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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 FY2040 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 (Pillar 1) Project: 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 analyzed their impact on the SSN(X)'s cost;
- the potential future impact of the SSN(X) program on funding 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 to FY2040 on the future U.S. ability to maintain undersea superiority and fulfill U.S. Navy missions;
- the Navy's plan for managing the impact on the submarine design industrial base of deferring procurement of the first SSN(X) to FY2040;
- whether it would be feasible and cost-effective 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 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 May 17, 2024, Navy information paper provided to CRS states that

> The shift in expected delivery of SSN(X) [due to the deferral of the lead ship procurement from FY2035 to FY2040] does not change the Navy's position of not pursuing LEU fuel. Naval fuel system testing and evaluation would need to be funded and performed. Prior estimates have been 10-15 years and $1B to complete enough work to determine whether a fuel system may be viable and what performance may be achieved. Success is not assured. An optimistic estimate of total time to develop and deploy a naval LEU fuel system is 20-30 years (which includes the 10-15 years initial development program) and $25B. This does not include the cost of additional force structure to cover mission of submarines being refueled.
>
> The U.S. Navy has developed and improved technology using highly enriched uranium (HEU) fuel over the past 75 years, providing the U.S. Navy with unmatched asymmetric advantages in naval warfare. U.S. Navy warships requirements determine naval fuel system design features, including the use of HEU fuel. An LEU fuel system would not provide any military benefit to the performance of U.S. naval reactors. It would decrease the available energy in the propulsion plant, negatively affect reactor endurance, reactor size, ship costs, force structure, and maintenance infrastructure.

Funding Request

The Navy's proposed FY2025 budget requests $586.9 million in research and development funding for the SSN(X) program ($208.0 million less than programmed for FY2025 under the Navy's FY2024 budget submission), including $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.

The joint explanatory statement for the House-Senate agreement on the FY2025 National Defense Authorization Act (NDAA) (H.R. 5009) recommends reducing the funding request for line 155 by $27.9 million for "Program delay" (page 69) and reducing the funding request for line 47 by $41.0 million for "Project 2370 excess to need" (page 64). Section 3116 of H.R. 5009 would prohibit FY2025 funds authorized by H.R. 5009 or otherwise made available for FY2025 from being obligated or expended for the purposes of conducting research and development of an advanced naval nuclear fuel based on LEU until certain determinations are provided.

The House Appropriations Committee, in its report (H.Rept. 118-557 of June 17, 2024) on the FY2025 DOD Appropriations Act (H.R. 8774), recommended approving the funding request for line 155 (page 191) and reducing the funding request for line 47 by $41.0 million (page 186). The Senate Appropriations Committee, in its report (S.Rept. 118-204 of August 1, 2024) on the FY2025 DOD Appropriations Act (S. 4921), recommended reducing the request for line 155 by a net $25.9 million (page 215) and reducing the request for line 47 by $85.0 million (page 214).

Ronald O'Rourke, Specialist in Naval Affairs

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