

SSN 774 *Virginia* Class Submarine

Executive Summary

- The USS *Virginia* successfully completed initial builder's and performance trials. Both the crew and the ship performed well. The Navy deployed USS *Virginia* to the U.S. Southern Command area in 2005. The Navy conducted a Quick Reaction Assessment (QRA) to assess the ability of the ship and crew to successfully complete the limited mission areas assigned.
- Operational evaluation is scheduled for late 2008.
- The Navy and DOT&E are conducting a review of the *Virginia* class LFT&E program.

System

The *Virginia* class submarine is the replacement for the aging fleet of *Los Angeles* class submarines with the capability of the *Seawolf*.

- Capable of targeting, controlling, and launching Mk 48 Advanced Capability torpedoes, Tomahawk cruise missiles, and mines
- Sonar capability similar to the *Seawolf* submarine class with improvements to electronic support suite and combat control systems
- New design propulsion plant incorporating many proven components from previous submarine classes
- Utilizes a modular design and significant commercial off-the-shelf hardware

Mission

The Maritime Mission Commander will employ the *Virginia* class submarine to enable open-ocean and littoral covert operations in support of the following submarine mission areas:



- Strike warfare
- Anti-submarine warfare
- Intelligence collection and surveillance
- Indications and warnings
- Electronic warfare
- Anti-surface ship warfare
- Special warfare
- Mine warfare
- Battle Group/Expeditionary Strike Group Support

Activity

- The Navy commissioned the lead ship USS *Virginia* and conducted initial sea and acoustic trials in FY05. The Navy and building shipyard completed the builder's and initial performance trials successfully with a few system and ship deficiencies. Correction of deficiencies will occur during *Virginia's* post-shakedown availability in 2006. There are plans to complete Non-propulsion Electronic Systems modernization and performance trials in 2007 and Operational Evaluation (OPEVAL) in late 2008.
- The Navy chose to deploy USS *Virginia* in 2005, before completing scheduled developmental and operational testing. The Navy has a process called a QRA for evaluating the performance of a system they desire to deploy without completing operational testing. The Commander, Operational Test and Evaluation (COMOPTEVFOR) conducted the QRA

during sea trials, dockside testing, and planned developmental testing prior to the deployment. COMOPTEVFOR stated that the current status of USS *Virginia* supported the limited scope deployment planned by the Navy and plans to include their observations in an ongoing operational assessment.

- DOT&E approved the *Virginia* class Submarine Test and Evaluation Master Plan (TEMP) Revision D on June 2, 2004. DOT&E directed the Navy to complete a TEMP revision to identify the final system configurations installed on USS *Virginia* during the FY06 Post-Shakedown Availability and pre-OPEVAL modernization maintenance availabilities.
- USS *Virginia* conducted a short deployment to the U.S. Southern Command Area of Responsibility in September–October 2005.

NAVY PROGRAMS

- The Navy conducted extensive testing, analysis, and modeling and simulation to support a recommendation to delete the full ship shock trial from the approved LFT&E program. After considerable review of the Navy's work, OSD concurred with the recommendation to delete the USS *Virginia* full ship shock trial provided the Navy:
 - Complete the verification, validation, and accreditation of the Transient Shock Analysis Process
 - Conduct a bottoms-up review of the *Virginia* class LFT&E program to identify data voids and additional testing and/or analysis that may be needed to better understand the survivability of the *Virginia* class submarine

Assessment

- USS *Virginia* completed initial trials on schedule with few deficiencies. *Virginia's* Non-propulsion Electronic Systems adequately supported at-sea trials. This is a credit to the extensive testing at the shipbuilder and the land-based test site over the last three years.
- The Navy plans to upgrade many of these systems in 2007; however, some systems such as Acoustic Rapid Commercial off-the-shelf Insertion (A-RCI) sonar will not be upgraded. By the time *Virginia* undergoes OPEVAL, the installed sonar system will be one of the oldest and least capable installed on U.S. submarines. Performance in all mission areas is dependent on A-RCI system performance; this increases the risk that *Virginia* will perform poorly in operational testing in some mission areas. The A-RCI sonar modernization program has a history of inadequate testing.
- *Virginia's* early deployment forced a unique and rapid evaluation period that the Navy considers a precedent for

- integrated testing. The Navy's instructions state that the QRA does not satisfy or alter plans or need for full operational testing. COMOPTEVFOR did not resolve any critical operational issues during the QRA. DOT&E considers the scope of this type of testing inadequate for operational evaluations.
- Acquisition decisions, cost, and the rapid pace of technology change forces the Navy to complete the building of submarines during post-shakedown availability and modernization availabilities after delivery from the shipyard. Currently the schedule has more than four years between delivery and the completion of OPEVAL. Most of the schedule time is for completing the building, modernization, testing, and certification of the ship.
 - DOT&E anticipates a comprehensive survivability evaluation will result from a successful completion of the bottoms-up review of the *Virginia* class LFT&E program.

Recommendations

1. The Navy should complete all developmental and operational testing before scheduling or conducting further deployments.
2. Navy operational testers should ride all ship underway periods to ensure familiarity with *Virginia* systems and to support the rapid completion of OPEVAL.
3. The Navy should consider installing upgraded supporting program systems, such as the A-RCI sonar before OPEVAL. These upgrades will ensure USS *Virginia* has the same or better systems than the current systems in the fleet. Separately the Navy should take measures to ensure the modernization programs such as the A-RCI sonar program completes adequate operational testing.