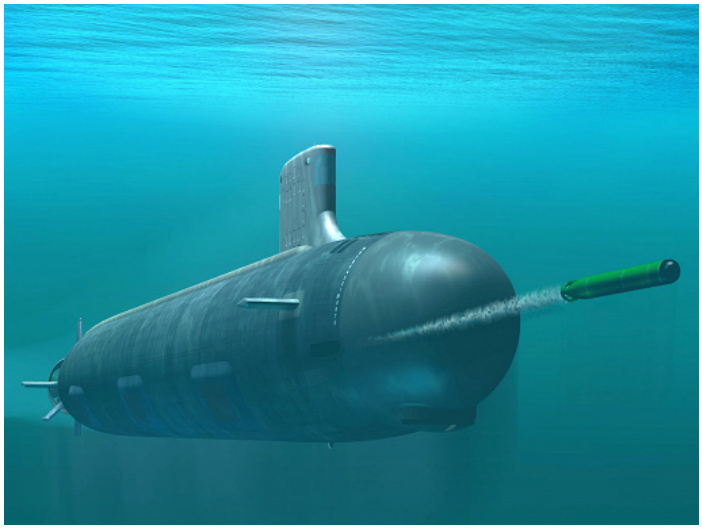
MK 48 Torpedo Modifications

Executive Summary
- In May 2019, the Navy fielded the Advanced Processor Build 5 (APB 5) for the MK 48 Mod 7 Common Broadband Advanced Sonar System (CBASS) torpedo prior to the completion of IOT&E.
- In September 2019, DOT&E submitted a classified Early Fielding Report (EFR) for the APB 5 Torpedo. APB 5 has no apparent degradation from the preceding variant, APB 4, in its ability to acquire and close submarines and surface ships. APB 5 demonstrates improvement in some tactically relevant scenarios. However, a primary modification in APB 5 is untested.
- DOT&E will report operational effectiveness and suitability upon the completion of IOT&E; the Navy intends to complete IOT&E of the APB 5 torpedo in 2020.

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 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 surface ships and submarines in all ocean environments.

Major Contractor
Lockheed Martin Sippican Inc. – Marion, Massachusetts

Activity
- In August 2018, the Navy concluded that the APB 5 torpedo was ready to undergo operational testing against submarines. The Navy deferred operational testing against surface ships pending completion of additional developmental testing.
- In September 2018, the Navy commenced operational testing of the APB 5 torpedo against submarines and continued developmental testing against surface ships. The Navy conducted the following events in accordance with DOT&E-approved test plans.
  - In September 2018, in-water testing of 14 APB 5 torpedoes against a U.S. nuclear submarine and an Australian diesel submarine.
  - In November 2018 through August 2019, in-water testing of 38 APB 5 torpedoes against U.S. nuclear submarines. Testing includes APB 5 torpedoes employed during fleet training events (Submarine Command Courses and Combat Readiness Evaluations). Fleet training events included 25 APB 5 torpedoes employed against surface ships.
  - In June 2019, in-lab evaluation of the survivability of the APB 5 torpedo and its test equipment against cyber-attacks.
  - In June 2019, model and simulation (M&S) runs using the Environment Centric Weapons Analysis Facility (ECWAF) commenced. M&S runs will continue through 1QFY20.
- In May 2019, the Navy fielded the APB 5 torpedo prior to the completion of IOT&E. Torpedoes in the wartime inventory are updated to APB 5 software as available.
- In September 2019, DOT&E submitted a classified EFR for the APB 5 torpedo.
- In October 2019, the Navy concluded the APB 5 torpedo ready to undergo operational testing against surface ships.

Assessment
- The DOT&E EFR dated September 23, 2019, had insufficient data to determine operational effectiveness and suitability due to testing being incomplete. However, DOT&E had the

following unclassified conclusions and impressions regarding performance:
  - APB 5 has no apparent degradation from the preceding variant, APB 4, in its ability to acquire and close submarines and surface ships.
  - APB 5 demonstrates improvement in some tactically relevant scenarios.
  - A primary modification in APB 5 is untested.
- DOT&E will report operational effectiveness and suitability upon the completion of IOT&E; the Navy intends to complete IOT&E of the APB 5 torpedo in 2020.
- ECWAF runs contribute to the APB 5 evaluation by providing supplemental performance data for the at-sea scenarios and performance data in environments that are unavailable for at-sea test. Further, successful accreditation of the ECWAF for APB 6 will reduce its at-sea testing by approximately 50 percent.

Recommendation

1. The Navy should address the three recommendations in the classified 2019 DOT&E EFR.