Navy SSBN(X) Ballistic Missile Submarine Program: Background and Issues for Congress

Ronald O'Rourke
Specialist in Naval Affairs

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Summary

Ballistic missile submarines (SSBNs) carry submarine-launched ballistic missiles (SLBMs), which are large, long-range missiles armed with multiple nuclear warheads. The SSBNs' basic mission is to remain hidden at sea with their SLBMs, so as to deter a nuclear attack on the United States by another country. Navy SSBNs form one leg of the U.S. strategic nuclear deterrent force, or "triad," which also includes land-based intercontinental ballistic missiles (ICBMs) and land-based long-range bombers. The Navy currently operates 14 Ohio (SSBN-726) class SSBNs, the first of which is projected to reach the end of its service life in 2027.

The Navy is currently conducting development and design work on a planned class of 12 next-generation ballistic missile submarines, or SSBN(X)s, which the service wants to procure as replacements for the 14 Ohio-class boats. The SSBN(X) program, also known as the Ohio-class replacement program, received $497.4 million in research and development funding in the Navy's FY2010 budget, and the Navy's proposed FY2011 budget requests an additional $672.3 million in research and development funding for the program. Navy plans call for procuring the first SSBN(X) in FY2019, with advance procurement funding for the boat beginning in FY2015.

The Navy preliminarily estimates the procurement cost of each SSBN(X) at $6 billion to $7 billion in FY2010 dollars—a figure equivalent to roughly one-half of the Navy's budget each year for procuring new ships. Some observers are concerned that procuring 12 SSBN(X)s during the 15-year period FY2019-FY2033, as called for in Navy plans, could lead to reductions in procurement rates for other types of Navy ships during those years.

Potential FY2011 issues for Congress include the following:

- the accuracy of the Navy's preliminary estimate of the procurement cost of each SSBN(X);
- the prospective affordability of the SSBN(X) program and its potential impact on other Navy shipbuilding programs;
- the question of which shipyard or shipyards will build SSBN(X)s;
- the impact of UK preferences for the design of its new SSBNs on U.S. consideration of SSBN(X) design options; and
- congressional access to the SSBN(X) analysis of alternatives (AOA).

Options for reducing the cost of the SSBN(X) program or its potential impact on other Navy shipbuilding programs include procuring fewer than 12 SSBN(X)s; reducing the number of submarine-launched ballistic missiles (SLBMs) to be carried by each SSBN(X); designing the SSBN(X) to carry a smaller SLBM; stretching out the schedule for procuring SSBN(X)s and making greater use of split funding (i.e., two-year incremental funding) in procuring them; funding the procurement of SSBN(X)s in a part of the Department of Defense (DOD) budget other than the Navy's shipbuilding account; and increasing the Navy's shipbuilding budget.

This report focuses on the SSBN(X) as a Navy shipbuilding program. CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by Amy F. Woolf, discusses the SSBN(X) as an element of future U.S. strategic nuclear forces in the context of strategic nuclear arms control agreements.

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Introduction

The Navy is currently conducting development and design work on a planned class of 12 next-generation ballistic missile submarines, or SSBN(X)s,[1] which the service wants to procure as replacements for its current force of 14 Ohio-class ballistic missile submarines. The SSBN(X) program, also known as the Ohio-class replacement program, received $497.4 million in research and development funding in the Navy's FY2010 budget, and the Navy's proposed FY2011 budget requests an additional $672.3 million in research and development funding for the program. Navy plans call for procuring the first SSBN(X) in FY2019, with advance procurement funding for the boat beginning in FY2015.

The Navy preliminarily estimates the procurement cost of each SSBN(X) at $6 billion to $7 billion in FY2010 dollars—a figure equivalent to roughly one-half of the Navy's budget each year for procuring new ships. Some observers are concerned that the SSBN(X) program will significantly compound a challenge the Navy faces concerning the affordability of its long-term shipbuilding program. These observers are concerned that procuring 12 SSBN(X)s during the 15-year period FY2019-FY2033, as called for in Navy plans, could lead to reductions in procurement rates for other types of Navy ships during those years. The Navy's report on its 30-year (FY2011-FY2040) shipbuilding plan states: "While the SSBN(X) is being procured, the Navy will be limited in its ability to procure other ship classes."[2]

Potential FY2011 issues for Congress include the following:

- the accuracy of the Navy's preliminary estimate of the procurement cost of each SSBN(X);
- the prospective affordability of the SSBN(X) program and its potential impact on other Navy shipbuilding programs;
- the question of which shipyard or shipyards will build SSBN(X)s;
- the impact of UK preferences for the design of its new SSBNs on U.S. consideration of SSBN(X) design options; and
- congressional access to the SSBN(X) analysis of alternatives (AOA).

FY2011 options for Congress include but are not limited to the following:

- approving, rejecting, or modifying the Navy's FY2011 funding request for the program;
- limiting the obligation of SSBN(X) funds until the Navy makes the SSBN(X) AOA available to Congress and its three technical support agencies (GAO, CBO, and CRS); and

[1] In the designation SSBN(X), SS means submarine, B mean ballistic missile, and N means the ship is nuclear-powered (i.e., it uses a nuclear reactor to generate energy to propel the ship through the water and to power shipboard systems), and X means the design of the ship has not yet been determined.

[2] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, pp. 24-25.

- providing additional direction to the Navy or DOD concerning the SSBN(X) program.

Congress's decisions on the SSBN(X) program could significantly affect U.S. strategic nuclear capabilities, Navy funding requirements, the shipbuilding industrial base, and the UK's program for replacing its own aging SSBNs.

This report focuses on the SSBN(X) as a Navy shipbuilding program. Another CRS report discusses the SSBN(X) as an element of future U.S. strategic nuclear forces in the context of strategic nuclear arms control agreements.[3]

Background

SSBNs in General

Mission of Navy SSBNs

The U.S. Navy operates three kinds of submarines—nuclear-powered attack submarines (SSNs), nuclear-powered cruise missile submarines (SSGNs), and nuclear-powered ballistic missile submarines (SSBNs).[4] The SSNs and SSGNs are multi-mission ships that perform a variety of peacetime and wartime missions.[5] They do not carry nuclear weapons.[6]

The SSBNs, in contrast, perform a specialized mission of strategic nuclear deterrence, and carry submarine-launched ballistic missiles (SLBMs), which are large, long-range missiles armed with multiple nuclear warheads. SSBNs, which are sometimes referred to informally as "boomers,"[7]

[3] CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by Amy F. Woolf.

[4] In the designation SSGN, the G stands for guided missile (such as a cruise missile). As shown by the "Ns" in SSN, SSGN, and SSBN, all U.S. Navy submarines are nuclear-powered. Other navies operate non-nuclear powered submarines, which are powered by energy sources such as diesel engines. 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.

[5] These missions include covert intelligence, surveillance, and reconnaissance (ISR), much of it done for national-level (as opposed to purely Navy) purposes; covert insertion and recovery of special operations forces (SOF); covert strikes against land targets with the Tomahawk cruise missiles; covert offensive and defensive mine warfare; anti-submarine warfare (ASW); and anti-surface ship warfare. The Navy's four SSGNs, which are converted former SSBNs, can carry larger numbers of Tomahawks and SOF personnel than can the SSNs. SSGN operations consequently may focus more strongly on Tomahawk and SOF missions than do SSN operations. For more on the Navy's SSNs and SSGNs, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RS21007, *Navy Trident Submarine Conversion (SSGN) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[6] The Navy's non-strategic nuclear weapons—meaning all of the service's nuclear weapons other than submarine-launched ballistic missiles (SLBMs)—were removed from Navy surface ships and submarines under a unilateral U.S. nuclear initiative announced by President George H. W. Bush in September 1991. The initiative reserved a right to rearm SSNs at some point in the future with nuclear-armed Tomahawk land attack missiles (TLAM-Ns) should conditions warrant. Navy TLAM-Ns were placed in storage to support this option. DOD's report on the 2010 Nuclear Posture Review (NPR), released on April 6, 2010, states that the Untied States will retire the TLAM-Ns. (Department of Defense, *Nuclear Posture Review Report*, April 2010, pp. xiii and 28.)

[7] This informal name is a reference to the large boom that would be made by the detonation of an SLBM nuclear warhead.

launch their SLBMs from large-diameter vertical launch tubes located in the middle section of the boat.[8] The SSBNs' basic mission is to remain hidden at sea with their SLBMs, so as to deter a nuclear attack on the United States by another country by demonstrating to other countries that the United States has an assured second-strike capability, meaning a survivable system for carrying out a retaliatory nuclear attack.

Navy SSBNs form one leg of the U.S. strategic nuclear deterrent force, or "triad," which also includes land-based intercontinental ballistic missiles (ICBMs) and land-based long-range bombers. At any given moment, some of the Navy's SSBNs are conducting nuclear deterrent patrols. The Navy's report on its 30-year shipbuilding plan states: "These ships are the most survivable leg of the Nation's strategic arsenal and provide the Nation's only day-to-day assured nuclear response capability."[9] DOD's report on the 2010 Nuclear Posture Review (NPR), released on April 6, 2010, states that "strategic nuclear submarines (SSBNs) and the SLBMs they carry represent the most survivable leg of the U.S. nuclear Triad."[10]

Current Ohio-Class SSBNs

The Navy currently operates 14 Ohio (SSBN-726) class SSBNs. The boats are commonly called Trident SSBNs or simply Tridents because they carry Trident SLBMs.

A total of 18 Ohio-class SSBNs were procured in FY1974-FY1991. The ships entered service in 1981-1997. The boats were designed and built by General Dynamics' Electric Boat Division (GD/EB) of Groton, CT, and Quonset Point, RI. They were originally designed for 30-year service lives but were later certified for 42-year service lives, consisting of two 20-year periods of operation separated by a two-year mid-life nuclear refueling overhaul, called an engineered refueling overhaul (ERO). The nuclear refueling overhaul includes both a nuclear refueling and overhaul work on the ship that is not related to the nuclear refueling, and costs roughly $260 million per ship.

