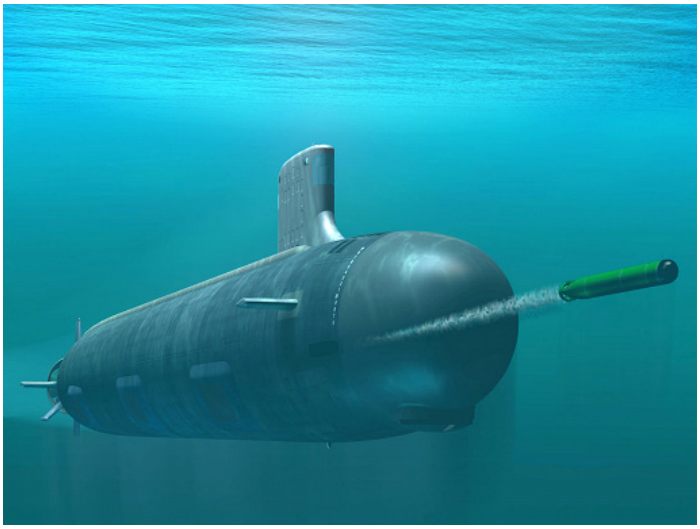
MK 48 Torpedo Modifications

Executive Summary

- The Navy collected performance data on the Advanced Processor Build 5 (APB 5) MK 48 torpedo from 115 torpedo firings against real-world submarine and surface ship targets. The Navy intends to complete IOT&E in 2QFY21. DOT&E will submit an IOT&E report after the Navy has completed testing.
- The Navy also collected APB 5 performance data using the Environment Centric Weapons Analysis Facility (ECWAF) that stimulates an in-the-loop APB 5 torpedo within a modeled environment. Successful development of the ECWAF for use against both submarines and surface ships will reduce at-sea torpedo runs for the next MK 48 variant, APB 6, by approximately 50 percent.

System

- The MK 48 torpedo is the only anti-submarine and anti-surface ship weapon used by U.S. submarines.
- Fielded MK 48 torpedo variants include MK 48 Mod 6, Mod 6 Advanced Common Torpedo (ACOT), and Mod 7 Common Broadband Advanced Sonar System (CBASS).
- Torpedo improvements are made within CBASS variants as a shared development effort with the Royal Australian Navy. Torpedo improvements are primarily software based and the torpedo is commonly referred to by its software build (e.g., APB 5 torpedo).



Mission

The Submarine Force employs the MK 48 torpedo to destroy submarines and surface ships in all ocean environments.

Major Contractor

Lockheed Martin Sippican Inc. – Marion, Massachusetts

Activity

- From September 2019 through June 2020, the Navy collected APB 5 performance data from simulation runs against modeled submarine targets using the ECWAF at the Naval Undersea Warfare Command in Newport, Rhode Island. The ECWAF stimulates an in-the-loop APB 5 torpedo within a modeled environment.
- In October 2019, the Navy concluded that the APB 5 torpedo was ready for operational testing against surface ships. The Navy had previously concluded that the APB 5 torpedo was ready for operational testing against submarines in August 2018.
- In November 2019 through September 2020, the Navy collected APB 5 performance data on 115 exercise torpedo firings against submarines and surface ships. The Navy conducted the following events in accordance with DOT&E-approved test plans:
  - One hundred and two torpedo firings during fleet training events (Submarine Command Courses and Combat Readiness Evaluations).
  - Thirteen APB 5 torpedo firings in a dedicated in-water operational test event to the North of Maui, Hawaii.
- In November 2019, the Navy commenced validation of the ECWAF for APB 5 performance data collection against modeled submarines and environments. Validation compares in-water exercise torpedo performance to that demonstrated with simulation. The Navy prioritized development and validation of the ECWAF for use in assessing APB 5 performance against submarines. The Navy deferred development and validation of the ECWAF for use against modeled surface ships until the operational testing of the next variant, APB 6, of the MK 48 torpedo.

Assessment

- DOT&E will report operational effectiveness and suitability after the completion of IOT&E; the Navy intends to complete IOT&E of the APB 5 torpedo in 2QFY21. DOT&E impressions of initial performance were reported in a classified Early Fielding Report dated September 23, 2019.
- ECWAF runs contribute to the APB 5 evaluation by providing supplemental performance data for the at-sea scenarios and performance data against threat submarines in environments

that are unavailable for at-sea testing. The Navy expects to complete the accreditation of the ECWAF for evaluation of APB 5 performance against submarines in 1QFY21.

- Accreditation of the ECWAF to support performance assessment against both submarines and surface ships will reduce at-sea testing of the next variant, APB 6, by approximately 50 percent. The Navy appropriately focused ECWAF development on modeling and simulation related to submarines for APB 5. However, the Navy must complete development of the models for surface ships in order to achieve the full reduction in at-sea testing for APB 6.

Recommendation

1. The Navy should complete development of models related to surface ships in the ECWAF as soon as feasible to support the operational assessment of the APB 6 torpedo.