

## Standard Missile-6 (SM-6)

### Executive Summary

- The Navy will not demonstrate the Standard Missile-6 (SM-6) Capability Production Document performance requirement for interoperability until the fielding of the Navy Integrated Fire Control-Counter Air (NIFC-CA) From the Sea (FTS) capability in FY14/15. The Navy expects to demonstrate the maximum range and launch availability Key Performance Parameters during SM-6 FOT&E and Aegis Baseline 9 operational testing in FY14.
- The Navy will fire 16 SM-6 missiles during SM-6 FOT&E/Aegis Baseline 9 operational testing and NIFC-CA FTS demonstrations scheduled for FY14/15. These firings will demonstrate SM-6 integration with Aegis Baseline 9 software and SM-6 performance as part of NIFC-CA FTS.
- As reported in DOT&E's May 2013 IOT&E and Live Fire Report, the Navy conducted high-temperature wind tunnel tests of the improved missile uplink/downlink antenna shrouds.
  - During these tests, the Navy discovered inter-layer delamination in the antenna shroud insulation on three of the five wind tunnel test articles, which questioned the efficacy of the Navy's previous corrective actions.
  - Failure review and analysis determined the observed anomaly was not a high risk for aggravating the original removal of insulation material failure mode, as there was no observed delamination or removal of material.
  - DOT&E will monitor and assess the uplink/downlink antenna shroud reliability issue throughout FOT&E.
- The performance deficiency discovered during IOT&E and outlined in the classified SM-6 IOT&E and Live Fire Report remains unresolved and continues to affect DOT&E's final assessment of effectiveness.
  - The Navy is assessing several options for a solution, each with varying degrees of complexity. A primary concern is to ensure the solution causes no degradation to the existing SM-6 performance envelope.
  - The Navy anticipates making a final decision on corrective action by 3QFY14; however, funding for final implementation and testing of the solution remains unresolved.

### System

- SM-6 is the latest evolution of the Standard Missile family of fleet air defense missiles that incorporates components from two existing Raytheon product lines:
  - SM-2 Block IV
  - Advanced Medium-Range Air-to-Air Missile (AMRAAM)



- SM-6 is employed from cruisers and destroyers equipped with Aegis combat systems.
- The SM-6 seeker and terminal guidance electronics derive from technology developed in the AMRAAM program. SM-6 retains the legacy Standard Missile semi-active radar homing capability.
- SM-6 receives midcourse flight control from the Aegis combat system via ship's radar; terminal flight control is autonomous via the missile's active seeker or supported by the Aegis combat system via the ship's illuminator.

### Mission

- The Joint Force Commander/Strike Group Commander will use SM-6 for air defense against fixed-/rotary-winged targets and anti-ship missiles operating at altitudes ranging from very high to sea-skimming.
- The Joint Force Commander will use SM-6 as part of the NIFC-CA FTS operational concept to provide extended-range, over-the-horizon capability against at-sea and overland threats.

### Major Contractor

Raytheon Missile Systems – Tucson, Arizona

# NAVY PROGRAMS

## Activity

- DOT&E submitted its SM-6 IOT&E and Live Fire Report to Congress in May 2013.
  - The SM-6 entered full-rate production in FY13 and will achieve Initial Operational Capability in 1QFY14.
  - The Navy conducted the Flight Test Round (FTR)-25A test mission at White Sands Missile Range, New Mexico, in accordance with a Navy-approved SM-6 developmental test plan. FTR-25 demonstrated the flight reliability of a missile equipped with the Processor Replacement Program computer hardware update that mitigated parts obsolescence.
  - The Navy conducted SM-6 Live Fire-02 (LF-02) at the Pacific Missile Test Center, Point Mugu, California, in accordance with the Aegis Baseline 9 developmental test plan. LF-02 demonstrated the ability of an Aegis Baseline 9 cruiser, utilizing the SM-6 missile, to engage and intercept a target using targeting data provided by an off-board sensor on the Cooperative Engagement Capability network. DOT&E collected SM-6 flight reliability data during this event.
  - The Navy conducted SM-6 Live Fire-04 (LF-04) at the Pacific Missile Test Center, Point Mugu, California, in accordance with the Navy-approved plan for NIFC-CA testing. LF-04 demonstrated the ability of an Aegis Baseline 9 cruiser, utilizing the SM-6 missile, to engage and intercept a target using targeting data provided by an off-board sensor on the Cooperative Engagement Capability network. This was the first at-sea demonstration of the NIFC-CA FTS capability. DOT&E collected SM-6 flight reliability data during this event.
  - In FY14/15, the Navy plans to fire up to 16 SM-6 missiles during SM-6 FOT&E/Aegis Baseline 9 operational testing and NIFC-CA FTS demonstrations. These firings will demonstrate SM-6 integration with Aegis Baseline 9 software and SM-6 performance as part of NIFC-CA FTS. DOT&E will collect SM-6 performance and flight reliability data during these events.
  - The Navy concluded its Failure Review Board for the Mk 54 Safe-Arm Device anomaly.
- delamination or removal of material, the Navy's failure review and analysis determined the insulation inter-layer delamination observed was not a high risk for aggravating the original removal of insulation material failure mode. DOT&E will monitor and assess this reliability issue throughout FOT&E.
- The Navy Failure Review Board's analysis of the Mk 54 Safe-Arm Device anomaly, as reported in the IOT&E and Live Fire Report, concluded that the anomalous data observed during live testing was not indicative of a device malfunction and is not expected to affect lethality of the SM-6 missile.
  - The FY13 SM-6 flight tests were all successful. There were no occurrences of the uplink/downlink antenna shroud flight reliability deficiency or other anomalies during these tests. DOT&E and the Navy will continue to collect data on this deficiency throughout FOT&E flight-testing.
  - In the FY13 IOT&E and Live Fire Report, DOT&E assessed SM-6 as suitable. This assessment considered combined data from the IOT&E and developmental/operational flight tests. DOT&E will collect reliability data and assess suitability throughout SM-6 FOT&E testing in FY14/15.
  - The performance deficiency discovered during IOT&E and outlined in the classified SM-6 IOT&E and Live Fire Report remains unresolved and continues to affect DOT&E's final assessment of effectiveness. The Navy is assessing several options for a solution, each with varying degrees of complexity. A primary concern is to ensure the solution causes no degradation to the existing SM-6 performance envelope. The Navy anticipates making a final decision by 3QFY14; however, funding for final implementation and testing of the solution remains unresolved.
  - The Navy will not demonstrate the SM-6 Capability Production Document performance requirement for interoperability until the fielding of the NIFC-CA FTS capability in FY14/15. The Navy expects to demonstrate the maximum range and launch availability Key Performance Parameters during Aegis Baseline 9 operational testing in FY14.

## Assessment

- As reported in DOT&E's May 2013 IOT&E and Live Fire Report, the Navy conducted high-temperature wind tunnel tests of the improved missile uplink/downlink antenna shrouds. These tests discovered inter-layer delamination in the antenna shroud insulation on three of the five wind tunnel test articles, which raised questions regarding the efficacy of the Navy's previous corrective actions. As there was no observed

## Recommendations

- Status of Previous Recommendations. The Navy is addressing all previous recommendations.
- FY13 Recommendation.
  1. The Navy should correct the classified performance deficiency discovered during IOT&E and test those corrective actions in flight.