Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress

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Summary

The Navy has been procuring Virginia (SSN-774) class nuclear-powered attack submarines (SSNs) since FY1998. Sixteen have been procured through FY2012, and another two are to be requested for FY2013. The eight boats to be procured in the five-year period FY2009-FY2013 (boats 11 through 18, in annual quantities of 1-1-2-2-2) are being procured under a multiyear procurement (MYP) arrangement.

The Navy's proposed FY2012 budget requested $3,232.2 million in procurement funding to complete the procurement cost of the 15th and 16th Virginia-class boats. The FY2012 budget estimated the combined procurement cost of these two boats at $5,142.8 million, and under Navy FY2012 budget plans the boats were to receive a total of $1,910.5 million in prior-year advance procurement (AP) and Economic Order Quantity (EOQ) funding. The Navy's proposed FY2012 budget also requested $1,524.8 million in AP funding for Virginia-class boats to be procured in future years.

The Navy's FY2012 30-year SSN procurement plan, if implemented, would not be sufficient to maintain a force of 48 SSNs consistently over the long run. The Navy projects under that plan that the SSN force will fall below 48 boats starting in 2024, reach a minimum of 39 boats in 2030, and remain below 48 boats through 2041.

Potential issues for Congress regarding the Virginia-class program include the following:

- the Virginia-class procurement rate in coming years, particularly in the context of the projected SSN shortfall and the larger debate over future U.S. defense strategy and defense spending;
- the Navy's plans for inserting new technologies into the Virginia-class design;
- whether the Navy should build at least some Virginia-class boats in future years with the Virginia Payload Module (VPM)—an additional mid-body section equipped with large-diameter vertical launch tubes suitable for cruise missiles, unmanned underwater vehicles (UUVs), and other payloads; and
- Virginia-class program issues raised in a December 2011 report from the Department of Defense's (DOD's) Director, Operational Test and Evaluation (DOT&E).

The Navy's Ohio Replacement (SSBN[X]) ballistic missile submarine program is discussed in CRS Report R41129, *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.

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Introduction

This report provides background information and oversight issues for Congress on the Virginia-class nuclear-powered attack submarine (SSN) program. Decisions that Congress makes on procurement of Virginia-class boats could substantially affect U.S. Navy capabilities and funding requirements, and the U.S. shipbuilding industrial base.

The Navy's Ohio Replacement (SSBN[X]) ballistic missile submarine program is discussed in another CRS report.[1]

Background

U.S. Navy Submarines[2]

The U.S. Navy operates three types of submarines—nuclear-powered ballistic missile submarines (SSBNs),[3] nuclear-powered cruise missile and special operations forces (SOF) submarines (SSGNs),[4] and nuclear-powered attack submarines (SSNs). The SSNs are general-purpose submarines that perform a variety of peacetime and wartime missions, including the following:

- covert intelligence, surveillance, and reconnaissance (ISR), much of it done for national-level (as opposed to purely Navy) purposes;
- covert insertion and recovery of SOF (on a smaller scale than possible with the SSGNs);
- covert strikes against land targets with the Tomahawk cruise missiles (again on a smaller scale than possible with the SSGNs);
- covert offensive and defensive mine warfare;

[1] See CRS Report R41129, *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.

[2] In U.S. Navy submarine designations, SS stands for submarine, N stands for nuclear-powered, B stands for ballistic missile, and G stands for guided missile (such as a cruise missile). Submarines can be powered by either nuclear reactors or non-nuclear power sources such as diesel engines or fuel cells. All U.S. Navy submarines are nuclear-powered. A submarine's use of nuclear or non-nuclear power as its energy source is not an indication of whether it is armed with nuclear weapons—a nuclear-powered submarine can lack nuclear weapons, and a non-nuclear-powered submarine can be armed with nuclear weapons.

[3] The SSBNs' basic mission is to remain hidden at sea with their nuclear-armed submarine-launched ballistic missiles (SLBMs) and thereby deter a strategic nuclear attack on the United States. The Navy's SSBNs are discussed in CRS Report R41129, *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RL31623, *U.S. Nuclear Weapons: Changes in Policy and Force Structure*, by Amy F. Woolf.

[4] The Navy's four SSGNs are former Trident SSBNs that have been converted (i.e., modified) to carry Tomahawk cruise missiles and SOF rather than SLBMs. Although the SSGNs differ somewhat from SSNs in terms of mission orientation (with the SSGNs being strongly oriented toward Tomahawk strikes and SOF support, while the SSNs are more general-purpose in orientation), SSGNs can perform other submarine missions and are sometimes included in counts of the projected total number of Navy attack submarines. The Navy's SSGNs are discussed in CRS Report RS21007, *Navy Trident Submarine Conversion (SSGN) Program: Background and Issues for Congress*, by Ronald O'Rourke.

- anti-submarine warfare (ASW); and
- anti-surface ship warfare.

During the Cold War, ASW against the Soviet submarine force was the primary stated mission of U.S. SSNs, although covert ISR and covert SOF insertion/recovery operations were reportedly important on a day-to-day basis as well.[5] In the post-Cold War era, although anti-submarine warfare remains a mission, the SSN force has focused more on performing the other missions noted on the list above.

Attack Submarine Force-Level Goal

The Navy wants to achieve and maintain a fleet in coming years of 313 ships, including 48 SSNs (and 4 SSGNs).[6] For a review of SSN force level goals since the Reagan Administration, see **Appendix A**.

Attack Submarine Force Level

The SSN force included more than 90 boats during most of the 1980s, when plans called for achieving a 600-ship Navy including 100 SSNs. The number of SSNs peaked at 98 boats at the end of FY1987 and has declined since then in a manner that has roughly paralleled the decline in the total size of the Navy over the same time period. The 53 SSNs in service at the end of FY2011 included the following:

- 42 Los Angeles (SSN-688) class boats;
- 3 Seawolf (SSN-21) class boats; and
- 8 Virginia (SSN-774) class boats.

Los Angeles- and Seawolf-Class Boats

A total of 62 Los Angeles-class submarines, commonly called 688s, were procured between FY1970 and FY1990 and entered service between 1976 and 1996. They are equipped with four 21-inch diameter torpedo tubes and can carry a total of 26 torpedoes or Tomahawk cruise missiles in their torpedo tubes and internal magazines. The final 31 boats in the class (SSN-719 and higher) are equipped with an additional 12 vertical launch system (VLS) tubes in their bows for carrying and launching another 12 Tomahawk cruise missiles. The final 23 boats in the class (SSN-751 and higher) incorporate further improvements and are referred to as Improved Los Angeles class boats or 688Is. As of the end of FY2011, 20 of the 62 boats in the class had been retired.

