

## AN/SQQ-89A(V)15 Integrated Undersea Warfare (USW) Combat System Suite

### Executive Summary

- Operational testing of the Advanced Capability Build 2011 (ACB-11) variant began in FY14 and is expected to conclude in FY15. However, the Navy has not yet scheduled all required IOT&E events. The Navy completed limited, at-sea testing in FY14 in conjunction with two fleet-training events.
- In December 2014, DOT&E issued a classified Early Fielding Report on the ACB-11 variant of AN/SQQ-89A(V)15 Integrated Undersea Warfare Combat System Suite. The report was submitted due to the installation of the ACB-11 variant on ships that deployed prior to IOT&E. From the data collected, DOT&E concluded the system demonstrated some capability to detect submarines and incoming U.S. torpedoes in deep water. However, no data were available to assess its capability in shallow water, an area of significant interest due to the prevalence of submarines operating in littoral regions. Also, no data were available to assess performance against threat torpedoes.

### System

- AN/SQQ-89A(V)15 is the primary Undersea Warfare system used aboard U.S. Navy surface combatants to locate and engage threat submarines. AN/SQQ-89A(V)15 is an open architecture system that includes biannual software upgrades (ACBs) and four-year hardware upgrades called Technology Insertions.
- AN/SQQ-89A(V)15 uses active and passive sonar to conduct Anti-Submarine Warfare (ASW) search. Received acoustic energy is processed and displayed to support operator detection, classification, localization, and tracking of threat submarines.
- AN/SQQ-89A(V)15 uses passive sonar (including acoustic intercept) to provide early warning of threat torpedoes.
- The Navy intends for the program to provide improvement in sensor display integration and automation, reduction in false alerts, and improvement in onboard training capability to better support operation within littoral regions against multiple sub-surface threats.
- The system consists of:
  - Acoustic sensors – hull-mounted array, multi-function towed array (TB-37) including a towed acoustic intercept array, calibrated reference hydrophone, helicopter, and/or ship deployed sonobuoys



- Functional segments used for processing and display of active, passive, and environmental data
- Interface to Aegis Combat System for Mk 46 and Mk 54 torpedo prosecution using surface vessel torpedo tubes, Vertical Launch Anti-Submarine Rocket, or SH-60B/MH-60R helicopters
- The system is deployed on a DDG 51 class destroyer or CG 47 class cruiser host platform.

### Mission

- Maritime Component Commanders employ surface combatants with AN/SQQ-89A(V)15 as escorts to high-value units to protect against threat submarines during transit.
- Maritime Component Commanders use surface combatants with AN/SQQ-89A(V)15 to conduct area clearance and defense, barrier operations, and ASW support during amphibious assault.
- Theater Commanders use surface combatants with AN/SQQ-89A(V)15 to support theater ASW prosecution of threat submarines.
- Unit Commanders use AN/SQQ-89A(V)15 to support self-protection against incoming threat torpedoes.

### Major Contractor

Lockheed Martin Mission Systems and Training – Manassas, Virginia

## Activity

- In January 2013, DOT&E sent a memorandum to the Assistant Secretary of the Navy (Research, Development, and Acquisition) outlining the need for a threat torpedo surrogate to support operational testing of the AN/SQQ-89A(V)15. In October 2013, the Navy commenced a formal study to identify gaps in currently available torpedo surrogates' capability to represent threat torpedoes. The study was also intended to provide an analysis of alternatives for either the modification of current surrogates or the development of new surrogates to overcome these identified gaps.
- In August 2014, DOT&E approved the Test and Evaluation Master Plan covering the ACB-11 variant. ACB-11 operational testing will include at-sea evaluations focusing on ASW and torpedo detection, particularly in shallow-water (generally defined as water that is less than 100 fathoms in depth), littoral environments that have not been evaluated in prior variants. Testing will also include a cybersecurity evaluation.
- In December 2014, DOT&E issued a classified Early Fielding Report for the ACB-11 variant of AN/SQQ-89A(V)15 Integrated Undersea Warfare Combat System Suite. The report was issued due to the installation of the ACB-11 variant on ships that deployed prior to IOT&E.
- The Commander, Operational Test and Evaluation Force commenced IOT&E on the ACB-11 variant in May 2014. Testing was conducted in accordance with a DOT&E-approved test plan and included ASW transit search and area search operations using AN/SQQ-89A(V)15 onboard a DDG 51 class destroyer. Testing was conducted in conjunction with the following two fleet events:
  - Submarine Command Course 40 Anti-Surface Warfare events at the Navy's Atlantic Undersea Test and Evaluation Center.
  - Submarine Command Course 40 ASW events at the Fort Pierce, Florida, Operations Area. This testing focused on torpedo employment in shallow water.
- The Navy has not yet scheduled the dedicated IOT&E.

## Assessment

- The final assessment of ACB-11 is not complete, as testing is expected to continue through FY15. DOT&E's classified Early Fielding Report concluded the following regarding performance:
  - The ACB-11 variant appears to be meeting program performance metrics for submarine detection and classification in deep-water environments. This assessment is made with low confidence due to limited data collection. Also, the data were insufficient to determine if this detection capability and accompanying operator classifications would translate to an effective prosecution of the threat submarine.
  - The ACB-11 variant demonstrated some capability to detect U.S. torpedoes at a program-defined range that is intended to support a meaningful torpedo evasion.

However, the data were insufficient to determine if the observed torpedo detection ranges will support effective torpedo evasion. No data were available to assess performance against quieter, modern torpedoes.

- The ACB-11 variant is currently not suitable due to low operational availability. Extensive logistic delays limited system capability throughout the majority of the time frame evaluated. A primary contributor was a significant delay in the repair of the Multi-Function Towed Array (MFTA) because of a limited inventory of spare arrays; array repair is primarily achieved through replacement of the MFTA in port.
- Insufficient data were collected to confidently determine performance for the ACB-11 variant against real-world, diesel submarines and nuclear submarines. Further, no assessment can be made against the smaller midget and coastal diesel submarines due to the Navy having no test surrogates to represent this prevalent threat.
- Analysis of the few completed IOT&E events is ongoing. Preliminary analysis indicates that the ACB-11 variant has some capability to detect submarines in shallow water. However, the fleet exercise did not support the necessary ranges to assess detection against system requirements.
- The ability of surface combatants employing the ACB-11 variant to avoid torpedoes can only partially be assessed due to significant differences in U.S. torpedoes and torpedoes employed by other nations.

## Recommendations

- Status of Previous Recommendations. The Navy is making progress and should continue to address FY13 recommendations. The Navy has started the process for identifying existing gaps between threat torpedoes and available torpedo surrogates in operational testing. However, the Navy still needs to:
  1. Complete an analysis and develop a plan to overcome gaps between threat torpedoes and torpedoes available for operational testing.
  2. Schedule and complete dedicated IOT&E test events in shallow water.
- FY14 Recommendations. The Navy should:
  1. Develop and integrate high-fidelity trainers and realistic, in-water test articles to improve training and proficiency of operators in ASW search and track of threat submarines, including midget and coastal diesel submarines.
  2. Include and assess capability of AN/SQQ-89A(V)15 during all opportunities against real-world diesel submarines to determine performance differences from that observed against U.S. nuclear submarines.
  3. Pre-position spare TB-37 MFTA and spare MFTA modules at appropriate forward-operating ports to minimize logistic delays.
  4. Address the four additional classified recommendations listed in the December 2014 Early Fielding Report.