Ohio-class SSBNs each carry 24 SLBMs. The first eight boats in the class were originally armed with Trident I C-4 SLBMs; the final 10 were armed with larger and more-capable Trident II D-5 SLBMs. The Clinton Administration's 1994 Nuclear Posture Review (NPR) recommended a strategic nuclear force for the START II strategic nuclear arms reduction treaty that included 14 Ohio-class SSBNs, all armed with D-5s. This recommendation prompted interest in the idea of converting the first four Ohio-class boats (SSBNs 726-729) into SSGNs, so as to make good use of the 20 years of potential operational life remaining in these four boats, and to bolster the U.S. SSN fleet. The first four Ohio-class boats were converted into SSGNs in 2002-2008,[11] and the

[8] SSBNs, like other Navy submarines, are also equipped with horizontal torpedo tubes in the bow for firing torpedoes or other torpedo-sized weapons.

[9] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 15.

[10] Department of Defense, *Nuclear Posture Review Report*, April 2010, p. 22. The next sentence in the report states: "Today, there appears to be no viable near or mid-term threats to the survivability of U.S. SSBNs, but such threats—or other technical problems—cannot be ruled out over the long term." The report similarly states on page 23: "Today, there appears to be no credible near or mid-term threats to the survivability of U.S. SSBNs. However, given the stakes involved, the Department of Defense will continue a robust SSBN Security Program that aims to anticipate potential threats and develop appropriate countermeasures to protect current and future SSBNs."

[11] For more on the SSGN conversion program, see CRS Report RS21007, *Navy Trident Submarine Conversion (SSGN) Program: Background and Issues for Congress*, by Ronald O'Rourke.

next four (SSBNs 730-733) were backfitted with D-5 SLBMs in 2000-2005, producing the current force of 14 Ohio-class SSBNs, all of which are armed with D-5 SLBMs.

Eight of the 14 Ohio-class SSBNs are homeported at Bangor, WA, in Puget Sound; the other six are homeported at Kings Bay, GA, close to the Florida border.

Unlike most Navy ships, which are operated by single crews, Navy SSBNs are operated by alternating crews (called the Blue and Gold crews) so as to maximize the percentage of time that they spend at sea in deployed status. The Navy consequently maintains 28 crews to operate its 14 Ohio-class SSBNs.

The first of the 14 Ohio-class SSBNs (SSBN-730) will reach the end of its 42-year service life in 2027. The remaining 13 will reach the ends of their service lives at a rate of roughly one ship per year thereafter, with the 14th reaching the end of its service life in 2040.

The Navy has initiated a program to extend the service lives of D-5 SLBMs to 2042 "to match the OHIO Class submarine service life."[12]

Summary of U.S. SSBN Designs

The Navy has operated four classes of SSBNs since 1959. **Table 1** compares the current Ohio-class SSBN design to the three earlier U.S. SSBN designs. As shown in the table, the size of U.S. SSBNs has grown over time, reflecting in part a growth in the size and number of SLBMs carried on each boat. (A longer SLBM can require a boat with a bigger beam [i.e., diameter], and more or larger-diameter SLBMs can require a boat with a greater length.) The Ohio-class design, at 18,750 tons submerged displacement, is more than twice the size of earlier U.S. SSBNs. The Ohio class carries an SLBM (the D-5) that is much larger than the SLBMs carried by earlier U.S. SSBNs, and it carries 24 SLBMs, compared to the 16 on earlier U.S. SSBNs.[13]

[12] Statement of Rear Admiral Stephen Johnson, USN, Director, Strategic Systems Programs, Before the Subcommittee on Strategic Forces of the Senate Armed Services Committee [on] FY2011 Strategic Systems, 17 March 2010, p. 4.

[13] The larger size of the Ohio-class design also reflects a growth in size over time in U.S. submarine designs due to other reasons, such as providing increased interior volume for measures to quiet the submarine acoustically, so as to make it harder to detect.

Table 1. U.S. SSBN Classes

	George Washington (SSBN-598) class	Ethan Allen (SSBN-608) class	Lafayette/Benjamin Franklin (SSBN-616/640) class	Ohio (SSBN-726) class
Number in class	5	5	31	18/14
Fiscal years procured	FY1958-FY1959	FY1959 and FY1961	FY1961-FY1964	FY1974-FY1991
Years in commission	1959-1985	1961-1992	1963-2002	1981/1984-present
Length	381.7 feet	410.5 feet	425 feet	560 feet
Beam	33 feet	33 feet	33 feet	42 feet
Submerged displacement	6,700 tons	7,900 tons	8,250 tons	18,750 tons
Number of SLBMs	16	16	16	24
Final type(s) of SLBM carried	Polaris A-3	Polaris A-3	Poseidon C-3/ Trident I C-4	Trident II D-5
Diameter of those SLBMs	54 inches	54 inches	74 inches	83 inches
Length of those SLBMs	32.3 feet	32.3 feet	34 feet	44 feet
Weight of each SLBM (pounds)	36,000 pounds	36,000 pounds	65,000/73,000 pounds	~130,000 pounds
Range of SLBMs	~2,500 nm	~2,500 nm	~2,500 nm/~4,000 nm	~4,000 nm

Source: Prepared by CRS based on data in Norman Polmar, *The Ships and Aircraft of the U.S. Fleet*, Annapolis, Naval Institute Press, various editions, and (for SSBN decommissioning dates) U.S. Naval Vessel Register.

Notes: Beam is the maximum width of a ship. For the submarines here, which have cylindrical hulls, beam is the diameter of the hull.

The range of an SLBM can vary, depending on the number and weight of nuclear warheads it carries; actual ranges can be lesser or greater than those shown.

The George Washington-class boats were procured as modifications of SSNs that were already under construction. Three of the boats were converted into SSNs toward the ends of their lives and were decommissioned in 1983-1985. The two boats that remained SSBNs throughout their lives were decommissioned in 1981.

All five Ethan Allen-class boats were converted into SSNs toward the ends of their lives. The boats were decommissioned in 1983 (two boats), 1985, 1991, and 1992.

Two of the Lafayette/Benjamin Franklin-class boats were converted into SSNs toward the ends of their lives and were decommissioned in 1999 and 2002. The 29 that remained SSBNs throughout their lives were decommissioned in 1986-1995. For 19 of the boats, the Poseidon C-3 was the final type of SLBM carried; for the other 12, the Trident I C-4 SLBM was the final type of SLBM carried.

A total of 18 Ohio-class SSBNs were built. The first four, which entered service in 1981-1984, were converted into SSGNs in 2002-2008. The remaining 14 boats entered service in 1984-1997.

U.S.-UK Cooperation on SLBMs

SSBNs are also operated by the United Kingdom, France, Russia, and China.[14] The UK's four Vanguard-class SSBNs, which entered service in 1993-1999, each carry 16 Trident II D-5 SLBMs. (The nuclear warheads on UK D-5s are of UK design and manufacture.) Previous classes of UK SSBNs similarly carried earlier-generation U.S. SLBMs. The UK's use of U.S.-made SLBMs on its SSBNs is one element of a long-standing close cooperation between the two countries on nuclear-related issues that is carried out under the 1958 Agreement for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes (also known as the Mutual Defense Agreement). Within the framework established by the 1958 agreement, cooperation on SLBMs in particular is carried out under the 1963 Polaris Sales Agreement and a 1982 Exchange of Letters between the two governments. The Navy testified in March 2010 that "the United States and the United Kingdom have maintained a shared commitment to nuclear deterrence through the Polaris Sales Agreement since April 1963. The U.S. will continue to maintain its strong strategic relationship with the UK for our respective follow-on platforms, based upon the Polaris Sales Agreement."[15]

The first Vanguard-class SSBN is projected to reach the end of its service life in 2024. The UK wants to replace the Vanguard-class boats with three or four next-generation SSBNs. The UK would like the replacement SSBNs to carry D-5 SLBMs, and would like any successor to the D-5 SLBM to be compatible with, or be capable of being made compatible with, the D-5 launch system. President George W. Bush, in a December 2006 letter to UK Prime Minister Tony Blair, invited the UK to participate in any program to replace the D-5 SLBMs, and stated that any successor to the D-5 system should be compatible with, or be capable of being made compatible with, the launch system for the D-5 SLBM.

SSBN(X) Program

Program Origin and Early Actions

The SSBN(X) program can be traced to an exchange of letters in December 2006 between President George W. Bush and UK Prime Minister Tony Blair concerning the UK's desire to participate in a program to extend the service life of the Trident II D-5 SLBM into the 2040s, and to have its next-generation SSBNs carry D-5s. Following this exchange of letters, and with an awareness of the projected retirement dates of the Ohio-class SSBNs and the time that would likely be needed to develop and field a replacement for them, DOD in 2007 began studies on a next-generation sea-based strategic deterrent (SBSD).[16] The studies used the term sea-based

[14] India in July 2009 launched a nuclear-powered submarine that is equipped to carry several short-range SLBMs; the ship is not expected to enter service until 2011 at the earliest.

[15] Statement of Rear Admiral Stephen Johnson, USN, Director, Strategic Systems Programs, Before the Subcommittee on Strategic Forces of the Senate Armed Services Committee [on] FY2011 Strategic Systems, 17 March 2010, p. 6.

[16] In February 2007, the commander of U.S. Strategic Command (STRATCOM) commissioned a task force to support an anticipated Underwater Launched Missile Study (ULMS). On June 8, 2007, the Secretary of the Navy initiated the ULMS. Six days later, the commander of STRATCOM directed that a Sea Based Strategic Deterrent (SBSD) capability-based assessment (CBA) be performed. In July 2007, the task force established by the commander of STRATCOM provided its recommendations regarding capabilities and characteristics for a new SBSD. (Source: Navy list of key events relating to the ULMS and SBSD provided to CRS and the Congressional Budget Office (CBO) on July 7, 2008.)

strategic deterrent to signal the possibility that the new system would not necessarily be a submarine.