The Seawolf class was originally intended to include about 30 boats, but Seawolf-class procurement was stopped after three boats as a result of the end of the Cold War and associated

[5] For an account of certain U.S. submarine surveillance and intelligence-collection operations during the Cold War, see Sherry Sontag and Christopher Drew with Annette Lawrence Drew, *Blind Man's Bluff* (New York: Public Affairs, 1998).

[6] For additional information on Navy force-level goals, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

changes in military requirements. The three Seawolf-class submarines are the *Seawolf* (SSN-21), the *Connecticut* (SSN-22), and the *Jimmy Carter* (SSN-23). SSN-21 and SSN-22 were procured in FY1989 and FY1991 and entered service in 1997 and 1998, respectively. SSN-23 was originally procured in FY1992. Its procurement was suspended in 1992 and then reinstated in FY1996. It entered service in 2005. Seawolf-class submarines are larger than Los Angeles-class boats or previous U.S. Navy SSNs.[7] They are equipped with eight 30-inch-diameter torpedo tubes and can carry a total of 50 torpedoes or cruise missiles. SSN-23 was built to a lengthened configuration compared to the other two ships in the class.[8]

Virginia (SSN-774) Class Program

General

The Virginia-class attack submarine (see **Figure 1**) was designed to be less expensive and better optimized for post-Cold War submarine missions than the Seawolf-class design. The Virginia-class design is slightly larger than the Los Angeles-class design,[9] but incorporates newer technologies. Virginia-class boats currently cost about $2.6 billion each to procure. The first Virginia-class boat entered service in October 2004.

[7] Los Angeles-class boats have a beam (i.e., diameter) of 33 feet and a submerged displacement of about 7,150 tons. Seawolf-class boats have a beam of 40 feet. SSN-21 and SSN-22 have a submerged displacement of about 9,150 tons.

[8] SSN-23 is 100 feet longer than SSN-21 and SSN-22 and has a submerged displacement of 12,158 tons.

[9] Virginia-class boats have a beam of 34 feet and a submerged displacement of 7,800 tons.

Figure 1. Virginia-Class Attack Submarine

Source: U.S. Navy file photo accessed by CRS on January 11, 2011, at http://www.navy.mil/search/display.asp?story_id=55715.

Past and Projected Procurement Rate

As shown in **Table 1**, 16 Virginia-class boats have been procured through FY2012.

Table 1. Past and Programmed Virginia-Class Procurement (FY2012 Budget)

FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
1	1	0	1	1	1	1	1	1	1
FY08	**FY09**	**FY10**	**FY11**	**FY12**	***FY13***	***FY14***	***FY15***	***FY16***	
1	1	1	2	2	*2*	*2*	*2*	*2*	

Source: Prepared by CRS based on U.S. Navy data. The eight boats procured or to be procured in FY2009-FY2013 are being procured under a multiyear procurement (MYP) arrangement.

Multiyear Procurement (MYP)

Under a multiyear procurement (MYP) arrangement requested by the Navy and approved by Congress in FY2008 and FY2009,[10] a total of 8 Virginia-class boats (boats 11 through 18 in the

[10] Section 8011 of the compromise version of the FY2009 defense appropriations act (Division C of H.R. 2638/P.L. 110-329 of September 30, 2008) granted authority for using FY2009 funds for an MYP arrangement for the Virginia-class program. Section 122 of the compromise version of the FY2009 defense authorization bill (S. 3001/P.L. 110-417 of October 14, 2008) modified the authority to use an MYP arrangement for Virginia-class boats to be procured in (continued...)

program) are to be procured in the period FY2009-FY2013, in annual quantities of 1, 1, 2, 2, and 2, respectively.

The five Virginia-class boats procured in FY2004-FY2008 were also procured under a multiyear procurement (MYP) arrangement. The four boats procured in FY1998-FY2002 were procured under a somewhat similar arrangement called a block buy. The boat procured in FY2003 fell between the FY1998-FY2002 block buy and the FY2004-FY2008 MYP, and was contracted for separately. The Navy anticipates requesting authority for another MYP contract for Virginia-class boats to be procured in FY2014-FY2018.

Joint Production Arrangement

Virginia-class boats are built jointly by General Dynamics' Electric Boat Division (GD/EB) of Groton, CT, and Quonset Point, RI, and Newport News Shipbuilding (NNS), of Newport News, VA, which forms part of Huntington Ingalls Industries (HII). HII previously was part of Northrop Grumman, during which time it was known as Northrop Grumman Shipbuilding (NGSB).[11] Under the arrangement, GD/EB builds certain parts of each boat, NNS builds certain other parts of each boat, and the yards take turns building the reactor compartments and performing final assembly of the boats. GD/EB is building the reactor compartments and performing final assembly on boats 1, 3, and so on, while NNS is doing so on boats 2, 4, and so on. The arrangement results in a roughly 50-50 division of Virginia-class profits between the two yards and preserves both yards' ability to build submarine reactor compartments (a key capability for a submarine-construction yard) and perform submarine final-assembly work.

The joint production arrangement is a departure from past U.S. submarine construction practices, under which complete submarines were built in individual yards. The joint production arrangement is the product of a debate over the Virginia-class acquisition strategy within Congress, and between Congress and the Department of Defense (DOD), that occurred in 1995-1997 (i.e., during the markup of the FY1996-FY1998 defense budgets). The goal of the arrangement is to keep both GD/EB and NNS involved in building nuclear-powered submarines, and thereby maintain two U.S. shipyards capable of building nuclear-powered submarines, while minimizing the cost penalties of using two yards rather than one to build a submarine design that is being procured at a relatively low annual rate.

Cost-Reduction Effort

The Navy states that it has achieved a goal of reducing the procurement cost of Virginia-class submarines so that two boats can be procured in FY2012 for combined cost of $4.0 billion in constant FY2005 dollars—a goal referred to as "2 for 4 in 12." Achieving this goal involved removing about $400 million (in constant FY2005 dollars) from the cost of each submarine. (The

(...continued)

FY2009-FY2013 that was granted to the Secretary of the Navy by Section 121 of FY2008 defense authorization act (H.R. 4986/P.L. 110-181 of January 28, 2008). The modification additionally permits the Secretary to enter into one or more contracts for advance procurement and advance construction of components for the boats procured under the MYP arrangement.

[11] GD/EB and NNS are the only two shipyards in the country capable of building nuclear-powered ships. GD/EB builds submarines only, while NNS also builds nuclear-powered aircraft carriers and is capable of building other types of surface ships.

Navy calculates that the unit target cost of $2.0 billion in constant FY2005 dollars for each submarine translates into about $2.6 billion for a boat procured in FY2012.)

The Navy says that, in constant FY2005 dollars, about $200 million of the $400 million in the sought-after cost reductions was accomplished simply through the improved economies of scale (e.g., better spreading of shipyard fixed costs and improved learning rates) of producing two submarines per year rather than one per year. The remaining $200 million in sought-after cost reductions, the Navy says, was accomplished through changes in the ship's design (which will contribute roughly $100 million toward the cost-reduction goal) and changes in the shipyard production process (which will contribute the remaining $100 million or so toward the goal). Some of the design changes are being be introduced to Virginia-class boats procured prior to FY2012, but the Navy says the full set of design changes will not be ready for implementation until the FY2012 procurement.

