



Navy Aegis Ballistic Missile Defense (BMD) Program: Background and Issues for Congress

Ronald O'Rourke
Specialist in Naval Affairs

November 29, 2011

Congressional Research Service

7-5700

www.crs.gov

RL33745

Summary

The Aegis ballistic missile defense (BMD) program, which is carried out by the Missile Defense Agency (MDA) and the Navy, gives Navy Aegis cruisers and destroyers a capability for conducting BMD operations. Under MDA and Navy plans, the number of BMD-capable Navy Aegis ships is scheduled to grow from 23 at the end of FY2011 to 41 at the end of FY2016, and the cumulative number of SM-3 Aegis BMD interceptor missiles delivered to the Navy is scheduled to grow from 111 at the end of FY2011 to 341 at the end of FY2016.

Under the Administration's European Phased Adaptive Approach (EPAA) for European BMD operations, BMD-capable Aegis ships have begun operating in European waters to defend Europe from potential ballistic missile attacks from countries such as Iran. On October 5, 2011, the United States, Spain, and NATO jointly announced that, as part of the EPAA, four BMD-capable Aegis ships are to be forward-homeported (i.e., based) at Rota, Spain, beginning in 2014. BMD-capable Aegis ships also operate in the Western Pacific and the Persian Gulf to provide regional defense against potential ballistic missile attacks from countries such as North Korea and Iran.

The Aegis BMD program is funded mostly through MDA's budget. The Navy's budget provides additional funding for BMD-related efforts. MDA's proposed FY2012 budget requests a total of \$2,380.3 million in procurement and research and development funding for Aegis BMD efforts, including funding for Aegis Ashore sites that are to be part of the EPAA.

Some observers are concerned—particularly in light of the EPAA—that demands from U.S. regional military commanders for BMD-capable Aegis ships are growing faster than the number of BMD-capable Aegis ships. They are also concerned that demands from U.S. regional military commanders for Aegis ships for conducting BMD operations could strain the Navy's ability to provide regional military commanders with Aegis ships for performing non-BMD missions.

Issues for Congress include demands for BMD-capable Aegis ships, demands for Aegis ships in general, the U.S. economic impact of shifting four Aegis ships to Rota, Spain, U.S. vs. European naval contributions to European BMD, the capability of the SM-3 Block IIB Aegis BMD interceptor, and technical risk in the Aegis program.

Contents

Introduction.....	1
Background.....	1
Navy Aegis Ships	1
Ticonderoga (CG-47) Class Aegis Cruisers	1
Arleigh Burke (DDG-51) Class Aegis Destroyers	1
Projected Aegis Ship Force Levels.....	2
Aegis Ships in Allied Navies.....	2
Aegis BMD System.....	3
Versions of Aegis BMD System.....	3
Aegis BMD Interceptor Missiles.....	3
European Phased Adaptive Approach (EPAA) for European BMD	5
General	5
Aegis Ashore Sites	6
First BMD-Capable Aegis Ship Deployed As Part of EPAA	7
Planned Numbers of BMD-Capable Aegis Ships and SM-3 Interceptors	7
Home Ports of BMD-Capable Aegis Ships	9
Pacific vs. Atlantic Fleet Homeporting	9
October 5, 2011, Announcement of Homeporting in Spain to Start in 2014.....	9
Aegis BMD Flight Tests.....	12
Allied Participation and Interest in Aegis BMD Program	13
Japan.....	13
Other Countries	13
FY2012 Funding Request.....	14
Issues for Congress	16
Demands for BMD-Capable Aegis Ships.....	16
Demands for Aegis Ships in General.....	20
U.S. Economic Impact of Shifting Four Aegis Ships to Rota, Spain	23
U.S. vs. European Naval Contributions to European BMD	24
Capability of SM-3 Block IIB Interceptor.....	24
Technical Risk in Aegis BMD Program	26
March 2011 GAO Report.....	27
April 2011 Press Report	30
Additional Issues Concerning European Aegis BMD Operations.....	32
Legislative Activity for FY2012	37
Summary of Action on FY2012 MDA Funding Request	37
FY2012 National Defense Authorization Bill (H.R. 1540/S. 1867/S. 1253).....	38
House.....	38
Senate (S. 1867)	44
Senate (S. 1253)	44
FY2012 DOD Appropriations Bill (H.R. 2219)	46
House.....	46
Senate	46

Tables

Table 1. Versions of Aegis BMD System.....	5
Table 2. Numbers of BMD-Capable Aegis Ships and SM-3 Missiles.....	8
Table 3. MDA Funding for Aegis BMD Efforts, FY2011-FY2016.....	15
Table 4. Summary of Congressional Action on FY2012 Request for MDA Procurement and RDT&E Funding for Aegis BMD Program.....	38
Table B-1. Aegis BMD Flight Tests Since January 2002.....	61

Appendixes

Appendix A. Additional Background Information European Phased Adaptive Approach (EPAA).....	48
Appendix B. Aegis BMD Flight Tests.....	61

Contacts

Author Contact Information.....	73
---------------------------------	----

Introduction

This report provides background information and issues for Congress on the Aegis ballistic missile defense (BMD) program, which is carried out by the Missile Defense Agency (MDA) and the Navy, and gives Navy Aegis cruisers and destroyers a capability for conducting BMD operations. Issues for Congress concerning the Aegis BMD program include demands for BMD-capable Aegis ships, demands for Aegis ships in general, the U.S. economic impact of shifting four Aegis ships to Rota, Spain, U.S. vs. European naval contributions to European BMD, the capability of the SM-3 Block IIB Aegis BMD interceptor, and technical risk in the Aegis program.

Background

Navy Aegis Ships

The Navy's cruisers and destroyers are called Aegis ships because they are equipped with the Aegis ship combat system—an integrated collection of sensors, computers, software, displays, weapon launchers, and weapons named for the mythological shield that defended Zeus. The Aegis system was originally developed in the 1970s for defending ships against aircraft, anti-ship cruise missiles (ASCMs), surface threats, and subsurface threats. The system was first deployed by the Navy in 1983, and it has been updated many times since. The Navy's Aegis ships include Ticonderoga (CG-47) class cruisers and Arleigh Burke (DDG-51) class destroyers.

Ticonderoga (CG-47) Class Aegis Cruisers

A total of 27 CG-47s were procured for the Navy between FY1978 and FY1988; the ships entered service between 1983 and 1994. The first five, which were built to an earlier technical standard, were judged by the Navy to be too expensive to modernize and were removed from service in 2004-2005. The remaining 22 are scheduled to remain in service until age 35.

Arleigh Burke (DDG-51) Class Aegis Destroyers¹

62 Flight I/II and Flight IIA DDG-51s Procured in FY1985-FY2005

A total of 62 DDG-51s were procured for the Navy between FY1985 and FY2005; the first entered service in 1991 and the 62nd is scheduled to enter service in FY2012. The first 28 ships, known as Flight I/II DDG-51s, are scheduled to remain in service until age 35. The next 34 ships, known as Flight IIA DDG-51s, incorporate some design changes and are to remain in service until age 40.

¹ For more on the DDG-51 program, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.

No DDG-51s Procured in FY2006-FY2009

No DDG-51s were procured in FY2006-FY2009. The Navy during this period instead procured three Zumwalt (DDG-1000) class destroyers. The DDG-1000 design does not use the Aegis system and does not include a capability for conducting BMD operations. Navy plans do not call for modifying DDG-1000s to make them BMD-capable.

12 Flight IIA DDG-51s Procured or Programmed for FY2010-FY2017

Procurement of DDG-51s resumed in FY2010. One Flight IIA DDG-51 was procured in FY2010; the ship is scheduled to enter service in FY2016. Another two were procured in FY2011, and Navy plans call for procuring nine more Flight IIA DDG-51s in FY2012-FY2017 in annual quantities of 1-2-2-2-0-2.

22 Flight III DDG-51s Envisioned for Procurement in FY2016-FY2031

Navy plans call for shifting in FY2016 to procurement of a new version of the DDG-51, called the Flight III version, that is to be equipped with a new radar, called the Air and Missile Defense Radar (AMDR), that is more capable than the SPY-1 radar installed on all previous Aegis cruisers and destroyers. The one DDG-51 that the Navy plans to procure in FY2016 is to be the first Flight III ship, and the Navy's 30-year (FY2012-FY2041) shipbuilding plan calls for procuring 21 more Flight III DDG-51s between FY2018 and FY2031.²

Projected Aegis Ship Force Levels

The Navy's 30-year (FY2012-FY2041) shipbuilding plan projects that the total number of Aegis cruisers and destroyers will grow from 84 at the end of FY2011 to a peak of 94 in FY2020 and FY2021, and then decline thereafter as CG-47s and older DDG-51s retire and are replaced by new DDG-51s on a less than one-for-one basis, reaching a minimum of 65 ships in FY2034 before growing back to 75 ships in FY2041.³

Aegis Ships in Allied Navies

Sales of the Aegis system to allied countries began in the late 1980s. Allied countries that now operate, are building, or are planning to build Aegis-equipped ships include Japan, South Korea, Australia, Spain, and Norway.⁴

² Supplementary data on 30-year shipbuilding plan provided to CRS and CBO by the Navy in late May 2011.

³ Supplementary data on 30-year shipbuilding plan provided to CRS and CBO by the Navy in late May 2011. The Navy's cruiser-destroyer force during this period is also to include the three DDG-1000s procured in FY2006-FY2009.

⁴ The Norwegian ships are somewhat smaller than the other Aegis ships, and consequently carry a reduced-size version of the Aegis system that includes a smaller, less-powerful version of the SPY-1 radar.

Aegis BMD System⁵

Aegis ships are given a capability for conducting BMD operations by incorporating changes to the Aegis system's computers and software, and by arming the ships with BMD interceptor missiles. In-service Aegis ships can be modified to become BMD-capable ships, and DDG-51s procured in FY2010 and subsequent years are to be built from the start with a BMD capability.

Versions of Aegis BMD System

Currently fielded versions of the Aegis BMD system are called the 3.6.1 version and the newer and more capable 4.0.1 version. MDA and Navy plans call for fielding increasingly capable versions in coming years; these planned versions are called 5.0, 5.1, and 5.2. Improved versions feature improved processors and software, and are to be capable of using improved versions of the SM-3 interceptor missile (see **Table 1**).

MDA states that an in-service Aegis ship with no BMD capability can be given a 3.6.1 BMD capability for about \$10 million to \$15 million, or a 4.0.1 BMD capability for about \$53 million. MDA states that an in-service ship with a 3.6.1 BMD capability can be upgraded to a 4.0.1 BMD capability for about \$45 million to \$55 million.⁶

Aegis BMD Interceptor Missiles

The BMD interceptor missiles used by Aegis ships are the Standard Missile-3 (SM-3) and the Standard Missile-2 Block IV (SM-2 Block IV). The SM-3 is designed to intercept ballistic missiles above the atmosphere, in the midcourse phase of an enemy ballistic missile's flight. It is equipped with a "hit-to-kill" warhead, called a kinetic warhead, that is designed to destroy a ballistic missile's warhead by colliding with it. The SM-2 Block IV is designed to intercept ballistic missiles inside the atmosphere, during the terminal phase of an enemy ballistic missile's flight. It is equipped with a blast fragmentation warhead.

SM-3 Interceptor

MDA and Navy plans call for fielding increasingly capable versions of the SM-3 in coming years. The current version, called the SM-3 Block IA, is now being supplemented by the more capable SM-3 Block IB. These are to be followed by the SM-3 Block IIA and the SM-3 Block IIB.

Compared to the Block IA version, the Block IB version has an improved (two-color) target seeker, an advanced signal processor, and an improved divert/attitude control system for adjusting its course.

In contrast to the Block IA and IB versions, which have a 21-inch-diameter booster stage at the bottom but are 13.5 inches in diameter along the remainder of their lengths, the Block IIA version is to have a 21-inch diameter along its entire length. The increase in diameter to a uniform 21 inches provides more room for rocket fuel, permitting the Block IIA version to have a burnout

⁵ Unless stated otherwise, information in this section is taken from an MDA briefing on the Aegis BMD program given to CRS and CBO analysts on March 18, 2010.

⁶ Source: MDA briefing to congressional staff, March 2011.

velocity (a maximum velocity, reached at the time the propulsion stack burns out) that is 45% to 60% greater than that of the Block IA and IB versions,⁷ as well as a larger-diameter kinetic warhead. The United States and Japan have cooperated in developing certain technologies for the Block IIA version, with Japan funding a significant share of the effort.⁸

Compared to the Block IIA, the Block IIB version is to include a lighter kill vehicle, flexible propulsion, and upgraded fire control software.⁹

MDA states that SM-3 Block IAs have a unit procurement cost of about \$9 million to \$10 million, that SM-3 Block IBs have an estimated unit procurement cost of about \$12 million to \$15 million, and that SM-3 Block IIAs have an estimated unit procurement cost of about \$20 million to \$24 million.

SM-2 Interceptor

The existing inventory of SM-2 Block IVs—72 as of February 2011—was created by modifying SM-2s that were originally built to intercept aircraft and ASCMs. A total of 75 SM-2 Block IVs were modified, and three have been used in BMD flight tests, leaving the current remaining inventory of 72.

MDA and Navy plans call for developing and procuring a more capable terminal-phase BMD interceptor called the sea-based terminal (SBT) interceptor. The SBT interceptor is to be based on the SM-6 air defense missile (the successor to the SM-2 air defense missile). The initial version of the SBT, called SBT Increment 1, is to enter service around 2015; a subsequent version, called SBT Increment 2, is to enter service around 2018.

Table 1 summarizes the various versions of the Aegis BMD system and correlates them with the phases of the European Phased Adaptive Approach (or EPAA; see below) for European BMD operations.

⁷ The 13.5-inch version has a reported burnout velocity of 3.0 to 3.5 kilometers per second (kps). See, for example, J. D. Marshall, *The Future Of Aegis Ballistic Missile Defense*, point paper dated October 15, 2004, available at <http://www.marshall.org/pdf/materials/259.pdf>; “STANDARD Missile-3 Destroyers a Ballistic Missile Target in Test of Sea-based Missile Defense System,” Raytheon news release circa January 26, 2002, available at http://www.prnewswire.com/cgi-bin/micro_stories.pl?ACCT=683194&TICK=RTN4&STORY=/www/story/01-26-2002/0001655926&EDATE=Jan+26,+2002; and Hans Mark, “A White Paper on the Defense Against Ballistic Missiles,” *The Bridge*, summer 2001, pp. 17-26, available at [http://www.nae.edu/nae/bridgecom.nsf/weblinks/NAEW-63BM86/\\$FILE/BrSum01.pdf?OpenElement](http://www.nae.edu/nae/bridgecom.nsf/weblinks/NAEW-63BM86/$FILE/BrSum01.pdf?OpenElement). See also the section on “Sea-Based Midcourse” in CRS Report RL31111, *Missile Defense: The Current Debate*, by Steven A. Hildreth et al.

⁸ The cooperative research effort has been carried out under a U.S.-Japan memorandum of agreement signed in 1999. The effort has focused on risk reduction for four parts of the missile: the sensor, an advanced kinetic warhead, the second-stage propulsion, and a lightweight nose cone. The Block IIA development effort includes the development of a missile, called the Block II, as a stepping stone to the Block IIA. As a result, the Block IIA development effort has sometimes been called the Block II/IIA development effort. The Block II missile is not planned as a fielded capability.

⁹ Source: H.Rept. 111-491 of May 21, 2010 (the House Armed Services Committee report on H.R. 5136, the FY2011 defense authorization bill), p. 196.

Table I. Versions of Aegis BMD System

EPAA Phase	Phase I	Phase II	Phase III	Phase IV	
Version of Aegis BMD system	3.6.1	4.0.1	5.0/5.0.1	5.1/5.1.1	5.1/5/1.1
Certified for initial use	2006	2012	2014	2018	2020
OTE assessment	2008	2014	2016	2020	2022
Mid-course interceptor(s) used					
SM-3 Block IA	X	X	X	X	X
SM-3 Block IB		X	X	X	X
SM-3 Block IIA				X	X
SM-3 Block IIB					X
Terminal-phase interceptor used					
SM-2 Block IV	X			X	
SBT Increment 1			X		
SBT Increment 2				X	X
Types of ballistic missiles that can be engaged					
SRBM	Yes	Yes	Yes	Yes	Yes
MRBM	Yes	Yes	Yes	Yes	Yes
IRBM	Limited	Yes	Yes	Enhanced	Enhanced
ICBM	No ^a	No ^a	No ^a	Limited	Limited
Launch or engage on remote capability					
Launch on remote	Initial	Enhanced	Yes	Yes	Yes
Engage on remote	No	No	No	Yes	Yes

Source: MDA briefings to CRS and the Congressional Budget Office (CBO), March 2010 and March 2011.

Notes: **OTE** is operational test and evaluation. **SRBM** is short-range ballistic missile; **MRBM** is medium-range ballistic missile; **IRBM** is intermediate-range ballistic missile; **ICBM** is intercontinental ballistic missile. **Launch on remote** is the ability to launch the interceptor using data from off-board sensors. **Engage on remote** is the ability to engage targets using data from off-board sensors.

- a. Cannot intercept ICBMs, but the system has a long-range search and track (LRS&T) capability—an ability to detect and track ballistic missiles at long ranges.

European Phased Adaptive Approach (EPAA) for European BMD

General

On September 17, 2009, the Obama Administration announced a new approach for European BMD operations called the European Phased Adaptive Approach (EPAA). EPAA calls for using BMD-capable Aegis ships and eventually Aegis Ashore sites to defend Europe against ballistic missile threats from countries such as Iran. The EPAA is to be implemented in four phases between 2011 and 2020. A DOD official summarized the four phases as follows in April 2010 testimony:

In Phase 1, out through the 2011 timeframe, existing missile defenses to defend against short- and medium-range ballistic missiles will be deployed. Phase 1 will be accomplished by deploying a forward-based sensor and utilizing BMD-capable Aegis ships carrying SM-3 Block IA interceptors.

In Phase 2, in the 2015 timeframe, improved interceptors and sensors to defend against SRBMs and MRBMs will be deployed. The architecture will be expanded with a land-based SM-3 site in Southern Europe and the deployment of SM-3 Block IB interceptors.

In Phase 3, in the 2018 timeframe, to improve coverage against medium- and intermediate-range ballistic missiles, a second land-based SM-3 site will be deployed in Northern Europe. This will include use of the more capable SM-3 Block IIA interceptors on land and at sea to cover all NATO Europe countries.

In Phase 4, a decade from now, to address the threat of potential ICBM attack from the Middle East, the next generation SM-3 interceptor, the Block IIB, will be available for land-based sites. This interceptor, with its higher velocity, is intended to provide the ability to engage longer-range ballistic missiles and to intercept threats in their ascent phase.¹⁰

The Administration has stated that the phased adaptive approach can be used for structuring BMD operations in other regions, such as the Western Pacific and the Persian Gulf. For more on the EPAA, see **Appendix A**.

Aegis Ashore Sites

The EPAA calls for fielding two land-based Aegis BMD systems in Europe. Each of these Aegis Ashore sites, as they are called, would include, among other things, a land-based Aegis SPY-1 radar and 24 SM-3 missiles. The Aegis Ashore sites would launch SM-3 missiles from a re-locatable Vertical Launch System (VLS) based on the VLS that is installed in Navy Aegis ships for launching missiles. MDA states:

In 2015, Aegis Ashore will install a system in Romania, as part of the PAA Phase II. This deployed capability will use Aegis BMD 5.0 and SM-3 Block IB to provide ballistic missile coverage of Southern Europe.

¹⁰ Statement of Dr. Brad Roberts, Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy, Before the House Armed Services Committee, April 15, 2010, p. 9. An MDA official testifying at the same hearing summarized the four phases as follows:

The Phase 1 capability (planned to begin deployment in 2011) will provide initial protection for southern Europe from existing short- and medium-range threats using sea-based interceptors and forward-based sensors. Phase 2 (~2015) deploys the SM-3 IB interceptor at sea and at an Aegis Ashore site. In collaboration with OSD Policy, USSTRATCOM, the Department of State, and United States European Command (USEUCOM), we are preparing to begin negotiations with Romania to locate an Aegis Ashore site on its territory in 2015. Phase 3 (~2018) employs SM-3 IIA on land and at sea to protect NATO from SRBM, MRBM, and IRBM threats. Poland has agreed to host this Aegis Ashore site. The Phase 4 architecture (~2020 timeframe) features the higher velocity land-based SM-3 IIB, a persistent sensor network, and enhanced command and control system to intercept large raids of medium- to long-range missiles early in flight.

(Unclassified Statement of Lieutenant General Patrick J. O'Reilly, Director, Missile Defense Agency, Before the House Armed Services Committee Subcommittee on Strategic Forces Regarding the Fiscal Year 2011 Missile Defense Programs, Thursday, April 15, 2010, pp. 5-6.)

In 2018, Aegis Ashore will install a system in Poland, as part of the PAA Phase III. This deployed capability will use Aegis BMD 5.1 and SM-3 Block IB and IIA to support defense of Northern Europe.

In 2020, Aegis Ashore systems will be upgraded with the future variants of Aegis BMD and SM-3.¹¹

First BMD-Capable Aegis Ship Deployed As Part of EPAA

Although BMD-capable Aegis ships have deployed to European waters in the past, the first BMD-capable Aegis ship officially deployed to European waters as part of the EPAA—the Aegis cruiser *Monterey* (CG-61)—departed from its home port of Norfolk, VA, on March 7, 2011, for a six-month independent deployment to the Mediterranean.¹²

Planned Numbers of BMD-Capable Aegis Ships and SM-3 Interceptors

MDA and the Navy plan to eventually equip at least 10 of the Navy's 22 Aegis cruisers, and every Aegis destroyer, for BMD operations. As shown in **Table 2**, under MDA and Navy plans, the number of BMD-capable Navy Aegis ships is scheduled to grow from 23 at the end of FY2011 to 41 at the end of FY2016, and the cumulative number of SM-3 interceptors delivered to the Navy is scheduled to grow from 111 at the end of FY2011 to 341 at the end of FY2016. (Some of these interceptors have been or will be used in Aegis BMD flight tests.)

¹¹ MDA web page entitled "Aegis Ashore," accessed November 19, 2010, at http://www.mda.mil/system/aegis_ashore.html. See also the similar Aegis Ashore fact sheet available at http://www.mda.mil/global/documents/pdf/aegis_ashore.pdf.

¹² Karen Parrish, "Milestone nears for European Missile Defense Plan," *American Forces Press Service*, March 2, 2011 (accessed online at <http://www.defense.gov/news/newsarticle.aspx?id=62997>); Untitled "Eye On The Fleet" news item, *Navy News Service*, March 7, 2011 (accessed online at http://www.navy.mil/view_single.asp?id=98184); "Warship With Radar Going To Mediterranean," *Washington Post*, March 2, 2011; Brock Vergakis, "US Warship Deploys to Mediterranean to Protect Europe From Ballistic Missiles," *Canadian Press*, March 7, 2011.

Table 2. Numbers of BMD-Capable Aegis Ships and SM-3 Missiles

	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
BMD-capable Aegis ships												
<i>BMD conversions of existing Aegis cruisers and destroyers (cumulative totals)</i>												
3.6.1 version ^a	18	20	21	23	23	19	16	11	10	6	3	0
4.0.1 version ^b	0	0	2	4	6	9	7	7	6	6	6	6
5.0 version	0	0	0	1	3	8	14	20	22	24	27	30
5.1 version	0	0	0	0	0	0	0	0	0	1	1	1
Subtotal	18	20	23	28	32	36	37	38	38	37	37	37
<i>New Aegis destroyers procured in FY2010 and beyond, with BMD installed during the ship's construction (cumulative totals)</i>												
5.0 version	0	0	0	0	0	0	1 ^c	3	4	6	6	6
TOTAL	18	20	23	28	32	36	38	41	42	43	43	43
SM-3 missiles (annual procurement quantities)^d												
Block I/IA	12	6	0	0	0	0	0	0	0	0	0	0
Block IB	4	18	20	46	62	73	82	68	0	0	0	0
Block IIA	0	0	0	0	0	14	0	15	0	0	0	0
Block IIB	0	0	0	0	0	0	TBD	TBD	TBD	TBD	0	0
Total	16	24	20	46	62	87	82 + TBD	83 + TBD	0 + TBD	0 + TBD	0	0
SM-3 missiles (cumulative deliveries – includes missiles procured prior to FY09)^e												
Block I/IA	63	88	107	113	113	113	113	113	113	113	113	113
Block IB	0	1	4	16	42	88	150	223	305	373	373	373
Block IIA	0	0	0	0	0	0	0	5	10	14	27	29
Block IIB	0	0	0	0	0	0	0	0	TBD	TBD	TBD	TBD
Total	63	89	111	129	155	201	263 + TBD	341 + TBD	428 + TBD	500 + TBD	513	515

Source: DOD FY2012 budget submission.

- Declining totals for 3.6.1 ships after FY2013 reflect the upgrading of some of these ships to more advanced versions of the Aegis BMD system.
- Declining totals for 4.0.1 ships after FY2014 reflect the upgrading of some of these ships to more advanced versions of the Aegis BMD system.
- Navy budget-justification documents show the DDG-51 procured in FY2010 entering service in FY2016, not FY2015 as shown in this table.
- Includes missiles funded through both RDT&E and procurement funds.
- Includes missiles funded through both RDT&E and procurement funds. Some of the missiles shown here have been or will be used in Aegis BMD flight tests.