An Initial Capabilities Document (ICD) for a new SBSD was developed in early 2008[17] and approved by DOD's Joint Requirements Oversight Committee (JROC) on June 20, 2008.[18] In July 2008, DOD issued a Concept Decision providing guidance for an analysis of alternatives (AOA) for the program; an acquisition decision memorandum from John Young, DOD's acquisition executive, stated the new system would, barring some discovery, be a submarine.[19] The Navy established an SSBN(X) program office at about this same time.[20] The AOA reportedly began in the summer or fall of 2008.[21] The basic analysis for the AOA was completed in May 2009, and the final report on the AOA was completed in September 2009.[22] As of March 2010, the AOA was being reviewed within the Navy.[23] The program is scheduled for a Milestone A review in the Spring of 2010.[24] A March 2010 Government Accountability Office (GAO) report states that "the Navy is planning for departmental approval of its proposed [SSBN(X)] alternative by the third quarter of fiscal year 2010. According to program officials, the Navy began concept design in fiscal year 2010."[25]

Procurement and Replacement Schedule

Table 2 shows the Navy's proposed schedule for procuring 12 SSBN(X)s, and for having SSBN(X)s replace Ohio-class SSBNs. As shown in the table, the Navy wants to procure the first SSBN(X) in FY2019 and have it enter service in FY2028. The remaining 11 would be procured between FY2022 and FY2033 and would enter service between FY2029 and FY2040.

The Navy states that the schedule for procuring the 12 SSBN(X)s "is inextricably linked to legacy [i.e., Ohio-class] SSBN retirements. The latest start for the lead SSBN(X) is FY 2019 and the replacements must start reaching the operational force by FY 2029. There is no leeway in this plan to allow a later start or any delay in the procurement plan."[26] The implication from this

[17] On February 14, 2008, the SBSD ICD was approved for joint staffing by the Navy's Resources and Requirements Review Board (R3B). On April 29, 2008, the SBSD was approved by DOD's Functional Capabilities Board (FCB) to proceed to DOD's Joint Capabilities Board (JCB). (Source: Navy list of key events relating to the ULMS and SBSD provided to CRS and the Congressional Budget Office (CBO) on July 7, 2008.)

[18] Source: Navy briefing to CRS and CBO on the SBSD program, July 6, 2009.

[19] Source: Navy briefing to CRS and CBO on the SBSD program, July 6, 2009.

[20] An August 2008 press report states that the program office, called PMS-397, "was established within the last two months." (Dan Taylor, "Navy Stands Up Program Office To Manage Next-Generation SSBN," *Inside the Navy*, August 17, 2008.

[21] "Going Ballistic," *Defense Daily*, September 22, 2008, p. 1.

[22] Source: *Department of the Navy Fiscal Year (FY) 2011 Budget Estimates, Justification of Estimates, Research, Development, Test & Evaluation, Navy, Budget Activity 4*, entry for PE0603561N, Project 3220 (pdf page 433 of 1054).

[23] Statement of Rear Admiral Stephen Johnson, USN, Director, Strategic Systems Programs, Before the Subcommittee on Strategic Forces of the Senate Armed Services Committee [on] FY2011 Strategic Systems, 17 March 2010, p. 6.

[24] Statement of Rear Admiral Stephen Johnson, USN, Director, Strategic Systems Programs, Before the Subcommittee on Strategic Forces of the Senate Armed Services Committee [on] FY2011 Strategic Systems, 17 March 2010, p. 6.

[25] Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-10-388SP, March 2010, p. 152.

[26] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 24. The report similarly states on page 5 that "the first boat in the class must be procured no later than FY 2019 to ensure that 12 operational ballistic missile submarines will always be available to perform the vital (continued...)

statement is that deferring the procurement of one or more SSBN(X)s beyond the dates shown in **Table 2** would result in an SSBN force that drops below 12 boats for some period of time.

Table 2. Navy Schedule for Procuring SSBN(X)s and Replacing Ohio-Class SSBNs

Fiscal Year	Number of SSBN(X)s procured	Cumulative number of SSBN(X)s in service	Ohio-class SSBNs in service	Combined number of Ohio-class SSBNs and SSBN(X)s in service
2019	1			
2020				
2021				
2022	1			
2023				
2024	1			
2025	1		14	14
2026	1		14	14
2027	1		13	13
2028	1	1	12	13
2029	1	2	11	13
2030	1	2	10	12
2031	1	3	9	12
2032	1	4	8	12
2033	1	5	7	12
2034		6	6	12
2035		7	5	12
2036		8	4	12
2037		9	3	12
2038		10	2	12
2039		11	1	12
2040		12		12

Source: Navy data provided by the Navy to CRS and the Congressional Budget Office on February 18, 2010, by Navy Office of Legislative Affairs.

SSBN(X) Design Features

Although the design of the SSBN(X) has not yet been determined, intended or potential design features include the following:

(...continued)

strategic deterrent mission."

- The SSBN(X) is to be designed for a 40-year expected service life.[27]
- Unlike the Ohio-class design, which requires a mid-life nuclear refueling, the SSBN(X) is to be equipped with a life-of-the-ship nuclear fuel core (a nuclear fuel core that is sufficient to power the ship for its entire expected service life).[28]
- The SSBN(X) might have fewer SLBM tubes than the Ohio-class design. Instead of 24 tubes, as on the Ohio-class design, the SSBN(X) might have 20, 16, or 12. The number of SLBM tubes in the SSBN(X) design will reflect recommendations in the 2010 Nuclear Posture Review (NPR) regarding future numbers of U.S. strategic nuclear warheads.
- The SLBM tubes on the SSBN(X) may be somewhat larger than those on the Ohio class design.[29] The Navy states that "a larger diameter missile tube provides flexibility to accommodate any future changes to missiles and payloads over the service life of a class that will extend to the 2080's. This concept was employed in earlier SSBN classes, for example in the OHIO Class, which initially fielded C-4 missiles (34 feet long and 74 inches in diameter) in missile tubes that later accommodated the longer and larger diameter D-5 missiles (44 feet long and 83 inches in diameter)."[30] If the SLBM tubes on the SSBN(X) are at least as large as those on the Ohio-class boats, then the SSBN(X) would likely have a beam (i.e., diameter)[31] as least as great as the 42-foot beam of the Ohio-class design.
- The Navy states that "owing to the unique demands of strategic relevance, [SSBN(X)s] must be fitted with the most up-to-date capabilities and stealth to ensure they are survivable throughout their full 40-year life span."[32]

Program Acquisition Cost

The Navy preliminarily estimates the procurement cost of each SSBN(X) at $6 billion to $7 billion in FY2010 dollars.[33] The SSBN(X) program would also incur several billion dollars in research and development costs[34]—one press report from 2008 mentions a figure of $7 billion.[35]

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[27] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 24.

[28] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 5. The two most recent classes of SSNs—the Seawolf (SSN-21) and Virginia (SSN-774) class boats—are built with cores that are expected to be sufficient for their entire 33-year expected service lives.

[29] Source: Transcript of spoken testimony of Loren Thompson before the Seapower and Expeditionary Forces subcommittee of the House Armed Services Committee hearing on Navy force structure and capabilities, January 20, 2010. Thompson stated that the Navy is "planning to make the tubes on the next generation satellite [sic: SSBN] slightly bigger than what a D5 would require because their estimate is that circa 2040 they'll need a different missile. They start with the D5, but then they actually are considering moving to a bigger missile as a follow-on."

[30] Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010.

[31] Beam is the maximum width of a ship. For Navy submarines, which have cylindrical hulls, beam is the diameter of the hull.

[32] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 24.

[33] Source: U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 20.

[34] If a new design is developed for the SSBN(X), as the Navy intends, then the research and development cost of the (continued...)

On this basis, the total acquisition (i.e., research and development plus procurement) cost of the SSBN program might be roughly $79 billion to $91 billion in constant FY2010 dollars.[36]

Common Missile Compartment (CMC)

Current U.S. and UK plans call for the SSBN(X) and the UK's replacement SSBN to use a missile compartment of the same general design.[37] The UK's version of this Common Missile Compartment (CMC) may have fewer missile tubes than the U.S. version, but the size of the missile tubes is to be the same in both versions. Since the UK's first Vanguard-class SSBN is projected to reach the end of its service life in 2024—three years before the first Ohio-class SSBN is projected to reach the end of its service life—design work on the CMC began about three years sooner than would have been required to support the SSBN(X) program alone. This is the principal reason why the FY2010 budget included a substantial amount of research and development funding for the CMC. The UK is providing some of the funding for the design of the CMC, including a large portion of the initial funding. A March 2010 GAO report stated:

> According to the Navy, in February 2008, the United States and United Kingdom began a joint effort to design a common missile compartment. This effort includes the participation of government officials from both countries, as well as industry officials from Electric Boat Corporation and BAE Systems. To date, the United Kingdom has provided a larger share of funding for this effort, totaling just over $200 million in fiscal years 2008 and 2009.[38]

Program Funding

Table 3 shows funding for the SSBN(X) program. The table shows U.S. funding only; it does not include funding provided by the UK to help pay for the design of the CMC. As can be seen in the table, the SSBN(X) program received $497.4 million in research and development funding in the Navy's FY2010 budget, and the Navy's proposed FY2011 budget requests an additional $672.3 million in research and development funding for the program.

(...continued)

SSBN(X) is likely to be as great as that of the Virginia-class SSN program—and perhaps greater, since the Virginia-class SSN did not require the development of an SLBM compartment. The research and development cost of the Virginia-class program is about $6.5 billion in constant FY2011 dollars. (The December 31, 2007, Selected Acquisition Report [SAR] for the Virginia-class program states that the research and development cost of the Virginia-class program is $5,501.1 million in then-year dollars, or $4.879.8 million in constant FY1995 dollars. The figure in constant FY1995 dollars equates to $6.541.3 million in constant FY2011 dollars, using the deflator for RDT&E budget authority (BA) in Department of Defense, *National Defense Budget Estimates* for FY 2011, March 2010, Table 5-7 (page 48).

