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STATEMENT OF
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BEFORE THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON SEAPOWER AND PROJECTION FORCES
HEARING ON
NAVY SHIPBUILDING ACQUISITION PROGRAMS AND
BUDGET REQUIREMENTS OF THE NAVY'S SHIPBUILDING AND
CONSTRUCTION PLAN
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Chairman Akin, Ranking Member McIntyre, distinguished members of the subcommittee, thank you for the opportunity to appear before you today to discuss Navy shipbuilding programs. As requested, my testimony discusses:

- the Navy's ship force structure plan (pages 1-3);
- the Navy's short-term, mid-term, and long-term shipbuilding plans (pages 3-10);
- execution risks for Navy shipbuilding programs in general (pages 10-16); and
- execution risks for specific Navy shipbuilding programs (pages 16-25).¹

Navy's De Facto 320-321 Ship Force Structure Plan

The Navy in February 2006 presented to Congress a goal of achieving and maintaining a fleet of 313 ships, consisting of certain types and quantities of ships. Since then, the Navy has changed its desired quantities for some of those ship types, and the Navy's goals now appear to add up to a desired fleet of 320 or 321 ships. Although the 313-ship plan of 2006 is no longer a fully accurate representation of current Navy ship force-structure goals, the Navy has not presented to Congress an official replacement for the 313-ship plan. Many observers continue to refer to the Navy's planned fleet as a 313-ship fleet. Navy officials sometimes refer to the figure of 313 ships as a "floor," or to a force-structure goal of 313-321 ships. This testimony treats the Navy's desire for a fleet of 320-321 ships as the service's de facto ship force structure plan.

Table 1 compares the current de facto 320-321 ship plan to the 313-ship plan of 2006 and earlier Navy ship force structure plans.

¹ Parts of this testimony are adapted from CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

Table I. Navy Ship Force Structure Plans Since 2001

Ship type	Current de facto 320-321 ship plan reflecting changes since 2006 to the 313-ship plan	2006 Navy plan for 313-ship fleet	Early-2005 Navy plan for fleet of 260-325 ships		2002-2004 Navy plan for 375-ship Navy ^a	2001 QDR plan for 310-ship Navy
			260-ships	325-ships		
Ballistic missile submarines (SSBNs)	12 ^b	14	14	14	14	14
Cruise missile submarines (SSGNs)	0 ^c	4	4	4	4	2 or 4 ^d
Attack submarines (SSNs)	48	48	37	41	55	55
Aircraft carriers	10 or 11 ^e	11 ^f	10	11	12	12
Cruisers and destroyers	88 ^g	88	67	92	104	116
Frigates	0	0	0	0	0	0
Littoral Combat Ships (LCSs)	55	55	63	82	56	0
Amphibious ships	33 ^h	31	17	24	37	36
MPF(F) ships ⁱ	0 ⁱ	12 ⁱ	14 ⁱ	20 ⁱ	0 ⁱ	0 ⁱ
Combat logistics (resupply) ships	30	30	24	26	42	34
Dedicated mine warfare ships	0	0	0	0	26 ^k	16
Other ^l	44 ^m	20	10	11	25	25
Total battle force ships	320 or 321	313	260	325	375	310 or 312

Sources: Table prepared by CRS based on U.S. Navy data.

Note: QDR is Quadrennial Defense Review.

- a. Initial composition. Composition was subsequently modified.
- b. The Navy plans to replace the 14 current Ohio-class SSBNs with a new class of 12 next-generation SSBNs. For further discussion, see CRS Report R41129, *Navy SSBN(X) Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.
- c. Although the Navy plans to continue operating its four SSGNs until they reach retirement age in the late 2020s, the Navy does not plan to replace these ships when they retire.
- d. The report on the 2001 QDR did not mention a specific figure for SSGNs. The Administration's proposed FY2001 Department of Defense (DOD) budget requested funding to support the conversion of two available Trident SSBNs into SSGNs, and the retirement of two other Trident SSBNs. Congress, in marking up this request, supported a plan to convert all four available SSBNs into SSGNs.
- e. The FY2011 30-year (FY2011-FY2040) shipbuilding plan would reduce the Navy's carrier force from 11 ships to 10 ships after 2040.
- f. For a time, the Navy characterized the goal as 11 carriers in the nearer term, and eventually 12 carriers.
- g. Although the 88 number remains unchanged from the 2006 plan, the types and quantities of cruisers and destroyers has changed. The 2006 plan envisioned 62 DDG-51 destroyers, 7 DDG-1000 destroyers, and 19 next-generation CG(X) cruisers. The 19 CG(X)s would replace today's 22 Aegis cruisers. The new plan calls for 88 destroyers, including 85 DDG-51s and 3 DDG-1000s. The 85 DDG-51s are to include Flight III DDG-51s that are to be procured as replacements for today's 22 Aegis cruisers. For further discussion, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RL34179, *Navy CG(X) Cruiser Program: Background for Congress*, by Ronald O'Rourke.
- h. The Navy acknowledges that meeting a requirement for being able to lift the assault echelons of 2.0 Marine Expeditionary Brigades (MEBs) would require a minimum of 33 amphibious ships rather than 31. For further discussion, see CRS Report RL34476, *Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

- i. Today's Maritime Prepositioning Force (MPF) ships are intended primarily to support Marine Corps operations ashore, rather than Navy combat operations, and thus are not counted as Navy battle force ships. The MPF (Future) ships, however, would contribute to Navy combat capabilities (for example, by supporting Navy aircraft operations). For this reason, the ships in the planned MPF(F) squadron were counted by the Navy as battle force ships.
- j. The Navy no longer plans to acquire an MPF(F) squadron. The Navy, however, has procured or plans to procure six ships that were previously planned for the MPF(F) squadron—three modified TAKE-I class cargo ships, and three Mobile Landing Platform (MLP) ships. These six ships are now included in the 44-ship total shown for "Other" ships.
- k. The figure of 26 dedicated mine warfare ships includes 10 ships maintained in a reduced mobilization status called Mobilization Category B. Ships in this status are not readily deployable and thus do not count as battle force ships. The 375-ship proposal thus implied transferring these 10 ships to a higher readiness status.
- l. This category includes, among other things, command ships and support ships.
- m. The increase in this category from 20 ships under the 313-ship plan to 44 ships under the 320-321 ship plan includes an 18-ship increase in the planned number of JHSV's (from 3 to 21), and the transfer into this category of six ships—three modified TAKE-I class cargo ships, and three Mobile Landing Platform (MLP) ships—that were previously intended for the planned (but now canceled) MPF(F) squadron. The 21 JHSV's include 16 ships dedicated to Navy missions and 5 ships that are to be transferred from the Army to the Navy and operated by the Navy primarily for the performance of Army missions.

A potential oversight issue for Congress regarding the Navy's ship force structure goals is whether and when the Navy plans to present to Congress an official replacement for the 313-ship plan of 2006. Such a replacement presumably would take into account the changes that have led to the 320-321 ship total shown in the first data column of **Table 1**, plus any other changes the Navy might wish to announce. The Navy's February 2010 report on its FY2011 30-year (FY2011-FY2040) shipbuilding plan stated that the Navy was undertaking a force structure assessment (FSA). Such an assessment could lead to a new plan to replace the 313-ship plan of 2006, but the Navy's report did not say when the FSA might be completed, or when the Navy might present a new official ship force structure plan to Congress.

Navy's Near-Term, Mid-Term, and Long-Term Shipbuilding Plans

FY2012 Near-Term (5-Year) Shipbuilding Plan

Table 2 shows the Navy's FY2012 near-term (i.e., 5-year) shipbuilding plan.

Table 2. Navy FY2012 5-year (FY2012-FY2016) Shipbuilding Plan
(Battle force ships—i.e., ships that count against 320-321 ship goal)

Ship type	FY12	FY13	FY14	FY15	FY16	Total
Ford (CVN-78) class aircraft carrier		1				1
Virginia (SSN-774) class attack submarine	2	2	2	2	2	10
Arleigh Burke (DDG-51) class destroyer	1	2	2	2	1	8
Littoral Combat Ship (LCS)	4	4	4	4	3	19
San Antonio (LPD-17) class amphibious ship	1					1
LHA(R) amphibious assault ship					1	1
Fleet tug (TATF)				1		1
Mobile Landing Platform (MLP) ship	1	1				2
Joint High Speed Vessel (JHSV)	1	2	2	2	1	8
TAO(X) oiler			1	1	1	3
TAGOS ocean surveillance ship		1				1
TOTAL	10	13	11	12	9	55

Source: FY2012 Navy budget submission.

Notes: The FY2012-FY2016 shipbuilding plan also includes, in FY2012, an oceanographic ship that does not count against the 320-321 ship goal. JHSVs are being procured by both the Navy and the Army. The Army is procuring a second JHSV in FY2012; this ship is included in the Army's budget.

Observations that can be made about the Navy's proposed 5-year (FY2012-FY2016) shipbuilding plan include the following:

- The FY2012-FY2016 plan includes a total of 55 battle force ships, or 5 more than the FY2011-FY2015 plan. The net increase of five ships includes the addition of six ships and the subtraction of one previously planned ship. The six added ships include a second DDG-51 in FY2014, a fourth Littoral Combat Ship (LCS) in FY2012, three TAO(X) oilers in FY2014-FY2016, and a TAGOS ocean surveillance ship in FY2013. The ship that was subtracted was a second JHSV that was previously planned for FY2016.
- The FY2012-FY2016 plan includes an average of 11 battle force ships per year, making this the second year in a row that the Navy has presented a 5-year shipbuilding plan showing an average of 10 or more battle force ships per year. Given the single-digit numbers of battle force ships that have been procured each year since FY1993, shipbuilding supporters for some time have wanted to increase the shipbuilding rate to 10 or more battle force ships per year. A rate of 10 battle force ships per year is above the steady-state replacement rate for a fleet of 320-321 ships with an average service life of 35 years, which is about 9.2 ships per year. The average shipbuilding rate since FY1993 has been substantially below 9.2 ships per year.
- Although LCSs and JHSVs account for about 24% of the ships in the Navy's planned force structure (78 of 320-321 ships), they account 49% of the ships in the FY2012-FY2016 shipbuilding plan (27 of 55). In this sense, these relatively inexpensive ships are overrepresented in the 5-year shipbuilding plan relative to their portion of the 320-321 ship requirement, making it easier to procure an average of 11 ships per year within available resources. Starting a few years from

now, when the LCS and JHSV programs are no longer overrepresented in the shipbuilding plan, and particularly when procurement of next-generation SSBN(X) ballistic missile submarines begins, procuring an average of 10 or more ships per year will become a considerably more expensive proposition. In this sense, the FY2012-FY2016 shipbuilding program's average of 11 ships per year does not necessarily imply that the Navy has solved the challenge it faces concerning the long-term affordability of its shipbuilding plans.

