Javelin Close Combat Missile System - Medium

Executive Summary

- In FY17, the Army completed testing of the Spiral 2 missile and continued development of the Spiral 3 missile and a new Light Weight Command Launch Unit (CLU). The Army intends these efforts to improve lethality against non-armored targets and to reduce unit cost and weight.
- The Program Office investigated and addressed Spiral 2 precursor warhead (PCWH) failures experienced in FY16. The Army resumed testing in FY17. The final production-representative configuration of the Spiral 2 missile performed reliably in 14 of 14 flight tests.
- Test results and lethality modeling of the Spiral 2 missile, which includes a new Multi-Purpose Warhead (MPWH), indicate the Spiral 2 missile has improved warhead fragmentation while maintaining required primary target armor penetration.
- Through 22 flight tests, the Spiral 2 missiles demonstrated proper target lock-on and missile launch resulting in 18 successful hits against vehicles, 2 successful hits against structure targets, and 1 near miss and 1 complete miss against an IED team in the open.
- DOT&E and the Army continue planning the testing required for the Spiral 3 missile and Light Weight CLU developments.

System

- The Javelin Close Combat Missile System – Medium is a man-portable, fire-and-forget, anti-tank guided missile used to defeat threat armored combat vehicles out to 2,500 meters.
- The Javelin system consists of a missile in a disposable launch tube assembly and a reusable CLU. The CLU mechanically engages the launch tube assembly for shoulder firing, has day and night sights for surveillance and target acquisition, and electronically interfaces with the missile for target lock-on and missile launch. An operationally-ready Javelin system weighs 49.5 pounds.
- The Javelin missile employs a tandem shaped charged warhead to defeat vehicle armor and can be fired in direct-fire or lofted trajectory top-attack modes.
- The Army plans four Javelin system improvements to reduce unit cost and weight and improve lethality against non-armored targets. These improvements are referred to as missile Spiral 1, 2, 3, and Light Weight CLU.
  - The Spiral 1 effort replaced electronic components in the control actuator section of the missile for cost and weight savings. Production missiles are designated FGM-148E.

  - The Spiral 2 effort developed a new PCWH, and an MPWH that uses enhanced fragmentation to improve lethality against non-armored targets and personnel in the open while maintaining lethality against armored threats. Production missiles will be designated FGM-148F.
  - The Spiral 3 effort will develop a new launch tube assembly and battery unit, and will replace the current gas-cooled seeker with an uncooled seeker in the guidance section of the missile. Production missiles will be designated FGM-148G.
  - The Light Weight CLU effort will develop a new CLU that is smaller and lighter while maintaining or improving system performance.

Mission

- Commanders use Army and Marine Corps ground maneuver units equipped with the Javelin to destroy, capture, or repel enemy assault through maneuver and firepower.
- Service members use the Javelin to destroy threat armor targets and light-skinned vehicles, and to incapacitate or kill threat personnel within fortified positions. In recent conflicts, Javelin was used against enemy bunkers, caves, urban structures, mortar positions, snipers, and personnel emplacing IEDs.

Major Contractors

- Raytheon – Tucson, Arizona
- Lockheed Martin – Orlando, Florida

Activity

- In FY17, the Army Aviation and Missile Research, Development and Engineering Center completed testing of the Spiral 2 missile improvements in accordance with the DOT&E-approved live fire strategy.

- From FY16 through FY17, the Army conducted a total of 16 static warhead tests and 22 missile flight tests at the Redstone Test Center, Alabama.
  - In FY16, testing was halted after nine static warhead tests and seven missile flight tests due to a reoccurring failure of the new PCWH. Following an analysis of the failures, the Army decided to replace the new PCWH with the proven legacy PCWH.
  - In FY17, the Army conducted the remaining 7 static warhead tests and 15 flight tests.
- Three FGM-148D (Block 0) and three FGM-148E (Spiral 1) missiles were fired to demonstrate backward compatibility with current CLUs and new missile software.
- DOT&E and the Army continued to plan testing required for the Spiral 3 missile and Light Weight CLU, and the Javelin Program Office began an update to the Test and Evaluation Master Plan (TEMP).

Assessment

- During FY16 testing, the new PCWH failed to detonate in two static tests and in two flight tests. The failure was caused by age-related degradation in the explosive material of the PCWH. The program determined the best course of action was to use the legacy PCWH in the Spiral 2 missiles. The remaining test missiles were rebuilt with the legacy PCWH and the Army resumed testing in FY17. No additional failures occurred during the remaining 7 static tests and 14 tactical missile flight tests.
- Missile flight and static test results indicate improved fragmentation enabling the intended, improved lethality against light-skinned vehicles and targeted personnel in the open, while maintaining effectiveness against armored targets.
- Through 22 flight tests, the Spiral 2 missiles demonstrated proper target lock-on and missile launch resulting in 18 successful hits against vehicles, 2 successful hits against structure targets, and 1 near miss and 1 complete miss against an IED team in the open. Personnel in the open are a secondary target for the Javelin.
- The failure of the new PCWH was the sole failure mode to occur during Spiral 2 missile testing. Following the PCWH change, the production-representative missile performed reliably in 14 of 14 flight tests.
- DOT&E assesses that Javelin Spiral 2 would meet its reliability requirement.

Recommendations

- Status of Previous Recommendations. The Army and DOT&E are planning testing required for the Spiral 3 missile and Light Weight CLU. The Army agrees that an operational test should be conducted prior to fielding to confirm that effectiveness/lethality and suitability have not been compromised, and to ensure compatibility with applicable fielded variants of the missile. The Javelin Program Office is updating the TEMP.
- FY17 Recommendation.
  1. The Javelin Program Office should perform additional testing and modeling to establish the capability of the Spiral 2 missile to hit targeted personnel in the open (such as the three-man IED team). Information gained should inform the Spiral 3 missile design.