[35] Dan Taylor, "Admiral: Virginia-Class Hulls May Benefit From Future Sub Research," *Inside the Navy*, May 26, 2008.

[36] The figure of $79 billion includes $7 billion in research and development costs and the procurement of 12 SSBN(X)s at a cost of $6 billion each. The figure of $91 billion includes $7 billion in research and development costs and the procurement of 12 SSBN(X)s at a cost of $7 billion each.

[37] Statement of Rear Admiral Stephen Johnson, USN, Director, Strategic Systems Programs, Before the Subcommittee on Strategic Forces of the Senate Armed Services Committee [on] FY2011 Strategic Systems, 17 March 2010, p. 6, which states: "The OHIO Replacement programs includes the development of a common missile compartment that will support both the OHIO Class Replacement and the successor to the UK Vanguard Class."

[38] Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-10-388SP, March 2010, p. 152.

Table 3. SSBN(X) Program Funding

Millions of then-year dollars, rounded to nearest tenth; totals may not add due to rounding

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Research and development (R&D) funding								
PE0101221N/Project 3198	0	9.7	0	0	0	0	0	0
PE0603561N/Project 3220	0	0	385.9	493.0	755.9	830.8	1,044.4	597.3
PE0603561N/Project 9999	4.9	3.2	4.0	0	0	0	0	0
PE0603570N/Project 3219	0	0	107.4	179.3	284.1	345.3	402.9	391.8
Total R&D funding	**4.9**	**12.9**	**497.4**	**672.3**	**1,040.0**	**1,176.1**	**1,447.3**	**989.1**
Procurement funding	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**954.6**
TOTAL all funding	**4.9**	**12.9**	**497.4**	**672.3**	**1,040.0**	**1,176.1**	**1,447.3**	**1,943.7**

Source: Navy data provided to CRS on March 11, 2010, by Navy Office of Legislative Affairs. PE means Program Element, that is, a research and development line item. A Program Element may include several projects.

Notes: PE0101221N/Project 3198 is Underwater Launch Missile System (ULMS) project within the PE for Strategic Submarine and Weapons System Support. **PE0603561N/Project 3220** is SBSD project within the PE for Advanced Submarine System Development. **PE0603561N/Project 9999** is Congressional funding additions within the PE for Advanced Submarine System Development. The figure shown for FY2010 includes two separate additions of $2.0 million each. **PE0603570N/Project 3219** is SSBN(X) reactor plant project within the PE for Advanced Nuclear Power Systems. **Procurement funding** shown in FY2015 is advance procurement funding for first SSBN(X), which is scheduled to be procured in FY2019.

Issues for Congress

Potential issues for Congress include the following:

- the accuracy of the Navy's preliminary estimate of the procurement cost of each SSBN(X);
- the prospective affordability of the SSBN(X) program and its potential impact on other Navy shipbuilding programs;
- the question of which shipyard or shipyards will build SSBN(X)s;
- the impact of UK preferences for the design of its new SSBNs on U.S. consideration of SSBN(X) design options; and
- congressional access to the SSBN(X) Analysis of Alternatives (AOA).

Each of these issues is discussed below.

Accuracy of Navy's Preliminary Unit Procurement Cost Estimate

The Navy's report on its 30-year shipbuilding plan states that "until a definitive cost estimate is completed, the Navy is assuming a unit [procurement] cost of about $6-7 billion per ship [in constant FY2010 dollars, which is] consistent with the escalated cost of the OHIO class SSBN.

The estimated cost should be refined and reported in a subsequent Report to Congress."[39] This statement might be taken to mean that the Navy inflated the historical unit procurement costs of Ohio-class boats to constant FY2010 dollars. This procedure, however, results in a unit procurement cost of a little more than $3 billion in constant FY2010 dollars.[40] The Navy has explained to CRS and the Congressional Budget Office (CBO) that the figure of $6 billion to $7 billion in constant FY2010 dollars is actually the Navy's rough estimate, in constant FY2010 dollars, of what it might cost today, under current production conditions, to build Ohio-class submarines.[41]

The accuracy of the Navy's preliminary estimate of the procurement cost of each SSBN(X) will depend in part on how the design of the SSBN(X) will compare to that of the Ohio-class SSBN. As noted earlier, the SSBN(X) may have fewer SLBM tubes than the Ohio-class design, but its tubes might also be somewhat larger than those on the Ohio-class design. The SSBN(X) will incorporate technologies (such as electronics or nuclear propulsion technologies) that in some (perhaps many) cases are newer than those used in the Ohio-class design.[42] Using newer technologies can either increase or reduce a ship's cost, depending on the exact technologies in question.

Another factor is how production conditions for the SSBN(X) will compare to those for the Ohio-class SSBNs. During the period when the Ohio-class boats were procured (FY1974-FY1991), the Navy also procured as many as three or four SSNs per year. During the years when SSBN(X)s are to be procured, the Navy plans to procure no more than one or (in a few cases) two SSNs per year. Economies of scale for submarine production will in this sense be lower for the SSBN(X) program than they were for the Ohio-class program. The above-cited difference between the historical procurement costs of the Ohio-class boats inflated to constant FY2010 dollars, and the Navy's estimate, in constant FY2010 dollars, of what it would cost to build Ohio-class boats today, under current production conditions, suggests that this could be a very significant consideration. On the other hand, shipyard processes and methods for building submarines (including modular construction, design for producibility, and automated shipyard tools) will be more advanced for the SSBN(X) program than they were for the Ohio-class program.

These design and production-related considerations make it difficult to assess the accuracy of the Navy's preliminary estimate of the unit procurement cost of the SSBN(X). CBO is currently developing an estimate of the cost to implement the Navy's 30-year shipbuilding plan. As a part of this analysis, CBO will develop an estimate of the unit procurement cost of the SSBN(X). CBO's estimate should be available later this year.

[39] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 20.

[40] Source: CBO, as provided in CRS discussion with CBO, March 17, 2010.

[41] Navy briefing on 30-year shipbuilding plan to CRS and CBO, March 17, 2010.

[42] In certain cases where Ohio-class technologies might be adequate for the SSBN(X), incorporating those technologies into the SSBN(X) might be difficult or expensive due to a reduction in sources for manufacturing or supporting those technologies.

Program Affordability and Impact on Other Navy Shipbuilding Programs

Some observers are concerned that the SSBN(X) program will significantly compound a challenge the Navy faces concerning the affordability of its long-term shipbuilding program. These observers are concerned that procuring 12 SSBN(X)s during the 15-year period FY2019-FY2033, as called for in Navy plans, could lead to reductions in procurement rates for other types of Navy ships during those years.[43] The Navy's report on its 30-year (FY2011-FY2030) shipbuilding plan states:

> Recapitalizing the SSBN force will impact the Navy in the mid-term as significant resources are allocated to the SSBN(X) recapitalization program ... these ships require significant resource commitment and they will impact the Navy's ability to procure other shipbuilding requirements during the period when they are being procured....
>
> The SSBN(X) procurements will be concurrent with wholesale end-of-service-life retirements of SSN 688 submarines, CG 47 class guided missile cruisers, DDG 51 class guided missile destroyers, and LSD 41/49 class dock landing ships. While the SSBN(X) is being procured, the Navy will be limited in its ability to procure other ship classes. This slowdown in procurement will occur when the Navy needs to be procuring at least 10 ships per year to maintain its force level against the anticipated ship retirements from the 1980s and 1990s.[44]

The report also states:

> Because of the high expected costs for these important national assets, yearly shipbuilding expenditures during the mid-term planning period [FY2021-FY2030] will average about $17.9B (FY2010$) [$17.9 billion in constant FY2010 dollars] per year, or about $2B more than the steady-state 30-year average. Even at this elevated funding level, however, the total number of ships built per year will inevitably fall because of the percentage of the shipbuilding account which must be allocated for the procurement of the SSBN. In the far-term planning period, average shipbuilding expenditures fall back to a more sustainable level of about $15.3B (FY2010$) average per year. Moreover, after the production run of SSBN(X)s comes to an end in FY 2033, the average number of ships built per year begins to rebound.[45]

The Navy's 30-year shipbuilding plan includes a total of 276 ships and states that the 12 SSBN(X)s are to be funded within the Navy's shipbuilding budget.[46] An earlier draft of the 30-year plan that was reported in December 2009 suggested that funding the 12 SSBN(X)s within the Navy's shipbuilding budget without an offsetting increase to the shipbuilding budget would reduce the number of ships in the 30-year plan from 278 to 222—a reduction of 56 ships. The 56

[43] See, for example, John M. Donnelly, "Cost Of Nuclear Subs Could Sink Navy Budget," *CQ Today*, March 2, 2010.

[44] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, pp. 24-25.

[45] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 5.

[46] The report states that "funding for the SSBN(X) will be included in the SCN core budget." (U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, p. 4.) SCN stands for the Shipbuilding and Conversion, Navy appropriation account—the Navy's shipbuilding budget.

eliminated ships included 19 destroyers, 15 Littoral Combat Ships (LCSs), four SSNs, three amphibious ships, and 15 auxiliary ships.[47]

In assessing the prospective affordability of the SSBN(X) program and its potential impact on other Navy shipbuilding programs, Congress may consider the following factors, among others:

- the total number of SSBN(X)s that are to be procured;
- the design (and thus unit procurement cost) of the SSBN(X);
- the schedule for procuring the SSBN(X)s and the potential for using incremental funding for procuring the ships;
- how procurement of SSBN(X)s is funded in DOD's budget; and
- the potential for increasing the Navy's shipbuilding budget enough to procure SSBN(X)s without having to reduce procurement rates for other Navy ships.

Each of these factors is discussed below.