- The addition of the fourth LCS in FY2012 brings planned annual LCS procurement quantities into line with those called for in the dual-award acquisition strategy that Congress approved in December 2010 for the LCS program.²
- The San Antonio (LPD-17) class amphibious ship planned for FY2012 is to be the 11th and final ship in the class. The 33-ship force-structure goal for amphibious ships includes 11 LPD-17s.³
- The first of three planned MLPs was requested in the Navy's FY2011 budget. The FY2011-FY2015 plan scheduled the second and third ships for FY2013 and FY2015. The FY2012-FY2016 plan accelerates the second and third ships to FY2012 and FY2013. The annual procurement profile for the three MLPs has thus been changed from 1-0-1-0-1 to 1-1-1. Last year, some supporters of the MLP program proposed making this change (or, at a minimum, accelerating the third MLP from FY2015 to FY2014), on the grounds that it would permit a more efficient production profile for the three ships. The Navy last year was presumably aware of the potential production-line advantages of procuring the ships in consecutive years, but may have nevertheless stretched out the procurement profile to 1-0-1-0-1 to help bridge the builder of these ships—National Steel and Shipbuilding Company (NASSCO) of San Diego—to the planned start of the TAO(X) oiler and LSD(X) amphibious ship programs in FY2017. As noted in the next point below, the planned start of the TAO(X) program has now been accelerated from FY2017 to FY2014. The Navy plans to compete the TAO(X) program; NASSCO is generally considered to be a likely competitor for the program.
- The addition of the three TAO(X) oilers in FY2014-FY2016 reflects an acceleration of the start of this program from FY2017 to FY2014. This acceleration was one of a series of measures that the Navy announced on September 17, 2010, for sustaining the shipbuilding capability in Louisiana.⁴ As mentioned above, the Navy plans to compete the TAO(X), so it is not certain that the program will be awarded to a shipyard in Louisiana, such as the Avondale shipyard near New Orleans that currently forms part of Northrop Grumman Shipbuilding. In July 2010, Northrop announced that it would sell or spin off its shipbuilding operations, and that as part of this plan, it intended to wind down operations at Avondale in 2013, following the completion of two LPD-17s currently being built at that yard.⁵

² For further discussion, see CRS Report RL33741, *Navy Littoral Combat Ship (LCS) Program: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

³ For more on the LPD-17 program, see CRS Report RL34476, *Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

⁴ For the text of the Navy's announcement, see <http://www.wvltv.com/news/Sec-of-Navy-remarks-on-shipyard-in-Avondale-103150169.html>.

⁵ For the text of Northrop's announcement, see http://www.irconnect.com/noc/press/pages/news_releases.html?d=

FY2012 Mid-Term (10-Year) Shipbuilding Plan

Table 3 shows the Navy's FY2012 mid-term (i.e., 10-year) shipbuilding plan. The first five years of this plan include the same ships as those shown in **Table 2**.

Table 3. Navy FY2012 10-Year (FY2012-FY2021) Shipbuilding Plan

(Battle force ships—i.e., ships that count against 320-321 ship goal)

Ship type	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Aircraft carriers		1					1			
Large surface combatants (i.e., destroyers)	1	2	2	2	1	2	1	2	1	2
Small surface combatant (i.e., LCSs)	4	4	4	4	3	3	3	3	2	2
Attack submarines	2	2	2	2	2	2	1	2	2	2
Ballistic missile submarines								1		
Amphibious ships	1				1	1		1		2
Combat logistics force (i.e., resupply) ships			1	1	1	1	1	1	1	1
Support ships	2	4	2	3	1	3	3	2	2	
TOTAL	10	13	11	12	9	12	10	12	8	9

Source: FY2012 Navy budget submission.

Notes: Tables does not include ships, such as oceanographic ships, that do not count against the 320-321 ship goal.

FY2011 Long-Term (30-Year) Shipbuilding Plan

The Navy did not submit an FY2012 30-year (FY2012-FY2041) shipbuilding plan.⁶ **Table 4** shows the Navy's FY2011 long-term (30-year) shipbuilding plan, which the Navy submitted to Congress last year, in conjunction with its proposed FY2011 budget. Because this 30-year plan reflects the Navy's FY2011 budget submission rather than the Navy's FY2012 budget submission, the figures it shows for FY2012-FY2021 do not match those in **Table 2** and **Table 3**. The FY2011 30-year (FY2011-FY2040) plan includes a total of 276 ships.

196340.

⁶ Section 1023 of the FY2011 defense authorization act (H.R. 6523/P.L. 111-383 of January 7, 2011) amended the law (10 U.S.C. 231) that had required DOD to submit a 30-year shipbuilding plan each year. As amended by Section 1023, 10 U.S.C. 231 now requires DOD to submit a 30-year shipbuilding plan once every four years, in the same year that DOD submits a Quadrennial Defense Review (QDR). Regarding the three years between each QDR, the joint explanatory statement of the House and Senate Armed Services Committees on H.R. 6523 stated:

The committees expect that, following the submission of the President's budget materials for a fiscal year, the Secretary of the Navy, at the written request of one of the congressional defense committees, will promptly deliver the Navy's long-term shipbuilding plan used to develop the President's budget request for that fiscal year, as well as a certification from the Secretary of the Navy that both the President's budget request for that fiscal year and the budget for the future-years defense program is sufficient to fund the construction schedule provided in that plan. The committees expect that such a plan would include the quantity of each class of ship to be constructed in that fiscal year and the nine following fiscal years.

Table 4. Navy FY2011 30-Year (FY2011-FY2040) Shipbuilding Plan

FY	CVN	LSC	SSC	SSN	SSBN	AWS	CLF	Supt	Total
11		2	2	2		1		2	9
12		1	3	2		1		1	8
13	1	2	4	2				3	12
14		1	4	2				2	9
15		2	4	2				4	12
16		1	3	2		1		2	9
17		2	3	2		1	1	3	12
18	1	1	3	1				3	9
19		2	3	2	1	1	1	3	13
20		1	2	2				4	9
21		2	2	2		2	1	2	11
22		1	2	2	1		1	3	10
23	1	2	2	1		1	1	3	11
24		1	2	1	1		1	2	8
25		1	1	1	1	2	1	1	8
26		2	2	1	1		1		7
27		2	1	1	1	1	1		7
28	1	1	2	1	1		1	1	8
29		2	1	1	1	2	1		8
30		1	2	1	1		1	2	8
31		2	1	1	1	1	1	1	8
32		2	2	1	1		1	1	8
33	1	2	1	1	1	2	1	2	11
34		2	2	1			1	2	8
35		2	2	2		1	1	2	10
36		2	2	1				2	7
37		2	2	2		1	1	2	10
38	1	2	2	1		1		2	9
39		2	2	2		1	1	2	10
40		2	2	1				2	7

Source: Navy FY2011 budget submission.

Key: **FY** = Fiscal Year; **CVN** = aircraft carriers; **LSC** = surface combatants (i.e., cruisers and destroyers); **SSC** = small surface combatants (i.e., Littoral Combat Ships [LCSs]); **SSN** = attack submarines; **SSGN** = cruise missile submarines; **SSBN** = ballistic missile submarines; **AWS** = amphibious warfare ships; **CLF** = combat logistics force (i.e., resupply) ships; **MPF(F)** = Maritime Prepositioning Force (Future) ships; **Supt** = support ships.

Projected Force Levels Under 10-Year Plan

Table 5 shows the Navy's projection of force levels for FY2012-FY2021 that would result from implementing the FY2012 10-year (FY2012-FY2021) shipbuilding plan shown in **Table 3**. This table includes five JHSV's that are to be transferred from the Army to the Navy and operated by the Navy primarily for the performance of Army missions.

Table 5. Projected Force Levels Resulting from FY2012 10-Year Plan

FY	CVN	LSC	SSC	SSN	SSGN	SSBN	AWS	CLF	Supt	Total
Goal in 320-321 ship plan	10 or 11	88	55	48	0	12	33	30	44	320 or 321
12	11	84	41	54	4	14	30	31	21	290
13	10	84	35	55	4	14	30	30	25	287
14	10	85	30	55	4	14	30	30	28	286
15	11	86	26	54	4	14	30	30	31	286
16	11	90	31	52	4	14	31	30	34	297
17	11	91	32	50	4	14	33	29	37	301
18	11	93	36	50	4	14	33	30	40	311
19	11	95	36	51	4	14	33	30	42	316
20	12	97	40	49	4	14	33	30	43	322
21	12	97	40	49	4	14	34	30	44	324

Source: Navy FY2012 budget submission.

Note: Unlike **Table 6**, figures in this table include, in the category for support ships, five JHSV's transferred from the Army to the Navy and operated by the Navy primarily for the performance of Army missions.

Key: **FY** = Fiscal Year; **CVN** = aircraft carriers; **LSC** = surface combatants (i.e., cruisers and destroyers); **SSC** = small surface combatants (i.e., frigates, Littoral Combat Ships [LCSs], and mine warfare ships); **SSN** = attack submarines; **SSGN** = cruise missile submarines; **SSBN** = ballistic missile submarines; **AWS** = amphibious warfare ships; **CLF** = combat logistics force (i.e., resupply) ships; **MPF(F)** = Maritime Prepositioning Force (Future) ships; **Supt** = support ships.

Projected Force Levels Under 30-Year Plan

Table 6 shows the Navy's projection of force levels for FY2011-FY2040 that would result from implementing the FY2011 30-year (FY2011-FY2040) shipbuilding plan shown in **Table 4**. This table, unlike **Table 5**, does not include five JHSV's that are to be transferred from the Army to the Navy, because the idea of transferring these ships emerged after the Navy issued the FY2011 30-year plan.

