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

Introduction

The Navy wants to begin procuring a new class of nuclear-powered attack submarine (SSN), called the Next-Generation Attack Submarine or SSN(X), in FY2031. The SSN(X) would be the successor to the Virginia-class SSN design, which the Navy has been procuring since FY1998. The Navy's proposed FY2022 budget requests $98.0 million in research and development funding for the SSN(X) program.

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

Virginia-class SSNs (**Figure 1**) have been procured sicne FY2011 at a rate of two boats per year. Most Virginia-class boats procured in FY2019 and subsequent years are to be built with the Virginia Payload Module (VPM), an additional, 84-foot-long, mid-body section equipped with four large-diameter, vertical launch tubes for storing and launching Tomahawk cruise missiles or other payloads. When procured at a rate of two boats per year, VPM-equipped Virginia-class SSNs have an estimated procurement cost of about $3.4 billion per boat.

For additional information on Navy submarine programs, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: 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.

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. For nuclear-propulsion component suppliers, an additional source of work is the Navy's nuclear-powered aircraft carrier construction program.

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.

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

Under the Navy's FY2020 30-year (FY2020-FY2049) shipbuilding plan, the first SSN(X) would be procured in FY2031, along with a single Virginia-class boat. In FY2032 and FY2033, the final four Virginia-class boats would be procured. Procurement of follow-on SSN(X)s, at a rate of two per year, would then begin in FY2034. The 30-year plan's sustained procurement rate of two SSNs per year would achieve a force of 66 SSNs—the Navy's current SSN force-level goal—in FY2048. A long-range Navy shipbuilding document released by the Biden Administration on June 17, 2021, proposed a new SSN force-level goal of 66 to 72 boats and envisaged increasing the SSN procurement rate years from now to something more than two boats per year.

Design of the SSN(X)

The Navy states that the SSN(X)

> will be designed to counter the emerging threat posed by near peer adversary competition for undersea supremacy. Unlike the VIRGINIA Class Submarine, which was designed for multimission dominance in the littoral, SSN(X) will be designed for greater transit speed under increased stealth

> conditions in all ocean environments, and carry a larger inventory of weapons and diverse payloads. It will also be designed to retain multi-mission capability and sustained combat presence in denied waters, with a renewed priority in the anti-submarine warfare (ASW) mission against sophisticated threats in greater numbers.
>
> (Budget-justification book for FY2022 Research, Development, Test, and Evaluation, Navy account, Vol. 3 [Budget Activity 5], p. 1301.)

The Navy wants the SSN(X) to incorporate the speed and payload 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. (Justin Katz, "SSN(X) Will Be 'Ultimate Apex Predator,'" *Breaking Defense*, July 21, 2021.)

Potential Procurement Cost

An April 2021 Congressional Budget Office (CBO) report states that in constant FY2021 dollars, the SSN(X)'s average unit procurement cost is estimated at $5.8 billion by the Navy and $6.2 billion by CBO—figures that are substantially higher than the $3.4 billion unit procurement cost of a VPM-equipped Virginia-class SSN.

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;
- 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, 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, is to be used 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 third 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.

FY2022 Funding Request and Congressional Action

The Navy's proposed FY2022 budget requests $98.0 million in research and development funding for the SSN(X) program, including $29.8 million in Project 2368 (SSN[X] Class Submarine Development) within Program Element (PE) 0604850N (SSN[X]), which is line 154 in the Navy's FY2022 research and development account, and $68.1 million in Project 2370 (Next Generation Fast Attack Nuclear Propulsion Development) within PE 0603570N (Advanced Nuclear Power Systems), which is line 48.

The House Armed Services Committee's report (H.Rept. 117-188 of September 10, 2021) on the FY2022 National Defense Authorization Act (NDAA) (H.R. 4350) recommended approving both of these funding requests. The Senate Armed Services Committee's report (S.Rept. 117-39 of September 22 [legislative day, September 21], 2021) on the FY2022 NDAA (S. 2792) recommended increasing line 154 by $25.8 million for "Navy UFR [unfunded requirement]—SSN(X) non-propulsion development." (Page 446)

The House Appropriations Committee's report (H.Rept. 117-88 of July 15, 2021) on the FY2022 DOD Appropriations Act (H.R. 4432) recommended reducing line 154 by $4.98 million for "excess to need" (page 270) and line 48 by $18.082 million for a "Classified adjustment" that may or may not be related to the SSN(X) program (page 266). The Senate Appropriations Committee, in the explanatory statement it released on October 18, 2021, for the FY2022 DOD Appropriations Act (S. XXXX), recommends approving the program's two funding requests. (PDF pages 170 and 172 of 253) The explanatory statement also recommends reducing the funding request for line 136—the line that requests funds for research and development work for improving the Virginia-class design—by $186.3 million for "Transfer to project XXX for SSN(X) acceleration only," and also increasing the funding request for line 136 by $273.3 million for "Project XXX: Transfer for SSN(X) acceleration only." (Page 176)

The House Appropriations Committee's report (H.Rept. 117-98 of July 20, 2021) on the FY2022 Energy and Water Development and Related Agencies Appropriations Act (H.R. 4549) recommends $20.0 million "within Nonproliferation Fuels Development to develop high-density, low-enriched fuels that could replace highly enriched uranium for naval applications." (Page 164)

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