Number of SSBN(X)s

U.S. strategic nuclear deterrence plans require a certain number of strategic nuclear warheads to be available for use on a day-to-day basis. After taking into account warheads on the other two legs of the strategic nuclear triad, as well as the number of warheads on an SSBN's SLBMs, this translates into a requirement for a certain number of SSBNs to be on station (i.e., within range of expected targets) in Pacific and Atlantic waters at any given moment. The SSBN force is sized to support this requirement. Given the time needed for at-sea training operations, restocking SSBNs with food and other consumables, performing maintenance and repair work on the SSBNs, and transiting to and from deterrent patrol areas, only a fraction of the SSBN force can be on patrol at any given moment. The Navy states that the current requirement for having a certain number of SSBNs on patrol at any given moment translates into a need for 14 Ohio-class boats. The Navy's report on its 30-year shipbuilding plan notes that the current planned total of 12 SSBN(X)s could change:

> Current plans call for 12 new SSBN(X)s with life-of-the-hull, nuclear reactor cores to replace the existing 14 OHIO-class SSBNs....
>
> There are many factors influencing this new SSBN that will impact the ship's maintenance cycle. Resolution of these factors will determine the number of ships required to maintain twelve operational submarines. As a result, until those decisions are made as part of the acquisition process, the procurement plan in this report supports a minimum inventory of 12 SSBNs, for this force. Should the ongoing Nuclear Posture Review change the SSBN requirements, the number of replacement ships may need to be adjusted to accommodate that outcome....
>
> The number of these submarines was delineated by the Nuclear Posture Review 2001 which established the requirement of a force comprised of 12 operational SSBNs (with two

[47] See the tables of the 222- and 278-ship scenarios published in *Inside the Navy* on December 7, 2009, as well as Christopher J. Castelli, "Navy Confronts $80 Billion Cost Of New Ballistic Missile Submarines," *Inside the Pentagon*, December 3, 2009.

> additional in overhaul at any time). As highlighted previously, the replacement SSBN program inventory is assumed to be 12 total ships. The Nuclear Posture Review, which is expected to be completed in 2010 will validate the SSBN requirement and will be reflected in future reports....
>
> The Navy has assumed, for the purposes of this report, that there will be no changes in the strategic deterrent posture for sea-based forces beyond those associated with the number of missile tubes in each SSBN(X) hull resulting from the Nuclear Posture Review that will complete in FY 2010.[48]

It is sometimes said that the current force of 14 Ohio-class boats supports 12 operational boats plus two other boats that are unavailable for operation because they are undergoing mid-life refueling overhauls. Some parts of the above-quoted passage can be read as consistent with that view. Current Navy plans, however, call for all 14 Ohio-class boats to remain in service even after the last Ohio-class mid-life refueling overhaul is completed around 2020, suggesting that maintenance work other than the mid-life refueling overhaul is a consideration. It can also be noted that while the SSBN(X) is to have a life-of-the-ship nuclear fuel core, thus avoiding the need for a mid-life refueling, the SSBN(X) might nevertheless require a lengthy mid-life non-refueling overhaul. DOD's report on the 2010 NPR states:

> The NPR concluded that ensuring a survivable U.S. response force requires continuous at-sea deployments of SSBNs in both the Atlantic and Pacific oceans, as well as the ability to surge additional submarines in crisis. To support this requirement, the United States currently has fourteen nuclear-capable Ohio-class SSBNs.
>
> By 2020, Ohio-class submarines will have been in service longer than any previous submarines. Therefore as a prudent hedge, the Navy will retain all 14 SSBNs for the near-term. Depending on future force structure assessments, and on how remaining SSBNs age in the coming years, the United States will consider reducing from 14 to 12 Ohio-class submarines in the second half of this decade. This decision will not affect the number of deployed nuclear warheads on SSBNs.[49]

This passage suggests that DOD might consider converting the 13th and 14th Ohio-class SSBNs into submarines that do not carry SSBNs in the second half of this decade, or cancelling their mid-life refueling overhauls and removing them from service. Under current plans, the mid-life refueling overhauls for these two boats might be scheduled for authorization around FY2017 and FY2018. The removal of the 13th and 14th boats from service as SSBNs following the completion of the mid-life refueling overhauls on the other 12 SSBNs would be consistent with the idea that the current force of 14 Ohio-class boats supports 12 operational boats plus two other boats that are unavailable for operation because they are undergoing mid-life refueling overhauls.

Some observers over the years have advocated or presented options for an SSBN force of fewer than 12 SSBNs. The Congressional Budget Office (CBO), for example, has at times in the past presented options for reducing the SSBN force to 10 boats as a cost-reduction measure.[50] A potential question for Congress is whether a force of fewer than 12 SSBN(X)s would provide for

[48] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010, pp. 5, 10, 15, 20.

[49] Department of Defense, *Nuclear Posture Review Report*, April 2010, p. 22.

[50] See, for example, Congressional Budget Office, *Rethinking the Trident Force*, July 1993, 78 pp.; and Congressional Budget Office, *Budget Options*, March 2000, p. 62.

an adequate number of SSBNs on deterrent patrol at any given moment. Views on that question could depend on, among other things, assessments of strategic nuclear threats to the United States and the role of SSBNs in deterring such threats as a part of overall U.S. strategic nuclear forces, as influenced by the terms of strategic nuclear arms control agreements.[51] Reducing the number of SSBNs below 12 could also raise a question as to whether the force should continue to be homeported at both Bangor, WA, and Kings Bay, GA, or consolidated at a single location. DOD's report on the 2010 NPR states:

> The NPR conducted extensive analysis of alternative force structures under a New START Treaty, and the Department of Defense will define its planned force structure under the Treaty after taking account of this work. The United States will retain the ability to adjust this posture under New START as needed to account for unexpected technological developments or operational vulnerabilities, or geo-political surprise.[52]

Design of SSBN(X)s

There are many elements of the design of the SSBN(X) that could affect its procurement cost. Other things held equal, a design with fewer SLBM tubes would cost less to procure than a design with more SLBM tubes. The difference in procurement cost resulting from a reduction in the number of SLBM tubes, however, might be relatively modest, since much of the ship's procurement cost is determined by other parts of the ship, such as the propulsion plant and the ship's collection of sensors, computers, software, and display systems. Reducing the number of SLBM tubes in the design would likely result in little (and possibly no) reduction to the ship's development and design cost.[53]

A design option that would more substantially reduce the procurement cost of the SSBN(X) would be to design the ship to carry an SLBM that is substantially smaller than the Trident II D-5 SLBM. Such a submarine could be substantially smaller, and thus have a lower unit procurement cost, than a submarine designed to carry an equal number of D-5-sized (or larger) SLBMs.

One example of this approach would be to use the Virginia-class SSN design as the basis for an SSBN(X) that would carry SLBMs the same size as the Trident I C-4 SLBM.[54] Such a ship could be armed with new-production Trident I C-4 SLBMs, or new-design SLBMs the same size as the Trident I C-4.[55] Although the Virginia-class design would need to be modified considerably to be converted into an SSBN design, the development and design cost of this option could be substantially less than that of a new-design SSBN(X). The net cost of a Virginia-based SSBN(X) design would also be affected by the cost of building new Trident I C-4 SLBMs, or developing

[51] For further discussion, see CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by Amy F. Woolf.

[52] Department of Defense, *Nuclear Posture Review Report*, April 2010, p. 25.

[53] It might also result in only a modest reduction in the design's annual operating and support cost.

[54] The Virginia-class design has a beam of 34 feet, which is one foot greater than the 33-foot beam of the Lafayette/Benjamin Franklin (SSBN-616/640) class SSBNs that carried the Trident I C-4 SLBM.

[55] The Navy states that "there are no TRIDENT I (C4) SLBMs available for refurbishment because only a limited number of TRIDENT I (C4) rocket motors remain. TRIDENT I (C4) missile hardware, including equipment sections, nozzles, and avionics, has been disposed of or destroyed. The remaining TRIDENT I (C4) rocket motors are at or near end of life, due to aging solid propellant, and are planned for accelerated disposal due to safety concerns. The TRIDENT I (C4) rocket motors are no longer certified for deployment on manned platforms." (Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010.)

and building new SLBMs the same size of Trident I C-4 SLBMs, and how that cost would compare to the cost of extending the service lives of D-5 SLBMs or developing a successor to the D-5 that is as large or larger than the D-5. The Navy states that

> the VIRGINIA Class design could be modified into an SSBN that carries SLBMs. This would require designing a missile compartment insert with missile tubes and other supporting systems. The missile compartment would likely have a larger pressure hull diameter than the VIRGINIA pressure hull (34 feet), resulting in a stepped pressure hull configuration.
>
> However, a VIRGINIA Insert SSBN would require redesign of the VIRGINIA and would have technical and operational shortcomings and risks. The increase in ship size for the modified ship would result in a loss in speed. Ship systems such as electric power, air conditioning, and chill water would have limitations, and the propulsor would require redesign. The increase in ship length would limit maneuvering performance without redesign of stern control surfaces and the ship control system. The VIRGINIA Insert SSBN would also have shortcomings in meeting speed and stealth performance parameters and maintainability requirements for the strategic mission.[56]

An alternative to modifying the Virginia-class design would be a new-design SSBN designed to carry an SLBM substantially smaller than the D-5. The SLBMs carried by such a submarine could be either new-production C-4s, a new-design SLBM the same size as the C-4, or a new-design SLBM that differs in size from the C-4 but is nevertheless substantially smaller than the D-5. This alternative would have a higher development and design cost than modifying the Virginia-class design – its development and design cost could be close to or virtually the same as that of a new-design SSBN intended to carry an SLBM the same size as (or larger than) the D-5. The resulting design, however, might better meet technical and operational requirements than a design based on the Virginia-class design.

