price resulted in procurement of four additional guidance sections.

### Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
<b>Current Procurement Cost (December 2021)</b>	
1.	TY\$M = 1491.3, BY03\$M = 1122.2, Quantity = 1803
<b>Original Baseline Estimate (July 2003)</b>	
1.	TY\$M = 972.9, BY03\$M = 806.5, Quantity = 1750
<b>Revised Original Estimate (N/A)</b>	
None	
<b>Current Baseline Estimate (Month YYYY)</b>	
1.	None

## Unit Cost

### *Current Baseline Compared with Current Estimate*

Category (BY 2003 \$M)	Current APB Objective	Current Estimate	% Change	NMC Breach
<b>PAUC</b>				
Cost	1796.1	1787.2	-	-
Quantity	1843	1847	-	-
Unit Cost	0.975	0.968	-0.72	
<b>APUC</b>				
Cost	1123.0	1114.1	-	-
Quantity	1803	1807	-	-
Unit Cost	0.623	0.617	-0.96	

### *Original Baseline Compared with Current Estimate*

Category (BY 2003 \$M)	Original Objective	Current Estimate	% Change	NMC Breach
<b>PAUC</b>				
Cost	1339.8	1787.2	-	-
Quantity	1790	1847	-	-
Unit Cost	0.748	0.968	+29.41	
<b>APUC</b>				
Cost	806.5	1114.1	-	-
Quantity	1750	1807	-	-
Unit Cost	0.461	0.617	+33.84	

#### **Unit Cost Notes:**

AGM-88E AARGM reported a significant Nunn-McCurdy breach in the December 2019 SAR. The DON notified the Congressional Committees of the Significant Nunn-McCurdy breach in accordance with U.S.C. §2433 on March 24, 2020.

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## Contracts

FRP 6/7 is not reported because the contract is 100% complete and closed.

Contract Data (\$TYM)		
Contract Number	N00019-19-C-0049	
Effort Number		
Modification Number	P00020	
Award Date	January 12, 2022	
Definitization Date	N/A	
Order Number		
CAGE Code/CAGE Legal Name	3EFM9 / Alliant Techsystems Operations, LLC	
Contract Title	AARGM FRP 8/9	
Contract Address	9401 Corbin Avenue Northridge, CA 91324	
Contracts/Effort Price, Quantity, and Performance (\$M)		
Initial Target Price	Current Target Price	
167.3	351	
Initial Ceiling Price	Current Ceiling Price	
167.3	351	
Contract's EAC: N/A	PM's EAC: N/A	
Initial Quantity	Current Quantity	Delivered Quantity
263	551	193
BAC	BCWP	ACWP
N/A	N/A	N/A
BCWS	Cost Variance	Schedule Variance
N/A	N/A	N/A

### Contract Notes:

The contract value of \$351M includes USN, ITAF and Germany requirements for AURs, CATMs and contractor production support.

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Contract Data (\$TYM)		
Contract Number	N000-19-21-C-0013	
Effort Number		
Modification Number	P00002	
Award Date	November 29, 2021	
Definitization Date	N/A	
Order Number		
CAGE Code/CAGE Legal Name	3EFM9 / Alliant Techsystems Operations, LLC	
Contract Title	AARGM FRP 10/11	
Contract Address	9401 Corbin Avenue Northridge, CA 91324	
Contracts/Effort Price, Quantity, and Performance (\$M)		
Initial Target Price	Current Target Price	
94.88	144	
Initial Ceiling Price	Current Ceiling Price	
94.88	144	
Contract's EAC	PM's EAC	
N/A		
Initial Quantity	Current Quantity	Delivered Quantity
N/A	N/A	N/A
BAC	BCWP	ACWP
N/A	N/A	N/A
BCWS	Cost Variance	Schedule Variance
N/A	N/A	N/A

**Contract Notes:**

The contract value of \$144M includes USN, ITAF and Germany requirements for AURs, CATMs and contractor production support.