Home Ports of BMD-Capable Aegis Ships

Pacific vs. Atlantic Fleet Homeporting

As of February 2011, 16 of the Navy's 21 BMD-capable Aegis ships were homeported in the Pacific, including 5 at Yokosuka, Japan, 6 at Pearl Harbor, HI, and 5 at San Diego, CA. The remaining five BMD-capable Aegis ships were homeported in the Atlantic, with four at Norfolk, VA, and one at Mayport, FL. The figures of 21 BMD-capable ships, including 6 at Pearl Harbor, include the *Lake Erie* (CG-70), which is equipped with an Engineering Development Model (EDM) version of the 4.0.1 system. This ship is not included in the totals shown in **Table 2**.

Reflecting the implementation of the EPAA, the number of BMD-capable Aegis ships homeported in the Atlantic is scheduled to grow over time. By the end of FY2012, the Navy is to still have 16 BMD-capable Aegis ships homeported in the Pacific, but the number of Aegis-BMD ships homeported in the Atlantic is to grow to 13, including 11 at Norfolk and 2 at Mayport.

October 5, 2011, Announcement of Homeporting in Spain to Start in 2014

On October 5, 2011, the United States, Spain, and NATO jointly announced that, as part of the EPAA, four BMD-capable Aegis ships are to be forward-homeported (i.e., based) at the naval base at Rota, Spain, beginning in 2014.¹³ Rota is on the southwestern Atlantic coast of Spain, a few miles northwest of Cadiz, and about 65 miles northwest of the Strait of Gibraltar leading into the Mediterranean. U.S. Navy ships have been homeported at Rota at various points in the past, most recently in 1979.¹⁴

As part of the October 5, 2011, joint announcement, the Prime Minister of Spain, Jose Luis Rodriguez Zapatero, stated in part:

This meeting marks a step forward on the path that we set for ourselves less than a year ago at the Lisbon Summit, aiming to make NATO an Alliance that is “more effective, engaged and efficient than ever before”, in the words of [NATO] Secretary-General Rasmussen.

At that historic Summit, decisions of enormous importance for the future of the Alliance were taken, such as the New Strategic Concept to face the new challenges of the 21st century, and the establishment of a new command structure that is leaner and more flexible, and improved.

Besides these two important innovations, and as a consequence of them, the allies decided to develop an Anti-Missile Defence System....

As you will recall, as a consequence of this new structure launched in Lisbon, Spain obtained an installation of great importance within NATO's Command and Control Structure: the Combined Air Operations Centre (CAOC) in Torrejón de Ardoz, Spain.

¹³ “Announcement on missile defence cooperation by NATO Secretary General Anders Fogh Rasmussen, the Prime Minister of Spain, Jose Luis Rodriguez Zapatero and US Defense Secretary Leon Panetta,” October 5, 2011, accessed October 6, 2011, at http://www.nato.int/cps/en/SID-107ADE55-FF83A6B8/natolive/opinions_78838.htm. See also “SECDEF Announces Stationing of Aegis Ships at Rota, Spain,” accessed October 6, 2011, at http://www.navy.mil/search/display.asp?story_id=63109.

¹⁴ Source: Sam Fellman, “U.S. To Base Anti-Missile Ships in Spain,” *Defense News*, October 10, 2011: 76.

This Centre, together with the Centre in Uedem, Germany, will form part of the air command and control system which is to include the anti-missile defence that the Alliance is going to implement.

Together with this land-based component of the new air defence system, I can inform you that Spain is also going to support, starting in 2013, an important part of the system's naval element.

In recent months, the different options have been studied, and finally, it was decided that Spain should be the site for this component of the system, due to its geostrategic location and its position as gateway to the Mediterranean.

Specifically, the United States is going to deploy, as its contribution to NATO's Anti-Missile Defence System, a total of four vessels equipped with the AEGIS system, to be based in Rota.

This means that Rota is going to become a support centre for vessel deployment, enabling them to join multinational forces or carry out NATO missions in international waters, particularly in the Mediterranean....

Moreover, this initiative will have a positive impact, in socio-economic terms, on our country, and most especially on the Bay of Cadiz.

Permanently basing four vessels in Rota will require investing in the Base's infrastructure, and contracts with service providers, thus generating approximately a thousand new jobs, both directly and indirectly.

For the shipyards, and for Spain's defence industry, the foreseeable impact will also be highly positive, as the USA is considering conducting the vessels' maintenance and upkeep at the nearby San Fernando shipyards, in the province of Cadiz. In addition, there will be significant transfer of state-of-the-art technology, from which Spain can benefit.¹⁵

As part of the same joint announcement, Secretary of Defense Leon Panetta stated in part:

With four Aegis ships at Rota, the alliance is significantly boosting combined naval capabilities in the Mediterranean, and enhancing our ability to ensure the security of this vital region. This relocation of assets takes place as part of the United States' ongoing effort to better position forces and defensive capabilities in coordination with our European allies and partners.

This announcement should send a very strong signal that the United States is continuing to invest in this alliance, and that we are committed to our defense relationship with Europe even as we face growing budget constraints at home....

Alongside important agreements that were recently concluded with Romania, Poland, and Turkey, Spain's decision represents a critical step in implementing the European Phased Adaptive Approach, as our leaders agreed to in Lisbon....

¹⁵ "Announcement on missile defence cooperation by NATO Secretary General Anders Fogh Rasmussen, the Prime Minister of Spain, Jose Luis Rodriguez Zapatero and US Defense Secretary Leon Panetta," October 5, 2011, accessed October 6, 2011, at http://www.nato.int/cps/en/SID-107ADE55-FF83A6B8/natolive/opinions_78838.htm.

Beyond missile defense, the Aegis destroyers will perform a variety of other important missions, including participating in the Standing NATO Maritime Groups, as well as joining in naval exercises, port visits, and maritime security cooperation activities....

The agreement also enables the United States to provide rapid and responsive support to the U.S. Africa and U.S. Central Commands, as needed.¹⁶

An October 5, 2011, press report stated:

A senior U.S. defense official said making the [ships'] base at Rota, on Spain's southwestern Atlantic coast near Cadiz, would reduce the numbers of [BMD-capable Aegis] ships needed for the [EPAA] system.

"You [would] probably need 10 of these ships if they were based in the eastern U.S. to be able to ... transit across the ocean back and forth to [keep the same number on] patrol in the Med," he said.

The U.S. official said the United States was committed to having at least one ship on station at all times in the eastern Mediterranean, where their anti-missile missiles would be most effective. Having them based in Rota would enable more than one to be in the eastern Mediterranean as needed.

The ships also would be part of the pool of vessels available to participate in standing NATO maritime groups, which are used to counter piracy and for other missions, he said.¹⁷

An October 10, 2011, press report stated:

"Our plan is to have the first couple [of ships] there in 2014 and the next two in about 2015," said Cmdr. Marc Boyd, spokesman for [U.S. Navy] 6th Fleet. Boyd added: "It's really early in the process and we haven't selected any of the ships yet." Boyd said the shift will bring an estimated 1,300 sailors and Navy civilians and 2,100 dependents to Naval Station Rota, which would double the base's ranks. Naval Station Rota spokesman Lt. j.g. Jason Fischer said the base now has 1,067 sailors....

The three piers at the base primarily support Navy ships passing through on port calls.

Boyd said 6th Fleet is considering plans to add base infrastructure and maintenance facilities to support the ships, as well as additional housing for crews, "but the base is pretty suited as it is now."¹⁸

¹⁶ "Announcement on missile defence cooperation by NATO Secretary General Anders Fogh Rasmussen, the Prime Minister of Spain, Jose Luis Rodriguez Zapatero and US Defense Secretary Leon Panetta," October 5, 2011, accessed October 6, 2011, at http://www.nato.int/cps/en/SID-107ADE55-FF83A6B8/natolive/opinions_78838.htm. See also "SECDEF Announces Stationing of Aegis Ships at Rota, Spain," accessed October 6, 2011, at http://www.navy.mil/search/display.asp?story_id=63109.

¹⁷ David Brunnstrom and David Alexander, "Spain To Host U.S. Missile Defense Ships," *Reuters*, October 5, 2011. Ellipsis as in original.

¹⁸ Sam Fellman, "U.S. To Base Anti-Missile Ships in Spain," *Defense News*, October 10, 2011: 76.

Aegis BMD Flight Tests

DOD states that since January 2002, the Aegis BMD system has achieved 18 successful exo-atmospheric intercepts in 23 attempts using the SM-3 missile (including three successful intercepts in four attempts by Japanese Aegis ships), and 3 successful endo-atmospheric intercepts in 3 attempts using the SM-2 Block IV missile, making for a combined total of 21 successful intercepts in 26 attempts. In addition, on February 20, 2008, a BMD-capable Aegis cruiser operating northwest of Hawaii used a modified version of the Aegis BMD system to shoot down an inoperable U.S. surveillance satellite that was in a deteriorating orbit.¹⁹ Including this intercept in the count increases the totals to 19 successful exo-atmospheric intercepts in 24 attempts using the SM-3 missile, and 22 successful exo- and endo-atmospheric intercepts in 27 attempts using both SM-3 and SM-2 Block IV missiles.

A December 2010 report on various DOD acquisition programs from DOD's Director, Operational Test and Evaluation (DOT&E)—DOT&E's annual report for FY2010—stated, in the section on the Aegis BMD program, that

In FY10 [FY2010], Aegis BMD flight testing continued to demonstrate the capability to engage medium-range separating ballistic missile targets in the midcourse phase with SM-3 Block IA interceptors.

The Aegis BMD program has not conducted a live intercept engagement against a ballistic missile target with the longer range expected as part of the new Phased Adaptive Approach [PAA] to missile defense in Europe. The program plans to use such a target for Flight Test Standard Missile Interceptor-15 (FTM-15) in FY11 [FY2011].

The successful intercepts of ballistic missile targets with SM-3 Block IA interceptors during [the Japanese Aegis BMD flight tests] JFTM-3 and JFTM-4 increase confidence in the reliability of the interceptor following the FY09 [FY2009] failure during the Japanese Aegis BMD flight test, JFTM-2.

¹⁹ The modifications to the ship's Aegis BMD midcourse system reportedly involved primarily making changes to software. DOD stated that the modifications were of a temporary, one-time nature. Three SM-3 missiles reportedly were modified for the operation. The first modified SM-3 fired by the cruiser successfully intercepted the satellite at an altitude of about 133 nautical miles (some sources provide differing altitudes). The other two modified SM-3s (one carried by the cruiser, another carried by an engage-capable Aegis destroyer) were not fired, and the Navy stated it would reverse the modifications to these two missiles. (For additional information, see the MDA discussion available online at http://www.mda.mil/system/aegis_one_time_mission.html, and also Peter Spiegel, "Navy Missile Hits Falling Spy Satellite," *Los Angeles Times*, February 21, 2008; Marc Kaufman and Josh White, "Navy Missile Hits Satellite, Pentagon Says," *Washington Post*, February 21, 2008; Thom Shanker, "Missile Strikes A Spy Satellite Falling From Its Orbit," *New York Times*, February 21, 2008; Bryan Bender, "US Missile Hits Crippled Satellite," *Boston Globe*, February 21, 2008; Zachary M. Peterson, "Navy Hits Wayward Satellite On First Attempt," *NavyTimes.com*, February 21, 2008; Dan Nakaso, "Satellite Smasher Back At Pearl," *Honolulu Advertiser*, February 23, 2008; Zachary M. Peterson, "Lake Erie CO Describes Anti-Satellite Shot," *NavyTimes.com*, February 25, 2008; Anne Mulrine, "The Satellite Shootdown: Behind the Scenes," *U.S. News & World Report*, February 25, 2008; Nick Brown, "US Modified Aegis and SM-3 to Carry Out Satellite Interception Shot," *Jane's International Defence Review*, April 2008: 35.) MDA states that the incremental cost of the shoot-down operation was \$112.4 million when all costs are included. MDA states that this cost is to be paid by MDA and the Pacific Command (PACOM), and that if MDA is directed to absorb the entire cost, "some realignment or reprogramming from other MDA [program] Elements may be necessary to lessen significant adverse impact on [the] AEGIS [BMD program's] cost and schedule." (MDA information paper dated March 7, 2008, provided to CRS on June 6, 2008. See also Jason Sherman, "Total Cost for Shoot-Down of Failed NRO Satellite Climbs Higher," *InsideDefense.com*, May 12, 2008.)

Aegis BMD and THAAD [the Terminal High Altitude Area Defense system – a ground-based, non-Navy BMD system] inter-element data transfer over tactical links continues to mature. Also, Aegis BMD continues to show increasing interoperability with other BMDS elements, as demonstrated in recent ground testing. However, Aegis BMD has not yet tested launch-on-remote capability in a live intercept mission, though the system plans to exercise this capability during FTM-15 in FY11 [FY2011]. Also, Aegis BMD has not yet demonstrated cued engagement capability against medium- to intermediate-range ballistic missiles in a live intercept test.

The next-generation Aegis BMD system (version 4.0.1) has demonstrated select new capabilities during recent live-target tracking exercises and simulated engagements. Development of that system continues, leading up to the first intercept mission with an SM-3 Block IB interceptor in FY11 [FY2011].²⁰

For further discussion of Aegis BMD flight tests—including a May 2010 magazine article and supplementary white paper in which two professors with scientific backgrounds criticize DOD claims of successes in Aegis (and other DOD) BMD flight tests—see **Appendix B**.

Allied Participation and Interest in Aegis BMD Program

Japan

Japan's interest in BMD, and in cooperating with the United States on the issue, was heightened in August 1998 when North Korea test-fired a Taepo Dong-1 ballistic missile that flew over Japan before falling into the Pacific.²¹ In addition to cooperating with the United States on development of technologies for the SM-3 Block IIA missile, Japan is modifying all six of its Aegis destroyers with an approximate equivalent of the 3.6.1 version Aegis BMD system. (Japan's previous plans called for modifying four of the six ships.) As of December 2010, four of Japan's Aegis ships had received the modification.²² Japanese BMD-capable Aegis ships have conducted four flight tests of the Aegis BMD system using the SM-3 interceptor, achieving three successful exo-atmospheric intercepts.

Other Countries

Other countries that MDA views as potential naval BMD operators (using either the Aegis BMD system or some other system of their own design) include the United Kingdom, the Netherlands, Spain, Germany, Denmark, South Korea, and Australia. As mentioned earlier, Spain, South Korea, and Australia either operate, are building, or are planning to build Aegis ships. The other countries operate destroyers and frigates with different combat systems that may have potential for contributing to BMD operations.

An October 3, 2011, press report stated that

²⁰ Director, Operational Test and Evaluation, *FY 2010 Annual Report*, December 2010, p. 230.

²¹ For a discussion, see CRS Report RL31337, *Japan-U.S. Cooperation on Ballistic Missile Defense: Issues and Prospects*, by Richard P. Cronin. This archived report was last updated on March 19, 2002. See also CRS Report RL33436, *Japan-U.S. Relations: Issues for Congress*, coordinated by Emma Chanlett-Avery.

²² John Liang, "Japan To Increase Aegis BMD Ship Fleet From Four To Six," *Inside the Navy*, December 27, 2010.

The Netherlands, which has had a longtime interest in a missile shield, is pressing ahead to build up its own capabilities. The Dutch defense ministry plans to expand the capabilities of the Thales Smart-L radar on Dutch frigates to take on BMD roles. The program's value is estimated at €100-250 million, including logistics support and spares.

Other European navies using the sensor may follow the Dutch lead.

Dutch Defense Minister Hans Hillen notes that the Smart-L effort would help address the BMD sensor shortage within the NATO alliance. Citing NATO's decision last year to take a more expansive approach to BMD, Hillen says Smart-L could give the ALTBMD [Active Layered Theater BMD] command-and control backbone the required long-range target-detection analysis to help identify where a threat originates.

The Netherlands has already carried out a sensor trial for the expanded role in cooperation with the U.S. Navy. The move does not include the purchase of Raytheon Standard Missile SM-3 interceptors.

Both hardware and software modifications to the combat management system are needed. All four [of the Dutch navy's] De Zeven Provinciën-class frigates would be modified to ensure that two can be deployed, even as one is in maintenance and the fourth is being readied for operations.

Thales is due to complete a series of studies to prepare for the acquisition of the upgrade in the third quarter of 2012. The goal is to have the first frigates ready for operations by 2017. All four should be upgraded by the end of that year.

Although the Netherlands is leading the program, other Smart-L users, including the German navy and Denmark, have been monitoring the effort. France also has shown interest in the system, Hillen said in a letter to legislators.

France also wants to upgrade its Aster 30 interceptor to give it a basic BMD capability, although a formal contract has not been awarded....

Raytheon, meanwhile, is still fighting to win a foothold for its Standard Missile 3 (SM-3) in Europe. The company continues its push to persuade continental navies to embrace the SM-3 Block 1B for missile defense roles, and says it has largely validated the dual-mode data link that would be key to the concept.

The data link would feature both S- and X-band capability—the former to support the Aegis radar system used by the U.S. and others, and the latter for the Smart-L/APAR (active phased array radar) combination used, for instance, by the Dutch navy.²³

FY2012 Funding Request

The Aegis BMD program is funded mostly through MDA's budget. The Navy's budget provides additional funding for BMD-related efforts. As shown in **Table 3**, MDA's proposed FY2012 budget requests a total of \$2,380.3 million in procurement and research and development funding for Aegis BMD efforts, including funding for Aegis Ashore sites that are to be part of the EPAA.

²³ Robert Wall, Amy Svitak, and Amy Butler, "Supporting Role," *Aviation Week & Space Technology*, October 3, 2011: 28-29. A shorter version of the story was published as Robert Wall, "Dutch Press Forward On Ship-Based Missile Defense Effort," *Aerospace Daily & Defense Report*, September 27, 2011: 4.

Table 3. MDA Funding for Aegis BMD Efforts, FY2011-FY2016

(In millions of dollars, rounded to nearest tenth; totals may not add due to rounding; FY2011 and FY2012 are requested; FY2013-FY2016 are programmed)

	FY11	FY12	FY13	FY14	FY15	FY16
Procurement						
Aegis Block 5 Procurement (Line 32, Project 355)	94.1	0	0	0	0	0
Aegis BMD (Line 34, Project MD09)	0	565.4	675.1	737.4	807.9	1,025.5
Aegis Ashore (Project MD73)	0	0	0	0	211.1	39.9
SUBTOTAL Procurement	94.1	565.4	675.1	737.4	1,019.0	1,065.4
Research, development, test & evaluation (RDT&E)						
SM-3 Block IIB missile (Line 69, PE 0603902C, Projects MD70, MD40)	0	123.5	433.1	384.6	401.1	394.8
BMD Aegis (Line 91, PE 0603892C, nine projects)	1,467.3	960.3	958.0	1,001.5	970.6	1,033.7
Land-based SM-3 (Line 110, PE 0604880C, Projects MD68, MD 40)	281.4	306.6	149.3	60.6	41.4	154.8
SM-3 Block IIA missile co-development (Line 111, PE 0604881C, Projects MD09, MD40)	318.8	424.5	357.2	279.4	203.6	25.2
SUBTOTAL RDT&E	2,067.5	1,814.9	1,897.6	1,726.1	1,616.7	1,608.5
SUBTOTAL Procurement plus RDT&E	2,161.6	2,380.3	2,572.7	2,463.5	2,635.7	2,673.9
Military Construction (MilCon)						
Land-based SM-3 launch facility HNI	0	0	89.4	0	0	0
SUBTOTAL MilCon	0	0	89.4	0	0	0
Operation and Maintenance (O&M)						
Aegis BMD	94.1	565.4	675.1	737.4	807.9	1,025.5
Aegis Ashore Phase III	0	0	0	0	211.1	39.9
SUBTOTAL O&M	94.1	565.4	675.1	737.4	1,019.0	1,065.4
TOTAL ALL ABOVE	2,255.7	2,945.7	3,337.2	3,200.9	3,654.7	3,739.3

Source: FY2012 DOD budget submission.

Issues for Congress

Demands for BMD-Capable Aegis Ships

One potential oversight issue for Congress concerns demands for BMD-capable Aegis ships from U.S. regional military commanders. Some observers are concerned—particularly in light of the EPAA—that these demands are growing faster than the number of BMD-capable Aegis ships. Much of the concern focuses on the situation over the next few years, prior to the scheduled establishment of the two Aegis Ashore sites in Europe. A September 16, 2011, press report stated:

“The BMD ships between now and 2017 are basically deployed for seven months, home for seven months, deployed for seven months, home for seven months for the next six years,” [Chief of Naval Operations Admiral Gary Roughead] said. “With the retention environment we’re in now, we’re not seeing the effects of that on our people yet, but when the economy turns, that’s a pretty brutal pace.”²⁴

The October 5, 2011, joint announcement by United States, Spain, and NATO that four BMD-capable Aegis ships are to be forward-homeported at Rota, Spain, beginning in 2014 (see “October 5, 2011, Announcement of Homeporting in Spain to Start in 2014” in “Background”) appears intended to reduce total demands for BMD-capable Aegis ships, since it would reduce the number of BMD-capable Aegis ships that would be needed to maintain deployments of such ships in the Mediterranean as part of the EPAA. If the Navy relied entirely on East Coast-homeported destroyers operating on seven-month deployments for supporting the EPAA, then maintaining two BMD-capable Aegis ships continuously on station in Mediterranean waters could require approximately nine BMD-capable Aegis ships.²⁵

An April 2011 Navy report to Congress on naval force structure and BMD stated the following:

The Navy currently has sufficient capacity to meet the most critical demands for multi-mission surface combatants. However, the Navy does not have the capacity to meet all GCC [Global Combatant Commander] demands for BMD-capable surface combatants without breaking currently established Chief of Naval Operations Personnel Tempo program limits for deployment lengths, dwell and homeport tempo. Navy’s funded BMD upgrade plan is structured to balance the need to meet current multi-mission and Aegis BMD operational requirements against the need to increase Aegis BMD capacity and upgrade existing BMD-capable Aegis ships to pace the future threat.

The Navy, in conjunction with the Missile Defense Agency (MDA), has established a plan to increase the number of BMD-capable Aegis ships from 23 in FY2011 to 41 in FY2016 to begin to address this shortfall. This plan increases capacity through a combination of installing Aegis BMD 3.6.1 / 4.0.1 / 5.0 suites in existing Aegis ships (Aegis Modernization Program) and new construction commencing with DDG-113. This combined upgrade/new

²⁴ Dan Taylor, “CNO: Biggest Concern Is That Shrinking Budgets Will Stretch Force Thin,” *Inside the Navy*, September 19, 2011.

²⁵ This number is based on a stationkeeping multiplier of 4.4 for Norfolk-based DDG-51s deploying to the European Command’s area of responsibility on seven-month deployments. The stationkeeping multiplier is the number of ships of a given type and a certain homeporting location that are needed to maintain one ship of such ship continuously on station in a certain overseas operating area. (Source for stationkeeping multiplier: Navy information paper on stationkeeping multipliers dated December 30, 2009, provided by the Navy to CRS on January 8, 2010.)

construction approach is designed to mitigate both the near term operational demand for multi-mission (including BMD) large surface combatants and the increasing Aegis BMD capability and capacity demand in the future.

The analytical work associated with the Navy's ongoing Force Structure Analysis has progressed to the point that a FY2024 requirement for 94 multi-mission large surface combatants has been established. The global proliferation of land-attack ballistic missiles and the anticipated proliferation of anti-ship ballistic missiles underpins a related requirement for all multi-mission large surface combatants with Aegis weapon systems to be BMD-capable beyond ~2025....

The Navy and Missile Defense Agency (MDA) have concluded that the Geographic Combatant Commanders' (GCCs) demand for surface combatants with Aegis BMD capability will outpace capacity through approximately 2018. This conclusion was reached based on an assessment that considered the current and projected ballistic missile threat; current and projected requests from the GCCs including the Phased Adaptive Approach (PAA) for defense of Europe directed by the President; other force generation factors such as maintenance availabilities necessary to ensure the ships reach their expected service lives, training requirements and deployment lengths; and the deployment of Aegis Ashore to offset some of the growing demand for BMD capability....

BMD-capable large surface combatant requirements are independently determined by each GCC based on theater operational planning and mission analyses that consider unique regional factors such as the ballistic missile threat, threat dispersal, geography, size of the defended area, and the specific number and disposition of defended assets. Each GCC submits their fiscal year Aegis BMD requirement to the Joint Staff for validation. Once validated, U.S. Fleet Forces Command provides a consolidated sourcing solution for large surface combatants, to include those that are BMD-capable. The annual requirements and sourcing solutions are reviewed by a Global Force Management Board which ensures competing GCC requirements are properly prioritized based on overarching global defense priorities and that the Navy's limited BMD capacity is applied to the most critical needs.

The Global Force Management Board submits its requirements/sourcing recommendation to SECDEF for approval, in the form of a Global Force Management Allocation Plan which allocates Aegis BMD surface combatants to the GCC's for specified timeframes. Emergent GCC requirements for Aegis BMD combatants in response to unforeseen crises are subject to a similar approval process, without the Global Force Management Board review. In this case, SECDEF decisions represent adjustments to the annual Global Force Management Allocation Plan.

