

# M109 Family of Vehicles (FoV) Paladin Integrated Management (PIM)

## Executive Summary

- In FY14, the Army conducted multiple test phases as part of the M109 Family of Vehicles (FoV) Paladin Integrated Management (PIM) LFT&E program, including follow-on ballistic hull testing, component ballistic tests, and fire survivability testing.
- The assessment of results for each of the test phases is ongoing. Preliminary assessments of the fire survivability tests indicate potential vulnerability issues with one PIM vehicle's automatic fire extinguishing system.
- Underbody blast testing will not be accomplished until high-fidelity prototypes and full-up systems are available.

## System

- The M109 FoV PIM consists of two vehicles: the Self-Propelled Howitzers (SPH) and Carrier, Ammunition, Tracked (CAT) resupply vehicles.
  - The M109 FoV SPH is a tracked, self-propelled 155 mm howitzer designed to improve sustainability over the legacy M109A6 howitzer fleet. The full-rate production howitzers will have a newly designed hull, modified Bradley Fighting Vehicle power train and suspension, and a high-voltage electrical system. The SPH is operated by a crew of four and can engage targets at ranges of 22 kilometers using standard projectiles and 30 kilometers using rocket-assisted projectiles.
  - The M109 FoV CAT supplies the SPH with ammunition. The full-rate production ammunition carriers will have a common chassis with the SPH. The ammunition carriers are designed to carry 12,000 pounds of ammunition in various configurations and a crew of four Soldiers.
- The Army will equip the SPH and CAT with two armor configurations to meet two threshold requirements for force protection and survivability – Threshold 1 (T1) and Threshold 2 (T2).
  - The base T1 armor configuration is integral to the SPH and CAT. The T2 configuration is intended to meet protection requirements beyond the T1 threshold with add-on armor kits.



- The Army plans to employ PIM vehicles in the T1 configuration during normal operations and will equip the SPH and CAT with T2 add-on armor kits during combat operations.
- The M109 FoV SPH can fire the PGK and the Excalibur precision munition to increase delivery accuracy. The Army developed the PGK to reduce the dispersion of unguided projectiles and the Excalibur precision munition to provide Field Artillery units a precision engagement capability.
- The Army intends to employ the M109 FoV as part of a Fires Battalion in the Armored Brigade Combat Team and Artillery Fires Brigades with the capability to support any Brigade Combat Team.
- The Army plans to field up to 557 sets of the M109 FoV with full-rate production planned for FY17.

## Mission

Field Artillery units employ the M109 FoV to destroy, defeat, or disrupt the enemy by providing integrated, massed, and precision indirect fire effects in support of maneuver units conducting unified land operations.

## Major Contractor

BAE Systems – York, Pennsylvania

## Activity

- The Army conducted multiple test phases as part of the M109 FoV PIM LFT&E program at Aberdeen Proving Ground, Maryland, including follow-on ballistic hull testing, component ballistic tests, and fire survivability testing.

- In FY13, initial exploitation testing against SPH and CAT ballistic structures to characterize the protection they provide against specified threats revealed multiple vulnerable areas in the systems' T1 and T2 armor

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configurations. The Program Office addressed each of these vulnerabilities, and proposed corrective actions for most of them. In 3QFY14, the Army conducted follow-on ballistic hull (retrofit) testing to validate proposed corrective actions.

- In 3QFY14, the Army conducted component ballistic tests of the SPH and CAT high-voltage electrical systems to characterize their performance and unexpected vulnerabilities after being subjected to a threat impact.
- In 4QFY14, the Army conducted fire survivability testing of the SPH. The Army will complete all fire survivability testing by May 2015.
- The Army conducted all test phases in accordance with DOT&E-approved test plans.
- The Army has designed and will test a separate underbelly kit (not a component of the T1 and T2 armor configurations) to determine the potential protection an SPH and CAT can provide against IEDs similar to those encountered in Iraq and Afghanistan. That testing is expected to occur in FY15-16 when the high-fidelity prototypes and full-up systems are available.

### Assessment

- Assessment of results from the follow-on SPH and CAT ballistic hull testing and component ballistic tests of the high voltage electrical systems on the systems is ongoing. DOT&E will include that assessment in a final LFT&E report to Congress.
- Preliminary results of the SPH's fire survivability tests indicate potential vulnerability issues with the platform's automatic fire extinguishing system. The specific details are classified. DOT&E will include that assessment in a final LFT&E report to Congress.

### Recommendations

- Status of Previous Recommendations. The Army has successfully addressed one previous recommendation and made progress on two. However, they still need to implement and validate planned armor configuration changes for Low-Rate Initial Production vehicles prior to full-up system-level testing.
- FY14 Recommendation.
  1. The Army should correct the deficiencies identified in fire survivability testing and validate those fixes in test.