Changes in the shipyard production process are aimed in large part at reducing the total shipyard construction time of a Virginia-class submarine from 72 months to 60 months. (If the ship spends less total time in the shipyard being built, its construction cost will incorporate a smaller amount of shipyard fixed overhead costs.) The principal change involved in reducing shipyard construction time to 60 months involves increasing the size of the modules that form each submarine, so that each submarine can be built out of a smaller number of modules.[12]

Submarine Construction Industrial Base

In addition to GD/EB and NNS, the submarine construction industrial base includes scores of supplier firms, as well as laboratories and research facilities, in numerous states. About 80% of the total material procured from supplier firms for the construction of submarines (measured in dollar value) comes from single or sole source suppliers. Observers in recent years have expressed concern for the continued survival of many of these firms. For nuclear-propulsion component suppliers, an additional source of stabilizing work is the Navy's nuclear-powered aircraft carrier construction program.[13] In terms of work provided to these firms, a carrier nuclear propulsion plant is roughly equivalent to five submarine propulsion plants.

Much of the submarine design and engineering portion is resident at GD/EB. Smaller portions are resident at NNS and some of the component makers. Several years ago, some observers expressed concern about the Navy's plans for sustaining the design and engineering portion of the submarine construction industrial base. These concerns appear to have receded, in large part because of the Navy's plan to design and procure a next-generation ballistic missile submarine called the Ohio Replacement Program or SSBN(X).[14]

[12] For detailed discussions of the Virginia-class cost-reduction effort, see David C. Johnson et al., "Managing Change on Complex Programs: VIRGINIA Class Cost Reduction," *Naval Engineers Journal*, No. 4, 2009: 79-94; and John D. Butler, "The Sweet Smell of Acquisition Success," *U.S. Naval Institute Proceedings*, June 2011: 22-28.

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

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

Projected SSN Shortfall

Size and Timing of Shortfall

The Navy's FY2012 30-year SSN procurement plan, if implemented, would not be sufficient to maintain a force of 48 SSNs consistently over the long run. As shown in **Table 2**, the Navy projects under the plan that the SSN force will fall below 48 boats starting in 2024, reach a minimum of 39 boats in 2030, and remain below 48 boats through 2041. Since the Navy plans to retire the four SSGNs by 2028 without procuring any replacements for them, no SSGNs would be available in 2028 and subsequent years to help compensate for a drop in SSN force level below 48 boats. The projected SSN shortfall has been discussed in CRS reports and testimony since 1995.

Table 2. Projected SSN Shortfall

As shown in Navy's FY2012-FY2041 30-year Shipbuilding Plan

		Shortfall relative to 48-ship goal, shown as a negative	
Fiscal year	**Projected number of SSNs**	**Number of ships**	**Percent**
12	54		
13	55		
14	55		
15	54		
16	52		
17	50		
18	50		
19	51		
20	49		
21	49		
22	48		
23	48		
24	46	-2	-4%
25	45	-3	-6%
26	44	-4	-8%
27	43	-5	-10%
28	41	-7	-15%
29	40	-8	-17%
30	39	-9	-19%
31	41	-7	-15%
32	41	-7	-15%
33	42	-6	-13%
34	43	-5	-10%
35	44	-4	-8%
36	45	-3	-6%
37	46	-2	-4%
38	45	-3	-6%
39	45	-3	-6%
40	45	-3	-6%
41	45	-3	-6%

Source: Table prepared by CRS based on Navy's FY2012 30-year shipbuilding plan. Percent figures rounded to nearest percent.

2006 Navy Study on Options for Mitigating Projected Shortfall

The Navy in 2006 initiated a study on options for mitigating the projected SSN shortfall. The study was completed in early 2007 and briefed to CRS and the Congressional Budget Office (CBO) on May 22, 2007.[15] At the time of the study, the SSN force was projected to bottom out at 40 boats and then recover to 48 boats by the early 2030s. Principal points in the Navy study (which cite SSN force-level projections as understood at that time) include the following:

- The day-to-day requirement for deployed SSNs is 10.0, meaning that, on average, a total of 10 SSNs are to be deployed on a day-to-day basis.[16]
- The peak projected wartime demand is about 35 SSNs deployed within a certain amount of time. This figure includes both the 10.0 SSNs that are to be deployed on a day-to-day basis and 25 additional SSNs surged from the United States within a certain amount of time.[17]
- Reducing Virginia-class shipyard construction time to 60 months—something that the Navy already plans to do as part of its strategy for meeting the Virginia-class cost-reduction goal (see earlier discussion on cost-reduction goal)—will increase the size of the SSN force by two boats, so that the force would bottom out at 42 boats rather than 40.[18]
- If, in addition to reducing Virginia-class shipyard construction time to 60 months, the Navy also lengthens the service lives of 16 existing SSNs by periods ranging from 3 months to 24 months (with many falling in the range of 9 to 15 months), this would increase the size of the SSN force by another two boats, so that the force would bottom out at 44 boats rather than 40 boats.[19] The total cost of extending the lives of the 16 boats would be roughly $500 million in constant FY2005 dollars.[20]

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[15] Navy briefing entitled, "SSN Force Structure, 2020-2033," presented to CRS and CBO on May 22, 2007.

[16] The requirement for 10.0 deployed SSNs, the Navy stated in the briefing, was the current requirement at the time the study was conducted.

[17] The peak projected wartime demand of about 35 SSNs deployed within a certain amount of time, the Navy stated, is an internal Navy figure that reflects several studies of potential wartime requirements for SSNs. The Navy stated that these other studies calculated various figures for the number of SSNs that would be required, and that the figure of 35 SSNs deployed within a certain amount of time was chosen because it was representative of the results of these other studies.

[18] If shipyard construction time is reduced from 72 months to 60 months, the result would be a one-year acceleration in the delivery of all boats procured on or after a certain date. In a program in which boats are being procured at a rate of two per year, accelerating by one year the deliveries of all boats procured on or after a certain date will produce a one-time benefit of a single year in which four boats will be delivered to the Navy, rather than two. In the case of the Virginia-class program, this year might be around 2017. As mentioned earlier in the discussion of the Virginia-class cost-reduction goal, the Navy believes that the goal of reducing Virginia-class shipyard construction time is a medium-risk goal. If it turns out that shipyard construction time is reduced to 66 months rather than 60 months (i.e., is reduced by 6 months rather than 12 months), the size of the SSN force would increase by one boat rather than two, and the force would bottom out at 41 boats rather than 42.