The Trident I C-4 SLBM is less accurate and has substantially less range/payload than the Trident II D-5 SLBM. The Navy states that "the range of a TRIDENT II (D5) missile is approximately 45% greater than that of TRIDENT I (C4) for an equivalent payload. The D5 missile is also considerably more accurate than the C4 missile and can host a larger payload."[57] An SSBN armed

[56] Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010. The Navy states elsewhere in the paper that "the Sea Based Strategic Deterrent (SBSD) Analysis of Alternatives (AoA) investigated a series of options including modified VIRGINIA hulls and an updated OHIO Class design," and that:

> Based on historical SSBN to SLBM and SLBM Length-to-Diameter (L/D) ratios, a 74-inch diameter SLBM is likely the largest diameter feasible for a new VIRGINIA-Class-based SLBM design in the 35 to 36 foot length range. This missile would be similar to a TRIDENT I (C4); however, the range would be substantially reduced relative to D5 performance.
>
> A VIRGINIA Insert SSBN would require redesign of the VIRGINIA and has shortcomings in meeting speed and stealth performance parameters and maintainability requirements for the strategic mission….
>
> The VIRGINIA Class SSN was not designed to serve as a strategic deterrent platform. The Navy has considered a range of VIRGINIA Class Insert designs; however, early design studies concluded that they were not viable options as they would require redesign of the VIRGINIA and had shortcomings in meeting speed and stealth performance, and maintainability requirements for the strategic mission.

[57] Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010.

with Trident I C-4 SLBMs or equivalent-sized missiles consequently would provide much less ability to hold at risk targets in other countries than would an SSBN armed with an equivalent number of Trident II D-5 SLBMs.

Developing a new SLBM smaller than the D-5 would cost billions of dollars. The Navy states:

> Development of a new SLBM has not been priced because there is no Navy plan to develop a new nuclear capable SLBM and has no recent experience with an end-to-end missile development and production program.…
>
> The TRIDENT II (D5) missile, which achieved IOC [initial operational capability] in 1990, was the 6th generation of continuous strategic missile development programs since 1956. The development cost of the TRIDENT II (D5) missile in the 1980's was $8.4B (in FY83 dollars)[58] and included 19 missile land flat pad flights and 9 submarine launched flights using a fully experienced design and production industrial base. Detailed budgetary estimates for a new missile development program would require significant work to define performance needs before budget profiles and timelines could be developed. The development cost of TRIDENT II (D5) cannot be escalated as an estimate, as the industrial base and technology have changed substantially. No detailed SLBM design and development work has been conducted in over 20 years.
>
> In general, much of the SLBM production industrial base is available in a diminished form. The TRIDENT II (D5) was the fifth SLBM developed within the span of 25 years; the development of a new SLBM today would mark the first new U.S. SLBM developed since completion of D5 development in the early 1990's. Solid Rocket Motor production has decreased substantially due to decreased demand from NASA, the U.S. Air Force and the U.S. Navy.[59]

A potential question for Congress is whether a force of 12 (or perhaps fewer) SSBN(X)s armed with SLBMs substantially smaller than the D-5 would provide a sufficient amount of strategic deterrence capability. As with the previous discussion on the number of SSBN(X)s, views on this question could depend on, among other things, assessments of strategic nuclear threats to the United States and the role of SSBNs in deterring such threats as a part of overall U.S. strategic nuclear forces, as influenced by the terms of strategic nuclear arms control agreements.[60] Views on this issue could also depend on the potential for improving the accuracy of the C-4 (or achieving greater accuracy on a new-design SLBM substantially smaller than a D-5), and on whether the range/payload capacity of the D-5 missile would need to be fully used to meet future requirements for nuclear deterrence. The Navy states that the range and accuracy of the D-5 "make the D5 missile uniquely critical to supporting the requirements of USSTRATCOM as the supported Combatant Commander."[61] An additional consideration is how a decision to design the

[58] Although the Navy states later in this passage that "the development cost of TRIDENT II (D5) cannot be escalated as an estimate, as the industrial base and technology have changed substantially," it can be noted, for reference purposes, that a figure of $8.4 billion in constant FY1983 dollars equates to about $16.1 billion in constant FY2011 dollars, using the deflator for RDT&E budget authority in Department of Defense, National Defense Budget Estimates, March 2010, Table 5-6 (page 47) .

[59] Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010.

[60] For further discussion, see CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by Amy F. Woolf.

[61] Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010.

SSBN(X) around an SLBM smaller than the D-5 would affect the UK's plan to have its replacement SSBNs carry D-5s, and U.S. costs for supporting that plan.

Schedule for Procuring SSBN(X)s and Potential for Using Split Funding

Another option for managing the potential impact of the SSBN(X) program on other Navy shipbuilding programs would be to stretch out the schedule for procuring SSBN(X)s and make greater use of split funding (i.e., two-year incremental funding) in procuring them.[62] This option would not reduce the total procurement cost of the SSBN(X) program—to the contrary, it might increase the program's total procurement cost somewhat by reducing production learning curve benefits in the SSBN(X) program.[63] This option could, however, reduce the impact of the SSBN(X) program on the amount of funding available for the procurement of other Navy ships in certain individual years. This might reduce the amount of disruption that the SSBN(X) program causes to other shipbuilding programs in those years, which in turn might avoid certain disruption-induced cost increases for those other programs. The annual funding requirements for the SSBN(X) program might be further spread out by funding some of the SSBN(X)s with three- or four-year incremental funding.[64]

Table 4 shows the Navy's currently planned schedule for procuring 12 SSBN(X)s and a notional alternative schedule that would start two years earlier and end two years later than the Navy's currently planned schedule. Although the initial ship in the alternative schedule would be procured in FY2017, it would be executed as it if were funded in FY2019. Subsequent ships in the alternative schedule that are funded earlier than they would be under the Navy's currently planned schedule could also be executed as if they were funded in the year called for under the Navy's schedule. Congress in the past has funded the procurement of ships whose construction was executed as if they had been procured in later fiscal years.[65] The ability to stretch the end of the procurement schedule by two years, to FY2035, could depend on the Navy's ability to carefully husband the use of the nuclear fuel cores on the last two Ohio-class SSBNs, so as to extend the service lives of these two ships by one or two years. Alternatively, Congress could grant the Navy the authority to begin construction on the 11th boat a year before its nominal year of procurement, and the 12th boat two years prior to its nominal year of procurement.

[62] Under split funding, a boat's procurement cost is divided into two parts, or increments. The first increment would be provided in the fiscal year that the boat is procured, and the second would be provided the following fiscal year.

[63] Procuring one SSBN(X) every two years rather than at the Navy's planned rate of one per year could result in a loss of learning at the shipyard in moving from production of one SSBN to the next.

[64] The Navy, with congressional support, currently uses split funding to procure large-deck amphibious assault ships (i.e., LHAs). The Navy currently is permitted by Congress to use four-year incremental funding only for procuring the first three Ford (CVN-78) class carriers (i.e., CVN-78, CVN-79, and CVN-80); the authority was granted in Section 121 of the FY2007 defense authorization act [H.R. 5122/P.L. 109-364 of October 17, 2006]).

[65] Congress funded the procurement of two aircraft carriers (CVNs 72 and 73) in FY1983, and another two (CVNs 74 and 75) in FY1988. Although CVN-73 was funded in FY1983, it was built on a schedule consistent with a carrier funded in FY1985; although CVN-75 was funded in FY1988, it was built on a schedule consistent with a carrier funded in FY1990 or FY1991.

Table 4. Navy SSBN(X) Procurement Schedule and a Notional Alternative Schedule

Fiscal year	Navy's Schedule	Boat might be particularly suitable for 2-, 3-, or 4-year incremental funding	Notional alternative schedule	Boat might be particularly suitable for 2-, 3-, or 4-year incremental funding
2017			1	X
2018				
2019	1	X	1	X
2020				
2021			1	X
2022	1	X		
2023			1	X
2024	1			
2025	1		1	
2026	1		1	
2027	1		1	
2028	1		1	
2029	1		1	X
2030	1			
2031	1	X	1	X
2032	1	X		
2033	1	X	1	X
2034				
2035			1	X
Total	**12**		**12**	

Source: Navy's current plan is taken from U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2011*, February 2010. Potential alternative plan prepared by CRS.

Notes: Notional alternative schedule could depend on Navy's ability to carefully husband the use of the nuclear fuel cores on the last two Ohio-class SSBNs, so as to extend the service lives of these two ships by one or two years. Alternatively, Congress could grant the Navy the authority to begin construction on the 11th boat a year before its nominal year of procurement, and the 12th boat two years prior to its nominal year of procurement. Under Navy's schedule, boat to be procured un FY2031 might be particularly suitable for 4-year incremental funding, and boat to be procured in FY2032 might be particularly suitable for 3- or 4-year incremental funding.

How Procurement of SSBN(X)s Is Funded in DOD's Budget

Procure SSBN(X)s Outside Navy's Shipbuilding Budget

Another option that some observers have suggested for reducing the potential impact of the SSBN(X) program on other Navy shipbuilding programs would be to fund the procurement of SSBN(X)s through a part of the DOD budget other than the Navy's shipbuilding account. There would be some precedent for such an arrangement:

- DOD sealift ships and Navy auxiliary ships are funded in the National Defense Sealift Fund (NDSF), a part of DOD's budget that is outside the Navy's shipbuilding budget (and also outside the procurement title of the DOD appropriations act).
- Most spending for ballistic missile defense (BMD) programs (including procurement-like activities) is funded through the Defense-Wide research and development account rather than through the research and development and procurement accounts of the individual military services.

A rationale for funding DOD sealift ships in the NDSF is that DOD sealift ships perform a transportation mission that primarily benefits services other than the Navy, and therefore should not be forced to compete for funding in a Navy budget account that funds the procurement of ships central to the Navy's own missions. A rationale for funding BMD programs together in the Defense-Wide research and development account is that this makes potential tradeoffs in spending among various BMD programs more visible and thereby helps to optimize the use of BMD funding.

