

Evolved Seasparrow Missile (ESSM)

SUMMARY

- As a result of poor aerial target performance during the FY03 operational evaluation (OPEVAL), the Evolved Seasparrow Missile (ESSM) operational effectiveness is undetermined. ESSM is suitable and the warhead is lethal.
- Follow-on Operational Test and Evaluation (FOT&E) requires:
 - Testing with an Aegis combat system against supersonic, sea-skimming, maneuvering targets, and supersonic, high-diving targets; the existing schedule (FOT&E-1) includes only the former.
 - Testing with ESSMs that have undergone shipboard storage for the requisite duration.
 - Testing with non-Aegis combat systems as ESSM integration occurs with these systems. This will require the non-Aegis combat systems on the Self Defense Test Ship.
- Consideration should be given to providing surface target engagement capability with ESSM in Aegis systems.



The ESSM is a short-range missile intended to provide self-protection for surface ships.

SYSTEM DESCRIPTION AND MISSION

The ESSM is a short-range missile intended to provide self-protection for surface ships. ESSM development intended to balance total system effectiveness against the low-altitude supersonic anti-ship cruise missile (ASCM) threat. On Aegis ships, ESSM launches from the Mark 41 Vertical Launch System. Each launcher cell stores four missiles, with folded tail fins (Aegis destroyers have 96 cells and Aegis cruisers have 128 cells that can hold a mix of weapons such as ESSM, Standard Missile, and Tomahawk). Vertical launch requires a thrust vector control system on the ESSM rocket motor. Up-linked signals provide guidance commands until the ESSM is near the target, at which time guidance transitions to semi-active homing on reflected radar signals from the target. Another guidance mode is home-all-the-way, requiring no up-linked commands. At this time, funding for ESSM installation is for Aegis ships only. Other launch systems on non-Aegis ships (aircraft carriers, amphibious assault ships, other surface combatants) will fire ESSMs using the home-all-the-way mode. ESSM uses an 8-inch diameter modified guidance section and a new warhead section. A new 10-inch diameter rocket motor provides higher thrust for longer duration than predecessor Seasparrow missiles. ESSM is a cooperative development effort that includes 13 participating governments.

The Milestone II review was in November 1994. During 1998, the program restructured to add an operational assessment (Operational Test-IIA) based on missile flights at White Sands Missile Range, New Mexico, to support the first low-rate initial production decision. Results of operational testing (Operational Test-IIC) with the Self Defense Test Ship supported an additional low-rate initial production decision. Live Fire Test and Evaluation (LFT&E)/section level ground testing, conducted in FY96-FY98, included arena warhead tests against fragmentation mats and components of United States and foreign targets. In addition, LFT&E used results of flight testing during Operational Test-IIC, technical evaluation, and OPEVAL. The Assistant Secretary of the Navy for Research, Development, and Acquisition approved full-rate production in January 2004.

NAVY PROGRAMS

TEST AND EVALUATION ACTIVITY



DOT&E completed its combined OT&E/LFT&E report to Congress in January 2004. Results of the technical evaluation and OPEVAL conducted on USS *Shoup*, in March and April 2003, were the basis of the report. The LFT&E occurred at Dahlgren, Virginia, and Socorro, New Mexico, in 1997.

TEST AND EVALUATION ASSESSMENT

As a result of unsatisfactory aerial target performance, DOT&E concluded that OPEVAL testing was not adequate for determining ESSM operational effectiveness. In particular, ESSM did not demonstrate capability against the supersonic, maneuvering, seaskimming ASCM and supersonic, high altitude, terminal diving ASCM threat. ESSM demonstrated capability against the non-maneuvering, low-altitude, subsonic ASCM threat. DOT&E's conclusion of inadequate testing differs from the Navy's Operational Test Agency conclusion that the missile is operationally effective, although the Navy included the caveat that performance against high-G maneuvering, sea-skimming, supersonic ASCMs remained undemonstrated. ESSM is operationally suitable, and the ESSM warhead is lethal against the ASCM threat. The full-rate production decision memorandum acknowledged the necessity for FOT&E with a maneuvering supersonic sea-skimming target.

FOT&E requires flight testing against the threat ASCM categories inadequately examined during the OPEVAL. FY05 FOT&E-1 includes a scenario against one of these categories: the supersonic, maneuvering, sea-skimming ASCM. Other requirements include flight testing in the presence of electronic jamming as well as with ESSMs that have undergone fleet representative shipboard storage time. Additional required testing includes ESSM against a Threat D target. The Navy needs to acquire credible Threat D surrogates and conduct ESSM testing against them.

The OPEVAL used an Aegis Weapon System Baseline 6.3 with Mark 41 vertical launch system. Other combat systems (based on the Ship Self Defense System Mark 2 or DD(X), for example) are sufficiently different that flight testing is a requirement when ESSM/combat system integration occurs. Safe and realistic combat system testing will require the Self Defense Test Ship for end-to-end self-defense mission execution.

Although it is not a requirement, non-Aegis combat systems with predecessor Seasparrows provide a useful capability against surface threats. Limitations in the Aegis Weapon System Baseline 6.3 computer program and shipboard illuminator radars precluded testing ESSM's capability against surface targets. Consideration should be given to providing surface target engagement capability with this and follow-on Aegis baselines.