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Navy Next-Generation Attack Submarine (SSN[X]) Program: Background and Issues for Congress

Introduction

The Navy has been procuring Virginia-class nuclear powered attack submarines (SSNs) since FY1998. The Navy's envisaged successor to the Virginia-class design is the Next-Generation Attack Submarine, or SSN(X). The Navy's FY2024 budget submission envisaged procuring the first SSN(X) in FY2035. The Navy's FY2025 budget submission defers the envisaged procurement of the first SSN(X) from FY2035 to 2040 due, the Navy states, to limitations on the Navy's total budget.

Submarines in the U.S. Navy

The U.S. Navy operates nuclear-powered ballistic missile submarines (SSBNs), nuclear-powered cruise missile and special operations forces (SOF) submarines (SSGNs), and nuclear-powered attack submarines (SSNs). The SSNs are general-purpose submarines that can perform a variety of peacetime and wartime missions.

Virginia-Class Program

When procured at a rate of two boats per year, Virginia-class SSNs (**Figure 1**) equipped with the Virginia Payload Module (VPM) have a current estimated procurement cost of more than \$4.5 billion per boat. For additional information on Navy submarine programs, see CRS Report RL32418, *Navy Virginia-Class Submarine Program and AUKUS Submarine Proposal: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report R41129, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.

Figure 1. Virginia-Class Attack Submarine (SSN)



Source: Cropped version of photograph accompanying Dan Ward, "Opinion: How Budget Pressure Prompted the Success of Virginia-Class Submarine Program," *USNI News*, November 3, 2014. The caption states that it shows USS *Minnesota* (SSN-783) under construction in 2012 and credits the photograph to the U.S. Navy.

Submarine Construction Industrial Base

U.S. Navy submarines are built by General Dynamics' Electric Boat Division (GD/EB) of Groton, CT, and Quonset Point, RI, and Huntington Ingalls Industries' Newport News Shipbuilding (HII/NNS), of Newport News, VA. These are the only two shipyards in the country capable of building nuclear-powered ships. GD/EB builds submarines only, while HII/NNS also builds nuclear-powered aircraft carriers. The submarine construction industrial base also includes hundreds of supplier firms, as well as laboratories and research facilities, in numerous states. Much of the material procured from supplier firms for building submarines comes from sole-source suppliers.

SSN(X) Program

Program Designation

In the designation SSN(X), the "X" means that the exact design of the boat has not yet been determined.

Procurement Schedule

The Navy's FY2024 budget submission envisaged procuring the first SSN(X) in FY2035. The Navy's FY2025 budget submission defers the envisaged procurement of the first SSN(X) from FY2035 to FY2040. The Navy's FY2025 30-year (FY2035-FY2054) shipbuilding plan states: "The delay of SSN(X) construction start from the mid-2030s to the early 2040s presents a significant challenge to the submarine design industrial base associated with the extended gap between the *Columbia* class and SSN(X) design programs, which the Navy will manage."

Design of the SSN(X)

The Navy states that the SSN(X) "will be designed to counter the growing threat posed by near peer adversary competition for undersea supremacy. It will provide greater speed, increased horizontal [i.e., torpedo-room] payload capacity, improved acoustic superiority and non-acoustic signatures, and higher operational availability. SSN(X) will conduct full spectrum undersea warfare and be able to coordinate with a larger contingent of off-hull vehicles, sensors, and friendly forces." (Budget-justification book for FY2025 Research, Development, Test, and Evaluation, Navy account, Vol. 3 [Budget Activity 5], p. 1299.)

Navy officials have stated that the Navy wants the SSN(X) to incorporate the speed and payload of the Navy's fast and heavily armed *Seawolf* (SSN-21) class SSN design, the acoustic quietness and sensors of the Virginia-class design, and the operational availability and service life of the *Columbia*-class design. These requirements will likely result in an SSN(X) design that is larger than the original Virginia-class design, which has a submerged displacement of about 7,800 tons, and possibly larger than the original

SSN-21 design, which has a submerged displacement of 9,138 tons. Due to technological changes over the years for improved quieting and other purposes, the designs of U.S. Navy submarines with similar payloads have generally been growing in displacement from one generation to the next.