[19] The Navy study identified 19 existing SSNs whose service lives currently appear to be extendable by periods of 1 to 24 months. The previous option of reducing Virginia-class shipyard construction time to 60 months, the Navy concluded, would make moot the option of extending the service lives of the three oldest boats in this group of 19, leaving 16 whose service lives would be considered for extension.

[20] The Navy stated that the rough, order-of-magnitude (ROM) cost of extending the lives of 19 SSNs would be $595 million in constant FY2005 dollars, and that the cost of extending the lives of 16 SSNs would be roughly proportional.

- The resulting force that bottoms out at 44 boats could meet the 10.0 requirement for day-to-day deployed SSNs throughout the 2020-2033 period if, as an additional option, about 40 SSN deployments occurring in the eight-year period 2025-2032 were lengthened from six months to seven months. These 40 or so lengthened deployments would represent about one-quarter of all the SSN deployments that would take place during the eight-year period.
- The resulting force that bottoms out at 44 boats could not meet the peak projected wartime demand of about 35 SSNs deployed within a certain amount of time. The force could generate a total deployment of 32 SSNs within the time in question—3 boats (or about 8.6%) less than the 35-boat figure. Lengthening SSN deployments from six months to seven months would not improve the force's ability to meet the peak projected wartime demand of about 35 SSNs deployed within a certain amount of time.
- To meet the 35-boat figure, an additional four SSNs beyond those planned by the Navy would need to be procured. Procuring four additional SSNs would permit the resulting 48-boat force to surge an additional three SSNs within the time in question, so that the force could meet the peak projected wartime demand of about 35 SSNs deployed within a certain amount of time.
- Procuring one to four additional SSNs could also reduce the number of seven-month deployments that would be required to meet the 10.0 requirement for day-to-day deployed SSNs during the period 2025-2032. Procuring one additional SSN would reduce the number of seven-month deployments during this period to about 29; procuring two additional SSNs would reduce it to about 17, procuring three additional SSNs would reduce it to about 7, and procuring four additional SSNs would reduce it to 2.

The Navy added a number of caveats to these results, including but not limited to the following:

- The requirement for 10.0 SSNs deployed on a day-to-day basis is a current requirement that could change in the future.
- The peak projected wartime demand of about 35 SSNs deployed within a certain amount of time is an internal Navy figure that reflects recent analyses of potential future wartime requirements for SSNs. Subsequent analyses of this issue could result in a different figure.
- The identification of 19 SSNs as candidates for service life extension reflects current evaluations of the material condition of these boats and projected use rates for their nuclear fuel cores. If the material condition of these boats years from now turns out to be worse than the Navy currently projects, some of them might no longer be suitable for service life extension. In addition, if world conditions over the next several years require these submarines to use up their nuclear fuel cores more quickly than the Navy now projects, then the amounts of time that their service lives might be extended could be reduced partially, to zero, or to less than zero (i.e., the service lives of the boats, rather than being extended, might need to be shortened).

- The analysis does not take into account potential rare events, such as accidents, that might force the removal an SSN from service before the end of its expected service life.[21]
- Seven-month deployments might affect retention rates for submarine personnel.

Issues for Congress

Virginia-Class Procurement Rate

One oversight issue for Congress concerns the Virginia-class procurement rate in coming years, particularly in the context of the projected SSN shortfall shown in **Table 2** and the larger debate over future U.S. defense strategy and defense spending.

Mitigating Projected SSN Shortfall

In addition to lengthening SSN deployments to 7 months and extending the service lives of existing SSNs by periods ranging from 3 months to 24 months (see "2006 Navy Study on Options for Mitigating Projected Shortfall" above), options for more fully mitigating the projected SSN shortfall include

- refueling some existing SSNs and extending their service lives by 10 years or more, and
- putting additional Virginia-class boats into the 30-year shipbuilding plan.

It is not clear whether it would be feasible or cost-effective to refuel existing SSNs and extend their service lives by 10 or more years, given factors such as limits on submarine pressure hull life. If the service lives of existing SSNs are not extended, then preventing the SSN force from dropping below 95% of the required 48-boat level in coming years could require putting six or seven additional Virginia-class boats into the 30-year shipbuilding plan between now and FY2024. Since procurement of Ohio Replacement (SSBN[X]) ballistic missile submarines could complicate the Navy's ability to afford to procure other kinds of Navy ships starting in FY2019, one option would be to add some or most of these six or seven Virginia-class boats to the shipbuilding plan prior to FY2019.

Larger Debate on Defense Strategy and Defense Spending

Some observers—particularly those who propose reducing U.S. defense spending as part of an effort to reduce the federal budget deficit—have recommended that the SSN force-level goal be reduced to something less than 48 boats, and/or that Virginia-class procurement be reduced. A

[21] In January 2005, the Los Angeles-class SSN San Francisco (SSN-711) was significantly damaged in a collision with an undersea mountain near Guam. The ship was repaired in part by transplanting onto it the bow section of the deactivated sister ship Honolulu (SSN-718). (See, for example, Associated Press, "Damaged Submarine To Get Nose Transplant," *Seattle Post-Intelligencer*, June 26, 2006.) Prior to the decision to repair the San Francisco, the Navy considered the option of removing it from service. (See, for example, William H. McMichael, "Sub May Not Be Worth Saving, Analyst Says," *Navy Times*, February 28, 2005; Gene Park, "Sub Repair Bill: $11M," *Pacific Sunday News (Guam)*, May 8, 2005.)

June 2010 report from a group called the Sustainable Defense Task Force recommends a Navy of 230 ships, including 37 SSNs,[22] and a September 2010 report from the Cato Institute recommends a Navy of 241 ships, including 40 SSNs.[23] Both reports recommend limiting Virginia-class procurement to one boat per year, as does a September 2010 report from the Center for American Progress.[24] A November 2010 report from a group called the Debt Reduction Task Force recommends "deferring" Virginia-class procurement.[25] The November 2010 draft recommendations of the co-chairs of the Fiscal Commission include recommendations for reducing procurement of certain weapon systems; the Virginia-class program is not among them.

Other observers have recommended that the SSN force-level goal should be increased to something higher than 48 boats, particularly in light of Chinese naval modernization.[26] The July 2010 report of an independent panel that assessed the 2010 Quadrennial Defense Review (QDR)—an assessment that is required by the law governing QDRs (10 U.S.C. 118)—recommends a Navy of 346 ships, including 55 SSNs.[27] An April 2010 report from the Heritage Foundation recommends a Navy of 309 ships, including 55 SSNs.[28]

Factors to consider in assessing whether to maintain, increase, or reduce the SSN force-level goal and/or planned Virginia-class procurement include but are not limited to the federal budget and debt situation, the value SSNs in defending U.S. interests and implementing U.S. national security strategy, and potential effects on the submarine industrial base.

