

Evolved Sea Sparrow Missile (ESSM) Block 2



In July 2022, the Navy delivered initial rounds of the Evolved Sea Sparrow Missile (ESSM) Block 2 for Aegis platforms to fleet inventory, prior to the completion of IOT&E. DOT&E submitted a classified Early Fielding Report (EFR) in September 2022 that includes anomalies that the Navy should address prior to the expected completion of IOT&E in FY25. Due to IOT&E being incomplete, insufficient data are available to determine operational effectiveness, suitability, lethality, or survivability in a contested environment.

SYSTEM DESCRIPTION

The ESSM Block 2 is a short-to-medium-range, ship-launched, guided missile intended to provide defensive, hard-kill engagement capability against anti-ship cruise missiles. ESSM Block 2 leverages Standard Missile 6 technology to reduce reliance on illuminator support and mitigate challenges in missile sequencing that are inherent in high-density stream raids. Semi-active guidance (using shipboard illuminators) is retained from ESSM Block 1. The ESSM Block 2 also features a new blast fragmentation warhead. The Navy intends the ESSM Block 2 seeker upgrade to improve performance against stressing air warfare threats (including stream raids) in challenging electromagnetic spectrum environments.

The full capability of the ESSM Block 2 is not available without an update to the Aegis Weapon System that remains in development. The legacy combat system can employ the ESSM Block 2 but initializes the weapon as an ESSM Block 1 missile. Although initialized as an ESSM Block 1 missile, the ESSM Block 2 functions as an ESSM Block 2 but without some enhancements. The Navy will evaluate this functional compatibility mode in the first phase (Phase 1) of IOT&E. The Navy will evaluate the full capability, or the optimized capability mode, in a second phase (Phase 2) of IOT&E when the updated Aegis Weapon

System is available. Operational testing of ESSM Block 2 employed from Ship Self Defense System platforms is planned for FOT&E.

MISSION

The Joint Force Commander utilizes the ESSM Block 2 as a ship self-defense weapon against anti-ship cruise missiles as part of a layered defense of Aegis cruisers/destroyers and Ship Self Defense System Mk 2 platforms, to include aircraft carriers and amphibious ships.

PROGRAM

The ESSM Block 2 is an Acquisition Category II program. In December 2021, the Navy declared ESSM Block 2 initial operational capability for Aegis platforms. DOT&E approved the ESSM Block 2 Test and Evaluation Master Plan in March 2022. In July 2022, the Navy delivered initial rounds of the ESSM Block 2 for Aegis platforms to fleet inventory. DOT&E submitted a classified EFR in September 2022 based on the limited test conducted to date. The Navy expects to complete Phase 1 IOT&E in FY23 and commence Phase 2 in FY25.

» MAJOR CONTRACTOR

- Raytheon Missiles and Defense – Tucson, Arizona

TEST ADEQUACY

In August 2021, the Navy commenced Phase 1 IOT&E in accordance with a DOT&E-approved test plan, and observed by DOT&E. Data from both phases of IOT&E are required for determination of operational effectiveness, suitability, and cyber survivability of the ESSM Block 2. The Navy expects to complete Phase 2 IOT&E in FY25.

Although the Navy intends to use modeling and simulation (M&S) in Phase I IOT&E, the Navy has not accredited the intended M&S for operational evaluation. The Navy has not yet scheduled cyber survivability testing.

The Navy completed lethality testing in FY20 but has not completed associated analysis or provided a lethality assessment report.

PERFORMANCE

» EFFECTIVENESS

Data are insufficient to determine operational effectiveness. Analysis of live test flights of ESSM Block 2 identified anomalies that are detailed in the DOT&E EFR published in September 2022.

» SUITABILITY

Data are insufficient to determine operational suitability, including missile in-flight reliability and launch availability. Early estimates of suitability metrics

are detailed in the DOT&E EFR published in September 2022.

» **SURVIVABILITY**

Data are insufficient to determine survivability. The Navy has yet to conduct operational cyber survivability assessment or assess performance in a contested electromagnetic spectrum environment.

» **LETHALITY**

No assessment of lethality can be made due to Navy analysis and reporting of lethality testing being incomplete. A summary of the lethality tests is detailed the DOT&E EFR published in September 2022.

RECOMMENDATIONS

The Navy should:

1. Determine and correct the root cause of the anomalies identified in the September 2022 EFR prior to Phase 2 IOT&E.
2. Complete cyber survivability assessment prior to operational deployment.
3. Complete development and accredit ESSM Block 2 M&S capability prior to Phase 2 IOT&E.
4. Complete post-test lethality analysis and final reporting of the lethality assessment as soon as feasible.