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## Technologies and Systems Engineering

### *Significant Technical Risks*

Significant Technical Risks	
Current Estimate (December 2021)	
1.	None

## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	40	40	40	100.00%
Production	1807	1384	1807	76.59%
Total Program Quantity Delivered	1847	1424	1847	77.09%

### Expended and Appropriated (TY \$M)

Total Acquisition Cost: 2201.8

Expended to Date: 1999.99

Percent Expended: 90.83%

Total Funding Years: 20

Years Appropriated: 2002-2021

Percent Years Appropriated: 100%

Appropriated to Date: 2201.8

Percent Appropriated: 100%

The above data is current as of April 18, 2022.

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## Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
<b>Approval Date</b>	9/30/2008	1/18/2011
<b>Approved Quantity</b>	187	112
<b>Reference</b>	Milestone C ADM	Gate 6 Sufficiency Review
<b>Start Year</b>	2008	2008
<b>End Year</b>	2010	2011

### LRIP Note:

Milestone C ADM of September 30, 2008 originally granted LRIP authority utilizing FY 2008 - FY 2010 funding, with a not-to-exceed quantity of 187 units. Deliveries for Phase I of LRIP, utilizing FY 2008 and FY 2009 funding, completed in October 2011. Deliveries for LRIP II, a Firm-Fixed-Price (FFP) contract utilizing FY 2010 funding, completed in November 2012. Due to delays in Initial Operational Test & Evaluation, and to avoid a production line break, the incorporation of a third LRIP into the AGM-88E AARGM Acquisition Strategy, utilizing FY 2011 funding, was approved on January 18, 2011 by the Assistant Secretary of the Navy (Research, Development, and Acquisition) at the Gate 6 Sufficiency Review. The total LRIP quantity remained under the not-to-exceed quantity of 187 units, which does not exceed the 10% guideline. The LRIP III FFP contract was awarded on October 31, 2011 at the Government's cost goal. Deliveries for LRIP III began in December 2012 and completed in December 2013.

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## Operating and Support Costs

### Total Program O&S Cost Compared with Baseline

	Current APB Objective (BY\$)	Current APB Threshold (BY\$)	Current Estimate (BY\$)	Current Estimate (TY\$)	Deviation
Total O&S (\$Millions)	125.2	137.7	125.2	197.7	

### O&S Cost Breakdown

Allocate O&S estimate by each weapon system (or system variants) acquired by the program) into the CAPE Cost Categories. Add a fresh column for each variant/system.

Category (BY03\$ Million)	AGM-88E AARGM	AGM-88 HARM (Antecedent)
Unit-Level Manpower	0.0	0.000
Unit Operations	0.962	0.000
Maintenance	29.978	36.00
Sustaining Support	64.480	34.00
Continued System Improvements	29.770	32.00
Other	0.0	0.00
Total O&S	125.190	102.000

**Cost Estimate Source:** Program Office Estimate dated December 04, 2019.

### O&S Cost Notes:

- a. Disposal/Demilitarization Cost Estimate and Source of Estimate:  
Total costs for disposal of all 1803 units is \$6.4M (BY\$ 2003).
- b. Sustainment Strategy:  
The AGM-88E AARGM sustainment approach is leveraged off of the existing HARM maintenance structure. The system is supported via a modified three level maintenance concept utilizing Organizational (O), Intermediate (I), Depot levels and a Designated Overhaul Point (DOP) for the AGM-88E AARGM unique components (guidance and control sections). The Original Equipment Manufacturer is the DOP for guidance and control section repair based on the completed Joint Depot Source of Repair Decision process. There are no changes to the manpower requirements or manning levels at activities that will operate and provide support to AGM-88E AARGM as O-level and I-level; capabilities are consistent with the HARM operations.
- c. For Each Acquired System or System Variant:
  - i. Quantity to Sustain: 1803
  - ii. First Operational Fiscal Year: FY 2012
  - iii. Final Operational Fiscal Year: FY 2038
  - iv. Unit Expected Service Life: 26 Years
- d. Antecedent System(s) O&S Costs:
  - i. The Antecedent System is the HARM. Data is based on a HARM period of performance of FY 1990 - FY 2009 (20 years), vice FY 2012 - FY 2038 (26 years) for AARGM. Historical O&S costs were collected from the Naval Visibility & Management of Operating and Support Costs database. Antecedent costs are not normalized to the AGM-88E AARGM parameters.

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