As discussed earlier (see "Multiyear Procurement (MYP)" in "Background"), Virginia-class boats scheduled for procurement in FY2011-FY2013 are covered under a multiyear procurement (MYP) contract for the five-year period FY2009-FY2013. This MYP contract calls for procuring two Virginia-class boats per year in FY2011-FY2013. If fewer than two boats per year were funded in any one of those years, the contractor would be permitted to renegotiate the cost of the boats.

Virginia-Class Technology Insertion

Another oversight issue for Congress concerns Navy plans for inserting new technology into the Virginia-class design. A March 2011 Government Accountability Office (GAO) report stated:

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[22] *Debt, Deficits, and Defense, A Way Forward[:] Report of the Sustainable Defense Task Force*, June 11, 2010, pp. 19-20, 31.

[23] Benjamin H. Friedman and Christopher Preble, *Budgetary Savings from Military Restraint*, Washington, Cato Institute, September 23, 2010 (Policy Analysis No. 667), pp. 9.

[24] Lawrence J. Korb and Laura Conley, *Strong and Sustainable[:] How to Reduce Military Spending While Keeping Our Nation Safe*, Center for American Progress, September 2010, p. 19-20.

[25] Debt Reduction Task Force, *Restoring America's Future[:] Reviving the Economy, Cutting Spending and Debt, and Creating a Simple, Pro-Growth Tax System*, November 2010, p. 103.

[26] For further discussion of China's naval modernization effort, see CRS Report RL33153, *China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress*, by Ronald O'Rourke.

[27] Stephen J. Hadley and William J. Perry, co-chairmen, et al., *The QDR in Perspective: Meeting America's National Security Needs In the 21st Century, The Final Report of the Quadrennial Defense Review Independent Panel*, Washington, 2010, Figure 3-2 on page 58.

[28] A *Strong National Defense[:] The Armed Forces America Needs and What They Will Cost*, Heritage Foundation, April 5, 2011, pp. 25-26.

> The Navy has decided not to pursue two planned technology insertions for the Virginia class, but it is still developing advanced electromagnetic signature reduction (AESR) technology that will be introduced onto existing and new submarines. The Navy plans to install AESR—software that monitors and optimizes the submarine's signature—on ships starting with SSN 782. The software will be installed on earlier ships over time. According to the Navy, AESR prototype testing slipped by more than a year due to non-AESR-related schedule delays, and is scheduled to begin on SSN 778 in September 2011. The Navy decided not to incorporate a conformal acoustic velocity sensor wide aperture array on the ship after it found it would significantly increase, not decrease, life-cycle costs and complicate maintenance. The Navy is still evaluating more affordable sail designs, but according to officials, the larger, flexible payload sail is no longer being considered because the communications requirements that drove the need for more space have been eliminated.[29]

Building Virginia-Class Boats with Additional Mid-body Vertical Launch Tubes

Another oversight issue for Congress is whether the Navy should build Virginia-class boats procured in FY2019 and subsequent years to a lengthened configuration incorporating the Virginia Payload Module (VPM)—an additional mid-body section, reportedly about 94 feet in length,[30] that would be equipped with four large-diameter vertical launch tubes suitable for carrying and launching Tomahawk cruise missiles, unmanned underwater vehicles (UUVs), or other payloads. The Navy has been studying this option as a possible way to compensate for the projected retirement in FY2026-FY2028 of the Navy's four Ohio-class cruise missile/special operations forces support submarines (SSGNs), each of which is equipped with 24 large-diameter vertical launch tubes.[31]

DOD appears to have approved the idea: A document released by DOD on January 26, 2012, that outlines selected program actions to be incorporated into DOD's FY2013 budget and future DOD budgets states that DOD "increased or protected investment in capabilities that preserve the U.S. military's ability to project power in contested areas and strike quickly from over the horizon, including ... [d]esign changes to increase [the] cruise missile capacity of future Virginia-class submarines."[32]

The four additional launch tubes in the VPM could carry a total of 28 additional Tomahawk cruise missiles (7 per tube),[33] which would increase by about 43% the total number of torpedo-sized weapons carried by the Virginia class design.[34] The Navy estimates that adding the VPM would increase the boat's procurement cost by about 20%, according to a June 2011 press report,[35] or by

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[29] Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-11-233SP, March 2011, p. 126.

[30] Christopher P. Cavas, "Innovations, No-Shows At Sea-Air-Space Exhibition," *Defense News*, April 18, 2011: 4.

[31] Michael J. Conner, "Investing in the Undersea Future," *U.S. Naval Institute Proceedings*, June 2011: 16-20.

[32] Department of Defense, *Defense Budget Priorities and Choices*, January 2012, p. 5.

[33] Michael J. Conner, "Investing in the Undersea Future," *U.S. Naval Institute Proceedings*, June 2011: 16-20.

[34] A Virginia-class SSN can carry about 25 Tomahawks or other torpedo-sized weapons in its four horizontal torpedo tubes and associated torpedo room, and an additional 12 Tomahawk cruise missiles in its bow-mounted vertical lunch tubes, for a total of about 37 torpedo-sized weapons. Another 28 Tomahawks in four mid-body vertical tubes would increase that total by about 43%.

[35] Michael J. Conner, "Investing in the Undersea Future," *U.S. Naval Institute Proceedings*, June 2011: 16-20.

about 15% to 19%, according to an October 2011 press report.[36] Assessing whether to pursue this option could involve weighing the increase in Virginia-class unit mission capability that would be provided by the four additional tubes against the effect that the higher unit procurement cost could have on the number of Virginia-class boats that could be procured within available resources.[37]

Program Issues Raised in December 2011 DOT&E Report

Another oversight issue for Congress concerns Virginia-class program issues raised in a December 2011 report from the DOD's Director, Operational Test and Evaluation (DOT&E)—DOT&E's annual report for FY2011. Regarding the Virginia-class program, the report stated:

> **Assessment**
>
> The Navy achieved testing efficiencies by combining operational testing of several programs into coordinated test events. Since testing is interdependent, the consolidation of the Virginia, A-RCI [Acoustic Rapid COTS Insertion Program], acoustic arrays, other sensors, and AN/BYG-1 [Combat Control System] TEMPs [Test and Evaluation Master Plans] into an Undersea Enterprise Capstone document would increase testing efficiency and enable a full end-to-end evaluation of submarine capability in the applicable mission areas.
>
> An FOT&E [Follow-On Test and Evaluation] event was conducted at the end of FY10 to examine Virginia's susceptibility to low-frequency active sonar and the ship's ability to conduct ASUW [anti-surface warfare] in a low-frequency active environment. This test event was not adequate due to last minute changes in the Fleet Exercise that prevented Virginia from conducting any ASUW operations. Additionally, differences in the transmit power of the low-frequency active source precluded an accurate comparison of susceptibility between the Los Angeles class and the Virginia class submarines present. Additional testing will be required to complete the FOT&E requirements in this area.
>
> The FOT&E event in the Arctic was adequate. DOT&E's assessment of Virginia's effectiveness in the Arctic environment and Virginia's susceptibility to low-frequency fixed passive sonar arrays will be contained in a classified report, expected to be issued in early FY12.
>
> The FOT&E event that examined the modernization of the Virginia class submarine's NPES [Non-Propulsion Electronics Systems] were adequate with one exception. Testing to examine Virginia's susceptibility to some mine types must be repeated.
>
> Since Virginia's mission performance is significantly dependent on supporting acquisition programs that make up the Virginia combat and weapons systems, Virginia inherits the performance capabilities of these systems. The A-RCI sonar, the AN/BYG-1 Combat Control System, and the Mk 48 ADCAP [Advanced Capability] torpedo are examples of systems with known performance limitations or reliability problems that affected Virginia's performance during FOT&E.