The total number of ships required to support the Phased Adaptive Approach to ballistic missile defense of Europe will be based on the operational planning and mission analysis factors noted above, combined with force generation factors such as maintenance, training and forward stationing or rotational model considerations. US European Command's operational plan for the ballistic missile defense of Europe has not been approved as of the date of this report....

US European Command's operational plan for the ballistic missile defense of Europe has not yet been approved, but could incorporate up to two Aegis Ashore batteries. Using a standard rotational BMD force structure model of five ships to sustain 1.0 presence, each Aegis Ashore battery could make up to five ships available to service Aegis BMD combatant requirements that would otherwise go unresourced....

All Aegis BMD surface combatants undergo the training, deployment and maintenance phases that comprise the Fleet Response Plan. These phases are balanced to ensure each crew

is proficient across the full spectrum of missions the ship is capable of performing; to meet the operational requirements of the GCCs; and to ensure these capital assets reach their expected service life. In the near term, this balance will entail deployments for BMD-capable surface combatants of about seven months.²⁶

In April 2011, the Navy provided CRS with responses to a series of questions that CRS had posed to the Navy regarding the Navy's strategy for maintaining deployments of BMD-Aegis ships to European waters as part of the EPAA. The text of the questions, and the Navy's responses, are as follows:

1. QUESTION: Will the establishment of the Aegis Ashore sites reduce requirements for maintaining deployments of BMD-capable Aegis ships in support of the EPAA, and if so, by how much?

RESPONSE: While Aegis Ashore is not a replacement for afloat Ballistic Missile Defense (BMD) capability, without it or potentially other land-based regional BMD assets, the long-term requirement for BMD-capable Aegis ships would likely increase. The specific impact of Aegis Ashore on BMD afloat requirements is not known as it would be based in part on Combatant Commander operational planning and Aegis Ashore system employment data that is still under development.

2. QUESTION: With respect to the Navy's longer-term strategy for maintaining BMD-capable Aegis ships on station in European waters in support of the European Phase Adaptive Approach (EPAA):

- (1) How many EPAA stations will be maintained?
- (2) How many BMD-capable Aegis ships will be maintained in each station?
- (3) What is the definition of being "on station"?
- (4) What are the geographic limits of each station?
- (5) Does the ship need to be in the station at all times, or will there be a tether?
- (6) If a tether is used, how is that tether defined?

RESPONSE: The number of stations, or more appropriately ship operating areas, and number of ships required to fulfill the EPAA mission is determined through operational planning based on guidance provided by the Combatant Commander and the Area Air Defense Plan. Navy Planners will provide input into this plan and identify ship operating areas based on expected threat and approved defended asset lists.

Although multiple ship operating areas may be identified, ship sourcing in support of the EPAA will continue to be through the Global Force Management process in order to balance the global requirements for BMD-capable multi-mission Aegis ships. SECDEF adjudication of global BMD assets will determine the number of ships available for sourcing to U.S. European Command (EUCOM).

²⁶ U.S. Navy, Office of the Chief of Naval Operations, Director of Strategy and Policy (N51), *Report to Congress On Naval Force Structure and Missile Defense*, April 2011, 12 pp.

The Aegis Mission Planner will be used to determine specific ship operating areas that optimize probability of intercept against a threat. The size and limits of specific ship operating areas will be based on the probability of intercept against threat, the areas to be defended and additional guidance from the operational commanders.

As with our BMD-capable ships in the Pacific, the Navy's notional operating concept for maritime BMD forces in Europe includes the use of operational tethers. These offer a graduated response, based on time, allowing BMD-capable Aegis ships to be available for other tasking when not directly involved in active BMD operations. Specific ship readiness, time requirements and indications and warning associated with the EPAA tethers will be established and managed by EUCOM through their component commanders.

3. QUESTION: Will the Navy attempt to maintain Aegis ships at these stations principally through deployments of Aegis ships that are home ported on the U.S. East Coast?

RESPONSE: The Navy assesses requirements for BMD-capable multi-mission ships from a global fleet perspective to determine the most efficient means of sourcing. Based on an increasing inventory of BMD-capable Aegis ships home ported on the U.S. east coast, sourcing of the EUCOM afloat BMD requirement will likely be met through rotational deployments from Norfolk and Mayport.

4. QUESTION: Does the Navy plan to forward-homeport (i.e., Forward Deployed Naval Forces)²⁷ BMD-capable Aegis ships at one or more locations in Europe to help reduce the number of such ships needed to maintain the EPAA stations?

RESPONSE: With the President's decision to pursue a phased adaptive approach (PAA) for the missile defense of Europe, the Navy has been working within the Department of Defense to identify the most efficient method to provide the required afloat BMD capability. The establishment of a forward deployed force in Europe is one of the options being assessed; however, no final decision has been made.

5. QUESTION: What is the resulting total number of BMD-capable Aegis ships that the Navy needs in inventory to maintain required numbers of BMD-capable Aegis ships at the EPAA stations?

RESPONSE: BMD-capable multi-mission surface combatants are part of the overall Navy force structure plan that supports a global posture of distributed, mission-tailored naval forces capable of regionally concentrated combat operations and peacetime theater security cooperation. The Navy currently has sufficient capacity to meet the most critical demands for multi-mission surface combatants, however, Navy does not have the capacity to meet full combatant demands for BMD-capable surface combatants without breaking established Personnel Tempo program limits for deployment lengths, dwell and/or homeport tempo. Working in conjunction with MDA, the Navy has established a plan to increase the total number of BMD-capable Aegis ships across the FYDP from 23 in FY2011 to 41 in FY2016. This plan includes increases in the capabilities and capacity of our surface fleet either through installation of the Aegis BMD 3.6.1 / 4.0.1 suite, the Aegis Modernization program, or new construction commencing with DDG113.²⁸

²⁷ The Navy refers to forward-homeported Navy ships as Forward Deployed Naval Forces (FDNF)—a term that can cause some confusion, since U.S.-homeported Navy ships that are sent to distant waters are also said to be forward deployed.

²⁸ DDG-113 is the DDG-51 class ship that was procured in FY2010.

Demands for Aegis Ships in General

Another potential oversight issue for Congress concerns demands from U.S. regional military commanders for Aegis ships in general. Some observers are concerned that demands for Aegis ships for conducting BMD operations could strain the Navy's ability to provide regional military commanders with Aegis ships for performing non-BMD missions in various locations around the world.

The Navy's Aegis ships are multi-mission platforms that are used for performing a range of non-BMD missions, including forward-deployed presence for regional deterrence, reassurance, and stabilization; partnership-building activities; humanitarian assistance and disaster response (HADR) operations; maritime security operations (including anti-piracy operations in the Gulf of Aden); intelligence, surveillance, and reconnaissance (ISR) operations; counter-terrorism operations; and (if need be) conventional warfighting operations. In conventional warfighting operations, Aegis ships could be called upon to perform a variety of non-BMD functions, including anti-air warfare, anti-surface warfare, strike warfare and naval surface fire support, and antisubmarine warfare. Locations that are good for performing BMD operations might not be good for performing non-BMD operations, and vice versa.

The Navy's force-level goal for cruisers and destroyers is to achieve and maintain a force of 94 ships. The Navy's 30-year (FY2012-FY2041) shipbuilding plan does not contain enough destroyers to maintain a force of 94 cruisers and destroyers consistently over the long run. The Navy projects that implementing the 30-year plan would result in a cruiser-destroyer force that drops below 94 ships in FY2025, reaches a minimum of 68 ships (i.e., 26 ships, or about 28%, below the required figure of 94 ships) in FY2034, and remains 16 or more ships below the 94-ship figure through the end of the 30-year period. The projected cruiser-destroyer shortfall is the largest projected shortfall of any ship category in the Navy's 30-year shipbuilding plan. Another CRS report discusses the projected cruiser-destroyer shortfall in greater detail.²⁹

Rear Admiral Archer Macy, the director of the Joint Integrated Air and Missile Defense Organization, testified to the Senate Armed Services Committee on April 20, 2010, that DOD does not plan to give BMD-capable Aegis ships a strict role of performing BMD operations only. He also stated, however, that it was possible, depending on ballistic missile threats, that BMD-capable Aegis ships might sometimes be constrained to certain operating areas.³⁰

As mentioned earlier (see "October 5, 2011, Announcement of Homeporting in Spain to Start in 2014" in "Background"), Secretary of Defense Leon Panetta stated the following as part of the October 5, 2011, joint announcement about homeporting four BMD-capable Aegis ships at Rota, Spain, as part of the EPAA:

Beyond missile defense, the Aegis destroyers will perform a variety of other important missions, including participating in the Standing NATO Maritime Groups, as well as joining in naval exercises, port visits, and maritime security cooperation activities....

²⁹ CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.

³⁰ Dan Taylor, "Macy: Navy Increases Total Aegis BMD Assets Over FYDP To 38 Ships," *Inside the Navy*, April 26, 2010.

The agreement also enables the United States to provide rapid and responsive support to the U.S. Africa and U.S. Central Commands, as needed.³¹

An April 2011 Navy report to Congress on naval force structure and BMD stated the following:

The Navy's operating concept for maritime BMD features a graduated readiness posture that allows BMD-capable Aegis ships to be on a BMD mission tether and employed concurrently in other missions such as strike warfare, air defense, anti-submarine warfare, surface warfare, information warfare, high value asset protection, or maritime interdiction to contribute to overall GCC [Global Combatant Commander] naval requirements. While Aegis ships performing a BMD mission do not lose the capability to conduct these other missions, specific mission effectiveness may be affected by optimizing the ships' position for BMD and/or application of the ship's radar resources to the BMD mission.

The Navy currently has sufficient capacity to meet the most critical demands for multi-mission surface combatants....

The analytical work associated with the Navy's ongoing Force Structure Analysis has progressed to the point that a FY2024 requirement for 94 multi-mission large surface combatants has been established. This requirement assumed that the Phased Adaptive Approach for the ballistic missile defense of Europe would incorporate two Aegis Ashore batteries....

Each GCC's multi-mission surface combatant requirement, including the BMD mission, is constantly evolving to reflect changes in the global security environment, our National Military Strategy, and other Department of Defense guidance related to operations and contingency plans. Within this context, BMD-capable surface combatant requirements are independently determined by each GCC based on mission analyses that consider unique regional factors such as the ballistic missile threat, threat dispersal, geography, size of the defended area, and the specific number and disposition of defended assets. Other mission requirements are similarly derived and the GCC's total surface combatant requirement is ultimately determined considering specific operational objectives and the extent to which supporting schemes of maneuver accommodate multi-mission employment of Aegis BMD surface combatants.³²

A January 4, 2010, news report stated:

No sooner did the Aegis ballistic missile defense (BMD) system become operational in 2008 than U.S. combatant commanders started asking for BMD-equipped ships to begin patrolling their areas.

Central Command needed a "shooter" in the northern Arabian Gulf. European Command wanted one in the eastern Mediter-ranean. Pacific Command already had Aegis ships with limited BMD capabilities on guard around Japan for a potential launch from North Korea.

³¹ "Announcement on missile defence cooperation by NATO Secretary General Anders Fogh Rasmussen, the Prime Minister of Spain, Jose Luis Rodriguez Zapatero and US Defense Secretary Leon Panetta," October 5, 2011, accessed October 6, 2011, at http://www.nato.int/cps/en/SID-107ADE55-FF83A6B8/natolive/opinions_78838.htm. See also "SECDEF Announces Stationing of Aegis Ships at Rota, Spain," accessed October 6, 2011, at http://www.navy.mil/search/display.asp?story_id=63109.

³² U.S. Navy, Office of the Chief of Naval Operations, Director of Strategy and Policy (N51), *Report to Congress On Naval Force Structure and Missile Defense*, April 2011, 12 pp.

The demand for BMD ships is only expected to increase, driven in part by rising concerns about Iran's intentions and the U.S. decision in September to cancel an anti-missile system in Poland and the Czech Republic and rely instead on Aegis.

But the Navy has a relatively small number of such ships, and those destroyers and cruisers are designed to carry out a wide range of war-fighting tasks.

As a result, while Navy commanders are pleased with the expanding capabilities of their Aegis ships, they're also somewhat guarded about trumpeting the advances.

"We can't constrain assets to one mission," a senior officer said last month. "They need to do a variety of other missions." Worries that valuable Aegis ships might be locked into the BMD mission were discussed in December at a two-day seminar at the National Defense University (NDU) in Washington. Reporters were allowed to quote comments made at the seminar under the condition that no speaker be identified.

"Sea-based ballistic missile defense is a necessary component of any theater defense," said the senior officer. "We need to find ways to get folks to use the ships in ways consistent with their being a ship—to realize they are not a point-defense asset." One analyst added, "The demand signal is ahead of the pot of ships." U.S. Navy spokesman Lt. Tommy Buck said the service is working to manage the demand.

"Combatant commanders need to understand BMD-capable ships are multimission-capable. BMD is one available asset," Buck said Dec. 18.

The Navy is also working on how to respond, said Vice Adm. Samuel Locklear, director of the Navy Staff.

"We have a small Navy today—the smallest since 1916—yet we have a growing global demand for maritime forces, maritime security operations. And now we have a growing demand for maritime ballistic missile defense. Our ships and our crews and our systems are up to the challenge, but it's a capacity issue for us," Locklear said to a reporter during the NDU seminar.

"As the capacity grows faster than we can grow the number of ships we have—which is always difficult, particularly in the demanding fiscal environment we're in—we have to look at ways to deploy these ships so that we can get the job done and still have a reasonable expectation that we can take care of the ship and the crew," Locklear said. "So we're looking at a lot of different options as to how we'll do that as this demand grows. But we are limited in capacity." Locklear said that despite meeting demands from joint commanders, the Navy has "to some degree preserved the command and control. Navy component commanders still command and control these ships." But, he added, "What we've had to do is to spread these multimission platforms more thinly across a growing number of demands globally."

27 BMD Ships By 2013

Twenty-one cruisers and destroyers will have been upgraded with the Aegis BMD capability by early 2010, and six more destroyers are to receive the upgrade in 2012 and 2013. But at least one senior officer at the seminar noted "there will be no more new ships for missile defense." The demand has already affected deployments. Early in 2009, for example, The Sullivans, a Florida-based destroyer on deployment with a carrier group, moved to Japan for a few weeks to pick up the exercise schedule of a Japan-based BMD destroyer that was called on by Central Command to guard the northern Arabian Gulf.

This fall, a San Diego-based ship, the destroyer Higgins, deployed to the eastern Mediterranean to provide BMD defense for European Command and take part in exercises.

Both moves are unusual, as it's rare for an Atlantic Fleet ship to visit Japan or for a Pacific ship to patrol the Mediterranean. Such cross-deployments require more coordination by fleet planners.

"Effective global force management requires global visibility on requirements," Buck said. "U.S. Fleet Forces Command [headquartered in Norfolk, Va.] and Pacific Fleet [headquartered in Pearl Harbor, Hawaii] collaborate, coordinate and communicate to have more complete knowledge of location and status of fleet capabilities and work to best employ those capabilities to meet global combatant commander requirements to include BMD." The senior officer said one way to manage demand is to encourage combatant commanders to give "sufficient warning to have ships on station. We need to remind [combatant commanders] that these are multimission ships." The BMD cruisers and destroyers are also equipped to handle anti-submarine, land-attack, air-defense and other tasks.³³

U.S. Economic Impact of Shifting Four Aegis Ships to Rota, Spain

Another potential oversight issue for Congress concerns the U.S. economic impact of the plan to shift the homeport of four BMD-capable Aegis ships to the naval base at Rota, Spain (see "October 5, 2011, Announcement of Homeporting in Spain to Start in 2014" in "Background"). As mentioned earlier, the Prime Minister of Spain, as part of the October 5, 2011, joint announcement of this plan, stated that

this initiative will have a positive impact, in socio-economic terms, on our country, and most especially on the Bay of Cadiz [area near Rota].

Permanently basing four vessels in Rota will require investing in the Base's infrastructure, and contracts with service providers, thus generating approximately a thousand new jobs, both directly and indirectly.

For the shipyards, and for Spain's defence industry, the foreseeable impact will also be highly positive, as the USA is considering conducting the vessels' maintenance and upkeep at the nearby San Fernando shipyards, in the province of Cadiz. In addition, there will be significant transfer of state-of-the-art technology, from which Spain can benefit.³⁴

As also mentioned earlier, the Navy estimates that shifting the four ships to Rota will bring about 1,300 sailors and Navy civilians and 2,100 dependents to the Rota area.³⁵

Potential oversight questions for Congress include the following:

³³ Christopher P. Cavas, "U.S. Navy Juggles Ships To Fill BMD Demands," *Defense News*, January 4, 2010. Material in brackets as in original.

³⁴ "Announcement on missile defence cooperation by NATO Secretary General Anders Fogh Rasmussen, the Prime Minister of Spain, Jose Luis Rodriguez Zapatero and US Defense Secretary Leon Panetta," October 5, 2011, accessed October 6, 2011, at http://www.nato.int/cps/en/SID-107ADE55-FF83A6B8/natolive/opinions_78838.htm.

³⁵ Sam Fellman, "U.S. To Base Anti-Missile Ships in Spain," *Defense News*, October 10, 2011: 76.

- What are the current home ports of the four BMD-capable Aegis ships that would be shifted to Rota?
- How much of the overhaul, maintenance, and repair work on these four ships would the Navy perform in Spain?
- What would be the impact on the economies of the current home port areas of these four ships of shifting the ships to Rota, including the effects of U.S. personnel and their families spending their paychecks in Spain rather than in the current home port areas; of the Navy purchasing supplies for these ships in Spain rather than from sources in the current home port areas; and of the Navy performing overhaul, maintenance, and repair work on the ships in Spain rather than in the United States?

U.S. vs. European Naval Contributions to European BMD

Another potential oversight issue for Congress concerns European naval contributions to European BMD capabilities and operations compared to U.S. naval contributions to European BMD capabilities and operations. Potential oversight issues for Congress include the following:

- How does the total value of European naval contributions to European BMD capabilities and operations compare to the total value of the U.S. contributions to European BMD capabilities and operations?
- Given anticipated reductions in planned levels of U.S. defense spending resulting from the Budget Control Act of 2011 (S. 365/P.L. 112-25 of August 2, 2011), as well as the potential for giving BMD capabilities to European navy ships (see “Allied Participation and Interest in Aegis BMD Program” in “Background”), should the United States seek increased investment by European countries in their naval BMD capabilities so as to reduce the need for assigning BMD-capable U.S. Navy Aegis ships to the EPAA?

Capability of SM-3 Block IIB Interceptor

Another potential oversight issue for Congress concerns the prospective capability of the SM-3 Block IIB interceptor for conducting certain kinds of intercepts called “early intercepts” as part of the EPAA. A June 13, 2011, press report stated:

When asked what the Pentagon’s plan is for countermeasures if early intercept does not materialize with the [SM-3 Block] IIB in 2020, Missile Defense Agency (MDA) officials simply state: “We fully expect to have a viable early-intercept capability with the SM-3 Block IIB in the 2020 time period.”...

At issue today is whether the architecture as envisioned is achievable; and the piece most critics question is the plan to achieve early intercept and protect the Eastern U.S. from an Iranian ICBM attack.

USAF Gen. (ret.) Lester Lyles, who led the MDA when it was called the Ballistic Missile Defense Organization, is co-chairing a Defense Science Board task force review of the early-intercept strategy with Adm. (ret.) William Fallon, who headed U.S. Pacific Command. The report is being written and will likely be briefed to Pentagon leaders in the fall.

Lyles declines to discuss his findings until they are briefed to the Pentagon. Industry and government sources familiar with the study have different views on what the findings will be. Some say the task force questions the ability to achieve early intercept with the time and money available. Others say the report will outline what can be achieved with the current strategy.

Whatever the outcome, the results are likely to influence the SM-3 IIB program, whether it moves forward and, if it does, what the missile will look like. The IIB is the notional long-range missile killer that will be fielded in Phase IV by 2020 for early intercept to fulfill the promise of protecting the Eastern U.S. and most of Europe from an Iranian ICBM attack....

GMD advocates point to the option of placing interceptors at Fort Drum, N.Y., to provide a deeper magazine and coverage for the Eastern U.S.....

The question of whether a IIB missile can achieve early intercept, and how to do it, is likely be to sorted out this summer. The Defense Science Board will report its findings, and the MDA is likely to request funding for the IIB strategy in the fiscal 2013 budget proposal that is due to Congress next February.³⁶

A June 17, 2011, press report states:

A Defense Science Board (DSB) report on early missile intercept is already prompting discussion on Capitol Hill over how U.S. strategic forces are funded.

The Obama administration is pursuing the European Phased Adaptive Approach to missile defense, which by 2020 would develop the SM-3 Block IIB interceptor to protect the U.S. and Europe against long-range missiles from North Korea and Iran. In April, Boeing, Lockheed Martin and Raytheon each won concept definition and program planning awards worth at least \$41 million.

But the DSB study, led by retired Air Force Gen. Lester Lyles and retired Navy Adm. William Fallon, casts doubt on a central capability of that interceptor—primarily the ability to hit an incoming missile before it deploys countermeasures, according to Senate Republican aides. The study’s unclassified version also finds that the goal of early interception may lead to a less-capable system overall and rather than investing in the interceptor, improvements to radars, satellites and communications are also important, an aide says.

With that information, already a critical question is emerging on Capitol Hill: During a deficit crisis, should the government be spending \$1.7 billion over the next five years to develop the SM-3 Block IIB if its ultimate goal is in doubt?

At least the rationale for pursuing the interceptor—replacing a missile defense site based in Poland and the Czech Republic—is in line for scrutiny.

“If the administration continues to sell early interceptors as a way of going after countermeasures, that’s not going to work,” one aide says.

So in that case, does it make sense to continue working on the IIB missile for other reasons? And if not, what are the alternatives?

³⁶ Amy Butler, “End Game,” *Aviation Week & Space Technology*, June 13, 2011: 40.

One camp could emerge in support of upgrades to the current Ground-based Midcourse Defense system or the creation of a site in the eastern United States. Another group may want to improve on the capabilities of the Raytheon-led SM-3 Block IIA.³⁷

A July 6, 2011, letter to the editor from the two co-chairmen of the DSB task force in question and the chairman of the full DSB stated:

The Defense Science Board (DSB) is now completing a review on Science and Technology Issues of Early Intercept (EI) Ballistic Missile Defense Feasibility as a concept to enhance missile defense....

In previous work, the DSB found the EI concept helpful in national missile defense against long-range ballistic missiles. In the current review, EI, as defined by the study's terms of reference, was judged less helpful in regional missile defense against shorter range regional ballistic missiles....

The DSB concluded that the Missile Defense Agency is on the right track in developing European Phased Adapted Approach (EPAA) options, including continued evolution of the SM-3 family of missiles, which will expand the battle space and provide more engagement opportunities in the regional defense provided by the EPAA. The DSB also examined the potential in the EPAA context for EI in regional defense against short-range missiles before threat payloads could be deployed, and concluded that this was not a viable option because of technical constraints - primarily related to the very short payload deployment times and the present absence of adequate sensors/Ballistic Missile C3 to overcome this.

The fact that this form of EI is not viable in shorter-range regional applications does not imply that either SM-3 family interceptors or the EPAA concept are flawed. In general, EI, including intercepts of longer- range missiles before the threat missile reaches apogee, can provide for multiple engagement opportunities and more effective defenses.

MDA is on the right track in pursuing this capability for national missile defense, and examining the potential application in regional defense as a function of the range of threat missiles.

The DSB did not conclude that EI is flawed. Nor did they conclude that the EPAA approach or the SM-3 family were flawed. The DSB did conclude that EI would have a very limited role in regional defense against shorter range missile threats.³⁸

Technical Risk in Aegis BMD Program

Another potential oversight issue for Congress is how much technical risk there is in the Aegis BMD program.

³⁷ Jen DiMascio, "DSB Report Raises Questions About SM-3 Block IIB Costs," *Aerospace Daily & Defense Report*, June 17, 2011: 4.

³⁸ Letter to the editor from Admiral William J. Fallon, U.S. Navy, retired, task force co-chairman; General Lester Lyles, U.S. Air Force, retired, task force co-chairman and DSB vice chairman; and Paul G. Kaminski, DSB chairman, published under the title "'Early Intercept' Not Flawed," *Washington Times*, July 6, 2011: B2.

March 2011 GAO Report

A March 2011 Government Accountability Office (GAO) report on DOD BMD programs stated the following regarding the Aegis BMD program:

Aegis BMD did not conduct any developmental intercept flight tests in fiscal year 2010, although it did participate in several other BMDS flight and ground tests to assess BMD functionality and interoperability with the BMDS. During fiscal year 2010, MDA expected to conduct FTM-15 to demonstrate Aegis 3.6's ability to launch the SM-3 IA interceptor using data from a remote sensor against an intermediate-range ballistic missile target. However, the flight test has been delayed due to target availability. This had a ripple effect on other scheduled events, resulting in a delay in demonstrating key capabilities of Aegis 3.6.1 with SM-3 IA and Aegis 4.0.1 with SM-3 IB. The FTM-15 is key to demonstrating capability of the IA interceptor to engage threat missiles in the range expected for European PAA Phase I, planned for deployment by December 2011. In other testing, a Japanese Aegis BMD destroyer conducted a successful intercept of a separating target using an SM-3 IA interceptor.