Table 6. Projected Force Levels Resulting from FY2011 30-Year Plan

FY	CVN	LSC	SSC	SSN	SSGN	SSBN	AWS	CLF	Supt	Total
Goal in 320-321 ship plan	10 or 11	88	55	48	0	12	33	30	44	320 or 321
11	11	84	42	53	4	14	29	29	18	284
12	11	84	41	54	4	14	30	29	20	287
13	10	85	37	55	4	14	30	29	23	287
14	10	86	32	55	4	14	30	30	24	285
15	11	88	28	54	4	14	31	30	25	285
16	11	90	32	51	4	14	33	30	27	292
17	11	91	33	51	4	14	33	30	31	298
18	11	93	37	50	4	14	33	30	33	305
19	11	94	37	51	4	14	33	30	37	311
20	12	96	39	49	4	14	33	30	38	315
21	12	96	39	49	4	14	34	31	39	318
22	12	95	41	48	4	14	34	29	41	318
23	11	94	39	48	4	14	35	29	45	319
24	11	94	40	46	4	14	36	28	47	320
25	12	92	41	45	4	14	35	28	46	317
26	12	89	43	44	4	14	36	28	45	313
27	12	87	45	43	2	13	35	26	46	308
28	11	85	46	41	1	13	36	26	46	304
29	11	81	48	40	0	13	34	25	44	296
30	12	77	49	39	0	12	33	25	44	291
31	12	73	51	41	0	12	33	24	44	290
32	11	71	52	41	0	12	32	25	44	288
33	11	69	53	42	0	12	31	26	44	288
34	11	67	54	43	0	12	33	26	44	290
35	12	68	55	44	0	12	30	25	44	290
36	11	70	56	45	0	12	30	26	44	294
37	11	72	56	46	0	12	29	27	44	297
38	11	74	56	45	0	12	29	27	44	298
39	11	76	56	45	0	12	29	28	44	301
40	11	76	55	45	0	12	30	28	44	301

Source: Navy FY2011 budget submission.

Note: Unlike **Table 5**, figures in this table do not include, in the category for support ships, five JHSVs transferred from the Army to the Navy and operated by the Navy primarily for the performance of Army missions.

Key: **FY** = Fiscal Year; **CVN** = aircraft carriers; **LSC** = surface combatants (i.e., cruisers and destroyers); **SSC** = small surface combatants (i.e., frigates, Littoral Combat Ships [LCSs], and mine warfare ships); **SSN** = attack submarines; **SSGN** = cruise missile submarines; **SSBN** = ballistic missile submarines; **AWS** = amphibious warfare ships; **CLF** = combat logistics force (i.e., resupply) ships; **MPF(F)** = Maritime Prepositioning Force (Future) ships; **Supt** = support ships.

As shown in **Table 6**, the 30-year shipbuilding plan does not include enough ships to fully support all elements of the planned 320-321 ship fleet over the long run:

- The Navy projects that the cruiser-destroyer and attack submarine forces will drop substantially below required levels in the latter years of the 30-year plan. The projected number of cruisers and destroyers drops below the required level of 88 ships in 2027, reaches a minimum of 67 ships in FY2034, and remains below 88 ships through FY2040. The projected number of attack submarines drops below the required level of 48 boats in FY2022, reaches a minimum of 39 boats in FY2030, and remains below 48 boats through 2040.
- There would also be shortfalls in certain years in amphibious ships, combat logistics force (i.e., resupply) ships, and support ships.

The projected shortfalls in cruisers and destroyers, attack submarines, and other ships could make it difficult or impossible for the Navy to fully perform its projected missions during the latter years of the 30-year plan. In light of the projected shortfalls in cruisers-destroyers and attack submarines, policymakers may wish to consider two options:

- increasing planned procurement rates of destroyers and attack submarines, perhaps particularly in years prior to the start of SSBN(X) procurement, and
- extending the service lives of older cruisers and destroyers to 45 years, and refueling older attack submarines an extending their service lives to 40 or more years.

Regarding the second option above, possible candidates for service life extensions include the Navy's 22 Aegis cruisers, the first 28 DDG-51 destroyers (i.e., the Flight I/II DDG-51s), the final 23 Los Angeles (SSN-688) attack submarines (i.e., the Improved 688s), and the 3 Seawolf (SSN-21) class attack submarines – a total of 76 ships. Whether such service life extensions would be technically feasible or cost effective is not clear. Feasibility would be a particular issue for the attack submarines, given limits on submarine pressure hull life.

Extending the service lives of any of these ships could require increasing funding for their maintenance, possibly beginning in the near term, so that the ships would be in good enough condition years from now to remain eligible for service life extension work. Such funding increases would be in addition to those the Navy has recently programmed for insuring that its surface ships can remain in service to the end of their currently planned service lives.

Execution Issues: Navy Shipbuilding in General

Execution risks for Navy shipbuilding in general include:

- the potential impact on FY2011 shipbuilding programs of a year-long continuing resolution,
- the affordability of the Navy's 30-year shipbuilding plan, and
- the disposition of Northrop's shipyards.

Each of these is discussed below.

Potential Impact of Year-Long Continuing Resolution

A near-term issue for Navy shipbuilding programs is the potential impact of a year-long continuing resolution for FY2011 at FY2010 funding levels. Several FY2011 Navy shipbuilding programs, including the Virginia-class attack submarine program and the DDG-51 destroyer program, would face significant execution challenges under this scenario. The Virginia-class program may merit special attention because Virginia-class boats are being procured under a multiyear procurement (MYP) contract that covers the period FY2009-FY2013.⁷

The issue of the potential impact of a year-long continuing resolution has two main elements: authorization for FY2011 quantity increases, and flexibility for transferring funds between shipbuilding programs.

Authorization for FY2011 Quantity Increases

Notwithstanding the enactment of the FY2011 defense authorization act (H.R. 6523/P.L. 111-383 of January 7, 2011), which authorizes the Shipbuilding and Conversion, Navy (SCN) account and the National Defense Sealift Fund (NDSF) at their requested FY2011 funding levels, the Navy does not believe it has authorization for executing proposed FY2011 quantity increases in shipbuilding programs.⁸

Table 7 compares FY2010 shipbuilding quantities to those proposed for FY2011. As shown in the table, programs with proposed quantity increases for FY2011 include the Virginia-class submarine, the DDG-51 destroyer, the LHA(R) amphibious ship, the Mobile Landing Platform (MLP) ship (whose FY2011 ship is to be the lead ship), an oceanographic ship (a non-Navy ship that is funded through the SCN account), and the LCAC SLEP (air-cushioned landing craft service life extension program).

⁷ For additional discussion, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke.

⁸ Source: Navy email to CRS on March 1, 2011.

Table 7. FY2010 and FY2011 Ship Procurement Quantities

Ship Type	FY2010 Quantity	Requested FY2011 Quantity	Difference
<i>Battle force ships</i>			
CVN-78 aircraft carrier	0	0	0
Virginia-class attack submarine ^a	1	2	+1
DDG-51 destroyer	1	2	+1
Littoral Combat Ship (LCS)	2	2	0
LPD-17 amphibious ship	0	0	0
LHA(R) amphibious assault ship	0	1	+1
TAKE dry cargo ship ^b	2	0	-2
Mobile Landing Platform (MLP) ship ^c	0	1	+1
Joint High Speed Vessel (JHSV)	1	1	0
<i>Other ships</i>			
Oceanographic Ship	0	1	+1
LCAC SLEP (air-cushioned landing craft service life extension program)	3	4	+1

Source: FY2011 and FY2012 budget submissions.

Notes: This table includes ships funded through both the Shipbuilding and Conversion, Navy (SCN) appropriation account and the National Defense Sealift Fund (NDSF). The NDSF is a separate DOD account outside the Navy's budget that funds the procurement of Navy auxiliary ships and Department of Defense sealift ships.

- Virginia-class boats are being procured under a multiyear procurement (MYP) contract that covers the period FY2009-FY2013.
- Funded through NDSF.
- Funded through NDSF. The FY2011 ship is the lead ship in the program.

Flexibility for Transferring Funds Between Shipbuilding Programs

Unlike other Department of Defense (DOD) procurement accounts, whose funds are appropriated at the full-account level, funding for the procurement of Navy ships in the SCN appropriation account is appropriated at the line-item level (including separate line items for advance procurement [AP] funding), and is therefore managed by the Navy at the line-item level. This significantly reduces the Navy's flexibility in using the FY2010 SCN funding level to execute FY2011 SCN-funded Navy shipbuilding programs.

As a result, Navy officials state that although the total amount of funding requested in the SCN account for FY2011 is roughly \$1.9 billion more than the total amount of funding appropriated for the SCN account in FY2010, FY2011 shipbuilding programs with requested increases over their respective FY2010 funding levels face potential FY2011 funding shortfalls totaling about \$5.6 billion. Since SCN-funded programs are appropriated at the line-item level, the Navy would need authority to transfer funding from SCN line items with FY2011 funding surpluses to SCN line items with FY2011 funding shortfalls. If such authority were received, using all SCN line-item surpluses to offset SCN line-item shortfalls would reduce the total FY2011 SCN shortfall to about \$1.9 billion. **Table 8** shows changes in SCN line-item funding levels from FY2010 to FY2011.

Table 8. FY2010 and FY2011 Funding Levels in SCN Account

Funding figures in millions, rounded to nearest million; figures may not add due to rounding; does not show funding levels for ships funded through NDSF

Ship type	FY2010 funding level	FY2011 funding level (requested)	Difference (with FY2011 funding shortfalls shown as negatives)
CVN-78 aircraft carrier	737	1,731	-994
CVN-78 aircraft carrier – AP	483	908	-425
Virginia-class submarine	2,004	3,441	-1,438
Virginia-class submarine – AP	1,954	1,691	262
CVN mid-life refueling overhaul	1,559	1,256	303
CVN mid-life refueling overhaul – AP	211	408	-197
DDG-1000 destroyer	1,379	186	1,192
DDG-51 destroyer	1,906	2,922	-1,016
DDG-51 destroyer – AP	577	48	529
Littoral Combat Ship (LCS)	1,077	1,231	-154
Littoral Combat Ship (LCS) – AP	0	278	-278
LPD-17 amphibious ship	969	0	969
LPD-17 amphibious ship – AP	184	0	184
LHA(R) amphibious assault ship	0	950	-950
LHA(R) amphibious assault ship – AP	169	0	169
Joint High Speed Vessel (JHSV)	177	181	-3
Oceanographic ship	0	89	-89
Outfitting	386	307	79
Service craft	4	14	-10
LCAC SLEP ^a	64	83	-19
Total	13,839	15,725	-1,886
Total of programs with FY2011 funding shortfalls			-5,574

Source: Source: U.S. Navy data provided to House Armed Services Committee (HASC) and used here with HASC permission.

Notes: AP is advance procurement funding.

a. Air-cushioned landing craft service life extension program.

In addition to the FY2011 SCN funding shortfall, the FY2011 budget requested \$380 million in the National Defense Sealift Fund (NDSF) for the procurement of a Mobile Landing Platform (MLP) ship. The FY2010 NDSF appropriation did not include any funding for the procurement of an MLP ship. The NDSF fund is appropriated at the full-account level, not at the line-item level, which would give DOD some flexibility in deciding how to use the FY2010 NDSF funding level to meet FY2011 funding needs for the MLP program and other NDSF programs. Ships procured through the NDSF, moreover, can be incrementally funded, giving the Navy additional flexibility

in deciding how to use FY2010 funding to execute FY2011 NDSF shipbuilding programs. As discussed in the previous section, however, the Navy believes it would need authorization to execute an FY2011 quantity increase in the MLP program.

