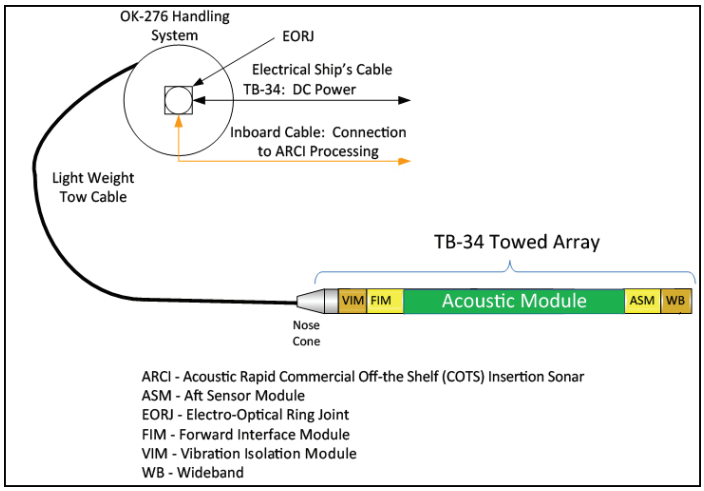
TB-34 Towed Array

Executive Summary

- The Navy completed operational testing of the TB-34 towed array in accordance with the DOT&E-approved test plan in January 2010 and DOT&E issued a classified Beyond Low-Rate Initial Production (BLRIP) report on the test results in November 2010.
- The TB-34 towed array meets the technical and performance requirements and is an acceptable and operationally suitable replacement for the TB-16 legacy array. The TB-34 towed array provides enhancements to the towing and self-noise characteristics compared to the TB-16.
- Future testing will be needed to determine if the TB-34 towed array's full capability, once implemented with new processing software, provides the anticipated performance improvements.

System

- The TB-34 towed array is one of several acoustic sensors that provide data to the Acoustic Rapid Commercial Off-the-Shelf Insertion (A-RCI) sonar system installed on U.S. submarines.
- A-RCI provides the computer processing and displays necessary for the TB-34 towed array to provide acoustic information to sonar operators. This array, along with the spherical array, hull array, wide aperture array, and high frequency array, enables submarines to conduct a variety of missions.
- The TB-34 towed array is intended to replace the legacy TB-16 tactical towed array, and provides additional hydrophones for future capability in passive sonar processing. The array is intended to provide improved capability for Anti-Submarine Warfare and contact avoidance in cluttered littoral environments as well as maintain the U.S. Submarine Force's Ready for Issue fat-line towed array inventory.



Mission

Submarine crews equipped with a TB-34 towed array should be able to complete the following submarine force missions:

- Covertly search, detect, track, and attack submarine and surface vessels in open-ocean and littoral sea environments
- Covertly conduct Intelligence, Surveillance, and Reconnaissance
- Covertly search and select appropriate locations to conduct other submarine missions (e.g., Strike Warfare, Naval Special Warfare, and Mine Warfare)

Major Contractor

Chesapeake Sciences Corporation – Millersville, Maryland

Activity

- The Navy completed operational testing of the TB-34 towed array in January 2010 in accordance with a DOT&E-approved test plan. Additional testing and data collection occurred during the deployment of the host submarine in early 2010.
- The Navy's Operational Test Agency, Commander, Operational Test and Evaluation Force (COTF), issued his report in April 2010. DOT&E delayed the release of a BLRIP report until operational data from the host submarine's deployment were received and analyzed.
- The TB-34 towed array testing was conducted in conjunction with the operational testing of A-RCI Advanced Processor Build 2007 (APB-07) and the APB-07 version of the AN/BYG-1 fire control system. DOT&E did not approve a Test and Evaluation Master Plan (TEMP) for the TB-34 towed array, but did approve TEMPs for the A-RCI and BYG-1 APB-07 programs in 2009, which included TB-34 towed array testing.
- DOT&E issued a classified BLRIP report on the test results in November 2010.

Assessment

- The Navy completed all planned operational testing of the TB-34 towed array.
- The DOT&E classified BLRIP report on TB-34 performance concluded the following:
  - The TB-34 towed array meets the technical and performance requirements and is an acceptable and operationally suitable replacement for the TB-16 legacy array.

- The TB-34 towed array provides enhancements in regards to towing and self-noise characteristics. DOT&E considers the TB-34 towed array a useful tool in U.S. submarines' sonar suites that contributes to providing safety-of-ship and situational awareness during submerged operations.
- In addition to the requirement of the TB-34 towed array's performance to be equivalent to the TB-16 legacy array, all other requirements were technical in nature and were successfully demonstrated during developmental testing. Operational testing provided information to assess mission performance in an operational environment against actual submarine and surface targets.
- The Navy conducted adequate in-water operational testing to provide a baseline comparison of the TB-34 towed array to the legacy TB-16 towed array. Additional testing will be required when the Navy introduces software processing to take advantage of the TB-34 towed array's full capability. This upgrade is currently planned for the APB-11 version of A-RCI.
- There were indications from the test data that the TB-34 towed array with the current processing software may exhibit a slight degradation in performance in comparison to the legacy TB-16 array. However this effect did not generally degrade operational performance for a well-trained crew.
- The Navy discovered during operational testing that the first TB-34 array exhibited a noisy channel problem due to a hardware design flaw. Additional testing and analysis will be needed to validate the effectiveness of the Navy's planned fixes.

• The Navy has achieved some testing efficiencies by combining operational testing of several programs into consolidated test events. Since testing is interdependent, the consolidation of A-RCI, TB-33, TB-34, and AN/BYG-1 TEMPs into an Undersea Enterprise Capstone document would increase testing efficiency and enable a full end-to-end evaluation of submarine capability in the applicable mission areas.

Recommendations

• Status of Previous Recommendations. This is the first annual report for this program.

• FY10 Recommendations. The Navy should address the recommendations contained in DOT&E's classified BLRIP report issued in November 2010 on the TB-34 towed array. Specifically,

1. Complete the development, implementation, and testing of the TB-34 towed array's full capability.
2. Conduct additional testing to characterize the self-noise and reliability of the TB-34 when it is towed with short tow cable scopes.
3. Conduct additional testing to determine the extent of a potential degradation in performance relative to the TB-16.
4. Continue to collect reliability and availability data on the TB-34 towed array.
5. Conduct additional testing of the first array manufactured with the hydrophone wiring modification to correct the noisy channel issue. Verify that this correction improves array performance.
6. Combine future test and evaluation of the TB-34 towed array with A-RCI testing since the TB-34 towed array is not functional without the power, processing, and displays provided by A-RCI.
7. Consolidate A-RCI, TB-33, TB-34, and AN/BYG-1 TEMPs into an Undersea Enterprise Capstone document.