Potential Procurement Cost

An October 2023 Congressional Budget Office (CBO) report on the Navy's FY2024 30-year shipbuilding plan states that in constant FY2023 dollars, the SSN(X)'s average unit procurement cost is estimated at \$6.7 billion to \$7.0 billion by the Navy and \$7.7 billion to \$8.0 billion by CBO. CBO's estimate is about 14% to 15% higher than the Navy's estimate. The CBO report states that CBO's estimate assumes that the SSN(X) design would have a submerged displacement of about 10,100 tons, about 11% more than that of the SSN-21 design.

Issues for Congress

Issues for Congress include the following:

- whether the Navy has accurately identified the SSN(X)'s required capabilities and accurately analyzed the impact that various required capabilities can have on the SSN(X)'s cost;
- the potential impact of the SSN(X) program on funding that will be available for other Navy program priorities, particularly if CBO's estimate of the SSN(X)'s procurement cost is more accurate than the Navy's estimate;
- the potential impact of deferring procurement of the first SSN(X) from FY2035 to FY2040 on the U.S. ability in the 2040s and beyond to maintain superiority in undersea warfare and fulfill U.S. Navy missions;
- the details and adequacy of the Navy's plan for managing the impact on the submarine design industrial base of deferring procurement of the first SSN(X) from FY2035 to FY2040;
- whether it would be technically feasible for the SSN(X) to be powered by a reactor plant using low-enriched uranium (LEU), rather than the highly enriched uranium (HEU) used on other Navy nuclear-powered ships, particularly if procurement of the first SSN(X) is deferred from FY2035 to FY2040, and if so, what impact that would have on nuclear arms control and nonproliferation efforts and SSN(X) costs and capabilities; and
- whether each SSN(X) should be built jointly by GD/EB and HII/NNS (the approach used for building Virginia-class SSNs and, in modified form, for building Columbia-class SSBNs), or whether individual SSN(X)s should instead be completely built within a given shipyard (the separate-yard approach used for building earlier Navy SSNs and SSBNs).

Regarding the fifth issue above, a January 2020 Department of Energy (DOE) National Nuclear Security Administration (NNSA) report to Congress on the potential for using LEU for the SSN(X) that was provided by the Navy to CRS in unclassified form stated

It is not practical to substitute LEU into existing naval fuel systems or to design a VIRGINIA Class Submarine (VCS) replacement [i.e., the SSN(X)] around an unproven advanced LEU fuel concept. Developing a newly designed submarine capable of later acceptance of an LEU reactor core would also involve insertion of substantial margin (e.g., increased hull size) that would be difficult to estimate accurately at present and costly to implement. If future United States policy requires a shift to LEU, at least 15 years of advanced fuel development and significant investment would be required. This development timeline makes it impractical to design a lead ship VCS replacement with an LEU reactor while meeting the Navy's schedule.

Funding Request

FY2024

The Navy's proposed FY2024 budget requested \$544.7 million in research and development funding for the SSN(X) program, including \$361.6 million in Project 2368 (SSN[X] Class Submarine Development) within Program Element (PE) 0604850N (SSN[X]), which is line 154 in the Navy's FY2024 research and development account, and \$183.1 million in Project 2370 (Next Generation Fast Attack Nuclear Propulsion Development) within PE 0603570N (Advanced Nuclear Power Systems), which is line 47. The explanatory statement for the FY2024 DOD Appropriations Act (Division A of H.R. 2882/P.L. 118-47 of March 23, 2024) reduces the request for line 154 by \$39.754 million for "Shipbuilder studies unjustified growth" (\$18.0 million), "NSWC [Naval Surface Warfare Center] studies unjustified growth" (\$13.804 million), and "Management and support costs unjustified growth" (\$7.95 million) (PDF page 217 of 314), and reduces the request for line 47 by \$27.0 million for "Overestimation of SSN(X) expenditures" (PDF page 212 of 314). The explanatory statement directs the Comptroller Director to conduct a comprehensive review of the Virginia-class program that is to include, among other things, the Navy's plans for SSN(X) development (PDF page 146 of 314).

FY2025

The Navy's proposed FY2025 budget requests \$586.9 million in research and development funding for the SSN(X) program, which is \$208.0 million less than the \$794.9 million in research and development funding that was programmed for FY2025 under the Navy's FY2024 budget submission. The request for \$586.9 million includes \$348.8 million in Project 2368 (SSN[X] Class Submarine Development) within Program Element (PE) 0604850N (SSN[X]), which is line 155 in the Navy's FY2025 research and development account, and \$238.1 million in Project 2370 (Next Generation Fast Attack Nuclear Propulsion Development) within PE 0603570N (Advanced Nuclear Power Systems), which is line 47.

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