As a reference tool for better understanding DOD spending, DOD includes in its annual budget submission a presentation of the DOD budget reorganized into 11 program areas, of which one is strategic forces. The FY2011 budget submission, for example, shows that the strategic forces program area received about $12.6 billion in funding in FY2010, and that about $11.1 billion is requested for the program area for FY2011.[66]

Supporters of funding the procurement of SSBN(X)s through a part of the DOD budget other than the Navy's shipbuilding budget might argue that this could help protect funding for other Navy shipbuilding programs by avoiding the need for those other shipbuilding programs to compete for scarce Navy shipbuilding funds against a strategic nuclear forces program of high national priority. They could also argue that creating a new budget account for strategic nuclear forces of all kinds could help DOD better view potential tradeoffs in spending for various strategic nuclear forces programs and thereby help DOD better optimize the use of strategic forces funding.

Skeptics of funding the procurement of SSBN(X)s through a part of the DOD budget other than the Navy's shipbuilding budget could argue that it might do little to protect funding for other Navy shipbuilding programs, because if DOD were to move the SSBN(X)s out of the Navy's shipbuilding budget, DOD might also remove from the shipbuilding budget the funding that was there for the SSBN(X)s. They might also argue that shifting SSBN(X)s out of the Navy's shipbuilding budget would make it harder to track and maintain oversight over Navy shipbuilding activities, and that creating a new budget account for strategic nuclear forces of all kinds could endanger the SSBN(X) program by making it more visible to those who might support reduced spending on nuclear-weapon-related programs.

A March 11, 2010, press report stated: "The massive cost of replacing the Navy's nuclear ballistic missile submarines will be shouldered in the coming years by diverting funds from other naval

[66] Department of Defense, *National Defense Budget Estimates For FY 2011, March 2010*, Table 6-4, "Department of Defense TOA by Program," page 79. See also Table 6-5 on page 80, which presents the same data in constant FY2011 dollars. The other 10 program areas in addition to strategic forces are general purpose forces; C3, intelligence and space; mobility forces; guard and reserve forces; research and development; central supply and management; training, medical and other; administration and associated; support of other nations; and special operations forces. (A 12th category—undistributed—shows relatively small amounts of funding.)

and Pentagon programs and perhaps by boosting the defense budget, but the program should not get its own special funding stream, according to Deputy Defense Secretary William Lynn."[67]

Shift SSBN(X) DD/NRE Costs Outside Navy's Shipbuilding Budget

A second option relating to where in the budget the procurement of SSBN(X)s are funded would be to fund the detailed design and nonrecurring engineering (DD/NRE) costs of the SSBN(X) program through the Navy's research and development budget rather than the Navy's shipbuilding budget. It is a long-standing budgeting practice in Navy shipbuilding to attach the DD/NRE costs of a Navy shipbuilding program to the procurement cost of the first ship in a class (or sometimes the first two ships in the class). DD/NRE work, however, might be viewed as research and development work that would be more suitably funded in the Navy's research and development account. Since the DD/NRE costs of the SSBN(X) program will likely exceed $1 billion, shifting the funding of these costs to the Navy's research and development account could reduce the procurement cost of the first SSBN(X) as it appears in the Navy's shipbuilding budget. Shifting the SSBN(X) program's DD/NRE costs to the Navy's research and development account, however, could increase funding pressure on other Navy research and development programs. Opponents of this approach could also argue that this option would do nothing to reduce the procurement cost of the second and succeeding ships in the class.

Shift SSBN(X) Nuclear Fuel Core Costs Outside Navy's Shipbuilding Budget

A third option relating to where in the budget the procurement of SSBN(X)s are funded would be to shift the cost of SSBN(X) nuclear fuel cores from the Navy's shipbuilding account to the Operations and Maintenance, Navy (OMN) account or the Other Procurement, Navy (OPN) account. It is a long-standing budgeting practice in Navy shipbuilding to include the cost of the initial nuclear fuel core for a nuclear-powered ship in the procurement cost of that ship. A ship's nuclear fuel core, however, is the functional equivalent of the fossil fuel used by a conventionally powered Navy ship. Fossil fuel is not included in the procurement cost of conventionally powered Navy ships; it is instead funded on an annual basis through the OMN account. Since an SSBN(X) nuclear fuel core will likely cost a few hundred million dollars,[68] shifting the cost of SSBN(X) nuclear fuel cores from the Navy's shipbuilding account to the OMN or OPN account could marginally reduce the procurement cost of each SSBN(X) as it appears in the Navy's shipbuilding account. It could also, however, marginally increase funding pressure on other programs funded through the OMN or OPN account.

Potential for Increasing Shipbuilding Budget

Another factor for Congress to consider is the potential for increasing the Navy's shipbuilding budget enough to procure SSBN(X)s without having to reduce procurement rates for other Navy

[67] Christopher J. Castelli, "Lynn: Navy, DOD To Shoulder SSBN(X) Cost Without Separate Fund," *Inside the Pentagon*, March 11, 2010.

[68] As of 2007, a nuclear fuel core for a Virginia-class SSN cost about $170 million in FY2007 dollars, and a nuclear fuel core for a reactor on a Nimitz (CVN-78) or Ford (CVN-78) class aircraft carrier cost about $330 million in FY2007 dollars. (Nimitz- and Ford-class carriers are each powered by two reactors, so the total cost for a set of nuclear fuel cores for each carrier would be about $660 million in FY2007 dollars.) (Source: Naval Reactors telephone conversation with CRS on March 8, 2007.)

ships. Supporters of this option could argue that SSBNs have a procurement cost comparable to that of aircraft carriers, and that the Navy's shipbuilding budget in the past has sometimes been allowed to "spike" upward in the year that a carrier was procured, so as to permit the Navy to procure the carrier without having to reduce other Navy shipbuilding programs in that year. They could also argue that if the Navy's shipbuilding budget is not increased to accommodate the cost of the SSBN(X)s, the resulting reductions to other Navy shipbuilding programs could be substantial enough to significantly reduce the Navy's ability to carry out its other missions.

Skeptics could argue that aircraft carries in recent years have been funded through incremental funding rather than allowing the Navy's shipbuilding budget to "spike" upward in a single year, and that increasing the shipbuilding budget significantly for a period of about 15 years to accommodate the SSBN(X) program would not be the same as allowing the shipbuilding budget to spike upward for a single year. Skeptics could also argue that unless the Navy's overall budget were increased, increasing the Navy's shipbuilding account would require reducing funding for other Navy programs, such as aircraft procurement programs, and that such reductions could reduce the Navy's ability to carry out its other missions.

Construction Shipyard(s)

Building SSBN(X)s

Another potential issue for Congress regarding the SSBN(X) program is which shipyard or shipyards will build SSBN(X)s. Two U.S. shipyards are capable of building nuclear-powered submarines—General Dynamics' Electric Boat Division of Groton, CT, and Quonset Point, RI (GD/EB), and the shipyard at Newport News, VA, that forms part of Northrop Grumman Shipbuilding (NGSB/NN). GD/EB's primary business is building nuclear-powered submarines; it can also perform submarine overhaul work. NGSB/NN's primary lines of business are building nuclear-powered aircraft carriers, building nuclear-powered submarines, and performing overhaul work on nuclear-powered aircraft carriers.

Table 5 shows the numbers of SSBNs built over time by GD/EB, NGSB/NN, and two government-operated naval shipyards (NSYs)—Mare Island NSY, located in the San Francisco Bay area, and Portsmouth NSY of Portsmouth, NH, and Kittery, ME. Mare Island NSY is no longer in operation. NSYs have not built new Navy ships since the early 1970s; since that time, they have focused solely on overhauling and repairing Navy ships.

As can be seen in the table, the Ohio-class boats were all built by GD/EB, and the three previous SSBN classes were built partly by GD/EB, and partly by NGSB/NN. GD/EB was the builder of the first boat in all four SSBN classes. The most recent SSBNs built by NGSB/NN were the George C. Marshall (SSBN-654) and George Washington Carver (SSBN-656), which were Lafayette/Benjamin Franklin-class boats that were procured in FY1964 and entered service in 1966.

Table 5. Construction Shipyards of U.S. SSBNs

	George Washington (SSBN-598) class	Ethan Allen (SSBN-608) class	Lafayette/ Benjamin Franklin (SSBN-616/640) class	Ohio (SSBN-726) class
Fiscal years procured	FY58-FY59	FY59 and FY61	FY61-FY64	FY77-FY91
Number built by GD/EB	2	2	13	18
Number built by NGSB/NN	1	3	10	
Number built by Mare Island NSY	1		6	
Number built by Portsmouth NSY	1		2	
Total number in class	**5**	**5**	**31**	**18**

Source: Prepared by CRS based on data in Norman Polmar, *The Ships and Aircraft of the U.S. Fleet*, Annapolis, Naval Institute Press, various editions. NSY means naval shipyard.

Notes: GD/EB was the builder of the first boat in all four SSBN classes. The George Washington-class boats were procured as modifications of SSNs that were already under construction. A total of 18 Ohio-class SSBNs were built; the first four were converted into SSGNs in 2002-2008, leaving 14 in service as SSBNs.

There are five basic possibilities for building SSBN(X)s:

- **build all SSBN(X)s at GD/EB**—the approach that was used for building the Ohio-class SSBNs;
- **build all SSBN(X)s at NGSB/NN**;
- **build some SSBN(X)s GD/EB and some at NGSB/NN**—the approach that was used for building the George Washington-, Ethan Allen-, and Lafayette/Benjamin Franklin-class SSBNs;
- **build each SSBN(X) jointly at GD/EB and NGSB/NN, with final assembly of the boats alternating between the yards**—the approach currently being used for building Virginia-class SSNs;[69] and

[69] Under the joint-production arrangement for Virginia-class boats, GD/EB builds certain parts of each boat, NGSB/NN builds certain other parts of each boat, and the two yards take turns building the reactor compartment and performing final assembly work. GD/EB is the final assembly yard for the first Virginia-class boat, the third one, and so on, while NGSB/NN is the final assembly yard for the second boat, the fourth one, and so on. The arrangement provides a roughly 50-50 split in profits between the two firms for the production of Virginia-class SSNs. The agreement governing the joint-production arrangement cannot be changed without the consent of both firms. Virginia-class SSNs are the first U.S. nuclear-powered submarines to be built jointly by two shipyards; all previous U.S. nuclear-powered submarines were built under the more traditional approach of building an entire boat within a single yard.