Aegis 4.0.1 with SM-3 IB has executed more slowly than expected in fiscal year 2010. At the last execution review of the fiscal year, progress toward verifying the SM-3 IB engagement capability required action, and 6 of the 14 development phase exit criteria tracking program execution were assessed as not on track, including those related to requirements, affordability, design, manufacturing, and weapon system safety. The slower pace primarily reflects delays in SM-3 IB interceptor development.

Aegis 4.0.1, with the SM-3 IB interceptor, is expected to have increased discrimination, engagement coordination, threat missile range capability and raid capacity. Technology development of the interceptor's Throttleable Divert Attitude Control System (TDACS) is following a high-risk path due to continuing resolution of issues discovered during sub-assembly hazard testing. The TDACS issues relate to the operational suitability and expected lifetime of the interceptor. The first intercept flight test, FTM-16, was moved into the third quarter fiscal year 2011 to allow time to investigate and resolve the issues. FTM-16 is critical to demonstrating the interceptor performance, as well as being required to certify the Aegis combat system. According to the Director, MDA, the flight test was rescheduled to allow time to complete qualification tests. Design verification and qualification tests validate component performance, reliability and producibility. MDA has since determined the root cause of the TDACS problem and identified two design improvements. However, due to continuing delays redesigned TDACS components will not be included in the interceptor manufactured for FTM-16; instead, it will be manufactured using a new process control to partially mitigate the issue. Further, MDA has since decided to conduct the flight test in the fourth quarter of fiscal year 2011 without completing the qualification tests as originally planned. The TDACS qualifications and verifications leading up to the FTM-16 intercept test will be limited to the environmental conditions expected during the FTM-16 event. Following FTM-16, the design changes to the TDACS will require the full set of design and qualification testing.

We reported in February 2010 that planned interceptor production would precede knowledge of interceptor performance, and recommended that MDA delay a decision to produce interceptors to follow successful completion of developmental testing, a flight test, and manufacturing readiness review. We reported again in December that the SM-3 IB test schedule was not synchronized with planned production and financial commitments. This schedule had become even more compressed as a result of TDACS redesign, and planned requalification. As a result, MDA recently deferred planned interceptor production decisions to follow redesign efforts, the manufacturing readiness review, and an additional flight test; steps that could better inform those production decisions.

While MDA characterized the first 30 interceptors as being test rounds, half remain unassigned to a specific test. Furthermore, of those interceptors assigned to a test, some may be produced earlier than necessary since they deliver 1 to 2 years prior to the scheduled test. Program officials note the unassigned “test” rounds will provide information on reliability, maintainability, and supportability, and verify cost estimates and production processes....

Aegis BMD 5.0 will not provide new mission capability; instead it will leverage the Navy’s Aegis modernization effort, which transitions the cruisers’ and destroyers’ computers and displays from military standard to commercial-off-the-shelf components. The modernization effort will increase the number of cruisers and destroyers that have the potential to be BMD capable from 27 to 84, and the installation of Aegis 5.0 in conjunction with the modernization will add the BMD capability. Once Aegis 5.0 is available, Aegis ships with version 3.6.1 may be upgraded directly to 5.0, instead of undergoing an interim installation of 4.0.1 (estimated at \$52 million per ship). Although it does not add new mission capability, the migration into an open architecture environment requires significant modification and testing of 8 of 10 major components of the Aegis weapons system. Execution reviews already show signs of schedule compression and interdependencies of multiple efforts increase schedule risk. As the European PAA’s new Aegis Ashore program is highly dependent on the scheduled delivery of Aegis 5.0, delays could have significant consequences for providing European BMD capability as planned....³⁹

Regarding the Aegis Ashore program, the GAO report stated:

According to the Director of MDA, the idea of Aegis Ashore preceded the new European PAA policy. Earlier in 2008 and 2009 MDA had been studying alternatives to the Arrow 3 program—a joint US-Israeli program designed for Israeli self-defense against short-range ballistic missiles. MDA’s analysis had considered several land-based SM-3 options, and had concluded that an Aegis with SM-3 was the preferred option. It is unclear how assumptions and analysis related to Arrow-3 supported—and what if any additional technical analysis was conducted to support—the selection of Aegis Ashore for the European PAA.

While MDA does not yet follow DOD’s standard acquisition processes, a robust consideration of alternatives is a key first step in that process and is intended to assess the operational effectiveness, costs, and risks of alternative weapon system solutions for addressing a validated warfighting need. We reported in September 2009 that DOD often did not effectively consider a broad range of alternatives for addressing a warfighting need or assess technical and other risks associated with each alternative. Without a sufficient comparison of alternatives and focus on technical and other risks, reviews of alternatives may identify solutions that are not feasible and decision makers may approve programs based on limited knowledge. While many factors can affect cost and schedule outcomes, we found that programs that had a limited assessment of alternatives tended to have poorer outcomes than those that had more robust assessments. The Office of Cost Assessment and Program Evaluation is studying alternatives to Aegis Ashore.

A knowledge-based acquisition approach is a cumulative process in which certain knowledge is acquired by key decision points before proceeding. In other words, demonstrating technology maturity is a prerequisite for moving forward into system development, during which the focus should be on design and integration. The President’s announcement of the European PAA on September 17, 2009 officially began Aegis Ashore, and MDA placed Aegis Ashore directly into the third acquisition development phase—product development.

³⁹ Government Accountability Office, *Missile Defense: Actions Needed to Improve Transparency and Accountability*, GAO-11-372, March 2011, pp. 58-60.

MDA officials note that this decision was due to the understanding that Aegis Ashore would be a modification of proven Aegis BMD capabilities. Yet Aegis Ashore has not yet completed some of the activities MDA outlines for its first two development phases (materiel solutions analysis and technology development), and is executing others concurrently with activities in the third development phase (product development). For example, although MDA's acquisition oversight process identifies the following top-level tenets for phase review entry/entrance criteria prior to entering the Product Development phase, Aegis Ashore had not: obtained an independent cost estimate, prepared a life cycle cost estimate, demonstrated critical technologies in the operational environment (land), or ensured interoperability and integration with the larger BMDS. MDA's knowledge points—typically identified during the first MDA acquisition phase—identify information required to make key decisions (e.g. program funding decisions, technology selections, capability declarations, program continuation, or the selection of an alternative course of action) and manage program risk. MDA's knowledge points for Aegis Ashore were completely redefined less than 3 months after being established.

DOD's commitment to field Aegis Ashore by 2015 has resulted in significant schedule compression for the program, even as MDA discovered issues that broadened the scope of development and design, placing the program at increased risk of cost growth and schedule delay. According to the Director, MDA, Aegis Ashore development is not a high risk because it is based on the existing Aegis BMD system. However, while Aegis BMD has demonstrated performance at sea, these demonstrations used the currently fielded 3.6.1 version of Aegis BMD with the SM-3 IA interceptor, not the newer variant of the Aegis operating system and new interceptor that Aegis Ashore will use. Aegis Ashore is dependent on next-generation versions of Aegis systems—Aegis 4.0.1 and Aegis 5.0—as well as the new SM-3 IB interceptor, all of which are currently under development (see appendix III). Moreover, a series of changes are required to further modify these new variants of Aegis BMD for use on land with Aegis Ashore. These modifications include changes to the VLS; suppression or disabling of certain features used at sea; design, integration, and fabrication of a new deckhouse enclosure for the radar, and potential changes to the SM-3 IB interceptor. Changes to those existing Aegis BMD components that will be reused for Aegis Ashore may reduce their maturity in the context of the new Aegis Ashore program, and new features will require testing and assessment to demonstrate their performance. MDA plans to conduct both ground and flight tests prior to deployment, however these tests will not occur prior to making production decisions.

Aegis Ashore expects to leverage the existing shipboard Aegis Combat System—comprised of 32 sensors, communications, weapons, and countermeasures. However only 11 of these will be reused for Aegis Ashore; the remaining 21 will need to be suppressed or otherwise disabled, including the software that accounts for a ship's pitch and yaw. While officials note that current land-based testing processes for portions of the Aegis Combat System involve similar suppression, the Aegis Ashore land-based configuration is unique and must still be demonstrated through operational testing.

The program office assessed both the SPY-1 radar and the VLS as flight proven through successful mission conditions, reflecting the assessment of the radar and VLS currently at sea. However, these systems will operate on land, and it is unclear whether the radar's spectrum supportability is fully understood or accounted for. Also, the VLS will be modified to address the differing protection, safety, and environmental requirements of its new land-based environment. Finally, MDA may modify the SM-3 Block IB for Aegis Ashore; the extent of these changes remains unknown.

Both the radar and the VLS will be configured in removable enclosures that have not yet been designed or tested. Also, Aegis Ashore's new deckhouse—instead of being integrated on a ship deck with the VLS and the ship's hull, mechanical, and electrical systems—will be

configured apart from the VLS and these will require standalone power generation. The deckhouse design also requires that it be removable in order to facilitate shipment. However not all requirements are fully known, and although neither the deckhouse requirements or design are stable, the contract for Aegis Ashore deckhouse fabrication and integration was awarded prior to preliminary or critical design reviews for the overall Aegis Ashore system. The potential for rework because design starts before requirements are complete was noted as a continuing risk in the last program review of the fiscal year, and we have previously reported that starting fabrication prior to achieving design stability can lead to costly modifications later in the process due to rework.

The number of planned developmental flight test events has been reduced since the Aegis Ashore program began and they are not timed to inform production decisions. In MDA's February 2010 test plan Aegis Ashore was scheduled to participate in 7 developmental flight test events, 5 of which were intercept events. The current plan is for 4 test events, 2 of which are intercepts. The first intercept is now scheduled more than a year later than previously planned....

MDA officials indicate that the current plan is sufficient to collect data on critical variables and to evaluate weapon system performance in the Aegis Ashore configuration. We have previously reported that repetition of intercept-related objectives is important to build confidence in intercept capability. MDA plans to make production commitments for the first operational Aegis Ashore and its interceptors by early fiscal year 2012. The first intercept flight test with a target is planned for the second half of fiscal year 2014, at which point the design will have been finalized, the Aegis Ashore deckhouse and components built, and Aegis Ashore construction and interceptor production will be well under way.⁴⁰

April 2011 Press Report

An April 6, 2011, press report stated:

The Navy's overreliance on the Raytheon [RTN]-built SM-3 system as the backbone for its ballistic missile defense strategy in Europe could delay White House plans to have a viable BMD presence in the region by 2015, a former high-ranking military official said yesterday.

Technical difficulties found in elements of the Block IA version of the SM-3 would likely find their way into the new Block IB variant of the weapon, former Missile Defense Agency (MDA) director Lt. Gen. Trey Obering said in an Aerospace Industry Association-sponsored event on Capitol Hill yesterday. Obering, currently an executive with Booz Allen Hamilton [BAH], served as director of MDA from 2004-2009.

Raytheon's block development approach on the SM-3, he added, would also make it likely that such problems would "tend to cycle through" all current and future variants of the weapon, he said....

Navy and industry program officials completed the system requirements review for Aegis Ashore late last year, with system design review for the program slated for February. Program officials plan to conduct the critical design review for the weapons system in the

⁴⁰ Government Accountability Office, *Missile Defense[:] Actions Needed to Improve Transparency and Accountability*, GAO-11-372, March 2011, pp. 61-65. See also Government Accountability Office, *Missile Defense: European Phased Adaptive Approach Acquisitions Face Synchronization, Transparency, and Accountability Challenges*, GAO-11-179R, December 21, 2010, 39 pp.

following fiscal quarter, Lisa Callahan, vice president of maritime BMD programs for Lockheed Martin [LMT], said in a Jan. 5 teleconference.

“All of that will culminate in a test system for Aegis Ashore that will be in Hawaii in 2013 and the first Aegis Ashore capability in Romania in 2015,” according to Callahan....

But those deployment plans could be thrown off course, should the new SM-3 variants be plagued with the same problems experienced on the Block IA weapon, Obering warned, noting that initial flight tests for the Block IB system were originally slated to begin in 2009. Those tests are now set for summer of this year.

The former Air Force three-star general went even further, saying technical delays “are likely” on the Block IB and the next-generation Block IIA and IIB, which could push any SM-3 deployments supporting BMD operations in Eastern Europe to the right.

“I expect we are going to see delays in there,” he said, adding the Navy and the Pentagon would be well served “to have alternative options” to the SM-3 system. The former MDA chief did not go into specifics on what alternatives could be explored.

However, Raytheon has undergone an “unmatched test process” on the Block IA system and has worked through the development issues and delivered the system to the Navy on time, in support of the first phase of the EPAA strategy Frank Wyatt, vice president of Raytheon Air and Missile Defense Systems, said in an interview with *Defense Daily* that same day.

On the postponement of Block IB flight testing, the delay was prompted mainly by development challenges with the integration of a new warhead propulsion and maneuvering system—known as the Throttling Divert and Attitude Control System (TDACS)—which allows the weapon to engage “more complex threats,” Wyatt said.

Along with the TDACS, the major changes between Block IA and IB were focused on improvements to the sensor and processing capabilities on the missile, the Raytheon executive added.

However, after a recent successful system integration test of the Block IB version of the SM-3, Wyatt was confident any TDACS problems have been corrected and the company will meet the 2015 deployment timeline for the IB missile, as outlined by the EPAA.

Aside from concerns over the SM-3’s viability, Obering also said he was “disturbed” over the manner in which Raytheon downplayed the potential development difficulties for the Block IB version, noting the program possessed “a higher technical risk than it was painted out to be.”

While acknowledging that he did not see any “fatal” problems with the Block IA or IB, and that any technical risk in the weapon’s development would be no different than those experienced on other new start programs. However, Raytheon’s decision to pitch the Block IB system as mere follow-on to the IA missile implied that the Block IB’s development would not suffer many of those new start challenges seen on other programs.

In response, Wyatt said the company was not dismissing any potential challenges that could arise with the SM-3 Block IB development, but added that using a follow-on, spiral strategy was the lowest risk approach to the weapon’s development while meeting the Pentagon’s time lines.

“We would not be meeting the [EPAA] timelines with an approach that begins with a brand-new interceptor,” he said. “Clearly, if you can spiral develop from an existing program that is clearly a lower-risk position.”⁴¹

Additional Issues Concerning European Aegis BMD Operations

The Administration’s plan to use BMD-capable Aegis ships to defend Europe against potential ballistic missile attacks raises a number of additional potential oversight issues for Congress, including the following:

- What will be the command and control procedures governing use of sea-based SM-3s for purposes of intercepting ballistic missiles fired toward Europe from Iran (or some other country in the Middle East or Southwest Asia)? Would authority to fire the missile rest with the ship’s commanding officer, or would approval from a higher authority be required?
- What additional system-integration challenges would the Administration’s plan pose for the Aegis BMD system? How significant are the technical risks associated with these challenges?
- What implications, if any, does Japanese involvement in the development of the SM-3 Block IIA missile have for implementing the Administration’s plan?

An April 19, 2010, press report stated that:

questions still under consideration include basics such as which areas American ships will defend and when; how many ships will be available; and how the alphabet-soup of U.S. and international commanders will work together in a crisis.

[Admiral Mark Fitzgerald, commander of Naval Forces Europe] gave a simple example of the bureaucratic and diplomatic intricacies involved with Navy ballistic-missile defense of Europe: Although U.S. European Command controls the territory in which BMD ships will be on guard, the potential launch sites in the Middle East, from which an attack might come, belong to U.S. Central Command.

Officials need to determine how to integrate their sensors, how they’ll handle warnings, and who will be in the loop—American, NATO, European Union or individual countries’ militaries—if a threat occurs....

The U.S. and its allies have begun testing systems and practicing for threats, Fitzgerald said, and American BMD ships are confirmed ready to join Israel’s command-and-control grid in case of an attack.⁴²

A November 6, 2009, press report stated:

Citing the resource-constrained U.S. Army budget, the general overseeing the Army’s Space and Missile Defense Command says he would prefer the U.S. Navy to assume oversight and

⁴¹ Carlo Munoz, “Obering: Navy Dependence On SM-3 Missile System Could Delay European BMD Plans,” *Defense Daily*, April 6, 2011: 3-4. Material in brackets as in original. See also Otto Kreisher, “Missile Defense Advocates Look For clearer Direction,” *National Journal Daily AM*, April 6, 2011.

⁴² Philip Ewing, “Officials Consider European Home Ports,” *NavyTimes.com*, April 19, 2010.

execution of the mission to land-base SM-3 Block IB ballistic missile killers in Europe for protection against an Iranian attack.

“Today, we have a number of priorities that we have trouble meeting outside of missile defense,” Campbell said during a Nov. 3 interview with *Aviation Week*.

These include providing weapons and manpower for the wars in Afghanistan and Iraq.

“In my view this is an opportunity to have another service, in this case the Navy, to be the lead service... From a resource perspective, it would be one less competing priority that we have to put in the mix.”

The Pentagon plans to field land-based SM-3 Block IB interceptors, originally designed for launch from Aegis ships, in Europe by 2015. Eventually, the SM-3 Block IIA, built on a 21-inch booster (the IA and IB use 13.5-inch boosters), will likely be based on European soil. It is unclear what type of fire control and sensor architecture will be used. Candidates include those used for the Navy’s Aegis ship system or the Army’s Terminal High-Altitude Area Defense (Thaad) system now being fielded.

It would seem a natural mission for the Army to fund and field the land-based SM-3 mission as the lead service. Campbell notes that the Army has 10 years of experience in operating missile defense architectures abroad through the Patriot, PAC-3 and now Thaad. “We’ve only started to scratch on the surface on how would it work in the theater with the new Terminal High-Altitude Air Defense, Thaad, and then how would it work with an Aegis ship introduced into the same region ... and Patriot could be part of that architecture,” Campbell said.

However, he says the service is facing too many financial troubles to take on the mission.

Inputs from both the Army and Navy have been sent to the Pentagon for consideration. A final decision is expected on the matter soon.⁴³

An October 25, 2009, press report stated:

U.S. Defense Secretary Robert Gates asked Japan last week to export a new type of ship-based missile interceptor [the SM-3 Block IIA] under joint development by Tokyo and Washington to third countries, presumably European, sources close to Japan-U.S. relations said.

Gates’ request could lead to a further relaxation of Japan’s decades-long arms embargo and spark a chorus of opposition from pacifist elements in the ruling Democratic Party of Japan and one of its coalition partners, the Social Democratic Party.

Gates made the request concerning Standard Missile-3 Block 2A missiles during talks with Defense Minister Toshimi Kitazawa on Wednesday, the sources said....

Japan has a policy of not exporting weapons or arms technology, except to the United States, with which it has a bilateral security pact.

⁴³ Amy Butler, “Army Three-Star Pushes For Navy To Be Ashore SM-3 Lead,” *Aerospace Daily & Defense Report*, November 6, 2009: 1-2. Ellipses as in original.

Gates' request followed President Barack Obama's announcement in September that the United States is abandoning plans for a missile defense shield in Eastern Europe and adopting a new approach to antimissile defense.

During his talks with Kitazawa, Gates called for a relaxation of Japan's arms embargo and prodded Tokyo to pave the way for exports of the new interceptors to third countries, particularly European, the sources said.

Kitazawa refrained from answering directly, telling Gates the government would study the request as it is an internal matter for Japan, the sources said.

The United States plans to begin deploying SM-3 Block 2A missiles in 2018. The Foreign and Defense ministries believe it will be difficult to reject Gates' request, the sources said.

In December 2004, Japan and the United States signed an agreement for bilateral cooperation on a ballistic missile defense system. At the time, Japan exempted U.S.-bound exports of missile interceptors to be developed by the two countries from its arms embargo rules.

Following an agreement on joint development of a new missile interceptor, Japan and the U.S. exchanged diplomatic documents on banning its transfer to third parties or its use for purposes other than originally intended without Japan's advance agreement.

The sources said Japan would probably be forced to exempt the export of the interceptors to third countries or give its nod in advance as stated in the documents.

The United States is hoping to get an answer to Gates' request by the end of 2010, and envisages Japan exporting the new interceptors to European countries, including Germany, the sources said....

In fiscal 2006, Japan and the United States began to jointly develop the SM-3 Block 2A, an advanced and more accurate version [of the SM-3 interceptor]....

Japan is developing the core part of the interceptor, which protects an infrared ray sensor from heat generated by air friction, while the United States is in charge of developing the warhead, called the Kinetic projectile, which would hit and destroy a ballistic missile.

Japan's arms embargo dates back to 1967, when then Prime Minister Eisaku Sato declared a ban on weapons exports to communist states, countries to which the United Nations bans such exports and parties to international conflicts.

The policy was tightened in 1976 when then Prime Minister Takeo Miki imposed an almost blanket ban on the export of weapons. But in 1983, Japan exempted exports of weapons technology to the United States from the embargo.⁴⁴

An October 8, 2009, press report stated:

As Navy planners figure out how the fleet will take on its new job of providing ballistic-missile defense protection for Europe, they don't have to look far for an example of what it could look like.

⁴⁴ Kyodo News, "U.S. Urges Japan To Export SM-3s," *Japan Times*, October 25, 2009.

The Norfolk, Va.-based destroyer Stout returned in early September from European Command's first dedicated BMD deployment, in what could be an early model for the missions of tomorrow.

"I would think they would look kind of similar to what we did," Cmdr. Mark Oberley, the Stout's commanding officer, told Navy Times.

Stout deployed to the 6th Fleet area of operations, made regular stops in the Mediterranean and Black seas, trained with partner navies and overall showed the U.S. flag. But everywhere it went, BMD was part of its daily life.

"The BMD just kind of goes in parallel with our normal routine wherever we go in the world; that didn't really change the exercises we did and the way we prepared," Oberley said.

The U.S. is committing at least two BMD ships—and as many as six, a top defense official said Sept. 24—for a standing patrol off Europe by 2011. The ships will be there to safeguard against ballistic-missile attacks launched from Iran.

It isn't clear yet just what that duty will look like: Still to be determined is where ships will patrol, how they'll be outfitted and what it all means for their crews and schedules.

In Stout's case, the crew was tied to patrol areas for which the ship had to provide BMD protection, within which it had some latitude about where it could stray.

"[Aegis] can reach far, but you also have a tether to be in a certain area in a certain time, just like a lot of the other missions that we do, and basically, as long as we're in that tether, then you're good," he said.

And although the Navy's BMD tests in the Pacific typically involve two or three ships, Oberley said Stout or any other BMD ship probably could see and hit a ballistic missile flying from the Middle East toward Europe.

"It depends on where it's launched from and where it's going to, so all those things are variable. If the situation required us to link with another ship or another system, we could do that," he said.

Missile numbers

Aegis warships are suitable for ballistic-missile defense because they can carry so many SM-3 interceptors. Cruisers have 122 vertical launch system missile tubes and destroyers have 90 or 96, depending on their flight. But there aren't even that many missiles in the whole U.S. arsenal—yet. The Pentagon has "more than 40" SM-3s today, according to Missile Defense Agency spokesman Chris Taylor. It requested funds for 147 missiles in fiscal 2009 and planned to request funding for 218 missiles in fiscal 2010.⁴⁵

A September 30, 2009, press report stated:

The Navy's new mission of protecting Europe from ballistic-missile attacks has widespread implications for the surface fleet, potentially affecting everything from deployment schedules to crewing arrangements to command-and-control procedures for cruisers and destroyers.

⁴⁵ Philip Ewing, "Stout Deployment May Be BMD Mission Blueprint," *NavyTimes.com*, October 8, 2009.

Ballistic-missile defense warships have become the keystone in a new national strategy to shield European allies from potential attacks by Iran. Rather than field sensors and missiles on the ground in Poland and the Czech Republic, the U.S. will first maintain a presence of at least two or three Aegis BMD ships in the waters around Europe, starting in 2011.

That announcement—which defined a new mission for the surface force: continent defense—immediately raised many questions that Navy planners must answer over the next two years:

Which ships will take the patrol mission? What will the deployments look like—will ships participate in exercises, make port visits or be confined to a narrow patrol box? How long will ships be assigned picket duty? Will BMD patrol ships sail with the crews they would have taken on normal deployments, or will they have fewer sailors to account for the narrower mission?

Navy officials had few answers in the week after Defense Secretary Robert Gates announced the new BMD mission. Spokesmen at the Pentagon and for 3rd Fleet, which is responsible for Navy Air and Missile Defense Command, said officials were working out the details.

Some hints could come from the deployment this summer of the BMD destroyer *Stout*, which spent six months in the Mediterranean and Black seas, training with Turkish, Romanian, Georgian and other sailors. When the mission was finished, *Stout* returned to Norfolk, Va., in early September.

But that traditional model might not be best for the new BMD patrols, said retired Rear Adm. Ben Wachendorf. He said top commanders might consider reviving crew-swaps—flying replacement sailors to a forward port to relieve a ship's company when its time at sea is over, keeping the ship at sea for extended periods of time.

Wachendorf, who worked on the Navy's original crew-swap experiments in the early 2000s, said it would be expensive, but crew swaps would enable commanders to keep BMD ships in place in European ports and save long transits home. Most of the Navy's BMD fleet is based in the Pacific, meaning ships would need a month at sea just to get to Europe and then another month for the trip home.