Additional comments relating to the potential impact of a year-long continuing resolution appear in the sections below on individual shipbuilding programs.

Affordability of 30-Year Shipbuilding Plan

Another execution issue for Navy shipbuilding programs in general concerns the prospective affordability of the Navy's 30-year shipbuilding plan. The Navy last year estimated that executing the FY2011 30-year shipbuilding plan would require an average of \$15.9 billion per year in constant FY2010 dollars for new-construction ships. A May 2010 Congressional Budget Office (CBO) report estimated that the plan would require an average of \$19.0 billion per year in constant FY2010 dollars for new-construction ships, or about 19% more than the Navy estimated. The CBO report stated: "If the Navy receives the same amount of funding for ship construction in the next 30 years as it has over the past three decades—an average of about \$15 billion a year in 2010 dollars—it will not be able to afford all of the purchases in the 2011 plan."⁹ **Table 9** summarizes the Navy and CBO estimates, as presented in the CBO report.

Table 9. Navy and CBO Estimates of Cost of FY2011 30-Year (FY2011-FY2040) Shipbuilding Plan

Funding for new-construction ships, in billions of constant FY2010 dollars

	First 10 years (FY2011- FY2020)	Next 10 years (FY2021-2030)	Final 10- years (FY2031- FY2040)	Entire 30 years (FY2011- FY2040)
Navy estimate	14.5	17.9	15.3	15.9
CBO estimate	15.2	20.4	21.4	19.0
% difference between Navy and CBO estimates	5%	14%	40%	19%

Source: Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2011 Shipbuilding Plan*, May 2010, Table 2 (page 9). The CBO report calculates the percent difference between the Navy and CBO estimates for the entire 30-year period as 20% rather than 19%. \$19.0 billion is 19.497% greater than \$15.9 billion.

As mentioned earlier, the Navy was able to assemble a 5-year (FY2012-FY2016) shipbuilding plan with a total of 55 ships, or an average of 11 per year, within available resources in part because almost half of those ships are relatively inexpensive LCSs and JHSVs. Starting a few years from now, when the LCS and JHSV programs are no longer overrepresented in the shipbuilding plan, and particularly when procurement of SSBN(X) ballistic missile submarines begins, procuring an average of 10 or more ships per year will become a considerably more expensive proposition.

The Navy wants to procure 12 SSBN(X)s, and is working to reduce the estimated unit procurement cost of ships 2 through 12 in the program to \$4.9 billion in FY2010 dollars. To help pay for the SSBN(X)s without reducing other shipbuilding programs, the shipbuilding funding profile in the Navy's FY2011 30-year shipbuilding plan includes a "hump" of approximately \$2 billion per year in constant FY2010 dollars during the years (FY2019-FY2033) when the 12 SSBN(X)s are to be procured. The Navy's report on the FY2011 30-year plan, however, contains little explanation of how this \$2-billion-per-year hump in shipbuilding funding will be realized,

⁹ Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2011 Shipbuilding Plan*, May 2011, p. vii.

particularly if the Navy's budget experiences little or no real growth in coming years. If the \$2-billion-per-year hump is not realized, the total number of ships of various kinds procured in FY2019-FY2033 could be less than the figures shown in the FY2011 30-year plan. If so, the shortfalls projected for cruisers and destroyers, attack submarines, and other categories of ships could be larger than those shown in **Table 6**.

An additional risk regarding the prospective affordability of the Navy's 30-year shipbuilding plan is the potential for cost growth on new or modified ship designs. In recent years, some new ship designs, such as the LPD-17 and the LCS, have turned out to be more expensive to build than the Navy had estimated. New or modified ship designs that in coming years might turn out to be more expensive to build than the Navy estimates include the Ford (CVN-78) class aircraft carrier, the SSBN(X) ballistic missile submarine, the Flight III DDG-51 destroyer, the LSD(X) amphibious ship, and the TAO(X) oiler.

Disposition of Northrop's Shipyards

A third execution risk to Navy shipbuilding programs in general concerns the disposition of Northrop's shipyards. As mentioned earlier, Northrop last July announced that it would wind down operations at its Avondale shipyard near New Orleans, LA, in 2013, following the completion of two LPD-17s currently being built at that yard, and explore strategic alternatives for its entire shipbuilding business. Northrop is seeking to spin off its shipyard at Newport News, VA, and its shipyard at Pascagoula, MS (the Ingalls yard) as a new business that would be called Huntington Ingalls Industries (HII), after the founders of the two yards.¹⁰

The Newport News yard is one of two U.S. shipyards capable of building nuclear-powered Navy ships (the other is General Dynamics' Electric Boat Division), and the only yard set up to build nuclear-powered surface ships (Electric Boat builds submarines but not surface ships). The Newport News yard is the country's sole builder of nuclear-powered aircraft carriers, and jointly builds Virginia-class submarines with Electric Boat. In the future, Newport News could additionally be involved in the construction of SSBN(X) ballistic missile submarines.

Ingalls builds surface combatants and amphibious ships. In recent years, production of destroyers has been divided more or less evenly between Ingalls and General Dynamics' Bath Iron Works (BIW) shipyard of Bath, ME. Ingalls in recent years has been the country's sole builder of "large-deck" (i.e., LHA/LHD-type) amphibious assault ships, and is one of two builders (along with Avondale) of LPD-17 amphibious ships. In the future, Ingalls could be involved in the construction of ships such as DDG-51s, LHAs, LSD(X) amphibious ships, and TAO(X) oilers. Other potential builders of such ships include BIW and General Dynamics' National Steel and Shipbuilding Company (NASSCO) of San Diego, CA.

The Navy is likely interested in ensuring that HII's management would have the skills needed to effectively manage the firm's shipbuilding activities (particularly the nuclear shipbuilding activities at Newport News), and that the firm would have the financial strength to absorb unforeseen losses and make workforce and capital plant investments needed to remain

¹⁰ See, for example, Northrop Grumman's news release of February 25, 2011, entitled "Huntington Ingalls Industries, Inc. to Commence Notes Offering," accessed online on March 4, 2011, at http://www.irconnect.com/noc/press/pages/news_releases.html?d=214768; Christopher P. Cavas, "Northrop Unveils Potential New Name For Shipbuilding Unit," *Defense News*, November 29, 2011: 3; Zachary R. Mider, Cristina Alesci, and Gopal Ratnam, "Northrop Said to Favor Spinoff Of Ship Unit Rather Than Sale," *Bloomberg.com*, November 5, 2010; Associated Press, "Northrop Prepares To Spin Off Ship Unit," *Washington Post*, October 16, 2010: 10; Christopher P. Cavas, "Northrop Files Papers for Shipyard Divestiture," *DefenseNews.com*, October 15, 2010; Christopher J. Castelli, "Northrop Files Paperwork To Shed Shipyards," *InsideDefense.com (DefenseAlert)*, October 15, 2010.

competitive against General Dynamics' shipyards.¹¹ If HII is encumbered in terms of management skills or financial strength, execution risks could be heightened for ships being built at HII. Regarding management skills, key Northrop shipbuilding managers would reportedly transfer to HII. Issues that could affect HII's financial strength reportedly include pension costs and the question of who should bear cleanup costs at Avondale, should Avondale close down as an industrial operation.¹²

Execution Issues: Specific Shipbuilding Programs

Virginia-Class Attack Submarine Program¹³

Potential Impact of Year-Long Continuing Resolution

A near-term execution issue for the Virginia-class submarine program is the potential impact of a year-long continuing resolution on the Navy's ability to execute the planned procurement of two Virginia-class boats in FY2011 under the terms of the FY2009-FY2013 Virginia-class multiyear procurement (MYP) contract. The FY2010 budget procured one Virginia-class boat, while the FY2011 budget requested funding for the procurement of two Virginia-class boats.

Table 10. FY2010 and FY2011 Virginia-Class Procurement and AP Funding

Figures in millions, rounded to nearest million, figures may not add due to rounding

	FY2010 funding level	FY2011 funding level (requested)	Difference (with FY2011 funding shortfall shown as a negative)
Procurement	2,004	3,441	-1,438
Advance procurement (AP)	1,954	1,691	262

Source: U.S. Navy data provided to House Armed Services Committee (HASC) and used here with HASC permission.

As can be seen in **Table 10**, under a year-long at FY2010 funding levels, the Navy would face a shortfall in the Virginia-class program of about \$1.4 billion in procurement funding. This shortfall – and the Navy's belief that it lacks authorization for a quantity increase in FY2011 – would likely prevent the Navy from procuring a second Virginia-class boat in FY2011, as called for under the FY2009-FY2013 MYP contract. This would likely require the Navy to renegotiate the contract, which could cause an increase in Virginia-class procurement costs, reducing the savings in Virginia-class procurement costs that were to have been generated as a result of the contract.

Under the FY2009-FY2013 MYP contract, the Navy was to have provided the contractor with full funding for both of the FY2011 boats by January 31, 2011. The Navy and the contractor agreed to extend this deadline to March 21, 2011. Regarding this agreement, the Navy on February 3, 2011, provided the following statement to CRS:

¹¹ See Gopal Ratnam and Tony Capaccio, "Northrop Said To Be In Talks With U.S. Navy On Ship-Unit Costs," *Bloomberg.com*, December 3, 2010; Andrea Shalal-Esa, "U.S. Navy Says Still Reviewing Nothrop Spin-Off," *Reuters.com*, March 1, 2011.

¹² Gopal Ratnam and Tony Capaccio, "Northrop Said To Be In Talks With U.S. Navy On Ship-Unit Costs," *Bloomberg.com*, December 3, 2010.

¹³ For more on the Virginia-class program, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke.

On Jan. 26, 2011, the Department of the Navy executed a contract modification to the VIRGINIA Class Block III construction contract (N00024-09-C-2104) with General Dynamics Electric Boat that was originally awarded on Dec. 22, 2008. This contract modification fully funds SSN 786; extends the contractual deadline for full funding of SSN 787 from Jan. 31, 2011 to March 21, 2011; obligates \$120 million for advanced procurement (AP) for SSN 787; and obligates the required AP and economic order quantity (EOQ) funding for SSNs 788-791.

Enactment of either an appropriations act for the remainder of Fiscal Year 2011, or another CR that includes specific anomaly language for the VIRGINIA Class program, is required to fully fund SSN 787 in FY 2011 and keep this submarine on track for a construction start in the fall of 2011 and in accordance with the multiyear contract which includes the two FY 2011 submarines.