[36] Christopher P. Cavas, "U.S. Navy Eyes Dual-Mission Sub," *Defense News*, October 17, 2011. The article quotes Navy officials as estimating that adding the mid-body section would add $400 million to $500 million to the roughly $2.6 billion procurement cost of a Virginia-class submarine.

[37] For additional press articles discussing this option, see Christopher P. Cavas, "U.S. Navy Eyes Dual-Mission Sub," *Defense News*, October 17, 2011; and Lee Hudson, "New Virginia-Class Payload Module May Replace SSGN Capability," *Inside the Navy*, October 24, 2011.

Recommendations

Status of Previous Recommendations. The Navy has made progress in addressing 17 of the 33 recommendations contained in the November 2009 classified BLRIP [Beyond Low-Rate Initial Production] report. Eight of the outstanding recommendations are classified. Of the remaining eight unclassified comments, the key recommendations are:

1. Test against an SSK threat [a diesel-electric submarine] surrogate in order to evaluate Virginia's capability, detectability, and survivability against modern diesel-electric submarines.

2. Conduct ASW [antisubmarine warfare]-search testing to assess Virginia's capability with other towed [sonar] arrays (i.e., TB-16 and TB-23).

3. Complete ASUW testing and investigate alternatives to the Atlantic Undersea Test Evaluation Center for ASW and ASUW testing.

4. Measure the ISR [intelligence, surveillance, and reconnaissance]-intercept metrics with a deployment-outfitted Virginia class submarine and with realistic threat signals.

5. Conduct FOT&E to examine Virginia's susceptibility to airborne ASW threats such as Maritime Patrol Aircraft and helicopters.

FY11 Recommendations. The Navy should:

1. Consolidate the Virginia, A-RCI, and AN/BYG-1 TEMPs into an Undersea Enterprise Capstone document.

2. Complete the verification, validation, and accreditation of the Transient Shock Analysis method used for Virginia Class Block III items.

3. Repeat the FOT&E event to determine Virginia's susceptibility to low-frequency active sonar and Virginia's ability to conduct ASUW in a low-frequency active environment. This testing should include a Los Angeles class submarine operating in the same environment to enable comparison with the Virginia class.[38]

Legislative Activity for FY2012

FY2012 Funding Request

The Navy's proposed FY2012 budget requested $3,232.2 million in procurement funding to complete the procurement cost of the 15th and 16th Virginia-class boats. The FY2012 budget estimated the combined procurement cost of these two boats at $5,142.8 million, and under FY2012 Navy budget plans the boats were to receive a total of $1,910.5 million in prior-year advance procurement (AP) and Economic Order Quantity (EOQ) funding. The Navy's proposed FY2012 budget also requested $1,524.8 million in AP funding for Virginia-class boats to be procured in future years.

[38] Department of Defense, Director, Operational Test and Evaluation, *FY2011 Annual Report*, December 2011, pp. 176-177.

FY2012 National Defense Authorization Bill (H.R. 1540/P.L. 112-81)

House

The House Armed Services Committee, in its report (H.Rept. 112-78 of May 17, 2011) on H.R. 1540, recommends approval of the Navy's request for FY2012 procurement and advance procurement funding for the Virginia-class program (page 345). The report states:

> The Virginia-class submarine program has proven itself to be a model shipbuilding program. Cost reduction efforts and ever-decreasing span time for construction and delivery allowed the Navy to fund two ships a year starting in fiscal year 2011, 1 year earlier than previously planned. The committee believes that modularity of payloads and open interfaces for its weapons systems, including electronic warfare, will improve capability while being more affordable. To continue to get the most efficiency from this program, the committee encourages the Secretary of the Navy to ensure that advance procurement for the next block of Virginia-class submarines is funded to required levels. (Page 33)

Senate (S. 1867)

S. 1867, an original measure reported by Senator Levin on November 15, 2011, without written report, in effect supersedes S. 1253 (see below). S. 1867 recommends approval of the Navy's request for FY2012 procurement and advance procurement funding for the Virginia-class program. (See Section 4101 of the bill. In the printed version of the bill, the relevant table within this section appears on page 611.)

Senate (S. 1253)

S. 1253 has been, in effect, superseded by S. 1867 (see above). S. 1253 as reported by the Senate Armed Services Committee (S.Rept. 112-26 of June 22, 2011) recommends approval of the Navy's request for FY2012 procurement and advance procurement funding for the Virginia-class program. (See Section 4101 of the bill as reported by the committee. In the printed version of the bill as reported by the committee, the relevant table within this section appears on page 606.)

Conference

The conference report (H.Rept. 112-329 of December 12, 2011) on H.R. 1540/P.L. 112-81 of December 31, 2011, recommends reducing by $10.901 million the Navy's request for FY2012 procurement funding for the Virginia-class program, with $1 million of the reduction being for "Exterior Communications System other cost unjustified growth," $5.538 million being for "Propulsor cost growth," and $4.363 million being for "Sonar hardware pricing cost growth" (pages 811-812). The report recommends reducing by $63.4 million the Navy's FY2012 request for advance procurement funding for the Virginia-class program, with the reduction being for "Nuclear long lead CFE [contractor-furnished equipment] advance procurement cost growth" (page 812).

FY2012 Military Construction and Veterans Affairs and Related Agencies Appropriations Act (H.R. 2055/P.L. 112-74)

Conference

In final action, H.R. 2055 became a "megabus" appropriations vehicle incorporating nine appropriations bills, including the FY2012 DOD appropriations bill, which was incorporated as Division A. The conference report (H.Rept. 112-331 of December 15, 2011) on H.R. 2055/P.L. 112-74 of December 23, 2011, reduces by $10.901 million the Navy's request for FY2012 procurement funding for the Virginia-class program, with $4.363 million of the reduction being for "Sonar hardware pricing cost growth," $1 million being for "Exterior Communications System other cost unjustified growth," and $5.538 million being for "Propulsor cost growth" (page 629). The report reduces by $63.4 million the Navy's FY2012 request for advance procurement funding for the Virginia-class program, with the reduction being for "Nuclear long lead CFE [contractor-furnished equipment] advance procurement cost growth" (page 629).