One reason the fleet might reconsider crew swaps is that BMD-patrol ships could sail with fewer people. If a cruiser or destroyer is loaded only with Standard Missile-3 interceptors and will be tasked only with picket duty, it may not need some elements of a normal crew, making it easier to fly fewer people to a forward port.

Then again, that concept could backfire.

“You might be able to cut back on some things. Do you need a towed array? Are you ever going to stream it out? Do you need a [helicopter] detachment?” Wachendorf asked. “I could say no, but Big Navy worries, ‘If we have a helo-capable ship that never operates helos, they’re not going to be ready to do that.’ Same thing with [anti-submarine warfare].”

Who pushes the button?

There were broader questions beyond crewing and deployments: For the first time, the commanding officer of a surface warship will have strategic responsibilities—the ship could be the only thing standing between a nuclear attacker and its victim. What discretion will commanders have in responding to attacks?

“You’ve put these commanders on a par with [ballistic-missile submarine] commanders,” said Steven Cimbala, an expert on ballistic-missile issues.

“But unlike an SSBN commander, who is unlikely to be under immediate tactical threat, an Aegis cruiser or a [destroyer] could very easily be attacked by surface or subsurface craft, or aircraft, as part of a first strike,” Cimbala said.

According to new intelligence described by Gates, the stakes for an engagement are very high: Rather than one or two rogue launches, Gates described the threat from Iran as involving volleys of many missiles fired simultaneously.

That also means a BMD captain could be responsible for a big, complex, dangerous battle in the space over Europe, needing to fire dozens of missiles to try to destroy dozens of attackers.⁴⁶

Legislative Activity for FY2012

Summary of Action on FY2012 MDA Funding Request

Table 4 summarizes congressional action on the FY2012 request for MDA procurement and research and development funding for the Aegis BMD program.

⁴⁶ Philip Ewing, “BMD Fleet Plans Europe Defense Mission,” *NavyTimes.com*, September 30, 2009. Material in brackets as in original.

Table 4. Summary of Congressional Action on FY2012 Request for MDA Procurement and RDT&E Funding for Aegis BMD Program

(In millions of dollars, rounded to nearest tenth; totals may not add due to rounding)

	Request	Authorization			Appropriation		
		HASC	SASC (S. 1253)	SASC (S. 1867)	Conf.	HAC	SAC
Procurement							
Aegis BMD (Line 34, Project MD09)	565.4	615.4	565.4	250.4		565.4	565.4
Research, development, test & evaluation (RDT&E)							
SM-3 Block IIB missile (Line 69, PE 0603902C, Projects MD70, MD40)	123.5	123.5	123.5	123.5		123.5	0
BMD Aegis (Line 91, PE 0603892C, nine projects)	960.3	965.3	990.3	1,250.3		960.3	1,027.0
Land-based SM-3 (Line 110, PE 0604880C, Projects MD68, MD 40)	306.6	306.6	306.6	306.6		306.6	306.6
SM-3 Block IIA missile co-development (Line 111, PE 0604881C, Projects MD09, MD40)	424.5	464.5	444.5	444.5		424.5	474.5
Subtotal RDT&E	1,814.9	1,859.9	1,864.9	2,124.9		1,814.9	1,808.1
TOTAL	2,380.3	2,475.3	2,430.3	2,375.3		2,380.3	2,373.5

Source: FY2012 DOD budget submission; HASC report (H.Rept. 112-78) on H.R. 1540; Sections 4101 and 4201 of S. 1253 as reported by SASC; Sections 4101 and 4201 of S. 1867 as reported by Senator Levin; HAC report (H.Rept. 112-110) on H.R. 2219; SAC report (S.Rept. 112-77) on H.R. 2219.

Notes: **HASC** is House Armed Services Committee; **SASC** is Senate Armed Services Committee; **HAC** is House Appropriations Committee; **SAC** is Senate Appropriations Committee; **Conf.** is conference.

FY2012 National Defense Authorization Bill (H.R. 1540/S. 1867/S. 1253)

House

As shown in **Table 4**, the House Armed Services Committee, in its report (H.Rept. 112-78 of May 17, 2011) on H.R. 1540, recommends increasing MDA's request for FY2012 procurement and research and development funding for the Aegis BMD program by \$95 million, including \$50 million for Aegis BMD procurement (Line 34, Project MD09) (page 369), \$5 million for BMD Aegis (Line 110, PE 0604880C, Projects MD68, MD 40) (page 420), and \$40 million for SM-3 Block IIA missile co-development (Line 111, PE 0604881C, Projects MD09, MD40) (page 420). **Section 1691** of H.R. 1540 as reported by the committee provides for the additional \$5 million for BMD Aegis (Line 91, PE 0603892C, nine projects), and states that the additional funding is to be used "for expanding the engagement capability of the Aegis ballistic missile defense in furtherance of national security objectives." The other two recommended increases are described in the committee's report as being for "program increase."

Section 233 of H.R. 1540 as reported by the committee states:

SEC. 233. HOMELAND DEFENSE HEDGING POLICY AND STRATEGY.

(a) Policy- It is the policy of the United States to develop and maintain a hedging strategy to provide for the protection of the homeland of the United States that—

(1) provides such protection through the phased, adaptive approach to missile defense in Europe if—

(A) the intercontinental ballistic missile threat from the Middle East to the United States materializes earlier than 2020 (the year in which phase four of the phased, adaptive approach is planned to begin protecting the homeland of the United States); or

(B) technical challenges or schedule delays affect the availability of the standard missile-3 block IIB interceptor planned for fielding in Europe by 2020 in order to protect the homeland of the United States as part of such phase four;

(2) provides such protection if the intercontinental ballistic missile threat from East Asia to the United States materializes more rapidly than expected;

(3) provides capabilities that improve or enhance the protection of the United States beyond the ground-based midcourse defense capabilities currently deployed for the defense of the United States; and

(4) includes plans for ensuring that such hedging capabilities described in paragraphs (1) through (3)—

(A) are suitable to perform the assigned mission;

(B) are operationally effective; and

(C) use technologies that are sufficiently matured and tested prior to fielding.

(b) Strategy-

(1) IN GENERAL- In light of the policy described in subsection (a), the Secretary of Defense shall develop a hedging strategy to provide for the protection of the homeland of the United States.

(2) ELEMENTS- The strategy under paragraph (1) shall include the following:

(A) A description of the hedging alternatives and capabilities considered by the Secretary.

(B) A summary of the analyses conducted, including—

(i) criteria used to assess such options and capabilities; and

(ii) the findings and recommendations of such analyses.

(C) Detailed plans, programs, and a budget profile for implementing the strategy through 2022.

(D) The criteria to be used in determining when each item contained in the strategy should be implemented and the schedule required to implement each item.

(E) Any other information the Secretary considers necessary.

(3) SUBMISSION- The Secretary shall submit to the congressional defense committees the strategy developed under paragraph (1) by the earlier of the following:

(A) December 5, 2011.

(B) The date on which the Secretary completes the development of such strategy.

Regarding Section 233, the committee's report states:

This section would make it the policy of the United States to develop and maintain a hedging strategy to provide protection of the United States:

(1) If the intercontinental ballistic missile (ICBM) threat from the Middle East materializes earlier than 2020, or technical challenges or schedule delays affect the availability of the Standard Missile-3 Block IIB interceptor planned for fielding in Europe by 2020 to protect the United States as part of phase 4 of the President's phased, adaptive approach;

(2) If the ICBM threat from East Asia materializes more rapidly than expected;

(3) That improves or enhances the protection of the United States beyond the ground-based midcourse defense capabilities currently deployed for the defense of the United States; and

(4) That includes plans for ensuring that hedging capabilities are suitable to perform the assigned mission, operationally effective, and use technologies that are sufficiently matured and tested prior to fielding.

This section would also require the Secretary of Defense to submit to the congressional defense committees the Department of Defense's homeland defense hedging strategy by December 5, 2011, or the date on which the Secretary completes the development of such strategy, whichever comes earlier.

The committee is aware that the Department of Defense is currently developing a hedging strategy for the protection of the U.S. homeland, to include continued development and assessment of a two-stage ground-based interceptor as noted in the February 2010 Department of Defense Ballistic Missile Defense Review. The committee notes that during testimony before the committee on October 1, 2009, the Under Secretary of Defense for Policy stated, "we keep the development of the two-stage [ground-based interceptor] on the books as a hedge in case things come earlier, in case there's any kind of technological challenge with the later models of the [Standard Missile-3]." This section would clarify and expand such policy. (Pages 95-96)

The report also states:

Standard missile-3 interceptors

The budget request contained \$565.4 million for procurement of Aegis ballistic missile defense (BMD) for the Missile Defense Agency (MDA).

The request would support the production of 46 standard missile-3 (SM-3) Block IB interceptors for delivery in fiscal year 2014. The fiscal year 2011 budget request included

plans by MDA to procure 66 SM-3 Block IB interceptors in fiscal year 2012. However, the budget request procures 20 less SM-3 Block IB interceptors than previously planned.

The SM-3 Block IB is a fundamental element of the President's phased, adaptive approach (PAA) to missile defense in Europe and in other geographic regions. In particular, sufficient inventories of SM-3 Block IB interceptors are necessary by 2015 to meet the President's planned deployment of phase 2 of the European PAA, to include a planned inventory of 36 Aegis BMD ships and an Aegis Ashore site in Romania. However, as noted in the February 2010 Ballistic Missile Defense Review "demand for U.S. BMD assets is likely to exceed supply for some years to come."

The committee is concerned that the current procurement plan for SM-3 interceptors is insufficient to meet the deployment plans of the PAA. At the same time, the committee seeks to ensure the SM-3 Block IB interceptor is sufficiently tested prior to MDA's planned ramp-up in interceptor production.

MDA has delayed the first SM-3 Block IB flight test until August 2011 to allow the Aegis BMD program office to resolve ongoing technical issues with the divert and attitude control system in the interceptor kill vehicle. In March 2010, the Government Accountability Office (GAO) reported that the "Aegis BMD program is putting the SM-3 Block IB at risk for cost growth and schedule delays by planning to begin manufacturing in 2010 before its critical technologies have been demonstrated in a realistic environment." In March 2011, GAO reported that MDA agreed to delay the start of SM-3 Block IB manufacturing until the Block IB had been successfully flight tested, consistent with its recommendations.

The committee expects that MDA will only allocate additional funding for SM-3 Block IB production in fiscal year 2012 if the first flight test is successful. Should the planned SM-3 Block IB flight testing be further delayed or technical issues remain unresolved, the committee would consider a reallocation of these funds to procure additional SM-3 Block IA interceptors.

The committee recommends \$615.4 million, an increase of \$50.0 million, for Aegis ballistic missile defense to procure additional SM-3 Block IB interceptors. (Pages 39-40)

The report also states:

Phased, adaptive approach

The committee commends the Department of Defense (DOD) for the progress it has made over the past year in the implementation of the phased, adaptive approach (PAA) for missile defense in Europe. The committee also appreciates the Department's improved engagement with the committee on the European phased, adaptive approach (EPAA).

As announced by the President in September 2009, the EPAA is designed to: sustain U.S. homeland defense against long-range ballistic missile threats; speed protection of U.S. deployed forces, civilian personnel, and their accompanying families against the near-term missile threat from Iran; ensure and enhance the protection of the territory and populations of all North Atlantic Treaty Organization (NATO) allies, in concert with their missile defense capabilities, against the current and growing ballistic missile threat; deploy proven capabilities and technologies to meet current threats; and provide flexibility to upgrade and adjust the architecture, and to do so in a cost-effective manner, as the threat evolves.

The committee notes that NATO formally endorsed territorial missile defense at its November 2010 Lisbon Summit and in its new Strategic Concept, and welcomed the EPAA "as a valuable national contribution to the NATO missile defence architecture." The Lisbon

Summit Declaration further stated that such a territorial missile defense capability would be “based on the principles of the indivisibility of Allied security and NATO solidarity.”

The committee has observed a range of DOD activities, many in conjunction with the Department of State, to implement EPAA. These include the March 2011 deployment of the Aegis ballistic missile defense cruiser USS Monterey to the Mediterranean for a 6-month mission to provide some defensive coverage of south and southeastern Europe as part of EPAA phase one, and ongoing bilateral negotiations with Romania and the Republic of Poland for the hosting of a land-based Aegis Ashore site as part of phase two and phase three, respectively. The committee is concerned, however, about the Department’s plans for forward-basing an AN/TPY-2 radar in southeastern Europe to meet the 2011 timeline for EPAA phase one, as a location has yet to be determined.

The committee expects continued engagement with the Department of Defense as the EPAA further evolves. The committee understands that specific command and control arrangements between the U.S. and other NATO members are still being developed. The committee believes contributions by U.S. allies are essential if EPAA is to be a NATO-wide capability and reflect the burden sharing commitment underpinning NATO.

Additionally, at the committee’s request, the Government Accountability Office (GAO) evaluated the Department of Defense’s plans for EPAA implementation. In its December 2010 report, GAO expressed concern that “DOD has not developed an overall investment cost or an acquisition decision schedule. The limited visibility into the costs and schedule for European PAA constrains independent assessments of progress as well as limits oversight.” Furthermore, a September 2010 independent assessment of EPAA by the Institute for Defense Analyses, required by section 235 of the National Defense Authorization Act for Fiscal Year 2010 (P.L. 111-84), estimated the 27-year total costs for the EPAA at \$22.0 billion to \$23.0 billion, which is significantly more than cost estimates provided to the committee by MDA. As the committee continues its oversight of EPAA, it expects MDA to further refine its cost estimates.

GAO further observed that system schedules are highly optimistic in technology development, testing, production, and integration, leaving little room for potential delays. To this point, the committee is concerned about the development of the standard missile (SM)-3 Block IIA and SM-3 Block IIB interceptors as well as the timeline for phase 4 of the EPAA, which is planned to provide additional protection of the United States. Elsewhere in this Act, the committee includes an increase in SM-3 Block IIA funds. (Pages 80-81)

The report also states:

Standard Missile–3 Block IIA interceptor

The budget request contained \$424.5 million in PE 64881C for Standard Missile (SM)-3 Block IIA Co-Development for the Missile Defense Agency (MDA).

The request would support the continued development and testing of the SM-3 Block IIA interceptor, which is being co-developed in cooperation with the Government of Japan. The SM-3 Block IIA is being designed with a larger diameter missile and more advanced kill vehicle technology than the SM-3 Block IA/IB interceptor. Upon planned deployment in 2018 as part of phase 3 of the President’s phased, adaptive approach to missile defense in Europe, the SM-3 Block IIB is expected to provide expanded coverage of Europe against intermediate range ballistic missile threats, and may provide some limited intercontinental ballistic missile intercept capability.

The committee is concerned about schedule risk in the SM-3 Block IIA program. The system preliminary design review (PDR) is planned for fiscal year 2012, leading to a first flight test planned for the first quarter of fiscal year 2015. The committee understands, however, that technical issues surfaced during component-level PDRs involving the divert and attitude control system in the kill vehicle, nosecone weight, and third stage rocket motor. The committee understands the technology maturation process and appreciates MDA efforts to retire technology risk. However, the committee believes MDA will be challenged in holding to its current schedule and is concerned about the program's ability to meet its planned 2018 deployment date.

The committee requests MDA to provide an updated schedule and funding profile for the SM-3 Block IIA program should either change in the near-term. The committee also notes that arrangements for SM-3 Block IIA production have not been determined with the Government of Japan, and the committee encourages the Department of Defense to begin such discussions.

The committee recommends \$464.5 million, an increase of \$40.0 million, in PE 64881C for SM-3 Block IIA Co-Development to fund additional development and technology risk reduction efforts, at the discretion of the Director, Missile Defense Agency, to reduce schedule risk. (Page 84)

The report also states:

Aegis Ballistic Missile Defense Operational Considerations and Force Structure

The committee recognizes the progress made by the Department of Defense to develop and field Aegis ballistic missile defense (BMD) capabilities. The committee, however, remains concerned about the force structure and inventory demands for Aegis ships resulting from the Phased Adaptive Approach (PAA) to missile defense in Europe, announced in September 2009, and the Department's plans to tailor the PAA to other geographic regions such as East Asia and the Middle East. As noted in the 2010 "Ballistic Missile Defense Review," "the demand for missile defense assets within each region over the next decade will exceed supply."

In particular, the committee would like to further understand the concept of operations for Aegis BMD capabilities and how operational considerations affect Aegis BMD force structure. The Vice Chairman of the Joint Chiefs of Staff previously testified before the committee on October 1, 2009 that when an Aegis ship is in missile defense mode, it "consumes all of the radar's activity," and a second ship is required for ship protection. Aegis BMD ships also support multiple missions such as maritime security, anti-submarine warfare, and surface warfare. While this multi-mission functionality provides flexibility and mobility, it may also place further force structure demands on the Aegis fleet and creates operational and performance tradeoffs for each ship. Additionally, as reported in June 2010, a Navy Fleet Review Panel assessment observed that Aegis SPY radar "manpower, parts, training and performance are in decline" and the decline in Aegis radar readiness may affect the Navy's ability to meet its missile defense mission requirements.

The committee directs the Secretary of the Navy to provide a report to the congressional defense committees, by December 5, 2011, that assesses how operational requirements and considerations, such as force protection, other mission requirements, geographic trade-offs, and readiness and availability, affect the Aegis BMD concept of operations and the implications of such operational requirements and considerations on force structure required to support combatant commanders' missile defense missions. Similarly, such assessment should also address how the Navy balances its various mission requirements and the impact of missile defense requirements on its force structure demands and operational tempo. The

assessment should also describe any recent Aegis BMD deployments, for example, to support the July 2009 Democratic People's Republic of Korea missile launches, and how operational requirements and considerations influenced the Aegis BMD force structure and concepts of operation to address the combatant commanders' mission requirements. (Page 107)

The report also states:

Aegis Ballistic Missile Defense Homeporting in Europe

The committee is aware that the Department of Defense is exploring the feasibility of homeporting U.S. Aegis ballistic missile defense (BMD) ships in Europe in support of the phased, adaptive approach for missile defense in Europe. The committee understands that such forward-basing of U.S. Aegis BMD ships in Europe may alleviate some force structure demands on the Aegis fleet by reducing their time in transit and providing closer proximity to Europe and the Middle East. Such a naval port in Europe would also further U.S. policy on international missile defense cooperation and burden sharing for the collective defense of Europe and the United States.

The committee directs the Secretary of Defense to provide a notification to the congressional defense committees preceding the Department's announcement of a decision to homeport U.S. Aegis BMD ships in Europe. The notification should include, at a minimum: the proposed location; number of ships to be homeported in Europe; the implementation schedule and funding profile, including military construction; and a summary of any analysis of alternatives that supports the decision, including any cost-benefit analysis. (Pages 287-288)

Senate (S. 1867)

S. 1867, an original measure reported by Senator Levin on November 15, 2011, without written report, in effect supersedes S. 1253 (see below). As shown in **Table 4**, S. 1867 recommends reducing by \$315.0 million MDA's request for FY2012 procurement funding for the Aegis BMD program (Line 34, Project MD09), with the reduction being for "Production delay; transfer to R&D for fixes." (See Section 4101 of the bill. In the printed version of the bill, the relevant table within this section appears on page 619.) The bill recommends increasing by \$290.0 million MDA's request for FY2012 research and development funding for the Aegis BMD program (Line 91, PE 0603892C), with \$30.0 million of the increase being for "SM-3 Block 1B production improvements" and \$260.0 million being for "Transfer from procurement to correct test failures." (See Section 4201 of the bill. In the printed version of the bill, the relevant table within this section appears on page 641.) The bill recommends increasing by \$20 million MDA's request for research and development funding for Aegis SM-3 Block IIA co-development (Line 111, PE 0604881C), with the increase being for "Program Increase—software integration." (See Section 4201 of the bill. In the printed version of the bill, the relevant table within this section appears on page 642.)

Senate (S. 1253)

S. 1253 has been, in effect, superseded by S. 1867 (see above). As shown in **Table 4**, S. 1253 as reported by the Senate Armed Services Committee (S.Rept. 112-26 of June 22, 2011) recommends increasing by \$30 million MDA's request for FY2012 research and development funding for the Aegis BMD program (Line 91, PE 0603892C), with the increase being for "SM-3

Block IB production improvements,” and increasing by \$20 million MDA’s request for FY2012 research and development funding for SM-3 Block IIA missile co-development (Line 111, PE 0604881C), with the increase being for “program increase – software integration.” (See Section 4201 of the bill as reported by the committee. In the printed version of the bill as reported by the committee, the relevant table within this section appears on page 631.)

The committee’s report states:

Standard Missile–3 Block IB

The budget request included \$960.3 million in PE 63892C for the Missile Defense Agency for continued development and testing of the Aegis Ballistic Missile Defense system and the Standard Missile–3 (SM–3) Block IB interceptor missile.

The Aegis BMD system is the centerpiece of the European Phased Adaptive Approach (EPAA) to missile defense, each phase of which is built upon the four successive generations of the SM–3 interceptor. The SM–3 Block IB interceptor is planned to be deployed during Phase 2 of the EPAA, in the 2015 timeframe, both at sea and at an Aegis Ashore site on land in Romania. The Block IB interceptor is expected to constitute the large majority of the SM–3 inventory, with more than 350 missiles planned.

The Block IB missile has experienced technical difficulties and delays related to the solid-fueled Throttleable Divert and Attitude Control System (TDACS) that would steer the kinetic kill vehicle directly into a threat missile reentry vehicle. These delays have caused a delay in testing and production of the Block IB missile, and up to 30 additional Block IA missiles will be produced to fill the gap. The first flight-test of the Block IB missile is scheduled for late summer 2012, and there are seven flight tests planned before a full-rate production decision would be made.

The cost of the effort to correct the TDACS problem has also caused a reduction in the initial number of Block IB missiles to be procured in fiscal year 2012, from 66 to 46. The production rate is planned to increase fourfold, from two per month in fiscal year 2012 to nearly eight per month in fiscal year 2017. The committee is concerned that the production line will not be able to achieve and sustain the planned increase in production rate, and that this could cause production delays, inventory shortfalls, and cost increases.

Therefore, the committee recommends \$990.3 million in PE 63892C, an increase of \$30.0 million, to purchase production tooling and special test equipment to permit an increase in the production rate of SM–3 Block IB, and to permit sustainment of that higher production rate. (Pages 54-55)

The report also states:

Standard Missile–3 Block IIA co-development

The budget request included \$424.5 million in PE 64881C for the Missile Defense Agency for co-development with Japan of the Standard Missile–3 (SM–3) Block IIA interceptor for the Aegis Ballistic Missile Defense (BMD) system.

The SM–3 Block IIA interceptor is being developed cooperatively by the United States and Japan as the next-generation of Aegis BMD capability. It will have significantly greater range and discrimination capability compared to the SM–3 Block IB interceptor, and is intended to provide defense against intermediate-range ballistic missiles (IRBM), as well as

some capability against some first-generation intercontinental ballistic missiles from nations such as North Korea and Iran.

The SM-3 Block IIA is planned to be deployed as part of Phase 3 of the European Phased Adaptive Approach to missile defense, in the 2018 timeframe, both on land and at sea. It is expected to be deployed at an Aegis Ashore site in Poland at that time.

The committee is concerned that the inherent complexity of a bi-national development program, and the level of technical sophistication of the SM-3 Block IIA interceptor, increase the development and schedule risk of the program.

The committee believes that the SM-3 Block IIA interceptor, combined with future variants of the Aegis Weapon System, will form the core of the U.S. and Japanese missile defense capability against future North Korean and Iranian IRBMs, and believes additional effort is warranted to provide developmental and schedule risk reduction.

The committee recommends \$444.5 million in PE 64881C, an increase of \$20.0 million, to purchase equipment to test software integration, and to accelerate software integration as a risk reduction measure for development of the SM-3 Block IIA interceptor in order to reduce development risk and provide additional schedule margin. (Page 57)

The report also states:

The committee notes that the SM-3 Block IIB development program is being managed initially by the MDA technology development organization, rather than by the Aegis BMD program office. The committee expects the SM-3 Block IIB development program to be coordinated closely with the Aegis BMD program office, and to transition to that office as soon as is programmatically sound (MDA has indicated by 2013) in order to ensure it benefits from the successful Aegis BMD development and management philosophy. (Page 67)

FY2012 DOD Appropriations Bill (H.R. 2219)

House

As shown in **Table 4**, the House Appropriations Committee, in its report (H.Rept. 112-110 of June 16, 2011) on H.R. 2219, recommends approving MDA's request for FY2012 procurement and research and development funding for the Aegis BMD program. (Pages 195, 246, and 247)

Senate

As shown in **Table 4**, the Senate Appropriations Committee, in its report (S.Rept. 112-77 of September 15, 2011) on H.R. 2219, recommends approving some of MDA's requests for FY2012 procurement and research and development funding for the Aegis BMD program, and changing others. (Pages 153, 207, 208, and 213).