Details follow:

- The contract modification provides \$120 million of AP (as opposed to the required full funding of \$1,361.2M) to allow progress on the SSN 787 to continue through the current CR, and it obligates required AP and EOQ funding for SSNs 788-791.
- The Navy reached a mutually-agreeable interim solution which depends on subsequent appropriations laws or CR to ultimately determine the affect - if any - on the Block III ships. Subject to funding provided by Congress by March 21, 2011, the current multiyear contract remains in effect.
- No extra cost is incurred by the Navy because of the modification. The funding for the contract modification came from available Fiscal Year 2011 Shipbuilding and Conversion, Navy funding available under the existing CR. While no other program was cut to finance this requirement, the Navy is continuously managing priorities under existing funding during the CR across the spectrum of shipbuilding programs.
- With construction start planned for fall 2011, long lead items for the second FY 2011 submarine (SSN 787) are part of the Navy/contractor plan for the VIRGINIA Class program, and the Navy anticipates the second boat will stay on schedule - provided full funding for both boats is appropriated in FY 2011
- The existing construction contract pricing is contingent upon the Navy's fully funding the two FY11 boats no later than March 21, 2011. If full funding and authority are not received for SSN 787 by the contractual deadline, and the Navy is unable to meet its contractual obligations, then there will be negative cost, schedule and fleet availability impacts for the VIRGINIA Class submarines under construction.¹⁴

Regarding the potential for extending the deadline beyond March 21, 2011, the Navy on February 15, 2011, provided the following additional statement to CRS:

Although the VIRGINIA Class Block III contract originally specified that funding for both FY 2011 ships be provided not later than January 31, the current contract modification extended the full funding date for the SSN 787 (the second FY 2011 ship) to March 21 and provided \$120 million of Shipbuilding & Conversion, Navy (SCN) Advance Procurement funding to allow progress to continue.

Assuming the rules of the existing CR continue past March 4, from a budget perspective, the Department could obligate up to a total of \$262 million of SCN Advance Procurement funding in FY 2011 to allow continued progress on SSN 787. However, any

¹⁴ Source: E-mail from Navy Office of Legislative Affairs to CRS, February 3, 2011. For a press report, see Jason Sherman and Cid Standifer, "Navy, GD Modify Sub Contract To Keep Plan For Two FY-11 Boats Viable," *Inside the Navy*, February 7, 2011.

further modifications to the contract, including extending the full funding date beyond March 21, would be subject to negotiations with the shipbuilder.¹⁵

Potential Impact of SSBN(X) Program on Virginia-Class Procurement Rate

A longer-term execution risk for the Virginia-class program is the possibility that shipbuilding affordability pressures could result in the removal of Virginia-class boats from the 30-year shipbuilding plan, particularly in the years when SSBN(X) ballistic missile submarines are procured. Given potential pressures on the shipbuilding budget during the years of SSBN(X) procurement, it is conceivable that most or even all Virginia-class boats shown in the 30-year shipbuilding plan during the years of SSBN(X) procurement could be removed from the plan. A suspension or near-suspension in Virginia-class procurement during the years of SSBN(X) procurement could reduce attack submarine force levels below those shown in the latter years of **Table 6**, and lead to significant Virginia-class restart costs (including loss of production learning curve benefits and costs to reestablish Virginia-unique suppliers) once SSBN(X) procurement is completed.

Additional Execution Issues

Additional execution issues for the Virginia-class program include the Navy's plan for inserting new technologies into the Virginia-class design, and the reliability of in-service Virginia-class boats. For more on these two issues, see **Appendix A** to this testimony.

SSBN(X) Ballistic Missile Submarine Program¹⁶

Potential Impact of Year-Long Continuing Resolution

A near-term execution issue for the SSBN(X) ballistic missile submarine program, also known as the Ohio Replacement Program (ORP), is the potential impact of a year-long continuing resolution on the program's development schedule. The amount of research and development funding requested for the program for FY2011 (\$672.3 million) is about 40% higher than the amount provided for FY2010 (\$474.9 million). If SSBN(X) research and development work in FY2011 is funded at FY2010 funding levels, the Navy might need to postpone some of the work that was scheduled for FY2011. This could make it more difficult for the Navy to complete SSBN(X) development in time to support the procurement of the lead SSBN(X) in FY2019. The Navy says that the SSBN(X) procurement schedule cannot be delayed without having the SSBN force drop below 12 boats at some point.

Likelihood That Navy Will Reach \$4.9 Billion Target Cost

Another potential execution issue for the SSBN(X) program is the likelihood that the Navy will be able to achieve the OSD-established goal of reducing the average procurement cost of boats 2-12 in the program to a target cost of \$4.9 billion each in FY2010 dollars. As of early 2011, the Navy estimated that cost-reduction efforts had reduced the estimated procurement cost of boats 2-12 to an average of about \$5.6 billion each in FY2010 dollars, leaving another \$700 million or so in cost reduction to reach the \$4.9 billion target cost.

¹⁵ Source: Navy information paper dated February 15, 2011, provided to CRS by Navy Office of Legislative Affairs on February 15, 2011.

¹⁶ For more on the SSBN(X) program, see CRS Report R41129, *Navy SSBN(X) Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.

Measures that the Navy has taken to reduce the average procurement cost of each boat to about \$5.6 billion include, among other things, reducing the number of SLBM launch tubes from 20 to 16, and making the launch tubes no larger in diameter than those on the Ohio-class design.¹⁷ The Navy is examining potential further measures to bring the cost of the boats closer to OSD's \$4.9 billion target cost. Potential oversight questions include the following:

- How did OSD settle on the figure of \$4.9 billion in FY2010 dollars as the target average procurement cost for boats 2-12 in the program? On what analysis was the selection of this figure based?
- How difficult will it be for the Navy to reach this target cost? What options is the Navy examining to achieve the additional \$700 million or so in unit procurement cost savings needed to reach it?
- Would a boat costing \$4.9 billion have sufficient capability to perform its intended missions?
- What, if anything, does OSD plan to do if the Navy is unable to achieve the \$4.9 billion target cost figure? If \$4.9 billion is the target figure, is there a corresponding "ceiling" figure higher than \$4.9 billion, above which OSD would not permit the SSBN(X) program to proceed?

In addition to the above questions, it can be noted that the Navy's estimated unit procurement cost for the program at any given point will reflect assumptions in, among other things, which shipyard or shipyards will build the boats, and how much Virginia-class construction will be taking place in the years when SSBN(X)s are being built. Changing the Navy's assumption about which shipyard or shipyards will build SSBN(X)s could reduce or increase the Navy's estimated unit procurement cost for the boats. If shipbuilding affordability pressures result in Virginia-class boats being removed from the 30-year shipbuilding plan during the years of SSBN(X) procurement (see previous section on the Virginia-class program), the resulting reduction in submarine production economies of scale could make SSBN(X)s more expensive to build than the Navy estimates.

DDG-51 and DDG-1000 Destroyers¹⁸

Potential Impact of Year-Long Continuing Resolution

DDG-51 Program

A near-term execution issue for the DDG-51 destroyer program is the potential impact of a year-long continuing resolution for FY2011 at FY2010 funding levels on the Navy's ability to execute the planned procurement of two DDG-51s in FY2011. The FY2010 budget procured one DDG-51, while the FY2011 budget requested funding for the procurement of two Virginia-class boats.

¹⁷ The Navy had examined the option of equipping the SSBN(X) with tubes greater in diameter than those on the Ohio-class design, so as to support an option of arming the boats many years from now with a new SLBM that is larger in diameter than the D-5 SLBM.

¹⁸ For more on the DDG-51 and DDG-1000 destroyer programs, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.

Table 11. FY2010 and FY2011 DDG-51 Procurement and AP Funding

Figures in millions, rounded to nearest million, figures may not add due to rounding

	FY2010 funding level	FY2011 funding level (requested)	Difference (with FY2011 funding shortfall shown as a negative)
Procurement	1,906	2,922	-1,016
Advance procurement (AP)	577	48	529

Source: U.S. Navy data provided to House Armed Services Committee (HASC) and used here with HASC permission.

As can be seen in **Table 10**, under a year-long CR at FY2010 funding levels, the Navy would face a shortfall in the DDG-51 program of about \$1.0 billion in procurement funding. This shortfall – and the Navy’s belief that it lacks authorization for a quantity increase in FY2011 – would likely prevent the Navy from procuring a second DDG-51 in FY2011. Moreover, under the terms of a 2009 agreement between the Navy, General Dynamics, and Northrop regarding the allocation of DDG-1000 and DDG-51 destroyer contracts between BIW and Ingalls, if the Navy is unable to award a contract for the second FY2011 DDG-51, it cannot award a contract for the first FY2011 DDG-51.¹⁹ The scenario of a year-long continuing resolution thus jeopardizes the Navy’s ability to award contracts for both of the DDG-51s requested for FY2011.

DDG-1000 Program

The scenario of a year-long continuing resolution may also be contributing to the continued delay in the signing of construction contracts for the second and third DDG-1000s. Although these two ships were procured in FY2007 and FY2009, respectively, these two ships are not yet fully under contract. The signing of contracts for these two ships was delayed during 2010 by the need for the DDG-1000 program to go back through the DOD acquisition milestone certification process following the determination that the program had experienced a critical cost breach under the Nunn-McCurdy provision.²⁰ That milestone process was completed last year. It is possible that the scenario of a year-long continuing resolution is contributing to the continued delay in the awarding of these contracts because BIW, not knowing whether or when it will be awarded the second of the two DDG-51s requested for FY2011, is facing uncertainty about its future business base, making it difficult for BIW to commit to a certain price for the second and third DDG-1000s. The longer the delay in the awarding of these two DDG-1000 construction contracts, the greater the risk might be that the delay itself will cause an increase in the ships’ construction cost.²¹

¹⁹ Under the agreement, the second DDG-1000 was shifted from Ingalls to BIW, Ingalls would receive the DDG-51 procured in FY2010 and the first of the two DDG-51s to be procured in FY2011, and BIW would receive the second of the two DDG-51s to be procured in FY2011. Secretary of Defense Robert Gates in 2009 said he would support construction of three DDG-1000s only if all three ships were built in the same shipyard. Shifting the second DDG-1000 from Ingalls to BIW fulfilled this condition, and Ingalls was compensated for this through the promise of receiving the FY2010 DDG-51 and the first of the two FY2011 DDG-51s.

²⁰ For more on this, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report R41293, *The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress*, by Moshe Schwartz.

²¹ For additional discussion, see Cid Standifer, “DDG-1001 And DDG-1002 Contract Awards Dragging Due To Price, Spin-Off,” *Inside the Navy*, February 28, 2011.