The Virginia-class joint-production arrangement was proposed by the two shipyards, approved by the Navy, and then approved by Congress as part of its action on the FY1998 defense budget. A principal goal of the arrangement is to preserve submarine-construction skills at two U.S. shipyards while minimizing the cost of using two yards to build a class of submarines that is procured at a relatively low rate of one or two boats per year. Preserving submarine-construction skills at two yards is viewed as a hedge against the possibility of operations at one of the yards being disrupted by a natural or man-made disaster.

The joint-production arrangement is more expensive than single-yard strategy of building all Virginia-class boats at one shipyard (in part because the joint-production strategy splits the learning curve for reactor compartment construction and final assembly work on Virginia-class SSNs), but it is less expensive than a separate-yard strategy of building complete Virginia-class separately at both yards (in part because a separate-construction strategy splits the learning curve for all aspects of Virginia-class construction work, and because, in the absence of other submarine-construction (continued...)

- **build each SSBN(X) jointly at GD/EB and NGSB/NN, with one yard—either GD/EB or NGSB/NN—performing final assembly on every boat**.

In assessing these five approaches, policymakers may consider a number of factors, including their potential costs, their potential impacts on employment levels at GD/EB and NGSB/NN, and the relative value of preserving SSBN-unique construction skills (such as those relating to the construction and installation of SLBM compartments) at one shipyard or two. The relative costs of these five approaches could depend on a number of factors, including the following:

- each yard's share of SSBN(X) production work (if both yards are involved);
- the number of SSNs procured during the years of SSBN(X);
- whether the current joint-production arrangement for the Virginia class remains in effect during those years (if the SSNs procured are Virginia-class boats);[70] and
- the volume of non-submarine-construction work performed at the two shipyards during these years, which would include in particular aircraft carrier construction and overhaul work at NGSB/NN.

Building CMCs for the UK's SSBNs

A related question is whether the CMCs for the UK's replacement SSBNs should be built in the United States or the UK. Building them in the United States could reduce the procurement cost of CMCs produced for both countries' SSBNs. It could also help maintain employment levels in U.S. shipyards. The UK, however, might prefer to build its CMCs in the UK in order to help maintain employment levels in UK shipyards or to preserve certain submarine-construction skills. An agreement to build the UK's CMCs in the United States might include what is known as an "offset"—a corresponding agreement to have the UK build some portion of a defense item that is being procured for use by the U.S. military.

Impact of UK Preferences for Its SSBN on U.S. Consideration of SSBN(X) Design Options

As mentioned earlier:

- The SSBN(X) program can be traced to an exchange of letters in December 2006 between President George W. Bush and UK Prime Minister Tony Blair concerning the UK's desire to participate in a program to extend the service life of the Trident II D-5 SLBM into the 2040s, and to have its next-generation SSBNs carry D-5s.

(...continued)

work, a procurement rate of one or two Virginia-class boats per year is viewed as insufficient to sustain a meaningful competition between the two yards for contracts to build the boats).

[70] The agreement governing the joint-production arrangement for the Virginia class cannot be changed without the consent of both yards.

- GAO reported in March 2010 that the joint U.S.-UK effort to design the Common Missile Compartment (CMC) for the SSBN(X) and the UK's new SSBNs began in February 2008.
- The SSBN(X) analysis of alternatives (AOA) reportedly began in the summer or fall of 2008.

Potential oversight questions for Congress arising from the above points include the following:

- Is the UK's desire for its replacement SSBNs to carry D-5s, combined with the timing of the start of the CMC design effort relative to the start of the SSBN(X) AOA, exerting too much, too little, or about the right amount of influence on the range of SSBN(X) design alternatives that the United States is interested in fully exploring?
- More specifically, is the UK's desire for its replacement SSBNs to carry D-5s, combined with the timing of the start of the CMC design effort relative to the start of the SSBN(X) AOA, prematurely inclining the United States toward not exploring, or toward negative evaluations of, SSBN(X) design concepts featuring SLBM launch tubes smaller than those on the Ohio-class design?
- Did the SSBN(X) AOA fully explore and analyze the option of an all-new SSBN design (as opposed to a modification of the Virginia-class design) featuring SLBM launch tubes smaller than those on the Ohio-class design? If not, was this in part because of the UK's desire for its replacement SSBNs to carry D-5s and/or the timing of the start of the CMC design effort relative to the start of the SSBN(X) AOA?
- Is the Navy relying too much, too little, or about the right amount on the UK's preference for its replacement SSBNs to carry D-5s, and on the fact that the CMC design effort is now underway, as an argument for responding to questions about the Navy's desire to design the SSBN(X) with SLBM launch tubes at least as large as those on the Ohio-class design?
- Since the December 2006 exchange of letters between President George W. Bush and UK Prime Minister Tony Blair predates the late-2008 U.S. financial-sector crisis and the subsequent change in projected U.S. federal budget deficits (which in turn might influence future U.S. defense spending levels), should the views expressed in those letters be reexamined?

Congressional Access to SSBN(X) Analysis of Alternatives (AOA)

Although, as mentioned earlier, the basic analysis for the SSBN(X) AOA was completed in May 2009, and the final report on the AOA was completed in September 2009, the Navy as of late March 2010 had not made the AOA generally available to Congress. In response to inquires that CRS and CBO placed to the Navy concerning SSBN(X) design options, the Navy in late March 2010 declined to provide certain information on some of those design options, and stated:

> The AoA is considered a deliberative document in advance of USD (AT&L)'s review of its results in support of a planned Milestone A review in Spring 2010. Following this review, the AoA data responsive to this question can be provided.[71]

Potential oversight questions for Congress include the following:

- On what date does the Navy plan to make the SSBN(X) AOA generally available to Congress?
- Will the defense oversight committees of Congress have access to the SSBN(X) AOA in time to inform their markups of the FY2011 defense authorization and FY2011 DOD appropriation bills?
- Given the $515.2 million provided for the SSBN(X) program in FY2008-FY2010 and the $672.3 million requested for the SSBN(X) program in FY2011, how committed will the Navy be to a particular design concept for the SSBN(X) by the time the SSBN(X) AOA is made generally available to Congress?
- What might be the implications for congressional oversight of the SSBN(X) program (and for congressional oversight of future major defense acquisition programs) of Congress providing a cumulative total through FY2011 of almost $1.2 billion for the SSBN(X) program without general access to the SSBN(X) AOA?

An April 22, 2010, news report states:

> A key congressman who oversees U.S. Navy programs on Capitol Hill is threatening to recommend against funding development of a new ballistic missile submarine if the service doesn't fork over its analysis of the program.
>
> Rep. Gene Taylor, D-Miss., chairman of the House Seapower subcommittee, complained in a letter sent April 22 to Defense Secretary Robert Gates that the Navy "refuses to share" the analysis of alternatives (AoA) for the SSBN(X) program - a document that, Taylor says in the letter, was completed last year.
>
> Rather than commit to replacing the current crop of large Ohio-class submarines armed with Trident II D5 ballistic missiles with similar ships, Taylor wants to see what a smaller, Virginia-class submarine armed with a less-lethal ballistic missile would cost. Instead, he says, the Navy already has decided it wants the bigger and more expensive ships - which some sources say could cost as much as $70 billion.
>
> "I have repeatedly asked officials of the Department of the Navy if less-expensive alternatives to building the Ohio-class were examined," Taylor said in the letter. "I have repeatedly been told that only the Trident solution met the requirement."
>
> The Navy's refusal to share the AoA with Congress, Taylor said, "is under the guise that final approval has not been obtained."

[71] Navy information paper on SSBNs and SLBMs dated March 24, 2010, and provided to CRS and CBO on March 25, 2010.

> Yet, he pointed out, $495 million was spent last year to develop a missile compartment "that would only support a Trident II D5 weapon" - and the Navy is asking for an additional $672 million this year "to continue development of an exclusive Trident replacement vessel."
>
> As a result, Taylor threatened to work against the Navy's SSBN(X) request unless the AoA is sent to Congress, along with an explanation for how much nuclear deterrent capability the nation needs.
>
> Taylor asked Gates to "direct the Secretary of the Navy to deliver to me the completed AoA for this program notwithstanding any final approvals from other officials in the Department of Defense."
>
> Additionally, Taylor said in the letter that he would ask House Armed Services Committee chairman Rep. Ike Skelton, D-Mo., for a "thorough investigation" of how the SSBN(X) program "apparently bypassed acquisition requirements" and already began system design and development, and ask for a full committee hearing "to determine the true national requirement for sea-based nuclear deterrence."
>
> The letter comes as Taylor's committee is preparing its markup of the 2011 defense authorization bill, expected to take place in mid-May.[72]

Options for Congress

FY2011 options for Congress include but are not limited to the following:

- approving, rejecting, or modifying the Navy's FY2011 funding request for the program;
- withholding approval of, or limiting the obligation or expenditure of, SSBN(X) funds until the Navy makes the SSBN(X) AOA available to Congress and its three technical support agencies (GAO, CBO, and CRS); and
- providing additional direction to the Navy or DOD concerning the SSBN(X) program.

Legislative Activity for FY2011

The Navy's proposed FY2011 budget was submitted to Congress on February 1, 2010. The budget requests $672.3 million in research and development funding for the SSBN(X) program.

[72] Christopher P. Cavas, "Lawmaker Wants Key Submarine Document," *DefenseNews.com*, April 22, 2010.

Author Contact Information

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