FY2012 DOD Appropriations Bill (H.R. 2219)

House

The House Appropriations Committee, in its report (H.Rept. 112-110 of June 16, 2011) on H.R. 2219, recommends reducing the Navy's requests for FY2012 procurement and advance procurement funding for the Virginia-class program by $10.091 million and $63.4 million, respectively. The reduction of $10.091 million in procurement funding includes reductions of $4.363 million for "Sonar hardware pricing cost growth," $1.0 million for "Exterior Communications System other cost unjustified growth," and $5.538 million for "Propulsor cost growth." The reduction of $63.4 million in advance procurement funding is for "Nuclear long lead CFE [contractor furnished equipment] advance procurement cost growth." (Pages 153-154)

Senate

The Senate Appropriations Committee, in its report (S.Rept. 112-77 of September 15, 2011) on H.R. 2219, recommends approving the Navy's requests for FY2012 procurement and advance procurement funding for the Virginia-class program (page 120).

Conference

For the conference version of the FY2012 DOD Appropriations Act, see the above discussion of H.R. 2055/P.L. 112-74.

Appendix A. Past SSN Force-Level Goals

This appendix summarizes attack submarine force-level goals since the Reagan Administration (1981-1989).

The Reagan-era plan for a 600-ship Navy included an objective of achieving and maintaining a force of 100 SSNs.

The George H. W. Bush Administration's proposed Base Force plan of 1991-1992 originally called for a Navy of more than 400 ships, including 80 SSNs.[39] In 1992, however, the SSN goal was reduced to about 55 boats as a result of a 1992 Joint Staff force-level requirement study (updated in 1993) that called for a force of 51 to 67 SSNs, including 10 to 12 with Seawolf-level acoustic quieting, by the year 2012.[40]

The Clinton Administration, as part of its 1993 Bottom-Up Review (BUR) of U.S. defense policy, established a goal of maintaining a Navy of about 346 ships, including 45 to 55 SSNs.[41] The Clinton Administration's 1997 QDR supported a requirement for a Navy of about 305 ships and established a tentative SSN force-level goal of 50 boats, "contingent on a reevaluation of peacetime operational requirements."[42] The Clinton Administration later amended the SSN figure to 55 boats (and therefore a total of about 310 ships).

The reevaluation called for in the 1997 QDR was carried out as part of a Joint Chiefs of Staff (JCS) study on future requirements for SSNs that was completed in December 1999. The study had three main conclusions:

- "that a force structure below 55 SSNs in the 2015 [time frame] and 62 [SSNs] in the 2025 time frame would leave the CINC's [the regional military commanders-in-chief] with insufficient capability to respond to urgent crucial demands without gapping other requirements of higher national interest. Additionally, this force structure [55 SSNs in 2015 and 62 in 2025] would be sufficient to meet the modeled war fighting requirements;"
- "that to counter the technologically pacing threat would require 18 Virginia class SSNs in the 2015 time frame;" and

[39] For the 80-SSN figure, see Statement of Vice Admiral Roger F. Bacon, U.S. Navy, Assistant Chief of Naval Operations (Undersea Warfare) in U.S. Congress, House Armed Services Committee, Subcommittee on Seapower and Strategic and Critical Materials, *Submarine Programs*, March 20, 1991, pp. 10-11, or Statement of Rear Admiral Raymond G. Jones, Jr., U.S. Navy, Deputy Assistant Chief of Naval Operations (Undersea Warfare), in U.S. Congress, Senate Armed Services Committee, Subcommittee on Projection Forces and Regional Defense, *Submarine Programs*, June 7, 1991, pp. 10-11.

[40] See Richard W. Mies, "Remarks to the NSL Annual Symposium," *Submarine Review*, July 1997, p. 35; "Navy Sub Community Pushes for More Subs than Bottom-Up Review Allowed," *Inside the Navy*, November 7, 1994, pp. 1, 8-9; *Attack Submarines in the Post-Cold War Era: The Issues Facing Policymakers*, op. cit., p. 14; Robert Holzer, "Pentagon Urges Navy to Reduce Attack Sub Fleet to 50," *Defense News*, March 15-21, 1993, p. 10; Barbara Nagy, " Size of Sub Force Next Policy Battle," *New London Day*, July 20, 1992, pp. A1, A8.

[41] Secretary of Defense Les Aspin, U.S. Department of Defense, *Report on the Bottom-Up Review*, October 1993, pp. 55-57.

[42] Secretary of Defense William S. Cohen, U.S. Department of Defense, *Report of the Quadrennial Defense Revie*w, May 1997, pp. 29, 30, 47.

- "that 68 SSNs in the 2015 [time frame] and 76 [SSNs] in the 2025 time frame would meet all of the CINCs' and national intelligence community's highest operational and collection requirements."[43]

The conclusions of the 1999 JCS study were mentioned in discussions of required SSN force levels, but the figures of 68 and 76 submarines were not translated into official Department of Defense (DOD) force-level goals.

The George W. Bush Administration's report on the 2001 QDR revalidated the amended requirement from the 1997 QDR for a fleet of about 310 ships, including 55 SSNs. In revalidating this and other U.S. military force-structure goals, the report cautioned that as DOD's "transformation effort matures—and as it produces significantly higher output of military value from each element of the force—DOD will explore additional opportunities to restructure and reorganize the Armed Forces."[44]

DOD and the Navy conducted studies on undersea warfare requirements in 2003-2004. One of the Navy studies—an internal Navy study done in 2004—reportedly recommended reducing the attack submarine force level requirement to as few as 37 boats. The study reportedly recommended homeporting a total of nine attack submarines at Guam and using satellites and unmanned underwater vehicles (UUVs) to perform ISR missions now performed by attack submarines.[45]

In March 2005, the Navy submitted to Congress a report projecting Navy force levels out to FY2035. The report presented two alternatives for FY2035—a 260-ship fleet including 37 SSNs and 4 SSGNs, and a 325-ship fleet including 41 SSNs and 4 SSGNs.[46]

In May 2005, it was reported that a newly completed DOD study on attack submarine requirements called for maintaining a force of 45 to 50 boats.[47]

In February 2006, the Navy proposed to maintain in coming years a fleet of 313 ships, including 48 SSNs. Some of the Navy's ship force-level goals have changed since 2006, and the goals now add up to a desired fleet of 328 ships. The figure of 48 SSNs, however, remains unchanged from 2006.

[43] Department of Navy point paper dated February 7, 2000. Reprinted in *Inside the Nav*y, February 14, 2000, p. 5.

[44] U.S. Department of Defense, *Quadrennial Defense Review*, September 2001, p. 23.

[45] Bryan Bender, "Navy Eyes Cutting Submarine Force," *Boston Globe*, May 12, 2004, p. 1; Lolita C. Baldor, "Study Recommends Cutting Submarine Fleet," *NavyTimes.com*, May 13, 2004.