Other Risks

DDG-51 Program

Other risks for the DDG-51 program include cost and schedule risks associated with restarting Flight IIA DDG-51 production, technical risks associated with developing the Air and Missile Defense Radar (AMDR) and other elements of the combat system for the Flight III DDG-51, and the previously mentioned risk of construction cost growth on Flight III DDG-51s. Some observers are concerned about the Navy's ability to develop the AMDR on the schedule needed to begin procuring the first Flight III DDG-51 in FY2016 as currently planned. The Navy could manage this risk by deferring the procurement of the first Flight III ship to FY2017 or later, if necessary, and instead continue procuring Flight IIA ships.

An additional question relates to the fleet's future air and missile defense capability. The version of the AMDR to be carried by the Flight III DDG-51 is to be considerably more capable than the SPY-1 radar carried by the Flight IIA DDG-51, but considerably less capable than the larger version of the AMDR that was to have been carried by the CG(X) cruiser. The Navy canceled the CG(X) program in favor of developing and procuring Flight III DDG-51s reportedly in part on the grounds that the Flight III destroyer would use data from off-board sensors to augment data collected by its AMDR.²² If those off-board sensors turn out to be less capable than the Navy assumed when it decided to cancel the CG(X) in favor of the Flight II DDG-51, the Navy may need to seek other means for augmenting the data collected by the Flight III DDG-51's AMDR. One option for doing this would be to build a small number of adjunct radar ships equipped with a very powerful radar. Such a ship could be broadly similar to the Cobra Judy replacement ship. CRS presented the option of building an adjunct radar ship in testimony to this subcommittee in July 2008.²³

The Navy in FY2012 intends to conduct preliminary design work for the Flight III DDG-51. Since the Navy intends to procure Flight III DDG-51s through FY2031, a potential oversight issue is whether the Navy is designing the Flight III DDG-51 to accommodate an electromagnetic rail gun (particularly in light of that weapon's newly identified potential for being an air and missile defense weapon)²⁴ and/or a higher-power (i.e., 200 kW to 300 kW) solid state laser.²⁵

²² Amy Butler, "STSS Prompts Shift in CG(X) Plans," *Aerospace Daily & Defense Report*, December 11, 2009: 1-2.

²³ See Statement of Ronald O'Rourke, Specialist in Naval Affairs, Congressional Research Service, Before the House Armed Services Committee, Subcommittee on Seapower and Expeditionary Forces Hearing on Surface Combatant Warfighting Requirements and Acquisition Strategy, July 31, 2008, pp. 12, which stated:

If DDG-51s are procured or modernized with an eye toward providing improved IAMD [integrated air and missile defense] capabilities, another option that policymakers may consider would be to procure a non-combat ship equipped with a powerful radar to act as an adjunct platform for missile defense operations and perhaps also air defense operations. The radar on the ship would be a large, active-array radar that would be considerably more powerful than the improved radar that could be installed on a modified DDG-51. The presence in the fleet of such a radar could significantly improve the fleet's IAMD capabilities. The ship might be similar to the Cobra Judy Replacement ship currently under construction. A few or several such adjunct ships might be procured, depending on the number of theaters to be covered, requirements for maintaining forward deployments of such ships, and their homeporting arrangements. The ships would have little or no self-defense capability and would need to be protected in threat situations by other Navy ships.

²⁴ A RAND report on the electromagnetic rail gun states:

Given their longer service life and more-recent construction dates, it reasonable to posit that DDG 51s will be in service after the rail gun achieves FOC [full operational capability], and this will nullify the service-life margin issue identified for potential rail gun hosts. Space margin, weight margin, organic power, and organic cooling, however, must be overcome in order to consider the DDG 51s, as currently designed, as a host for the rail gun. Given their current electrical-power

DDG-1000 Program

Execution risks for the DDG-1000 program include technical risks associated with developing and integrating the several new technologies used in the DDG-1000 design, and the risk of construction cost growth on the ships.

Littoral Combat Ship (LCS) Program²⁶

Potential Impact of Year-Long Continuing Resolution

Although the LCS program was not proposed for a quantity increase in FY2011, the program under a year-long continuing resolution would face shortfalls in both procurement and advance procurement funding. The Navy states that it is holding off on the awarding of the two FY2011 LCSs until the Navy's FY2011 funding is clarified. The situation may not be as urgent as it is for, say, the Virginia-class submarine program, because the LCS block-buy contracts that were awarded by the Navy last December to the two LCS builders do not call for the two LCSs requested for FY2011 to be awarded to the contractors until June 2011.

Table 12. FY2010 and FY2011 LCS Procurement and AP Funding

Figures in millions, rounded to nearest million, figures may not add due to rounding

	FY2010 funding level	FY2011 funding level (requested)	Difference (with FY2011 funding shortfalls shown as negatives)
Procurement	1,077	1,231	-154
Advance procurement (AP)	0	278	-278

Source: U.S. Navy data provided to House Armed Services Committee (HASC) and used here with HASC permission.

Other Risks

Other risks for the LCS program include the risk of construction cost growth on the 20 LCSs to be built under the block-buy contracts that the Navy awarded to the two LCS builders, and technical risks associated with developing LCS mission modules,

The risk of construction cost growth on the 20 LCSs to be built under the block-buy contracts might have been elevated by the competitive pressures under which the two LCS builders submitted their bids. (At the time, it was understood by the bidders that the Navy would use the bids conduct a down select between the two LCS designs, and award an initial block-buy contract

design, which consists of a 440-V power-generation and power-distribution system, there would be a significant redesign requirement. The rail gun will need significantly larger voltage than DDG 51s provide. The rail gun will also need more-robust cooling than the DDG 51s offer. Combined, the cooling and power issues create a need for the DDG 51 class to be redesigned if it is chosen to host the rail gun—a decision that would result in an essentially new class of destroyers.

(John Gordon IV et al, *The Rail Gun[:] Possibilities and Challenges for Naval Surface Fire Support*, RAND, Santa Monica (CA), 2010, p. 122.)

²⁵ For more on the potential value of shipboard lasers, including a solid state laser with a power of 200 kW to 300 kW, see CRS Report R41526, *Navy Shipboard Lasers for Surface, Air, and Missile Defense: Background and Issues for Congress*, by Ronald O'Rourke.

²⁶ For more on the LCS program, see CRS Report RL33741, *Navy Littoral Combat Ship (LCS) Program: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

to one of the bidders.) The Navy's use of fixed-price incentive (FPI) contracts for the two block-buy contracts shifts much of the risk of cost growth from the Navy to the builders. Consequently, if construction cost growth becomes a significant problem, it could damage the financial health of an LCS builder, which might make it difficult for that builder to continue building LCSs, at least at the prices specified in the builder's block-buy contract. The Navy could respond to such a development by bringing an additional shipyard into the LCS program, but that could lead to a delay in the LCS production schedule, and the price to build LCSs at the newly added shipyard could be higher than the prices in the two current block-buy contracts, particularly since the newly added shipyard would not have previously built LCSs.

Regarding technical risks associated with developing LCS mission modules, an August 2010 Government Accountability Office (GAO) report stated:

Challenges developing mission packages have delayed the timely fielding of promised capabilities, limiting the ships' utility to the fleet during initial deployments. Until these challenges are resolved, it will be difficult for the Navy to align seaframe purchases with mission package procurements and execute planned tests. Key mine countermeasures and surface warfare systems encountered problems in operational and other testing that delayed their fielding. For example, four of six Non-Line-of-Sight Launch System missiles did not hit their intended targets in recent testing, and the Department of Defense has since canceled the program. Further, Navy analysis of anti-submarine warfare systems has shown the planned systems do not contribute significantly to the anti-submarine warfare mission. These combined challenges have led to procurement delays for all three mission packages. Mission package delays have also disrupted program test schedules—a situation exacerbated by early deployments of initial ships—limiting their availability for operational testing. In addition, these delays could disrupt program plans for simultaneously acquiring seaframes and mission packages. Until mission packages are proven, the Navy risks investing in a fleet of ships that does not deliver promised capability.²⁷

On September 3, 2010, the Navy provided the press with a point paper responding to certain points made in the August 2010 GAO report.²⁸ The point paper stated in part:

The original LCS Anti-Submarine Warfare (ASW) mission package was cancelled by Navy two years ago (POM-10)²⁹ when analysis indicated that it did not provide a significant contribution to counter the ASW threat. [The] Navy immediately began exploring a new ASW approach for LCS. The next generation LCS ASW mission package is currently under development.

Central to the next ASW mission package will be a ship-deployed variable depth sonar (VDS) to complement the VDS carried by the [Navy's ship-based] MH-60R helicopter. [The] Navy is purchasing an advanced design model of a variable depth sonar system for testing and evaluation in 2012, to develop this future ASW package.³⁰

The Navy in January 2011 announced that it had made changes to the composition of the surface warfare (SUW) and antisubmarine warfare (ASW) modules, and that it was considering making a change to the composition of the mine countermeasures (MCM) module. For details on these changes, see **Appendix B** to this testimony. These changes could affect risks associated with

²⁷ Government Accountability Office, *Defense Acquisitions[:] Navy's Ability to Overcome Challenges Facing the Littoral Combat Ship Will Determine Eventual Capabilities*, GAO-10-523, August 2010, summary page.

²⁸ See Cid Standifer, "Navy Pushes Back Against GAO Criticism Of Littoral Combat Ship," *Inside the Navy*, September 6, 2010.

²⁹ This is a reference to the Program Objective Memorandum (POM) for the FY2010 budget submission. The POM is an internal DOD planning document that guides the preparation of a DOD budget submission. POM-10 was developed during 2008, to support the submission to Congress in May 2009 of the proposed FY2010 defense budget.

³⁰ Undated Navy point paper provided to CRS by Navy Office of Legislative Affairs on September 8, 2010.

developing LCS mission modules, the schedule for building modules and integrating them into the LCS fleet, and the LCS program's total acquisition cost. They will also affect LCS capabilities. For example, the initial version, at least, of the Griffin missile that the Navy now wants to use as part of the LCS surface warfare (SUW) module reportedly will have a shorter range than the canceled Non-Line of Sight Launch System (NLOS-LS) that the Navy previously planned to use in the SUW module.

Ford (CVN-78) Class Aircraft Carrier Program³¹

Potential Impact of Year-Long Continuing Resolution

Although the Ford (CVN-78) class aircraft carrier program was not proposed for a quantity increase in FY2011, the program under a year-long continuing resolution would face shortfalls in both procurement and advance procurement funding. Funding the CVN-78 program in FY2011 at FY2010 procurement and AP funding levels could cause a rescheduling of construction and component manufacturing work on CVN-78 and CVN-79. This could affect workloads and employments levels at the Newport News shipyard and supplier firms, and the ultimate procurement costs of the two ships. A February 14, 2011, press article quoted a Navy spokesman as stating: "The continuing resolution has the potential to impact CVN-78 and CVN-79 construction, and the Navy is working to mitigate these impacts."³²

Table 13. FY2010 and FY2011 CVN-78 Procurement and AP Funding

Figures in millions, rounded to nearest million, figures may not add due to rounding

	FY2010 funding level	FY2011 funding level (requested)	Difference (with FY2011 funding shortfalls shown as negatives)
Procurement	737	1,731	-994
Advance procurement (AP)	483	908	-425

Source: U.S. Navy data provided to House Armed Services Committee (HASC) and used here with HASC permission.