The committee's report states:

Standard Missile-3 [SM-3] Block IB.—The fiscal year 2012 budget request includes \$565,393,000 for the procurement of 46 SM-3 Block IB missiles. Following developmental challenges and schedule delays, MDA revised its acquisition strategy for the SM-3 Block IB

missile in February 2011 and initiated a series of flight tests that are intended to culminate in a production decision in the fourth quarter of fiscal year 2012. The Committee notes that the SM-3 Block IB recently failed the first flight test of this series that is specifically intended to verify a modified design of the missile's critical components. This test failure will likely delay the acquisition schedule for SM-3 Block IB missiles. The Committee notes that SM-3 missiles are in high demand by Combatant Commanders around the world, and is concerned that a delay to the SM-3 Block IB's test and acquisition schedule will negatively impact mission capability, shut down the vendor base, and drive up costs of the SM-3 production line. Noting the relative success of the SM-3 Block IB's predecessor, the SM-3 Block IA missile, and its high commonality with the SM-3 Block IB, the Committee directs MDA to apply the \$565,393,000 in the fiscal year 2012 budget requested for the procurement of 46 SM-3 Block IB interceptors to SM-3 Block IA missiles should the test and acquisition schedule for Block IB missiles require any adjustments during fiscal year 2012. The Committee expects to be fully informed about progress of the SM-3 Block IB missile's test and development schedule and of any changes to its acquisition strategy. (Pages 157-158)

The report also states:

Standard Missile-3 [SM-3] Block IB, Block IIA and Block IIB.—The fiscal year 2012 budget request includes \$109,800,000 for SM-3 Block IB, \$424,454,000 for SM-3 Block IIA, and \$123,456,000 for SM-3 Block IIB in Research, Development, Test and Evaluation, Defense-Wide. Each of these missiles is successively more capable and technologically complex. The Committee is concerned about the high concurrency of these developmental efforts, particularly in light of the development issues that have plagued the SM-3 Block IB missile. In particular, the Committee notes that MDA has programmed in excess of \$1,700,000,000 for the SM-3 Block IIB missile over the next 5 years, while at the same time, the SM-3 Block IB is scheduled to enter production in fiscal year 2013, and the SM-3 Block IIA is in early development, with fielding expected in 2018. The Committee is concerned that near-term requirements are underappreciated in order to fund uncertain long-term efforts. In addition, the Committee notes that the requirements for the SM-3 Block IIB remain in flux, as does its acquisition strategy and the associated costs for integration into the Fleet. Finally, the Committee understands that in its current form, the SM-3 Block IIB missile is of limited mission value due to technical constraints. Therefore, the Committee recommends no funding for the SM-3 Block IIB missile and instead recommends transferring those funds to the SM-3 Block IB and IIA missiles for additional risk reduction activities in order to ensure timely fielding of these capabilities to the warfighter. (Pages 217-218)

The report also states:

Ballistic Missile Defense [BMD] Capable Ships.—The Committee notes that the Navy has established a requirement for fiscal year 2024 of having a force of 94 multi-mission large surface combatants (including ballistic missile defense [BMD] capability), but the Navy's fiscal year 2012 30-year shipbuilding plan projects that the Navy will achieve the 94-ship goal for BMD-capable ships in 2020 and 2021, with force levels declining thereafter. Specifically, the Navy projects that it will have, at most, 92 BMD-capable ships in 2024 before declining to 65 in 2034. The Committee is concerned about this projected shortfall and believes that the Navy should begin to review and consider options to close this gap. The Navy has indicated that it intends to pursue a multiyear procurement contract for DDG-51 vessels in fiscal year 2013 that could result in significant cost savings. Historic production rates of three DDG-51s per fiscal year reflected substantial unit cost savings in the past and would likely be realized by procuring DDG-51 ships at a more economical procurement rate than currently planned. The Committee directs the Secretary of the Navy to provide a report, at the same time as the President submits the budget request for fiscal year 2013, which provides options for closing this gap. (Page 121)

Appendix A. Additional Background Information European Phased Adaptive Approach (EPAA)

This appendix presents additional background information on the European Phased Adaptive Approach (EPAA) for European BMD operations announced by the Administration on September 17, 2009.

A September 17, 2009, White House fact sheet on the EPAA stated:

President Obama has approved the recommendation of Secretary of Defense Gates and the Joint Chiefs of Staff for a phased, adaptive approach for missile defense in Europe. This approach is based on an assessment of the Iranian missile threat, and a commitment to deploy technology that is proven, cost-effective, and adaptable to an evolving security environment.

Starting around 2011, this missile defense architecture will feature deployments of increasingly-capable sea- and land-based missile interceptors, primarily upgraded versions of the Standard Missile-3 (SM-3), and a range of sensors in Europe to defend against the growing ballistic missile threat from Iran. This phased approach develops the capability to augment our current protection of the U.S. homeland against long-range ballistic missile threats, and to offer more effective defenses against more near-term ballistic missile threats. The plan provides for the defense of U.S. deployed forces, their families, and our Allies in Europe sooner and more comprehensively than the previous program, and involves more flexible and survivable systems.

The Secretary of Defense and the Joint Chiefs of Staff recommended to the President that he revise the previous Administration's 2007 plan for missile defense in Europe as part of an ongoing comprehensive review of our missile defenses mandated by Congress. Two major developments led to this unanimous recommended change:

- **New Threat Assessment**: The intelligence community now assesses that the threat from Iran's short- and medium-range ballistic missiles is developing more rapidly than previously projected, while the threat of potential Iranian intercontinental ballistic missile (ICBM) capabilities has been slower to develop than previously estimated. In the near-term, the greatest missile threats from Iran will be to U.S. Allies and partners, as well as to U.S. deployed personnel—military and civilian—and their accompanying families in the Middle East and in Europe.
- **Advances in Capabilities and Technologies**: Over the past several years, U.S. missile defense capabilities and technologies have advanced significantly. We expect this trend to continue. Improved interceptor capabilities, such as advanced versions of the SM-3, offer a more flexible, capable, and cost-effective architecture. Improved sensor technologies offer a variety of options to detect and track enemy missiles.

These changes in the threat as well as our capabilities and technologies underscore the need for an adaptable architecture. This architecture is responsive to the current threat, but could also incorporate relevant technologies quickly and cost-effectively to respond to evolving threats. Accordingly, the Department of Defense has developed a four-phased, adaptive approach for missile defense in Europe. While further advances of technology or future changes in the threat could modify the details or timing of later phases, current plans call for the following:

- Phase One (in the 2011 timeframe)—Deploy current and proven missile defense systems available in the next two years, including the sea-based Aegis Weapon System, the SM-3 interceptor (Block IA), and sensors such as the forward-based Army Navy/Transportable Radar Surveillance system (AN/TPY-2), to address regional ballistic missile threats to Europe and our deployed personnel and their families;
- Phase Two (in the 2015 timeframe)—After appropriate testing, deploy a more capable version of the SM-3 interceptor (Block IB) in both sea- and land-based configurations, and more advanced sensors, to expand the defended area against short- and medium-range missile threats;
- Phase Three (in the 2018 timeframe)—After development and testing are complete, deploy the more advanced SM-3 Block IIA variant currently under development, to counter short-, medium-, and intermediate-range missile threats; and
- Phase Four (in the 2020 timeframe)—After development and testing are complete, deploy the SM-3 Block IIB to help better cope with medium- and intermediate-range missiles and the potential future ICBM threat to the United States.

Throughout all four phases, the United States also will be testing and updating a range of approaches for improving our sensors for missile defense. The new distributed interceptor and sensor architecture also does not require a single, large, fixed European radar that was to be located in the Czech Republic; this approach also uses different interceptor technology than the previous program, removing the need for a single field of 10 ground-based interceptors in Poland. Therefore, the Secretary of Defense recommended that the United States no longer plan to move forward with that architecture.

The Czech Republic and Poland, as close, strategic and steadfast Allies of the United States, will be central to our continued consultations with NATO Allies on our defense against the growing ballistic missile threat.

The phased, adaptive approach for missile defense in Europe:

- *Sustains U.S. homeland defense* against long-range ballistic missile threats. The deployment of an advanced version of the SM-3 interceptor in Phase Four of the approach would augment existing ground-based interceptors located in Alaska and California, which provide for the defense of the homeland against a potential ICBM threat.
- *Speeds protection of U.S. deployed forces, civilian personnel, and their accompanying families* against the near-term missile threat from Iran. We would deploy current and proven technology by roughly 2011—about six or seven years earlier than the previous plan—to help defend the regions in Europe most vulnerable to the Iranian short- and medium-range ballistic missile threat.
- *Ensures and enhances the protection of the territory and populations of all NATO Allies*, in concert with their missile defense capabilities, against the current and growing ballistic missile threat. Starting in 2011, the phased, adaptive approach would systematically increase the defended area as the threat is expected to grow. In the 2018 timeframe, all of Europe could be protected by our collective missile defense architecture.
- *Deploys proven capabilities and technologies* to meet current threats. SM-3 (Block IA) interceptors are deployed on Aegis ships today, and more advanced versions are in

various stages of development. Over the past four years, we have conducted a number of tests of the SM-3 IA, and it was the interceptor used in the successful engagement of a decaying satellite in February 2008. Testing in 2008 showed that sensors we plan to field bring significant capabilities to the architecture, and additional, planned research and development over the next few years offers the potential for more diverse and more capable sensors.

- *Provides flexibility to upgrade and adjust the architecture*, and to do so in a cost-effective manner, as the threat evolves. Because of the lower per-interceptor costs and mobility of key elements of the architecture, we will be better postured to adapt this set of defenses to any changes in threat.

We will work with our Allies to integrate this architecture with NATO members' missile defense capabilities, as well as with the emerging NATO command and control network that is under development. One benefit of the phased, adaptive approach is that there is a high degree of flexibility—in addition to sea-based assets, there are many potential locations for the architecture's land-based elements, some of which will be re-locatable. We plan to deploy elements in northern and southern Europe and will be consulting closely at NATO with Allies on the specific deployment options.

We also welcome Russian cooperation to bring its missile defense capabilities into a broader defense of our common strategic interests. We have repeatedly made clear to Russia that missile defense in Europe poses no threat to its strategic deterrent. Rather, the purpose is to strengthen defenses against the growing Iranian missile threat. There is no substitute for Iran complying with its international obligations regarding its nuclear program. But ballistic missile defenses will address the threat from Iran's ballistic missile programs, and diminish the coercive influence that Iran hopes to gain by continuing to develop these destabilizing capabilities.

Through the ongoing Department of Defense ballistic missile defense review, the Secretary of Defense and the Joint Chiefs of Staff will continue to provide recommendations to the President that address other aspects of our ballistic missile defense capabilities and posture around the world.⁴⁷

At a September 17, 2009, DOD news briefing on the EPAA, General James Cartwright, the Vice Chairman of the Joint Chiefs of Staff, stated the following:

- The SM-3 “has had eight successful flight tests since 2007. These tests have amply demonstrated the SM-3’s capability and have given us greater confidence in the system and its future.”
- Regarding the second phase of the proposal, “Consultations have begun with allies, starting with Poland and the Czech Republic, about hosting a land-based version of the SM-3 and other components of the system. Basing some interceptors on land will provide additional coverage and save costs compared to a purely sea-based approach.”
- The SM-3 Block 1A “has proven itself in the testing and which we are now fielding in larger numbers. It is a more capable area-defense weapon. It is more

⁴⁷ White House news release, September 17, 2009, entitled “Fact Sheet on U.S. Missile Defense Policy A ‘Phased, Adaptive Approach’ for Missile Defense in Europe,” available online at http://www.whitehouse.gov/the_press_office/FACT-SHEET-US-Missile-Defense-Policy-A-Phased-Adaptive-Approach-for-Missile-Defense-in-Europe/.

aligned with trying to take care of a general area like the area from Philadelphia down to Washington, D.C., for an analogy.”

- The SM-3 Block 1B “along with better sensors—and the beginning deployment of these airborne sensors, should they manifest themselves in the way we think they will—will allow us to move from a relatively small area—and I talked about Philadelphia to Washington, D.C.—this would be at least three times larger, based on the ability of the missile and the sensor packages to address the threats that are out there.”
- The SM-3 Block IIA “will allow us, in probably no more than three locations, to be able to cover the entire land mass of Europe, okay, against intermediate- and short-range ballistic missiles. ”
- The SM-3 Block IIB “is an even more energetic capability that will have a substantial capability to intercept intercontinental ballistic missile type capabilities emanating from Iran.”
- “What you can do with an SM-3 in affordability and in deployment and dispersal is substantially greater for larger numbers of missiles than we what we have with a ground-based interceptor. A single Aegis can carry a hundred-plus or minus a few, depending on their mission configuration, of the SM-3. So this is a substantial addressal of the proliferation of the threat that we're seeing emerge. If it doesn't emerge, we don't have to build them all, but if it does, we're ready to basically go after it. And so we've put in place an architecture here that allows us to be adaptable. It is a global architecture.”
- Regarding the number of Aegis ships that would be maintained on station near Europe for BMD purposes, “on a day-in, day-out basis, we're looking probably for what we would call a 2.0 presence, maybe a 3.0 presence [i.e., two or three ships on station 12 months out of the year], so [two or] three ships at any given time in and around the Mediterranean and the North Sea, et cetera, to protect areas of interest, and then we would surge additional ships. And part of what's in the budget is to get us a sufficient number of ships to allow us to have a global deployment of this capability on a constant basis, with a surge capacity to any one theater at a time.”
- Regarding where in Europe land-based SM-3s might be based, “Initially—and it's the [SM-3 Block] IB that we would start with, the land-based system, so about the 2015 time frame. And it's actually relatively agnostic to the where. And so the Czech Republic, Poland, are both candidates. It's certainly something that they have to have a say in, though, as to whether we go there. There are other candidates in that region, and then obviously deeper into Europe, that would be good sites for the SM-3.”⁴⁸

Secretary of Defense Robert Gates, who was at the DOD news briefing along with Cartwright, also addressed the issue of where land-based SM-3s might be based, stating:

⁴⁸ Transcript of the September 17, 2009, DOD news briefing with Secretary of Defense Robert Gates and Vice Chairman of the Joint Chiefs of Staff General James Cartwright, available online at <http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=4479>.

We still want to partner with Poland. We still want Poland to go forward with the ratification of the agreements that we have with them, including the SOFA. We would prefer to put the SM-3s in Poland, in place of the GBI—the ground-based interceptors. That will still involve a presence of the U.S. They may be there earlier than they would have been with the ground-based interceptors, because, as I said, they would not become operational until probably 2017, 2018. We're talking about 2015 now. So I think that there are—all of the same opportunities for partnership between the United States and Poland that existed under the previous program continue to exist under this program.⁴⁹

At an October 1, 2009, hearing before the House Armed Services Committee, General James E. Cartwright, the Vice Chairman of the Joint Chiefs of Staff, and Michèle A. Flournoy, the Under Secretary of Defense for Policy, stated:

Thank you, Chairman Skelton, Congressman McKeon, and members of the Committee. We appreciate the opportunity to discuss the Administration's new approach to missile defense in Europe, and to set the record straight that the Obama Administration is committed to deploying timely, cost-effective, and responsive missile defenses to protect the United States, our deployed forces, as well as our friends and allies against ballistic missiles of all ranges.

We are confident that our new approach represents a dramatic improvement over the program of record. Under the old plan, we were not going to be able to deploy a European missile defense system capable of protecting against Iranian missiles until at least 2017. Under our new plan, we'll be able to protect vulnerable parts of Europe and the tens of thousands of US troops stationed there by the end of 2011. We'll also be creating a far more flexible missile defense system, one that can be adapted to provide better protection against emerging threats. And finally, we'll be able to enhance protections for the U.S. homeland against possible future threats from long-range ICBMs.

Before going into details, I would like to place this decision about European missile defense in context. As you know, we are in the midst of several major defense reviews, one of which is a congressionally-mandated review of our approach to ballistic missile defense. DOD is leading that review, with active participation from the intelligence community and a number of other agencies. That review is comprehensive and ongoing; it examines our strategic and operational approach to missile defense not just in Europe but around the world.

The review is moving forward based on four key principles:

- 1) We must ensure that US missile defenses are responsive to the threats we face today and are likely to face in the future, that the technologies we use are proven and effective, and that our defenses are cost effective;
- 2) We must maintain and improve defenses for the US and our allies against potential missile attacks from countries such as Iran and North Korea;
- 3) We must renew our emphasis on protecting US deployed forces and their dependents in theater, as well as US Allies and partners against regional threats; and
- 4) We must continue to make missile defense an important feature of our international cooperation efforts.

⁴⁹ Transcript of the September 17, 2009, DOD news briefing with Secretary of Defense Robert Gates and Vice Chairman of the Joint Chiefs of Staff General James Cartwright, available online at <http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=4479>.

The results of the Ballistic Missile Defense Review are not due back to Congress until January, but as we began our in-depth analysis, it became clear very early that circumstances had changed fundamentally with regard to missile defense in Europe, so that we would need to make some significant adjustments to the previous administration's plans.

Let me start by discussing what has changed since early 2007, when the previous administration decided to seek deployment of ground-based interceptors in Poland, a European Mid-Course radar (EMR) in the Czech Republic, and an AN/TPY-2 radar elsewhere in the region. The decision to move forward with that particular configuration was made nearly three years ago, based on the threat information and the technologies available at that time.

Circumstances have changed significantly since early 2007, however.

First, we now have a rather different intelligence picture than we had three years ago, particularly with regard to Iranian capabilities. And second, we have made major strides in missile defense technologies and capabilities in just the last few years. We are now in a position to put an effective missile defense system in place far more rapidly than we were a few years ago, one that will be far more flexible, adaptable, and capable.

The intelligence community now assesses that the threat from Iran's short- and medium-range ballistic missiles is developing more rapidly than previously projected, while the threat of potential Iranian intercontinental ballistic missile (ICBM) capabilities has been slower to develop than previously estimated. Iran already possesses hundreds of ballistic missile capable of reaching neighbors in the Middle East, Turkey and the Caucasus, and is actively developing and testing missiles that can reach further into Europe. Our intelligence assessments indicate that the continued production and deployment of these more capable medium-range missiles has become one of Iran's highest missile priorities.

In the near-to mid-term, what this means is that the primary threat posed by Iranian missiles will be to US allies, our 80,000 deployed forces in the Middle East and Europe, and our civilian personnel and the many accompanying families. And needless to say, this concern is all the more urgent in light of Iran's continued uranium enrichment program. Iran continues to defy international obligations, and there continues to be reason to fear that Iran is seeking a nuclear weapons option.

We hope that won't come to pass. But obviously it increases the urgency of developing a truly effective missile defense system in Europe for the protection of NATO territory and population and the US homeland. Missile defense is not a substitute for the critically important diplomatic efforts the U.S. and the international community are already engaged in with Iran, but strong missile defense can complement diplomatic efforts by providing an effective deterrent.

As the Secretary of Defense has noted, we understand that intelligence projections can be wrong, which makes it all the more important for us to have a flexible and adaptable missile defense system that can evolve with the threat. Iran may change its priorities and capabilities and ways we can't entirely predict. So we remain very concerned about Iran's potential to develop ICBMs in the future, and part of our approach is to maintain and improve robust homeland defense capabilities to ensure that we can effectively counter any future ICBM threats, whether they come from Iran or North Korea or any other adversary.

But I'll come back to that in a moment. I've described the changed intelligence assessments that lead us to consider short and medium-range missiles the greatest near-term threat. As I mentioned, however, the threat assessment is not the only thing that has changed since the

program of record was planned nearly three years ago. The second thing that has changed is the technologies and capabilities available to us.

Technological developments over the past several years have led to new capabilities, demonstrated in multiple tests. Improved interceptor capabilities now offer us more flexible and capable missile defense architecture, and we have also significantly improved our sensor technologies. That means we now have a variety of better options to detect and track enemy missiles and guide the interceptor in-flight to enable a successful engagement. As a result, we now have new and proven missile defense options that were not available even a few years ago.

The previous plan, approved in early 2007, relied on two large, fixed missile-defense sites, with 10 ground-based interceptors in Poland and the EMR in the Czech Republic. It was designed to identify and destroy up to about five to ten long-range missiles, and as noted, the radar and interceptors called for under the old plan would not have been in place until at least 2017.

Our new approach, which the President adopted on the unanimous recommendation of the Secretary of Defense and the Joint Chiefs of Staff, will rely on a distributed network of sensors and SM-3 interceptors. The SM-3 IA has had eight successful tests since 2007, and it is more than capable of dealing with current threats from even multiple short and medium-range missiles. It and future variants also have many advantages over a Ground Based Interceptor (GBI). The SM-3 is much smaller, weighing only about 1 ton compared to the GBI's 20 tons. Because it is smaller and fits inside a vertical launch canister, it can be fired both from Aegis capable ships and, starting with the SM-3IB, from land.

The capability of having a missile defense system that can integrate sensors and interceptor sites located both at sea and on land offers us geographic flexibility that was unavailable under the previous plan. Furthermore, the resulting distributed network is more survivable in the case of an attack than the single large radar and single missile field of the previous plan. The SM-3 IA and IB, at around \$10 million per interceptor, are also much cheaper than a GBI, which costs around \$70 million per interceptor. This means that we can deploy scores of SM-3 interceptors, again enhancing our defensive capabilities. Since Iran already possesses hundreds of short and medium range ballistic missiles, this improved defensive capability is critical.

Our new plan for European missile defense involves a phased, adaptive approach. As our capabilities and technologies continue to improve, the architecture will evolve and become ever more capable. Specifically, we are phasing in SM-3 upgrades over time. Each SM-3 upgrade will provide more capability for countering Iranian threats, meaning each upgrade will be able to defend an increasingly larger area.

Phase 1 of our approach to missile defense in Europe is already underway; the SM-3 Block IA is already deployed in the fleet. In this first phase of our plan, we can provide SM-3 Block IA capable warships when necessary for the protection of parts of southern Europe. To enhance protection in Phase 1, we will also rely on a forward based sensor, probably a TPY-2 radar. We expect that full Phase I missile defense capability will be possible in 2011.

By including a forward based sensor in Phase 1, we are retaining one of the most significant contributions to the defense of the United States from the previously proposed architecture. The forward based sensor will not only help protect the region, but will also contribute to the defense of the United States homeland by providing early and precise track data to our Ground-Based Interceptors in Alaska and California.

In Phase 2, to be completed by 2015, we intend to use a more advanced version of the SM-3 interceptor, the SM-3 Block IB, which is already under development. We will deploy this at sea and on land. By adding the land-based sites, we will significantly increase coverage of NATO against ballistic missiles from Iran without having to increase the number of Aegis BMD ships—a much more cost effective approach.

In Phase 3, we will introduce a new, more capable version of the SM-3, the Block IIA. The SM-3 Block IIA will provide full coverage of NATO against short, medium, and intermediate range ballistic missiles. We expect to deploy the SM-3 Block IIA by 2018.

In the final phase, Phase 4, we expect to field an even more-improved SM-3 missile that has anti-ICBM capabilities. This ascent-phase intercept capability will further augment the defense of the US homeland from potential Iranian ICBM threats. This phase is planned for 2020.

It is important to note that the SM-3-based defense against any Iranian ICBMs will be in addition to the GBI-based defense we already have deployed in the United States, at Fort Greely and Vandenberg AFB. As noted previously, these U.S.-based defenses will be made more effective by the forward-basing of a TPY-2 radar—which we plan by 2011.

We currently have the ability to defend the United States (including the East Coast) against any Iranian ICBM, and with the TPY-2 deployment planned in Phase I and continued improvement of the GBIs, this defense will grow even stronger in the next several years.

While we expect the SM-3-based approach to ICBM defense to be effective on its own, we also will continue to improve our existing GBI-based system here in the United States and conduct tests of the 2-stage GBI in the near-term. The SM-3s ascent-phased intercept capability in Phase 4 would mean that, unlike the previous administration's GBI-based system, Iranian missiles would have to defeat not one, but two very different kinds of missile defenses. This is something I want to underline, since it has at times been misunderstood: we are already capable of countering all current Iranian missile threats to the US homeland, and this will not change. Our defenses of the US homeland will only grow stronger as we proceed with our new approach.

But back to Europe: Over time, we plan on one land-based site in southern Europe and one somewhere in northern Europe. Given the flexibility of the architecture, there are a number of options for land-based sites that would provide the same capability, including in Poland. The mix of sea-and land-based systems makes our new approach far more capable and adaptable than the program of record, because we can move sensors and interceptors from region to region as needed. This approach also allows us to scale up our defenses, if necessary, by deploying additional SM-3 interceptors much faster and at lower costs than by adding the program of record's much heavier Ground Based Interceptors and their associated silos.

In times of crisis, the system can “flex” by surging Aegis capable ships to the area for more protection and to serve as a visible deterrent. This approach also allows us to deal with a wider range of potential missile tactics, such as salvo launches. The previous GBI architecture could intercept about five to ten missiles at most; the new plan's distributed network will be able to cope far more effectively should an adversary fire many missiles simultaneously.

Similarly, replacing the fixed radar site with a mix of sensors that are airborne, seaborne and ground-based will allow us to gather much more accurate data, and will offer better early warning and tracking options combined with a stronger networking capacity. Finally, because it relies on a distributed network of sensors and interceptors, the new approach is

more survivable—less vulnerable to destruction or disruption—than the previous plan, which relied on a single large radar and a single interceptor field.

