

Excalibur Increment 1b M982E1

Executive Summary

- The Army conducted the Excalibur Increment 1b IOT&E at Yuma Proving Ground, Arizona, in January and February 2014. DOT&E published the combined IOT&E/LFT&E report on June 18, 2014.
- The Excalibur Increment 1b projectile is operationally effective. Relative to standard projectiles, its accuracy and lethality allow cannon artillery units to effectively engage more point targets with better effects using fewer projectiles in complex urban terrain.
- The Excalibur Increment 1b is operationally suitable. Excalibur Increment 1b met its 90 percent reliability requirement by demonstrating a system reliability point estimate of 97 percent in the IOT.
- The Army awarded a full-rate production contract for 757 projectiles on June 27, 2014.

System

- Excalibur Increment 1b is a precision-guided, extended-range, 155-millimeter unitary, high-explosive artillery projectile. It is fin-stabilized and glides to a target.
- Excalibur uses GPS and an Inertial Measurement Unit to attack point targets with accuracy of less than 10 meters from the desired aim point (in an unjammed environment).
- The Army developed the High-Explosive, Unitary (Block I) projectile in three spirals of increasing capability (Ia-1, Ia-2, and Ib). The Ia-1 projectiles use aerodynamic lift generated by canards to extend range out to 24 kilometers without the maximum propellant charge. The Ia-2 and Ib projectiles add base bleed technology and use of the maximum propellant charge to further increase range to beyond

Activity

- In December 2013, the Army conducted the Excalibur Increment 1b First Article Test with low-rate initial production projectiles.
- The Army conducted the Excalibur Increment 1b IOT&E at Yuma Proving Ground, Arizona, from January through February 2014.
- On June 18, 2014, DOT&E published an IOT&E/LFT&E report in support of the Army's June 2014 Full-Rate Production decision.
- The Army Acquisition Executive approved full-rate production for Excalibur Increment 1b on June 25, 2014.
- The Army awarded a full-rate production contract for 757 projectiles on June 27, 2014.
- The Army conducted all testing in accordance with DOT&E-approved Test and Evaluation Master Plan and operational test plan.



35 kilometers. Increment 1b projectiles improve reliability and reduce cost.

Mission

Field Artillery units use Excalibur:

- To attack enemy targets in support of maneuver operations at a greater range and with increased accuracy than standard high-explosive munitions.
- To support the close fight in urban and complex environments, striking critical targets that must be engaged at extended ranges or in areas where minimal collateral damage is desired.
- To support fire missions against personnel and point targets such as threat forces emplacing IEDs, light material, and personnel within structures.

Major Contractor

Raytheon Missile Systems – Tucson, Arizona

Assessment

- Excalibur Increment 1b test plan execution was adequate to assess operational effectiveness, suitability, lethality, and survivability.
- The Excalibur Increment 1b projectile is operationally effective.
 - Relative to standard projectiles, its accuracy and lethality allow cannon artillery units to engage point targets with precision effects using fewer projectiles in complex, urban terrain, limiting collateral damage.
 - DOT&E has reviewed Army combat reporting that showed units in Operation New Dawn and Operation Enduring Freedom effectively used Excalibur Increment 1a-1 and 1a-2 projectiles for timely engagement of targets in complex urban environments with minimal collateral damage.

FY14 ARMY PROGRAMS

- Excalibur Increment 1b achieved required accuracy irrespective of the presence or absence of GPS jamming. During operational testing, Excalibur Increment 1b demonstrated a median miss distance of 3.7 meters for projectiles fired at 32-kilometer ranges in an unjammed environment. The median miss distance for all projectiles was 2.0 meters. The Army requires Excalibur Increment 1b target accuracy of 10 meters.
- Live fire testing and analyses concluded the Excalibur Increment 1b projectile is more lethal against personnel targets and light material targets than standard high-explosive projectiles.
- The Excalibur Increment 1b is operationally suitable. The projectile is reliable when fired at all ranges up to its maximum range of 35 kilometers. The Army requires a system reliability of 90 percent. During operational testing, Excalibur Increment 1b met the requirement and demonstrated a system reliability estimate of 97 percent.

Recommendations

- Status of Previous Recommendations. The Army addressed all previous recommendations.
- FY14 Recommendations. The Army should continue to address recommendations from DOT&E's June 2014 Report:
 1. Optimize Advanced Artillery Tactical Data System software to employ a special sheaf with aim points equally spaced from the target center when the achieved target location error reported by an observer is less than 10 meters to maximize the effects of multiple Excalibur projectiles fired against a single point target.
 2. Update the Forward Observer System software so that fire support teams at company level and above can specify Excalibur or Precision Guidance Kit munitions when transmitting observer-initiated fire mission requests for precision-guided munitions to a firing unit. The current Forward Observer System version does not provide the option to select specific precision munition shell/fuze combinations.
 3. Modify current metrics to better assess lethality against different types of construction prevalent in theaters of operation.
 4. Collect and examine data on the effects of varied terrain, vegetation, and body armor on Excalibur lethality and other blast-fragmentation projectiles with similarly small fragment sizes.