Other Risks

Other risks for the CVN-78 program include the previously mentioned risk of construction cost growth, and technical and design issues raised in a December 2010 report from the Director, Operational Test and Evaluation (DOT&E).

One possible source of additional cost growth in CVN-78 is new technologies that are being developed for the ship, particularly the electromagnetic aircraft launch system (EMALS)—an electromagnetic (as opposed to the traditional steam-powered) aircraft catapult. Problems in developing EMALS or other technologies could delay the ship's completion and increase its development and/or procurement cost. DOD's June 30, 2010, Selected Acquisition Report (SAR) for the CVN-78 program states:

³¹ For more on the CVN-78 program, see CRS Report RS20643, *Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress*, by Ronald O'Rourke.

³² Cid Standifer, "Carrier Build Cycle Change Could Be Impacted By Continuing Resolution," *Inside the Navy*, February 14, 2011.

Electromagnetic Aircraft Launch System component production remains on schedule to support CVN 78 construction with subsystems deliveries meeting Required In-Yard Dates. The first two, of three, phases of the High Cycle Testing are complete. The third phase is scheduled for completion in September 2010. The first of two phases of the Highly Accelerated Life Testing is complete. The second phase is planned for a September 2011 completion. System Functional Demonstration is scheduled to begin in September 2010, with live aircraft launching planned for Late Fall 2010.³³

Regarding technical and design issues, the December 2010 report from DOT&E stated that

The CVN 78 program continues to have challenges with F-35 Joint Strike Fighter (JSF) integration. The thermal footprint from the main engine exhaust, shipboard noise levels, and information technology requirements need work. Design changes may be required for the jet blast deflectors, and active cooling may be required in the flight deck just forward of the jet blast deflector....

Numerous integrated warfare system items are of concern, including:

- The ship-self-defense combat systems on aircraft carriers have historically had reliability and weapon system integration shortcomings. While the Navy has made efforts, it has not yet developed a detailed plan to address these concerns on CVN 78.
- The Navy lags in developing a new anti-ship ballistic missile target and in obtaining a capability to launch four simultaneous supersonic sea-skimming targets. Both are required to assess effectiveness of ship self-defense....

EMALS experienced two notable hardware/software incidents that caused test delays at the SFD [System Functional Design] test site at Lakehurst [NJ]. One incident involved an un-commanded armature retraction due to a software anomaly in the asset protection module. The second anomaly involved the loss of an encoder from the catapult armature during a dead-load test. Both anomalies have been resolved. EMALS has started performance verification with dead loads at the SFD site, and [the] AAG [Advanced Arresting Gear] is nearing the start of Jet Car Track Site dead load testing. Required In Yard Date (RIYD) for these systems continues to drive the development schedule; however, to date development and testing remains on track.³⁴

Mr. Chairman, distinguished members of the subcommittee, this concludes my testimony. Thank you again for the opportunity to appear before you to discuss these issues. I will be pleased to respond to any questions you might have.

³³ Department of Defense, *Selected Acquisition Report (SAR), CVN-78*, As of June 30, 2010, p. 7.

³⁴ Director, Operational Test and Evaluation, *FY 2010 Annual Report*, December 2010, p. 112.

Appendix A. Additional Execution Issues for Virginia-Class Attack Submarine Program

Virginia-Class Technology Insertion

One additional execution issue for the Virginia-class program concerns the Navy's plans for inserting new technology into the Virginia-class design. A March 2010 Government Accountability Office (GAO) report stated:

There are three new technologies that the Navy plans to incorporate on current and future Virginia Class submarines once they mature—advanced electromagnetic signature reduction (AESR), a conformal acoustic velocity sensor wide aperture array (CAVES WAA), and a flexible payload sail. AESR is a software package comprised of two systems that use improved algorithms to continuously monitor and recalibrate the submarine's signature. The basic algorithms required to support this technology have been proven on other submarines. Navy officials stated they are now developing software and conducting laboratory tests in support of further algorithm development. The Navy has completed and released about 80 percent of the software code for this technology and plans to test it on board a submarine in February 2010. The Navy will begin permanent AESR installations with SSN 782. It also plans to install the software on earlier ships when they are modernized.

CAVES WAA is a sensor array that is designed to detect the vibrations and acoustic signatures of targets. The Navy has stated that CAVES WAA could save approximately \$4 million per submarine. The Navy is analyzing two options for CAVES WAA production—ceramic accelerometers, a mature but more costly technology, or fiber-optic accelerometers, a less expensive but immature technology. According to program officials, the Navy completed testing panels incorporating both types of sensors in December 2008 and plans additional at sea testing in 2010. The Navy is also considering another option, using a more mature conformal array technology manufactured for the United Kingdom's Royal Navy. The Navy is evaluating whether or not this technology is a viable candidate for installation on Virginia-class submarines.

The flexible payload sail would replace the sail atop the main body of the submarine. Due to recent changes in communications requirements, the Navy is reevaluating the design of the sail and is not certain when this technology will be ready for installation.³⁵

Reliability of In-Service Virginia-Class Boats

Another execution issue for the Virginia-class boats concerns the reliability of in-service Virginia-class boats. Information on this issue is presented below.

December 2010 DOT&E Report

A December 2010 report on various DOD acquisition programs from DOT&E stated:

The reliability of several key [Virginia-class] engineering components, NPES [non-propulsion electronics systems] equipment, Government Furnished Equipment, and the Photonics Mast need improvement....

³⁵ Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-10-388SP, March 2010, p. 134.

Virginia's mission performance is significantly dependent on supporting acquisition programs that make up the Virginia combat and weapon systems. The performance requirements or demonstrated performance of some NPES components do not support meeting Virginia's requirements. The A-RCI [acoustic rapid COTS (commercial off the shelf) insertion] Sonar AN/BQQ-10, the TB-29 series towed [sonar] array, the AN/BLQ-10 Electronics Support Measures [system] and the Mk 48 Advanced Capability torpedo are examples of systems with known performance limitations or reliability programs that affected Virginia's performance during IOT&E [initial operational test and evaluation].³⁶

June 30, 2010, DOT&E Memorandum

A June 30, 2010, memorandum from J. Michael Gilmore, the Director, Operational Test and Evaluation, discussed reliability issues concerning in-service DOD weapon systems, including Virginia-class submarines. The memorandum stated the following of Virginia-class boats:

An OSD [Office of the Secretary of Defense] Program Support Review (Nov 2009) found:

- Multiple "fail to sail" issues, and test aborts associated with low reliability;
- No enterprise wide reliability measurement or growth program;
- Multiple subsystem failures associated with low reliability AN/TB-29 Towed [sonar] Array, Imaging / photonics mast, AN/BPS-16 radar, AN/WLY-1 sensors, Total Ship Monitoring System, Vertical Launch System tubes;
- Additional subsystems require reliability improvements (Active Shaft Grounding System, Circuit D, Ship Service Turbine Generator magnetic levitation bearings / throttle control system, etc.);
- Special Hull Treatment continues to debond from VIRGINIA Class submarines during underway periods, often in large sections up to hundreds of square feet.³⁷

July 15, 2010, Navy Statement

On July 15, 2010, the Navy issued a statement to a news organization defending the reliability of in-service Virginia-class boats. The Navy document states:

The Program Support Review [PSR] final report, referenced in the June 30 letter, was issued in November 2009 and stated "the design and reliability deficiencies identified during the PSR have mitigation plans and do not preclude the program from moving forward," and recommended the program proceed to the Milestone III / Full Rate Production review. On 23 June 2009 COMOPTEVFOR [Commander, Operational and Test and Evaluation Force] deemed the VIRGINIA Class "operationally effective" and "operationally suitable." On 12 November 2009, the Director, Operational Test and Evaluation deemed the VIRGINIA Class an "operationally effective, suitable and survivable replacement for the LOS ANGELES Class submarine."

It is inaccurate to say the VIRGINIA Class has a reliability problem. The [Virginia-class] Program ensures reliability by finding and correcting defects during the design, construction and post delivery periods. One of the last and most important reliability checks before a ship becomes fully operational is the shakedown and maintenance availability period between the submarine's delivery from construction and the beginning

³⁶ Director, Operational Test and Evaluation, *FY 2010 Annual Report*, December 2010, p. 170.

³⁷ Attachment entitled "Examples of Specific System Reliability Problems; Reliability Problems are Pervasive Across all Services and All Types of Systems," to memorandum dated June 30, 2010, from J. Michael Gilmore, Director, Operational Test and Evaluation, to Principal Deputy Under Secretary of Defense (Acquisition, Technology and Logistics), on State of Reliability, posted on *InsideDefense.com* (subscription required) on July 7, 2010.

of full fleet operations. Most of the issues and fail-to-sail events in the program have occurred and were corrected during this period. There have been comparatively few fail to sail events on ships that have completed PSA [post-shakedown availability].³⁸ While this shows the effectiveness of the Program's approach to improving the platform reliability, the Navy continues to monitor the success of the reliability improvement efforts in progress.

The proof of the reliability of a weapons system is in its intended use in its intended environment. For a US Navy Submarine in peacetime, this event occurs during a full six-month deployment. USS VIRGINIA (SSN 774) recently completed a highly successful full-length deployment including operations in the United States European Command (EUCOM) and United States African Command (AFRICOM) Area of Responsibility (AORs), with the highest Operational Tempo (OPTEMPO) (84.6%) of any deployed unit during that time period. Her deployment included several lengthy uninterrupted at-sea periods, including one of 75 days, during which she conducted highly classified missions of vital importance to the nation's security. At no time during these missions, or her entire deployment, was she unable to accomplish her tasking due to material failure.

The VIRGINIA program measures System Reliability using Under Secretary of Defense for Acquisition, Technology and Logistics Life Cycle Sustainment metrics and is currently scored at 97.7%, comparable to or higher than other classes of submarines. This level of reliability was achieved by invoking reliability, maintainability, and availability requirements during design development.

Subsystem reliability issues are managed by the respective Participating Managers (PARMs), which are separate program offices that supply capability to all classes of submarines in accordance with the Team Submarine business practice. In many cases the specific issues noted by the report have already been corrected. Subsystem reliability also performed at a high level during USS VIRGINIA's deployment and is included in the statistics above.