It should be crystal clear that those who say we are “scrapping” missile defense in Europe are, as Secretary Gates has said, “either misinformed or misrepresenting the reality of what we are doing.” In fact, we are replacing the previous plan with a phased approach that delivers more effective and more robust capability sooner.

To sum up: the new Phased Adaptive Approach offers many advantages over the previous plan for European missile defense. We will now be able to defend the most vulnerable parts of Europe 6-7 years earlier than the previous plan. Our new approach will be also able to cover all NATO territory and populations, rather than leaving some allies exposed to short- and medium-range threats. And we will move toward a new additive approach to defending the United States against any future Iranian ICBM—while continuing to enhance our existing GBI-based defenses. Overall, our new approach allows us to better respond to existing threats now—and to better prepare for future threats as they emerge.

Those who assert that the new plan doesn’t uphold U.S. security commitments to friends and allies, particularly Poland and the Czech Republic, are far off the mark. This is a better defense for Europe as well as for the United States. All of our missile defense efforts will be complementary of and interoperable with those being developed by NATO, and the new architecture we are creating provides many opportunities for alliance-building and burden-sharing between the United States and our NATO partners. NATO Secretary General Rasmussen has hailed our decision as “a positive step”; Polish Prime Minister Donald Tusk said it offers a real “chance to strengthen Europe’s security.”

We remain firmly committed to strong bilateral relationships with both Poland and the Czech Republic and have already begun discussions with both nations about their potential roles in the new missile defense architecture. In the coming weeks, we will have numerous strategic discussions with the Poles on missile defense and our security arrangements. It is prudent that we continue to seek Polish ratification of the missile defense basing agreement and supplemental Status of Forces Agreement.

We are also in discussions with the Czech Republic to ensure that they continue to play a leadership role on missile defense within the Alliance. We have several joint projects already underway with our Czech partners, and are discussing several more.

Two weeks ago, in addition to visiting Warsaw and Prague to discuss the Phased, Adaptive Approach, I briefed the North Atlantic Council on our new approach and emphasized that we will pursue missile defense in a NATO context. The response was very positive, as evidenced by the NATO Secretary General’s comments last week that “It is my clear impression that the American plan on missile defense will involve NATO...to a higher degree in the future...This is a positive step in the direction of an inclusive and transparent process, which I also think is in the interest of...the NATO alliance.”

This phased adaptive approach better meets our security needs, and our security commitments to our European allies and partners. Russia’s positive response to date is a useful collateral benefit, though we are not sure whether and how it will affect their perspective on missile defenses. We welcome Russian interest in our new approach as well as potential cooperation in sharing data from their radars. But this is not about Russia, and regardless of Russian reactions, we will continue to do whatever it takes to ensure our security and that of our European partners and allies.

In closing, it is important to note that the strategic thinking behind our new approach to European missile defense will also be valuable as we continue to address missile defense issues in other regions.

Because the type of system we are planning in Europe can be easily adapted to different geographic constraints, it can be applied in various regions around the globe, if necessary. In fact, a scaled-down version of this approach is already being used for the defense of Japan against North Korean missile threats, and for the defense of Israel against an Iranian missile attack. Because the assets of this system are either mobile or transportable, the new approach provides future flexibility to reposition interceptors and sensors if the geopolitical environment changes. And because the systems will be upgraded over time, the new approach provides a natural evolution to match the threat.

As the President said, “our new missile defense architecture in Europe will provide a stronger, smarter, and swifter defense of American forces, and America’s allies. It is more comprehensive than our previous program. It deploys capabilities that are proven (SM-3 IA) and cost-effective. And it sustains and builds upon our commitment to protect the U.S. homeland against long-range ballistic missile threats. And it ensures and enhances the protection of all of our NATO allies.”

Thank you for your time. We will continue to work with you as we move forward on the Ballistic Missile Defense Review, and I look forward to your questions.⁵⁰

At the same hearing, Lieutenant General Patrick J. O’Reilly, the Director of MDA, stated:

Good morning, Mr. Chairman, Mr. McKeon, distinguished Members of the Committee. I appreciate the opportunity to testify before you today on the technical and programmatic details of the President’s decision to use a Phased Adaptive Approach to enhance missile defense protection for the United States and Europe for our friends, Allies, our forward deployed forces, civilian personnel, and their families there. This new proposal would provide a more powerful missile defense capability for NATO, enhance U.S. homeland defense, would be applicable in other theaters around the world to counter a growing ballistic missile threat, and would be more adaptable to respond to threat uncertainties and developments. With the Phased Adaptive Approach, we are not scrapping or diminishing missile defense—rather we are strengthening it and delivering more capability sooner.

In 2006 the Defense Department proposed a long-range missile defense of Europe that consisted of four components: a command and control system; 10 Ground Based Interceptors (or GBIs) in Poland; an X- band discrimination radar in the Czech Republic; and an X-band precision tracking radar forward based in Southern Europe. Assuming a shot doctrine of two interceptors against each threat missile, the 2006 proposed missile defense architecture provided an upper-tier missile defense to intercept five Intermediate Range Ballistic Missiles (IRBMs) aimed at Europe, or it could intercept five Intercontinental Ballistic Missiles (ICBMs) aimed at the Continental United States from the Middle East. The most important component of the 2006 proposed architecture to the defense of the U.S. homeland was the forward based X-band radar in Southern Europe, which provided early and precise tracking of threat missiles from the Middle East, increasing the accuracy of the fire control instructions to our GBIs based at Fort Greely, Alaska and Vandenberg Air Force Base, California. We remain concerned about a future Iranian ICBM threat; therefore, we are

⁵⁰ Opening Statement of VCJCS [General James E. Cartwright, USMC, Vice Chairman, Joint Chiefs of Staff] and USDP [Honorable Michèle A. Flournoy, Under Secretary of Defense for Policy, Department of Defense] [at] HASC hearing on European Missile Defense, October 1, 2009, 8 pp.

retaining the forward-based X-band radar of the 2006 proposed European missile defense architecture in our new Phased Adaptive Approach proposal. We will also continue to improve our domestic GBI-based system and conduct research and development for the two-stage GBI in the near term.

Under the Phased, Adaptive Approach, we propose defending Europe in phases starting with the area most vulnerable to today's Iranian missile threat: southern Europe. Phase 1 would consist of Aegis ships with Standard Missile (SM)-3 Block IA missiles deployed in the Mediterranean Sea and a forward-based sensor in southern Europe. This will provide protection across much of the southern tier of Europe against Iranian medium-range ballistic missiles.

We propose by 2015 the deployment of the SM-3 Block IB missile, which will have a greater capacity to use a network of sensors and greater ability to discriminate threat objects. Once this technology is proven in our test program these interceptors would be deployed at land- and sea-based locations and extend protection against medium-range ballistic missiles launched from the Middle East.

By 2018, the deployment of the SM-3 Block IIA missile, an interceptor with greater range currently being developed, could defend all of Europe from land- and sea-based locations. By 2020, our goal is to leverage the lightweight kill vehicle technology developed in the now terminated Multiple Kill Vehicle program to develop a higher velocity SM-3 Block IIB missile that would destroy ballistic missiles early in flight, during the ascent phase, from many hundreds of kilometers from the threat launch location. This missile would still fit on today's Aegis launch system. With that capability, two land-based SM-3 Block IIB sites could protect all of Europe. The timelines I have presented allow for missile defense technologies to be tested and proven prior to deployment decisions.

A significant limitation of the previous European architecture was that the GBIs were used in both ICBM and IRBM defense roles. Although we have only tested the GBIs against IRBMs (ranges less than 5,000 km), it is currently our only interceptor designed against ICBMs. The earliest operational date of the 2006 proposed architecture is 2017 and more likely 2018 considering the host nation approvals that would have been required to construct the facilities. When deployed in 2017 the European based GBIs could be consumed by an attack of 5 IRBMs aimed at NATO countries, leaving no two-stage GBIs to contribute to U.S. ICBM defense. Therefore, the previously proposed European Defense architecture is insufficient to counter large raid sizes. Under the Phased, Adaptive Approach, the SM-3 Block IIB would be able to accommodate a large IRBM and ICBM missile threat and diversify the technology that we are using to counter Iranian ICBMs, providing a layered defense.

We have made significant advances in missile defense technologies that enable the Phased Adaptive Approach. First, the interceptors we are developing are smaller, faster and have greater on-board discrimination capability. The sea-based Aegis BMD SM-3 interceptor would provide a very capable weapon for this particular mission due to its high acceleration, burn out velocity, proven track record (for the SM-3 IA), and our ability to rapidly increase the number of interceptors at any launch site. Since we began testing the operationally configured SM-3 Block IA missile in June 2006, we successfully intercepted the target in 8 out of 9 attempts. We are also taking a deliberate approach to the development and testing of the next generation kill vehicle for the SM-3 interceptor, the SM-3 1B, which has a more advanced seeker and a fire control system that uses external sensors as well as its ship's radar. We have already demonstrated the higher risk components of the new kill vehicle: the solid propellant Divert and Attitude Control System, new seeker, and fire control system with good results. The first test of the SM-3 1B is scheduled for the winter of 2011.

The area of greatest opportunity for increased missile defense capability involves our achievements in developing faster and more accurate Command Control, Battle Management, and Communication capabilities, which combine data from a network of many different sensors (especially sensors that track missiles in the early phases of their flight), rather than using single large radars. Key to our successful intercept of the ailing satellite in February 2008 was our ability to combine data from sensors around the world and provide a highly accurate track of the satellite to an Aegis ballistic missile defense ship and launch the modified SM-3 1A prior to the ship's radar seeing the satellite. We have had many other demonstrations of these capabilities to date, to include the most recent intercept test of the Ground-based Midcourse Defense system last December, when we combined the tracks of satellites, early warning radars, Sea Based X-band radar and forward-based radars on land and at sea to provide the GBIs with a very accurate targeting track. Additionally, we have also demonstrated the capability of Unmanned Aerial Vehicles as highly accurate forward-based missile defense sensors in the Navy's "Stellar Daggers" series of intercept tests last spring. Last week, we launched a pair of demonstration Space Tracking and Surveillance System (STSS) satellites that will detect and track ballistic missiles over their entire flight. Over the next few years we will conduct several tests using the tracking capabilities of these STSS demonstration satellites, including the launching of an interceptor from an Aegis ship, to intercept ballistic missile targets. Finally, at our External Sensors Laboratory at Schriever Air Force Base, Colorado, we continue to develop new algorithms and combine new sensor data to achieve even more accurate tracks than any individual sensor could produce.

A more advanced variant of the SM-3 has been under development since FY 2006. This interceptor will have the range to defend all of NATO from only a few small sites. This SM-3 is also more affordable than GBIs (you can buy four to seven production variants of the SM-3s (IA or IB) for the cost of one GBI). But the key attribute is that we can launch SM-3s from sea or sites on land, which gives us great flexibility in locating the interceptor launch point between the origin of the threat launch and the area we are trying to protect—a key enabler to intercepting threat missiles early in flight. One advantage of land-based SM-3s over the previous GBI missile field proposal is that they can be relocated if the direction of the threat changes rather than waiting the more than five years needed to construct a new GBI missile field.

I would note that the new Phased Adaptive Approach offers greater opportunities for our close allies, including Poland and the Czech Republic, to collaborate on the missile defense architecture—by hosting sites or providing funding or capabilities that could be linked to provide a network of missile defenses. Likewise, the radars at Armavir and Gabala could augment the proposed sensor network and that type of cooperation could perhaps be a catalyst for Russia to join countries participating in our cooperative development of missile defense technologies.

An additional advantage of the Phased Adaptive Approach is that efforts over the next several years to develop, test, and procure the sensor, command and control, and interceptor upgrades for deployment of this architecture have application in the United States and theaters other than Europe.

We are committed to fully funding this program as we prepare for the next budget submission to Congress. However, it is important that we have relief from rescissions and the flexibility to spend the unused FY 2009 RDT&E and some MILCON dollars associated with the previous European Site proposal. With relief from some of the constraints placed on our FY 2009 budget and some redirection of FY 2010 funds, we believe we can pursue this new architecture within our FY 2010 budget request.

I would note that both House and Senate authorizing committees very presciently included provisions in this year's National Defense Authorization bill that permit the Department to

use FY 2009 and FY 2010 funding for an alternative architecture once the Secretary of Defense certifies that this architecture is as cost-effective, technically reliable, and operationally available as the previous program. I believe the President's new plan meets these criteria and would strongly reinforce NATO's overall approach to missile defense.

My assessment is that executing this approach is challenging, but no more challenging than the development of other missile defense technologies. It is more adaptable, survivable, affordable, and responsive than the previous proposal, and it enhances the resulting defense of the U.S. homeland and our European Allies. There will be setbacks, but the engineering is executable and development risks are manageable.

I look forward to discussing the specifics of the Phased, Adaptive Approach with Members and staff in this and other forums.

Thank you and I look forward to your questions.⁵¹

⁵¹ Unclassified Statement of Lieutenant General Patrick J. O'Reilly, USA, Director, Missile Defense Agency, Before the House Armed Services Committee Regarding Missile Defense in Europe, Thursday, October 1, 2009, 9 pp.

Appendix B. Aegis BMD Flight Tests

Summary of Test Flights

Table B-1 presents a summary of Aegis BMD flight tests since January 2002.

Table B-1. Aegis BMD Flight Tests Since January 2002

Date	Country	Name of flight test	Target	Successful?	Cumulative successes	Cumulative attempts
Exo-atmospheric (using SM-3 missile)						
1/25/02	US	FM-2	Unitary TTV short-range target	Yes	1	1
6/13/02	US	FM-3	Unitary TTV short-range target	Yes	2	2
11/21/02	US	FM-4	Unitary TTV short-range target	Yes	3	3
6/18/03	US	FM-5	Unitary TTV short-range target	No	3	4
12/11/03	US	FM-6	Unitary TTV short-range target	Yes	4	5
2/24/05	US	FTM 04-1 (FM-7)	Unitary TTV short-range target	Yes	5	6
11/17/05	US	FTM 04-2 (FM-8)	Separating medium-range target	Yes	6	7
6/22/06	US	FTM 10	Separating medium-range target	Yes	7	8
12/7/06	US	FTM 11	Unitary TTV short-range target	No	7	9
4/26/07	US	FTM 11 Event 4	Unitary ARAV-A short-range target	Yes	8	10
6/22/07	US	FTM 12	Separating medium-range target	Yes	9	11
8/31/07	US	FTM-11a	Classified	Yes	10	12
11/6/07	US	FTM 13	Unitary ARAV-A short-range target	Yes	11	13
			Unitary ARAV-A short-range target	Yes	12	14
12/17/07	Japan	JFTM-1	Separating medium-range target	Yes	13	15
11/1/08	US	Pacific Blitz	Short-range missile target	Yes	14	16
			Short-range missile target	No	14	17
11/19/08	Japan	JFTM-2	Separating medium-range target	No	14	18
7/30/09	US	FTM-17	Unitary ARAV-A short-range target	Yes	15	19
10/27/09	Japan	JFTM-3	Separating medium-range target	Yes	16	20
10/28/10	Japan	JFTM-4	Separating medium-range target	Yes	17	21
4/14/11	US	FTM-15	LV-2 intermediate range target	Yes	18	22
9/1/11	US	FTM-16	Short-range missile target	No	18	23
Endo-atmospheric (using SM-2 missile)						
5/24/06	US	Pacific Phoenix	Unitary short-range target	Yes	1	1
6/5/08	US	FTM-14	Unitary short-range target	Yes	2	2
3/26/09	US	Stellar Daggers	Short-range ballistic missile target	Yes	3	3
Combined total for exo- and endo-atmospheric above tests					21	26

Source: Table adapted from table presented in MDA fact sheet, "Aegis Ballistic Missile Defense Testing," dated November 2010, accessed on November 19, 2010, at http://www.mda.mil/global/documents/pdf/aegis_tests.pdf.

Notes: TTV is target test vehicle; ARAV is Aegis Readiness Assessment Vehicle. In addition to the flight tests shown above, the table in the MDA fact sheet lists the successful use of an SM-3 on February 20, 2008, to intercept an inoperative U.S. satellite – an operation called Burnt Frost. Including this intercept in the count increases the totals to 19 successful exo-atmospheric intercepts in 24 attempts using the SM-3 missile, and 22 successful exo- and endo-atmospheric intercepts in 27 attempts using both SM-3 and SM-2 Block IV missiles.

May 2010 Criticism of Claimed Successes in Flight Tests

In a May 2010 magazine article and supplementary white paper, two professors with scientific backgrounds—George Lewis and Theodore Postol—criticized DOD claims of successes in Aegis (and other DOD) BMD flight tests, arguing that

the Defense Department’s own test data show that, in combat, the vast majority of “successful” SM-3 experiments would have failed to destroy attacking warheads. The data also show potential adversaries how to defeat both the SM-3 and the GMD [ground-based missile defense] systems, which share the same serious flaws that can be readily exploited by adversaries.⁵²

The criticisms made by Lewis and Postol were reported in a May 18, 2010, *New York Times* article.⁵³ In response to the criticisms and the *New York Times* article, MDA issued a press release and other information defending the flight tests and arguing that the criticisms are based on inaccurate or incomplete information.⁵⁴

Details On Selected Exo-Atmospheric (SM-3) Flight Tests

June 22, 2006, Test. This was the first test to use the 3.6 version of the Aegis BMD system.⁵⁵

December 7, 2006, Test. This was the first unsuccessful flight test since June 2003. MDA stated that the ninth test

was not completed due to an incorrect system setting aboard the Aegis-class cruiser USS Lake Erie prior to the launch of two interceptor missiles from the ship. The incorrect configuration prevented the fire control system aboard the ship from launching the first of the two interceptor missiles. Since a primary test objective was a near-simultaneous launch of two missiles against two different targets, the second interceptor missile was intentionally not launched.

The planned test was to involve the launch of a Standard Missile 3 against a ballistic missile target and a Standard Missile 2 against a surrogate aircraft target. The ballistic missile target was launched from the Pacific Missile Range Facility, Kauai, Hawaii and the aircraft target was launched from a Navy aircraft. The USS Lake Erie (CG 70), USS Hopper (DDG 70) and

⁵² George N. Lewis and Theodore A. Postol, “A Flawed and Dangerous U.S. Missile Defense Plan,” *Arms Control Today*, May 2010: 24-32. The quoted passage appears on p. 26. The associated white paper is George N. Lewis and Theodore A. Postol, *A Technically Detailed Description of Flaws in the SM-3 and GMD Missile Defense Systems Revealed by the Defense Department’s Ballistic Missile Test Data*, May 3, 2010, 13 pp.

⁵³ William J. Broad and David E. Sanger, “Review Cites Flaws In U.S. Antimissile Program,” *New York Times*, May 18, 2010: 1.

⁵⁴ Missile Defense Agency news release entitled “Missile Defense Agency Responds to New York Times Article,” 10-News-0005, May 18, 2010; Missile Defense Agency, *Missile Defense Agency Response to Request for Information, Standard Missile – 3 Interceptor Testing*, May 18, 2010, 2 pp.; Missile Defense Agency, *Missile Defense Agency Response to Request for Information, Response to New York Times May 18, 2010, Article Regarding SM-3 Testing*, May 18, 2010, 3 pp.; Richard Lehner, “Missile Defense Agency Responds to New York Times Article,” *DOD Live* (<http://www.dodlive.mil>), May 18, 2010; Transcript of Department of Defense Bloggers Roundtable With Richard Lehner, Spokesman, Missile Defense Agency (MDA), Subject: Standard Missile 3 Test Program, May 18, 2010.

⁵⁵ Missile Defense Agency, “Missile Defense Test Results in Successful ‘Hit To Kill’ Intercept,” June 22, 2006 (06-NEWS-0018).

the Royal Netherlands Navy frigate TROMP were all successful in detecting and tracking their respective targets. Both targets fell into the ocean as planned.

After a thorough review, the Missile Defense Agency and the U.S. Navy will determine a new test date.⁵⁶

A news article about the ninth test stated:

“You can say it’s seven of nine, rather than eight of nine,” Missile Defense Agency spokesman Chris Taylor said of the second failure in tests of the system by the agency and the Navy....

The drill was planned to demonstrate the Navy’s ability to knock down two incoming missiles at once from the same ship.

“In a real world situation it is possible, maybe even probable, that in addition to engaging a ballistic missile threat that was launched, you may be engaging a surface action,” said Joe Rappisi before the test. He is director for the Aegis Ballistic Missile Defense system at Lockheed Martin, the primary contractor for the program.

The test would have marked the first time a ship has shot down one target in space and another target in the air at the same time.

The test presented a greater challenge to the ship’s crew and the ballistic missile defense system than previous tests, Rappisi said. The multiple target scenario is also closer to what sailors might actually face in battle.

The U.S. Pacific Fleet has been gradually installing missile surveillance and tracking technology on many of its destroyers and cruisers amid concerns about North Korea’s long-range missile program.

It is also installing interceptor missiles on many of its ships, even as the technology to track and shoot down incoming missiles is being developed and perfected.

The Royal Netherlands Navy joined the tracking and monitoring off Kauai to see how its equipment works. The Dutch presence marked the first time a European ally has sent one of its vessels to participate in a U.S. ballistic missile defense test.⁵⁷

A subsequent news article stated:

the test abort of the Aegis Ballistic Missile Defense system Dec. 7 resulted from human error, [MDA Director USAF Lt. Gen. Henry] Obering says.... Both the ballistic missile and aircraft targets launched as planned, but the first interceptor failed to fire because an operator had selected an incorrect setting for the test. Officials then aborted before the second could boost.

Aegis missile defense system tests are at a standstill until officials are able to identify an appropriate ballistic missile target. The one used Dec. 7 was the last of its kind, Obering says, leaving them empty handed in the near future.⁵⁸

⁵⁶ Untitled Missile Defense Agency “For Your Information” statement dated December 7, 2006 (06-FYI-0090).

⁵⁷ David Briscoe, “Test Interceptor Missile Fails To Launch,” *NavyTimes.com*, December 8, 2006.

Another article stated:

Philip Coyle, a former head of the Pentagon's testing directorate, gives the Navy credit for "discipline and successes so far" in its sea-based ballistic missile defense testing program. Coyle is now a senior adviser at the Center for Defense Information.

"The U.S. Navy has an enviable track record of successful flight intercept tests, and is making the most of its current, limited Aegis missile defense capabilities in these tests," Coyle told [*Inside the Navy*] Dec. 7.

"Difficulties such as those that delayed the latest flight intercept attempt illustrate the complexity of the system, and how everything must be carefully orchestrated to achieve success," Coyle added. "Nevertheless, this particular setback won't take the Navy long to correct."⁵⁹

April 26, 2007, Test. MDA states that this test:

involved the simultaneous engagements of a ballistic missile "unitary" target (meaning that the target warhead and booster remain attached) and a surrogate hostile air target....

The test demonstrated the [Aegis ship's] ability to engage a ballistic missile threat and defend itself from attack at the same time. The test also demonstrated the effectiveness of engineering, manufacturing, and mission assurance changes in the solid divert and attitude control system (SDACS) in the kinetic kill weapon. This was the first flight test of all the SM-3 Block IA's upgrades, previously demonstrated in ground tests.⁶⁰

A press report on the test stated that the hostile air target was an anti-ship cruise missile. The article stated that the scenario for the test

called for the [Aegis ship] to come under attack from a cruise missile fired by an enemy plane.... A Navy plane fired the cruise missile target used in the test.⁶¹

June 22, 2007, Test. MDA states that this test

was the third intercept involving a separating target and the first time an Aegis BMD-equipped destroyer was used to launch the interceptor missile. The USS Decatur (DDG 73), using the operationally-certified Aegis Ballistic Missile Defense Weapon System (BMD 3.6) and the Standard Missile-3 (SM-3) Block IA missile successfully intercepted the target during its midcourse phase of flight....

An Aegis cruiser, USS Port Royal (CG 73), a Spanish frigate, MÉNDEZ NÚÑEZ (F-104), and MDA's Terminal High Altitude Area Defense (THAAD) mobile ground-based radar also participated in the flight test. USS Port Royal used the flight test to support development

(...continued)

⁵⁸ Amy Butler, "GMD Trial Delayed Until Spring; Aegis Failure Human Error," *Aerospace Daily & Defense Report*, December 19, 2006.

⁵⁹ Zachary M. Peterson, "Sea-Based Missile Defense Test Fails Due To 'Incorrect Configuration,'" *Inside the Navy*, December 11, 2006.

⁶⁰ Missile Defense Agency, "Successful Sea-Based Missile Defense 'Hit to Kill' Intercept," April 26, 2007 (07-NEWS-0032).

⁶¹ Audrey McAvoy, "Aegis Missile Test Successful," *NavyTimes.com*, April 27, 2007.

of the new Aegis BMD SPY-1B radar signal processor, collecting performance data on its increased target detection and discrimination capabilities. MÉNDEZ NÚÑEZ, stationed off Kauai, performed long-range surveillance and track operations as a training event to assess the future capabilities of the F-100 Class. The THAAD radar tracked the target and exchanged tracking data with the Aegis BMD cruiser.