[46] U.S. Department of the Navy, *An Interim Report to Congress on Annual Long-Range Plan for the Construction of Naval Vessels for FY 2006*. The report was delivered to the House and Senate Armed Services and Appropriations Committees on March 23, 2005.

[47] Robert A. Hamilton, "Delegation Calls Report on Sub Needs Encouraging," *The Day (New London, CT)*, May 27, 2005; Jesse Hamilton, "Delegation to Get Details on Sub Report," *Hartford (CT) Courant*, May 26, 2005.

Appendix B. Options for Funding SSNs

This appendix presents information on some alternatives for funding SSNs that was originally incorporated into this report during discussions in earlier years on potential options for Virginia-class procurement.

Alternative Funding Methods

Alternative methods of funding the procurement of SSNs include but are not necessarily limited to the following:

- **two years of advance procurement funding followed by full funding**—the traditional approach, under which there are two years of advance procurement funding for the SSN's long-leadtime components, followed by the remainder of the boat's procurement funding in the year of procurement;
- **one year of advance procurement funding followed by full funding**—one year of advance procurement funding for the SSN's long-leadtime components, followed by the remainder of the boat's procurement funding in the year of procurement;
- **full funding with no advance procurement funding (single-year full funding)**—full funding of the SSN in the year of procurement, with no advance procurement funding in prior years;
- **incremental funding**—partial funding of the SSN in the year of procurement, followed by one or more years of additional funding increments needed to complete the procurement cost of the ship; and
- **advance appropriations**—a form of full funding that can be viewed as a legislatively locked in form of incremental funding.[48]

Navy testimony to Congress in early 2007, when Congress was considering the FY2008 budget, suggested that two years of advance procurement funding are required to fund the procurement of an SSN, and consequently that additional SSNs could not be procured until FY2010 at the earliest.[49] This testimony understated Congress's options regarding the procurement of additional SSNs in the near term. Although SSNs are normally procured with two years of advance procurement funding (which is used primarily for financing long-leadtime nuclear propulsion components), Congress can procure an SSN without prior-year advance procurement funding, or

[48] For additional discussion of these funding approaches, see CRS Report RL32776, *Navy Ship Procurement: Alternative Funding Approaches—Background and Options for Congress*, by Ronald O'Rourke.

[49] For example, at a March 1, 2007, hearing before the House Armed Services Committee on the FY2008 Department of the Navy budget request, Representative Taylor asked which additional ships the Navy might want to procure in FY2008, should additional funding be made available for that purpose. In response, Secretary of the Navy Donald Winter stated in part: "The Virginia-class submarines require us to start with a two-year advanced procurement, to be able to provide for the nuclear power plant that supports them. So we would need to start two years in advance. What that says is, if we were able to start in '08 with advanced procurement, we could accelerate, potentially, the two a year to 2010." (Source: Transcript of hearing.) Navy officials made similar statements before the same subcommittee on March 8, 2007, and before the Senate Armed Services Committee on March 29, 2007.

with only one year of advance procurement funding. Consequently, Congress at that time had option of procuring an additional SSN in FY2009 and/or FY2010.

Single-year full funding has been used in the past by Congress to procure nuclear-powered ships for which no prior-year advance procurement funding had been provided. Specifically, Congress used single-year full funding in FY1980 to procure the nuclear-powered aircraft carrier CVN-71, and again in FY1988 to procure the CVNs 74 and 75. In the case of the FY1988 procurement, under the Administration's proposed FY1988 budget, CVNs 74 and 75 were to be procured in FY1990 and FY1993, respectively, and the FY1988 budget was to make the initial advance procurement payment for CVN-74. Congress, in acting on the FY1988 budget, decided to accelerate the procurement of both ships to FY1988, and fully funded the two ships that year at a combined cost of $6.325 billion. The ships entered service in 1995 and 1998, respectively.[50]

The existence in both FY1980 and FY1988 of a spare set of Nimitz-class reactor components was not what made it possible for Congress to fund CVNs 71, 74, and 75 with single-year full funding; it simply permitted the ships to be built more quickly. What made it possible for Congress to fund the carriers with single-year full funding was Congress's constitutional authority to appropriate funding for that purpose.

Procuring an SSN with one year of advance procurement funding or no advance procurement funding would not materially change the way the SSN would be built—the process would still encompass about two years of advance work on long-leadtime components, and an additional six years or so of construction work on the ship itself. The outlay rate for the SSN could be slower, as outlays for construction of the ship itself would begin one or two years later than normal.

Congress in the past has procured certain ships in the knowledge that those ships would not begin construction for some time and consequently would take longer to enter service than a ship of that kind would normally require. When Congress procured two nuclear-powered aircraft carriers (CVNs 72 and 73) in FY1983, and another two (CVNs 74 and 75) in FY1988, it did so in both cases in the knowledge that the second ship in each case would not begin construction until some time after the first.

Procuring SSNs in a 2-1-2 Pattern

Some potential approaches for procuring additional boats in FY2009-FY2011 that were discussed in earlier years could have resulted in a pattern of procuring two boats in a given year, followed by one boat the following year, and two boats the year after that—a 2-1-2 pattern. Navy testimony to Congress in early 2007 and early 2008 suggested that if the procurement rate were increased in a given year to two boats, it would not be best, from an industrial-base point of view, to decrease the rate to a single boat the following year, and then increase it again to two boats the next year, because of the workforce fluctuations such a profile would produce.[51]

[50] In both FY1988 and FY1980, the Navy had a spare set of Nimitz (CVN-68) class nuclear propulsion components in inventory. The existence of a spare set of components permitted the carriers to be built more quickly than would have otherwise been the case, but it is not what made the single-year full funding of these carriers possible. What made it possible was Congress' authority to appropriate funds for the purpose.

[51] See, for example, the spoken remarks of Secretary of the Navy Donald Winter at hearings before the House Armed Services Committee on March 1, 2007, and March 6, 2008, and spoken remarks by other Navy officials at a March 29, 2007, hearing before the Senate Armed Services Committee and at a March 14, 2008, hearing before the Seapower and (continued...)

This statement may overstate the production-efficiency disadvantages of a 2-1-2 pattern. If two boats were procured in a given year, followed by one boat the next year—a total of three boats in 24 months—the schedule for producing the three boats could be phased so that, for a given stage in the production process, the production rate would be one boat every eight months. A production rate of one boat every 8 months might actually help the industrial base make the transition from the current schedule of one boat every 12 months (one boat per year) to one boat every 6 months (two boats per year). Viewed this way, a 2-1-2 pattern might actually lead to some benefits in production efficiency on the way to a steady rate of two boats per year. The Navy's own 30-year (FY2009-FY2038) SSN procurement plan calls for procuring SSNs in a 1-2-1-2 pattern in FY2029-FY2038.

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(...continued)

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