Mold-in-Place Special Hull Treatment (MIP/SHT) debonding has not caused any fail-to-sail events over the life of the program. The debonding issue has been aggressively pursued since its recognition in 2006. The problem was largely due to immature application processes, which have been corrected on later ships. Because of the parallel construction process, MIP/SHT was applied to several ships before the first at-sea testing of USS VIRGINIA. The Program Office continues to monitor the performance on all ships and pursue improvement.³⁹

January 21, 2011, Press Report

A January 21, 2011, press article stated:

The sharkskin-like coating that peeled off early Virginia Class submarines in large swatches appears to be adhering better to newer boats, a top Navy procurement official said.

After the Navy found that the specialized, sonar-absorbing coating had sloughed off three of the first four subs in the class, they initiated an investigation to determine the cause of the problem and how to fix it.

³⁸ At this point in the statement, there is a footnote that states: "20 total Fail-to-Sail events over the program to date, 5 on ships that have completed PSA." A PSA is an availability (i.e., a period of time when the ship is in a shipyard, available for maintenance work to be performed on it) that follows a ship's shakedown cruise (i.e., a cruise on a newly built ship that is intended in part to uncover defects in the ship's construction).

³⁹ July 15, 2010, Navy statement to Inside the Navy (Dan Taylor), entitled "Media Request from Dan Taylor," provided to CRS by Navy Office of Legislative Affairs on July 26, 2010. See also Dan Taylor, "VA-Class Program: Depictions Of Sub As Unreliable Are 'Inaccurate,'" *Inside the Navy*, July 26, 2010; Peter Frost, "Peeling Submarine Skin Prompts Navy Inquiry," *Newport News Daily Press*, September 19, 2010.

“Clearly we had problems on the early ships,” said Vice Adm. Kevin M. McCoy, commander of Naval Sea Systems Command, the Navy’s ship-buying and maintenance arm. “We think, for the most part, those issues are behind us.”

The loss of the specialized hull coating—designed to be “anechoic,” or able to absorb waves of active sonar so it does not bounce back to the ship or sub emitting the signal—could imperil underway submarines by making them easier to detect.

Despite those problems, McCoy insisted that the hull-coating failures have not contributed to operational issues for the submarines, saying “It’s not been a real big deal for us.”

McCoy said the Navy’s investigation revealed “no single smoking gun,” and that he’s “very confident going forward” that the Navy’s fast-attack submarines will retain the thick black coating that helps keep them silent and stealthy.

Affected submarines are being fixed during their normal dry-dock maintenance periods....

Although Northrop and Electric Boat apply the hull coatings, the Navy specifies the process of application.

The sea service has said it started making procedural changes in how the coating was applied immediately after the first problems surfaced in 2007 on the Virginia, the first sub of the class and the one with the most acute debonding problem to date.

While McCoy declined to reveal the specifics of how the process has changed, he said it “has gotten much better improved in terms of temperature controls, humidity controls and adhesion.”⁴⁰

⁴⁰ Peter Frost, “Hull Coating Failures On Virginia Class Submarines ‘Are Behind Us,’ Navy Says,” *Newport News Daily Press*, January 21, 2011.

Appendix B. Changes to LCS Mission Modules

SUW Module: Griffin Selected as Recommended Replacement for N-LOS

The Navy had planned to use an Army missile program known as the Non-Line of Sight Launch System (NLOS-LS) as part of the LCS surface warfare (SUW) mission package. The Navy planned for LCSs equipped with SUW mission packages to be nominally armed with three NLOS missile launchers, each with 15 missiles, for a total of 45 missiles per ship. The missiles could be used to counter swarm boats or other surface threats.

In May 2010, DOD approved an Army recommendation to cancel NLOS-LS.⁴¹ Following the cancellation of NLOS-LS, the Navy assessed potential alternative systems for fulfilling the NLOS role in the SUW mission package. On January 11, 2011, the Navy announced that it had selected the Griffin missile as its recommended replacement for NLOS-LS. The Navy stated that Griffin will be about half as expensive as NLOS-LS, and that it could be delivered about as soon as NLOS. The Navy stated that an initial version of the Griffin would be ready by 2014 or 2015, and that a follow-on, longer-ranged version would be ready by 2016 or 2017.⁴² One press report quoted an official from Raytheon, the maker of the Griffin, as stating that the Griffin's current range is less than 5 kilometers (i.e., less than about 2.7 nautical miles).⁴³ Another press report stated: "The Griffin's range has not been officially disclosed, though industry experts have reported a range of about 3.5 miles when surface-launched and about nine miles when launched from the air. The NLOS missile had a range of about 25 miles."⁴⁴

ASW Module: Shift to Systems With "In Stride" Capability

The Navy in January 2011 provided information on changes it has decided to make to the systems making up the ASW module. A January 14, 2011, press report stated that the Navy

discovered that while its [originally planned] LCS ASW module was able to do the mission, the equipment package proved unsatisfactory because the ship would actually have to stop in the water to deploy the equipment. "The ship could not do it in stride," says Capt. John Ailes, Navy mission module program office manager....

As for its ASW defense, the Navy plans to deploy a module that will include three parts: a variable-depth sonar; a multi-functional towed array; and a lightweight towed array,

⁴¹ "Out of Sight," *Defense Daily*, May 17, 2010: 3. See also Kate Brannen, "U.S. Army Asks to Cancel NLOS-LS," *DefenseNews.com*, April 23, 2010; Jason Sherman, "Army Cancels NLOS-NS, Frees Up Billions For Other Procurement Needs," *Inside the Navy*, April 26, 2010; Sebastian Sprenger, "NLOS-LS Seen As Effective—But To Pricey—In Key Army Analysis," *Inside the Navy*, May 3, 2010.

⁴² Grace Jean, "Buying Two Littoral Combat Ship Designs Saves the Navy \$600 Million, Official Says," *NationalDefenseMagazine.org*, January 12, 2011; Carlo Munoz, "Navy Pushing Griffin For NLOS-LS Replacement," *Defense Daily*, January 13, 2011; Michael Fabey, "U.S. Navy Identifies New LCS Modules," *Aerospace Daily & Defense Report*, January 14, 2011: 3; Cid Standifer, "Raytheon's Griffin System To Replace NLOS In LCS Mission Package," *Inside the Navy*, January 17, 2011; David Wichner, "New Navy Ships May Use Small Raytheon Missile," *Arizona Daily Star (Tucson)*, January 18, 2011.

⁴³ Cid Standifer, "Raytheon's Griffin System To Replace NLOS In LCS Mission Package," *Inside the Navy*, January 17, 2011.

⁴⁴ David Wichner, "New Navy Ships May Use Small Raytheon Missile," *Arizona Daily Star (Tucson)*, January 18, 2011.

Ailes says. The Navy will be testing the ASW module package throughout this and the coming year, he says, with an eye toward initial operational capability in 2017.⁴⁵

A January 12, 2011, press report stated:

For the anti-submarine warfare package, the Navy in 2012 expects to receive from Thales a low frequency sonar under development for demonstration and testing purposes. The towed array will provide sailors with a mobile anti-submarine capability. In the meantime, officials are moving ahead with other sensors, including the multifunction towed array for passive detection and the lightweight tow for torpedo countermeasures and non-acoustic rounds. The intent is to be able to counter enemy diesel submarines in the littorals. "You shift capabilities of the ship from a stationary anti-submarine warfare buried-in system to an in-stride littoral and open-ocean capability when you need it. That puts sensors and sound sources in the fleet in numbers," said [Rear Admiral Frank C. Pandolfe, director of the Navy's surface warfare division].⁴⁶

MCM Module: Possible Replacement of RAMICS by Modified ALMDS

A January 13, 2011, press report stated:

The Navy is looking to terminate an underperforming anti-mine system from the LCS mission package being designed for that mission.

Service acquisition officials have become increasingly frustrated with the testing results of the Rapid Airborne Mine Clearance System (RAMCS), Rear Adm. Frank Pandolfe, head of the Navy's surface warfare directorate, said this week.

While testing is still underway on the Northrop Grumman [NOC] system, which is to locate and destroy mines in shallow waters, the results have fallen short of service expectations, he said during a Jan. 11 speech at the Surface Navy Association's annual conference in Arlington, Va.

To remedy the situation, Pandolfe said program officials are looking to modify the Airborne Laser Mine Detection System (ALMDS) to carry out the RAMCS mission.

Also manufactured by Northrop Grumman, the ALMDS uses directed energy system mounted on board a MH-60R helicopter to detect mines at the same shallow depth the RAMCS was designed to destroy.

If the modification is successful, Navy decisionmakers plan to ax the RAMCS platform and use the ALMDS variant, Pandolfe said.

The surface warfare chief did not go into specifics regarding what kind of development work would be necessary to make such a transition, but he did note the move would also trim costs on the growing costs on the LCS anti-mine package.

However, Pandolfe reiterated that if the Navy opts to go with the ALMDS approach, the mission package itself would be delivered on time.

"They will be where they need to be when they need to be there," he said.⁴⁷

⁴⁵ Michael Fabey, "U.S. Navy Identifies New LCS Modules," *Aerospace Daily & Defense Report*, January 14, 2011: 3.

⁴⁶ Grace Jean, "Buying Two Littoral Combat Ship Designs Saves the Navy \$600 Million, Official Says," *NationalDefenseMagazine.org*, January 12, 2011.

⁴⁷ Carlo Munoz, "Navy Looks To Cut Anti-Mine System From LCS Mission Package," *Defense Daily*, January 13, 2011. Material in brackets as in original. A January 12, 2011, press report similarly stated that

A key technology [for the MCM module], the remote mine hunting vehicle, a diesel-powered semi-submersible that will tow the AQS-20 sonar, is behind schedule.

“Reliability of the system is about 80 percent of where we need to be,” [Rear Admiral Frank C. Pandolfe, director of the Navy’s surface warfare division] said. But he remains confident that the system will pull through. The rapid airborne mine clearance system, or RAMICS, a cannon designed to destroy mines floating below the surface in deep water, is not performing well in tests. Navy officials are looking to adapt the airborne mine neutralization system, which kills mines at the bottom of the ocean, for the mission. Preliminary testing is showing promise, and if it works, then the Navy may not need RAMICS, Pandolfe said.

“That would allow us to streamline the program, save money and go to a single kill vehicle,” he said. When the legacy mine sweeping force starts leaving the fleet in 2017, the Navy will be ready to introduce the LCS systems, he said.

(Grace Jean, “Buying Two Littoral Combat Ship Designs Saves the Navy \$600 Million, Official Says,” *NationalDefenseMagazine.org*, January 12, 2011.)