This event marked the third time that an allied military unit participated in a U.S. Aegis BMD test, with warships from Japan and the Netherlands participating in earlier tests.⁶²

August 31, 2007, Test. MDA has publicly noted the occurrence of this test and the fact that it resulted in a successful intercept,⁶³ but states that the details about the test are classified.⁶⁴ MDA does not appear to have issued a news release about this flight test following the completion of the test, as it has for other Aegis BMD flight tests.⁶⁵

November 6, 2007, Test. MDA states that this test involved:

a multiple simultaneous engagement involving two ballistic missile targets.... For the first time, the operationally realistic test involved two unitary “non-separating” targets, meaning that the target’s warheads did not separate from their booster rockets....

At approximately 6:12 p.m. Hawaii Standard Time (11:12 p.m. EST), a target was launched from the Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, Hawaii. Moments later, a second, identical target was launched from the PMRF. The USS Lake Erie’s Aegis BMD Weapon System detected and tracked the targets and developed fire control solutions.

Approximately two minutes later, the USS Lake Erie’s crew fired two SM-3 missiles, and two minutes later they successfully intercepted the targets outside the earth’s atmosphere more than 100 miles above the Pacific Ocean and 250 miles northwest of Kauai....

A Japanese destroyer also participated in the flight test. Stationed off Kauai and equipped with the certified 3.6 Aegis BMD weapon system, the guided missile destroyer JS Kongo performed long-range surveillance and tracking exercises. The Kongo used the test as a training exercise in preparation for the first ballistic missile intercept test by a Japanese ship planned for later this year. This event marked the fourth time an allied military unit participated in a U.S. Aegis BMDS test.⁶⁶

⁶² Missile Defense Agency, “Sea-Based Missile Defense ‘Hit to Kill’ Intercept Achieved,” June 22, 2007 (07-NEWS-0037).

⁶³ See for example, slide 8 in the 20-slide briefing entitled “Ballistic Missile Defense Program Overview For The Congressional Breakfast Seminar Series,” dated June 20, 2008, presented by Lieutenant General Trey Obering, USAF, Director, Missile Defense Agency. Source for briefing: *InsideDefense.com* (subscription required). Each slide in the briefing includes a note indicating that it was approved by MDA for public release on June 13, 2008. Slide 8 lists Aegis BMD midcourse flight tests conducted since September 2005, including a test on August 31, 2007. The slide indicates with a check mark that the flight test was successful. A success in this test is also needed to for the total number of successful intercepts to match the reported figure.

⁶⁴ An email from MDA to CRS dated June 30, 2008, states that the flight test “was a hit to kill intercept test but details about the test are classified.”

⁶⁵ MDA’s website, when accessed on June 30, 2008, did not show a news release issued on or soon after August 31, 2007, that discusses this test.

⁶⁶ Missile Defense Agency, “Sea-Based Missile Defense “Hit to Kill” Intercept Achieved,” November 6, 2007 (07-NEWS-0051).

December 17, 2007, Test. In this flight test, a BMD-capable Japanese Aegis destroyer used an SM-3 Block IA missile to successfully intercept a ballistic missile target in a flight test off the coast of Hawaii. It was the first time that a non-U.S. ship had intercepted a ballistic missile using the Aegis BMD system.⁶⁷

November 1, 2008, Test. This flight test was reportedly the first U.S. Navy Aegis BMD flight test conducted by the Navy, without oversight by MDA. The test involved two Aegis ships, each attempting to intercept a ballistic missile. The SM-3 fired by the first Aegis ship successfully intercepted its target, but the SM-3 fired by the second Aegis ship did not intercept its target. A press release from the U.S. Third Fleet (the Navy's fleet for the Eastern Pacific) states that:

Vice Adm. Samuel J. Locklear, Commander, U.S. Third Fleet announced today the successful Navy intercept of a ballistic missile target over the Pacific Ocean during Fleet Exercise Pacific Blitz. This was the first Fleet operational firing to employ the Standard Missile-3 (SM-3) against a ballistic missile target. Command and control of this mission resided with Commander, U.S. Third Fleet, based in San Diego, Calif.

Pearl Harbor-based Aegis destroyers, USS Paul Hamilton (DDG 60) and USS Hopper (DDG 70), which have been upgraded to engage ballistic missiles, fired SM-3 missiles at separate targets. During this event, a short-range ballistic missile target was launched from the Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, Hawaii. Upon detecting and tracking the target, USS Paul Hamilton, launched a SM-3 missile, resulting in a direct-hit intercept. Following USS Paul Hamilton's engagement, PMRF launched another target. USS Hopper successfully detected, tracked and engaged the target. The SM-3 followed a nominal trajectory, however intercept was not achieved. Extensive analysis of the flight mission will be used to improve the deployed Aegis BMD system.⁶⁸

November 19, 2008, Test. This was the second Japanese flight test, and involved a single ballistic missile target. The test did not result in a successful intercept. MDA states that:

Rear Admiral Tomohisa Takei, Director General of Operations and Plans, for the Japanese Maritime Staff Office (MSO), Japan Maritime Self Defense Force (JMSDF), and Lt. General Henry "Trey" Obering, United States Missile Defense Agency director, announced the completion today of a cooperative sea-based Aegis Ballistic Missile Defense intercept flight test off the coast of Kauai in Hawaii. The event, designated Japan Flight Test Mission 2 (JFTM-2), marked the second attempt by an Allied naval ship to intercept a ballistic missile target with the sea-based midcourse engagement capability provided by Aegis Ballistic Missile Defense. Target performance, interceptor missile launch and flyout, and operation of the Aegis Weapon System by the crew were successful, but an intercept was not achieved.

The JFTM-2 was a test of the newest engagement capability of the Aegis Ballistic Missile Defense configuration of the recently upgraded Japanese destroyer, JS CHOKAI (DDG-176). At approximately 4:21 pm (HST), 11:21 am (Tokyo time) a ballistic missile target was launched from the Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii. JS CHOKAI crew members detected and tracked the target using an advanced on-board radar.

⁶⁷ John Liang, "Japanese Destroyer Shoots Down Ballistic Missile Test Target," *Inside Missile Defense*, December 19, 2007; "Japanese Aegis Destroyer Wins Test By Killing Target Missile With SM-3 Interceptor," *Defense Daily*, December 18, 2007; Reuters, "Japanese Ship Downs Missile In Pacific Test," *New York Times*, December 18, 2007: 8; Audrey McAvoy, "Japan Intercepts Missile In Test Off Hawaii," *NavyTimes.com*, December 17, 2007.

⁶⁸ Commander, U.S. Third Fleet, Public Affairs Office, press release 23-08, dated November 1, 2008, entitled "Navy Intercepts Ballistic Missile Target in Fleet Exercise Pacific Blitz." See also Dave Ahearn, "One of Two Missiles Hit In Aegis Test; Navy For First Time Runs Test Instead of MDA," *Defense Daily*, November 4, 2008: 1-2.

The Aegis Weapon System then developed a fire control solution, and at approximately 4:24 pm (HST), 11:24 am (Tokyo time) on Nov 20, a single Standard Missile -3 (SM-3) Block IA was launched. Approximately two minutes later, the SM-3 failed to intercept the target. There is no immediate explanation for the failed intercept attempt. More information will be available after a thorough investigation. The JS CHOKAI crew performance was excellent in executing the mission. JFTM-2 was the second time that a Japanese ship was designated to launch the interceptor missile, a major milestone in the growing cooperation between Japan and the U.S.⁶⁹

A November 21, 2008, press report states that:

An Aegis ballistic missile defense (BMD) test by the Japanese destroyer Chokai (DDG-176) ended in failure when the Standard Missile-3 Block 1A interceptor lost track of the target missile in the final seconds before a planned hit-to-kill.

The Chokai and its crew performed well throughout the test, and the SM-3 also performed flawlessly through its first three stages, according to Rear Adm. Brad Hicks, the U.S. Navy Aegis ballistic missile defense program director. He spoke with several reporters in a teleconference around midnight ET Wednesday-Thursday, after the test in the area of the Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii.

This was the second Aegis BMD test failure in less than a month.

These latest two failures come as some Democrats in Congress are poised to cut spending on missile defense programs when they convene next year to consider the Missile Defense Agency budget for the fiscal year ending Sept. 30, 2010....

Still, in the coming money debates next year, missile defense advocates will be able to point out that even including the Hopper and Chokai failures, the record for the Aegis tests is an overwhelming 16 successful hits demolishing target missiles out of 20 attempts.

Those successes included the first Japanese attempt. The Japanese destroyer Kongo (DDG-173) successfully used its SM-3 interceptor to kill a target missile. The difference in tests is that the Kongo crew was advised beforehand when the target missile would be launched, while the Chokai crew wasn't....

[Hicks] said a board will be convened to examine why the latest test failed. Hicks declined to speculate on why the SM-3 interceptor missed the target. "I'm confident we'll find out the root cause" of the Chokai interceptor failure to score a hit, he said.

However, he was asked by *Space & Missile Defense Report* whether the prior SM-3 successes make it unlikely the Chokai failure stems from some basic design flaw in all SM-3s, and whether it is more likely that the Chokai SM-3 failed because of some flaw or glitch in just that one interceptor.

Hicks said that is likely.

"Obviously, we believe this is hopefully related to this one interceptor," and doesn't reflect any basic design flaw in the SM-3 interceptors, he said.

⁶⁹ Missile Defense Agency press release 08-News-0087, dated November 19, 2008, entitled "Japan/U.S. Missile Defense Flight Test Completed."

The Chokai test failure cost Japan a \$55 million loss, he said, adding, "It wasn't cheap."...

In the Chokai test, the target missile was launched from Barking Sands, and about three minutes later the Chokai crew had spotted the target, the Aegis system had developed a tracking and hit solution, and the SM-3 interceptor was launched.

The first, second and third stages of the interceptor performed nominally, without problems, but then came the fourth stage. The nosecone components opened to expose the kill vehicle area, and somehow the program to track the target missile failed.

"It lost track," Hicks said, only seconds before the hit would have been achieved.

If the kill had occurred, it would have been about 100 nautical miles (roughly 115 statute miles) above Earth, and some 250 miles away from Barking Sands, Hicks said.

It took the interceptor about two minutes flight time to reach the near miss with the target missile.

Meanwhile, the Hamilton was nearby watching the test. The Hamilton Aegis system successfully spotted and tracked the target, and developed a simulated solution and simulated interceptor launch that, if it had been real, would have resulted in a successful hit on the target, Hicks said. The Hamilton didn't cue the Chokai, however. "It was strictly Chokai's engagement," Hicks said.⁷⁰

July 30, 2009, Test. MDA states that:

In conjunction with the Missile Defense Agency (MDA), U.S. Pacific Fleet ships and crews successfully conducted the latest Aegis Ballistic Missile Defense (BMD) at-sea firing event on July 30. During this event, entitled Stellar Avenger, the Aegis BMD-equipped ship, USS Hopper (DDG 70), detected, tracked, fired and guided a Standard Missile -3 (SM-3) Block (Blk) IA to intercept a sub-scale short range ballistic missile. The target was launched from the Kauai Test Facility, co-located on the Pacific Missile Range Facility (PMRF), Barking Sands, Kauai. It was the 19th successful intercept in 23 at-sea firings, for the Aegis BMD Program, including the February 2008 destruction of the malfunctioning satellite above the earth's atmosphere. Stellar Avenger was part of the continual evaluation of the certified and fielded Aegis BMD system at-sea today.

At approximately 5:40 pm (HST), 11:40 pm (EDT), a target was launched from PMRF. Three U.S. Navy Aegis BMD-equipped ships, the cruiser, USS Lake Erie (CG 70) and destroyers USS Hopper (DDG 70) and USS O'Kane (DDG 77) detected and tracked the target with their SPY radars. Each developed fire control solutions. At 5:42 pm (HST), 11:42 pm (EDT) the crew of USS Hopper fired one SM-3 Blk IA missile. The USS Hopper's Aegis BMD Weapon System successfully guided the SM-3 to a direct body to body hit, approximately two minutes after leaving the ship. The intercept occurred about 100 miles above the Pacific Ocean. USS O'Kane conducted a simulated engagement of the target. USS Lake Erie, with its recently installed upgraded Aegis BMD 4.0.1 Weapons System, detected and tracked the same target.⁷¹

⁷⁰ Dave Ahearn, "Japanese Aegis Missile Defense Test Fails, But Aegis Record Is 16 Hits In 20 Tries," Defense Daily, November 21, 2008: 5-6.

⁷¹ Missile Defense Agency press release 09-News-0015, dated July 31, 2009, entitled "Aegis Ballistic Missile Defense Test Successful."

A July 31, 2009, press report states:

The test was the first Aegis BMD exercise to feature two versions of the software in a single event, according to Lisa Callahan, Lockheed's vice president for ballistic missile defense programs.

A goal of the exercises was to test the Aegis system's ability to discern all the different parts and pieces of a ballistic missile, Nick Bucci, Lockheed's director for Aegis BMD development programs, told reporters July 29 during a pre-exercise conference call.

Three more flight tests this fall will further test the system's discrimination capabilities, Bucci added, with each test becoming more complex. The last test will "be against a pretty darn complex target," he said.

The July 30 tests also validated fixes put in place after a BMD test last November involving a missile launched from the Aegis BMD Japanese destroyer Chokai failed to intercept its target, according to MDA spokesman Chris Taylor. The improvements—which were successful in the most recent test—involved fixes to the Solid Divert Attitude Control System.

The Chokai is the second of four Japanese Aegis ships being upgraded with BMD capability. A third ship, the Myoko, is scheduled to carry out a BMD test this fall.⁷²

An August 3, 2009, press report states:

This test was added to the schedule to evaluate changes made after last year's failed attempt to intercept a target with an SM-3 Block IA launched by a Japanese Aegis-equipped ship After the Nov. 19 test, MDA officials said, "Target performance, interceptor missile launch and flyout, and operation of the Aegis Weapon System by the crew were successful, but an intercept was not achieved."

A root cause has not been identified, and an MDA spokesman did not say whether fixes have been made to hardware or operational procedures resulting from the failure review. It is also unclear why a subscale target was used in the July 30 trial.⁷³

An August 4, 2009, press report states:

[Rear Admiral Alan "Brad" Hicks, Aegis/SM-3 program manager for MDA], said that a November [2008] failure of an SM-3 Block IA... during a flight-test was attributable to poor adherence to processes on Raytheon's assembly line in Tucson, Ariz.

This was isolated to that missile, and it was the result of perturbations to the build process encountered when shifting from development to production operations.

During the November test, a Japanese Aegis-equipped ship fired the interceptor and it flew "perfectly," Hicks said. In the endgame, a failure of the divert and attitude control system on the unitary kill vehicle led to a miss.

The July 30 demonstration using a U.S. ship "restored confidence" for the Japanese that the miss last fall was an isolated incident, he says.⁷⁴

⁷² Christopher P. Cavas, "Aegis BMD Test Successful," *DefenseNews.com*, July 31, 2009.

⁷³ Amy Butler, "SM-3 Scores Hit After Fixes Implemented," *Aerospace Daily & Defense Report*, August 3, 2009: 5.

October 27, 2009, Test. This was the third Japanese flight test, and it involved a single ballistic missile target. MDA states that:

The Japan Maritime Self-Defense Force (JMSDF) and the United States Missile Defense Agency (MDA) announced the successful completion of an Aegis Ballistic Missile Defense (BMD) intercept flight test, in cooperation with the U.S. Navy, off the coast of Kauai in Hawaii. The event, designated Japan Flight Test Mission 3 (JFTM-3), marked the third time that a JMSDF ship has successfully engaged a ballistic missile target, including two successful intercepts, with the sea-based midcourse engagement capability provided by Aegis BMD.

The JFTM-3 test event verified the newest engagement capability of the Japan Aegis BMD configuration of the recently upgraded Japanese destroyer, JS MYOKO (DDG-175). At approximately 6:00pm (HST), 1:00 pm Tokyo time on Oct 28, a separating, medium-range ballistic missile target was launched from the Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii. JS MYOKO crew members detected and tracked the target. The Aegis Weapon System then developed a fire control solution and, at approximately 6:04pm (HST), 1:04 pm Tokyo time a Standard Missile-3 (SM-3) Block IA interceptor missile was launched. Approximately 3 minutes later, the SM-3 successfully intercepted the target approximately 100 miles above the Pacific Ocean. JFTM-3 is a significant milestone in the growing cooperation between Japan and the U.S. in the area of missile defense.

Also participating in the test, were the Pearl Harbor-based USS Lake Erie (CG 70) and USS Paul Hamilton (DDG 60) which detected and tracked the target and conducted a simulated engagement.⁷⁵

October 28, 2010, Test. This was the fourth Japanese flight test, and it involved a single ballistic missile target. MDA states that:

The Japan Maritime Self-Defense Force (JMSDF) and the United States Missile Defense Agency (MDA) announced the successful completion of an Aegis Ballistic Missile Defense (BMD) intercept flight test, in cooperation with the U.S. Navy, off the coast of Kauai in Hawaii.

The event marked the fourth time that a JMSDF ship has engaged a ballistic missile target, including three successful intercepts, with the sea-based midcourse engagement capability provided by Aegis BMD.

The JFTM-4 test event verified the newest engagement capability of the Japan Aegis BMD configuration of the recently upgraded Japanese destroyer, JS KIRISHIMA. At approximately 5:06 p.m. (HST), 12:06 p.m. Tokyo time on Oct. 29, 2010, a separating 1,000 km class ballistic missile target was launched from the Pacific Missile Range Facility at Barking Sands, Kauai, Hawaii.

(...continued)

⁷⁴ Amy Butler, "SM-3 Upgrade Program Cost Increases," *Aerospace Daily & Defense Report*, August 4, 2009: 1-2. See also Dan Taylor, "Navy Conducts Aegis BMD Test, New Baseline System Participates," *Inside the Navy*, August 3, 2009; Daniel Wasserbly, "US Aegis BMD System Achieves Trial Success," *Jane's Defence Weekly*, August 5, 2009: 8.

⁷⁵ Missile Defense Agency press release 09-News-0021, dated October 28, 2009, entitled "Japan/U.S. Missile Defense Flight Test Successful." See also Christopher P. Cavas, "Japanese Destroyer Conducts Successful BMD Test," *NavyTimes.com*, October 28, 2009; and Amy Butler and Michael Bruno, "SM-3 Scores Hit In Japanese Test," *Aerospace Daily & Defense Report*, October 29, 2009: 3.

JS KIRISHIMA crew members detected and tracked the target. The Aegis Weapon System then developed a fire control solution and launched a Standard Missile -3 (SM-3) Block IA missile. Approximately three minutes later, the SM-3 successfully intercepted the target approximately 100 miles above the Pacific Ocean. JFTM-4 is a significant milestone in the growing cooperation between Japan and the U.S. in the area of missile defense.

Also participating in the test was USS LAKE ERIE and USS RUSSELL, Aegis ships which cooperated to detect, track and conduct a simulated intercept engagement against the same target.⁷⁶

April 15, 2011, Test. MDA states that this flight test “was the most challenging test to date, as it was the first Aegis BMD version 3.6.1 intercept against an intermediate-range target (range 1,864 to 3,418 [statute] miles) and the first Aegis BMD 3.6.1 engagement relying on remote tracking data.” MDA states that:

The Missile Defense Agency (MDA), U.S. Navy sailors aboard the Aegis destroyer USS O’KANE (DDG 77), and Soldiers from the 94th Army Air and Missile Defense Command operating from the 613th Air and Space Operations Center at Hickam Air Force Base, Hawaii, successfully conducted a flight test of the Aegis Ballistic Missile Defense (BMD) element of the nation’s Ballistic Missile Defense System, resulting in the intercept of a separating ballistic missile target over the Pacific Ocean. This successful test demonstrated the capability of the first phase of the European Phased Adaptive Approach (EPAA) announced by the President in September, 2009.

At 2:52 a.m. EDT (6:52 p.m. April 15 Marshall Island Time), an intermediate-range ballistic missile target was launched from the Reagan Test Site, located on Kwajalein Atoll in the Republic of the Marshall Islands, approximately 2,300 miles southwest of Hawaii. The target flew in a northeasterly direction towards a broad ocean area in the Pacific Ocean. Following target launch, a forward-based AN/TPY-2 X-band transportable radar, located on Wake Island, detected and tracked the threat missile. The radar sent trajectory information to the Command, Control, Battle Management, and Communications (C2BMC) system, which processed and transmitted remote target data to the USS O’KANE. The destroyer, located to the west of Hawaii, used the data to develop a fire control solution and launch the SM-3 Block IA missile approximately 11 minutes after the target was launched.

As the IRBM target continued along its trajectory, the firing ship’s AN/SPY-1 radar detected and acquired the ballistic missile target. The firing ship’s Aegis BMD weapon system uplinked target track information to the SM-3 Block IA missile. The SM-3 maneuvered to a point in space as designated by the fire control solution and released its kinetic warhead. The kinetic warhead acquired the target, diverted into its path, and, using only force of a direct impact, destroyed the threat in a “hit-to-kill” intercept.

During the test the C2BMC system, operated by Soldiers from the 94th Army Air and Missile Defense Command, received data from all assets and provided situational awareness of the engagement to U.S. Pacific Command, U.S. Northern Command and U.S. Strategic Command.

⁷⁶ Missile Defense Agency press release 10-News-0016, dated October 29, 2010, entitled “Joint Japan-U.S. Missile Defense Flight Test Successful.” See also Marina Malenic, “Japanese Aegis Destroyer Successfully Completes Missile-Intercept Test,” *Defense Daily*, November 1, 2010: 6.

The two demonstration Space Tracking and Surveillance Satellites (STSS), launched by MDA in 2009, successfully acquired the target missile, providing stereo “birth to death” tracking of the target.

Today’s event, designated Flight Test Standard Missile-15 (FTM-15), was the most challenging test to date, as it was the first Aegis BMD version 3.6.1 intercept against an intermediate-range target (range 1,864 to 3,418 [statute] miles) and the first Aegis BMD 3.6.1 engagement relying on remote tracking data. The ability to use remote radar data to engage a threat ballistic missile greatly increases the battle space and defended area of the SM-3 missile.

Initial indications are that all components performed as designed. Program officials will spend the next several months conducting an extensive assessment and evaluation of system performance based upon telemetry and other data obtained during the test.⁷⁷

September 1, 2011, Test. This flight test, which did not result in an intercept, was the first flight test of the SM-3 Block IB interceptor. MDA states that it

was unable to achieve the planned intercept of a ballistic missile target during a test over the Pacific Ocean exercising the sea-based element of the Ballistic Missile Defense System (BMDS).

At approximately 3:53 a.m. Hawaii Standard Time (9:53 a.m. EDT) a short-range ballistic missile target was launched from the U.S. Navy’s Pacific Missile Range Facility on Kauai, Hawaii. Approximately 90 seconds later, a Standard Missile 3 (SM-3) Block 1B interceptor missile was launched from the cruiser USS LAKE ERIE (CG-70) but an intercept of the target was not achieved.

This was the first flight test of the advanced SM-3 Block 1B interceptor missile. Program officials will conduct an extensive investigation to determine the cause of the failure to intercept.⁷⁸

Endo-Atmospheric (SM-2 Block IV) Flight Tests

The Aegis BMD system using the SM-2 Block IV interceptor has achieved three successful endo-atmospheric intercepts in three at-sea attempts, the first occurring on May 24, 2006,⁷⁹ the second on June 5, 2008,⁸⁰ and the third between March 24 and March 26, 2009.⁸¹

⁷⁷ Missile Defense Agency press release 11-News-0007, dated April 15, 2011, entitled “Sea-based Missile Defense Flight Test Results in Successful Intercept.”

⁷⁸ Missile Defense Agency press release 11-News-0016, dated September 1, 2011, entitled “Sea-Based Missile Defense Test Conducted.” See also Amy Butler, “Upgraded Ballistic Missile Killer Fizzles In First Flight Test,” *Aerospace Daily & Defense Report*, September 2, 2011: 3; and Mike McCarthy, “Sea-Based Missile Defense Test Fails,” *Defense Daily*, September 2, 2011: 2-3.

⁷⁹ See Missile Defense Agency, “First at-Sea Demonstration of Sea-Based Terminal Capability Successfully Completed,” May 24, 2006 (06-FYI-0079); Gregg K. Kakesako, “Missile Defense System Makes History,” *Honolulu Star-Bulletin*, May 25, 2006; Audrey McAvoy, “Ship Shoots Down Test Missile For The First Time,” *NavyTimes.com*, May 25, 2006; “Navy, MDA Announce First Terminal Sea-Based Intercept,” *Aerospace Daily & Defense Report*, May 26, 2006; Zachary M. Peterson, “Navy Conducts First Sea-Based Terminal Phase Missile Defense Test,” *Inside the Navy*, May 29, 2006; and Jeremy Singer, “Sea-Based Terminal May Boost U.S. Missile Defense Capability,” *Space News (www.space.com)*, June 12, 2006.

⁸⁰ See Missile Defense Agency, “Successful Sea-Based Missile Defense Intercept,” June 5, 2008 (08-NEWS-0068); (continued...)

Author Contact Information

Ronald O'Rourke
Specialist in Naval Affairs
rorourke@crs.loc.gov, 7-7610

(...continued)

Dave Ahearn, "Aegis, SM-2 Interceptors Kill Target Missile In Terminal-Phase Success," *Defense Daily*, June 6, 2008.

⁸¹ "Navy Completes Air and Ballistic Missile Exercise," *Navy News Service*, March 26, 2009.