Columbia-Class Submarine

Executive Summary
- The *Columbia*-class submarine will replace the current *Ohio*-class fleet ballistic missile submarine (SSBN).
- The Navy conducted an Early Operational Assessment (EOA) from August 2017 to July 2018. The EOA focused on the evaluation of *Columbia*-class design maturity to identify risks that can be mitigated prior to *Columbia*'s IOT&E scheduled for 2029. These risks are described in the Commander, Operational Test and Evaluation Force and DOT&E classified reports.
- The Navy continues to advance the *Columbia*-class design and is on track to start lead ship construction in October 2020 to ensure the delivery of *Columbia* for the first strategic patrol and Initial Operational Capability scheduled in 2031.

System
- The *Columbia*-class will recapitalize the aging *Ohio*-class fleet SSBN.
- The *Columbia*-class submarines will include a new design to:
  - Improve survivability over the legacy *Ohio* class.
  - Maximize availability and not require mid-life refueling allowing a fleet of 12 *Columbia*-class submarines to maintain the same at-sea presence as a fleet of 14 legacy *Ohio*-class submarines.
  - Host the existing Trident II Life Extension Strategic Weapon System. The Strategic Weapon System includes the Trident II D5 Life Extension missile, launcher, fire control, navigation systems, and associated support systems.
  - Use existing and recapitalized *Ohio*-class basing, maintenance, and training infrastructure. The Navy will leverage many ship components, such as communications, sonar, tactical control system, and internal computer networks from other submarine classes to reduce cost and risk as well as expand commonality across the submarine force.
- The Navy plans to procure 12 *Columbia*-class submarines to support U.S. Strategic Command requirements. Initial Operational Capability and the first Strategic Patrol is scheduled for FY31. The fielding rate consists of one submarine per year starting with the second submarine of the 12-ship class.
- The Navy is designing the *Columbia*-class submarines to have a 42-year service life and support a mixed gender crew. The last ship of the *Columbia* class will be decommissioned in the mid-2080s.

Mission
The Commander, U.S. Strategic Command will employ *Columbia*-class submarines as the survivable leg of the U.S. nuclear triad providing an effective sea-based strategic nuclear deterrent.

Major Contractors
- General Dynamics Electric Boat – Groton, Connecticut
- Huntington Ingalls Industries, Newport News Shipbuilding-Newport News, Virginia

Activity
- The Navy conducted an EOA, designated OT-B1, between August 2017 and July 2018, to support the 2020 Critical Design Review and lead ship Construction Defense Acquisition Board. The EOA focused on providing an assessment of risks that could affect operational effectiveness and suitability in support of IOT&E currently scheduled for 2029. The EOA was conducted in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP) and test plan. DOT&E issued the *Columbia* OT-B1 classified report in March 2019.
- The Navy completed the *Columbia*-class SSBN Validated Online Lifecycle Threat (VOLT) Report in November 2018. The VOLT replaced the Submarine Capstone System Threat Assessment Report and is the Office of Naval Intelligence's assessment of present and future threats to the *Columbia* platform and acquisition program.

- The Navy conducted two live fire test series in 2019 to support the survivability assessment of the vessel to underwater shock events. The first test series included shallow submergence underwater explosion tests to understand the response of representative scaled Tube Stiffened Models (TSM) when subjected to underwater shock loading. The second test series, using data from the first test series, included firings of small explosive charges against TSM's inside a pressure vessel simulating a submerged environment. Both test series will improve the confidence in the modeling and simulation (M&S) used to assess the *Columbia*-class's survivability. Tests were completed in accordance with the DOT&E-approved LFT&E Management Plan and detailed test plans.
- The Navy started the construction of all six *Columbia*-class super modules and is on track to meet Initial Operational Capability in 2031.
- In coordination with DOT&E, the Navy canceled the TEMP and LFT&E Management Plan update for 2019 as none were needed.

Assessment

- The *Columbia* EOA identified several design risks that may affect the ship's operational effectiveness and suitability. The details are classified and can be found in the Commander, Operational Test and Evaluation Force and DOT&E classified reports. The Program Office had identified many of these risks prior to the 2018 EOA and has plans to mitigate them prior to the start of *Columbia*'s IOT&E in 2029.
- The 2018 *Columbia* EOA addressed M&S limitations identified in the 2013 *Ohio* Replacement EOA and revealed additional, albeit known M&S limitations. The *Columbia*- and *Virginia*-class programs are collaborating to update the M&S for future operational assessments and IOT&E.
- DOT&E will continue to work with the Navy to secure test resources needed to evaluate *Columbia*'s susceptibility against emerging threats identified by the Intelligence Community as relevant to the effectiveness and survivability of the *Columbia*-class submarine program.
- Evaluation of the *Columbia*-class's survivability to underwater threats was assessed in the first *Columbia* Survivability Assessment Report in February 2018. Additional analysis is ongoing and the next *Columbia*-class submarine Survivability Assessment Report is expected in 2026, prior to lead ship delivery from the shipyard.

Recommendation

1. The Navy should address the recommendations from the classified EOA reports.