

B61 Mod 12 Life Extension Program Tail Kit Assembly

Executive Summary

- The B61 Mod 12 (B61-12) Life Extension Program (LEP) Tail Kit Assembly (TKA) program completed its IOT&E in November 2019. Operational flight testing consisted of seven weapons dropped from B-2A aircraft and eight weapons dropped from F-15E aircraft. The Department of Energy (DOE) also conducted an additional nine B61-12 drops, concluding in July 2020, which were used for operational testing (OT) reliability analysis.
- DOT&E published a classified IOT&E report in September 2020.
- In FY19, the DOE discovered an anomaly with the long-life reliability of the capacitors used in the bomb assembly (BA) Weapon Control Units (WCUs). After new capacitors were sourced and installed, DOT&E required comparison testing between the WCUs used in IOT&E and the final production WCUs. After extensive side-by-side testing completed in August 2020, DOT&E determined the WCUs used in IOT&E were production representative.
- The B61-12 TKA demonstrated high degrees of accuracy and reliability throughout IOT&E.

System

- The Nuclear Weapons Council (NWC) directed the B61-12 LEP as part of the Nuclear Modernization effort. The B61-12 LEP extends the life of the original, free-fall, gravity bomb while adding a guidance capability.
- The B61-12 LEP consolidates four legacy B61 variants (Mods 3, 4, 7, and 10) into a single variant.
- The B61-12 All-Up-Round (AUR) is composed of an updated BA integrated with a new TKA. The DOE National Nuclear Security Administration (NNSA) supplies the BA and the U.S. Air Force supplies the TKA. The NNSA is updating the BA to address all age-related issues.
- The TKA is mechanically mated and electrically connected to the nuclear BA. The TKA and BA communicate with each other and with the aircraft to provide the AUR guide-to-target capability (System 2), while retaining the legacy ballistic flight capability (System 1).

Activity

- The Air Force completed IOT&E in November 2019. Flight testing consisted of 15 total releases from B-2A and F-15E aircraft in operationally representative scenarios. During some sorties, the aircraft had access to GPS navigational information while in other sorties, the aircraft did not receive GPS signals the entire flight.
- The Air Force conducted IOT&E testing in accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan.



TKA - Tail Kit Assembly

- The TKA design does not include a GPS receiver. It receives pre-programmed target location data and updates from the aircraft prior to release.
- The Air Force is testing the TKA in accordance with DOD Instruction 5000.02 requirements. The NNSA leads B61-12 BA activities, and the BA subassembly will be tested and qualified per the NWC Phase 6.X Process. When mated, the BA and TKA constitute an AUR, which will be qualified in accordance with the B61-12 System Qualification Plan.

Mission

A unit equipped with the air-delivered B61-12 nuclear weapon plays a critical role in supporting the airborne leg of the nuclear triad for the United States and allies. The B61 thermonuclear bomb family is a key component of the current U.S. nuclear deterrence posture.

Major Contractor

Boeing Defense, Space & Security – St. Louis, Missouri

- DOT&E published a classified IOT&E report in September 2020 which evaluated operational effectiveness, suitability, and survivability, including cybersecurity. During IOT&E, there were no reliability failures attributed to the TKA.
- In FY19, the NNSA identified new problems with the long-life reliability of commercial off-the-shelf capacitors used in non-nuclear components, including the WCU of

FY20 AIR FORCE PROGRAMS

the BA. The NNSA completed lab testing in August 2020 of the final production WCUs, with the new capacitors, to compare performance with the WCUs used in testing. The first opportunity for flight testing of a final production WCU-equipped weapon will be in FY22 during the NNSA's retrofit evaluation system tests.

- The coronavirus pandemic caused minor delays to the WCU side-by-side comparison testing, but did not affect the DOT&E IOT&E report timeline.

Assessment

- IOT&E was adequate to assess the operational effectiveness, suitability, and survivability, including cybersecurity of the B61-12 TKA when employed by B-2A and F-15E aircraft.

Results indicated the TKA demonstrates high reliability, availability, and accuracy.

- DOT&E determined that the WCUs used in the IOT&E are production representative for the purpose of IOT&E. Comparison testing of WCUs with replacement capacitors and WCUs used in OT indicates no difference in performance.

Recommendation

1. The Air Force should observe flight testing of weapons outfitted with the final production WCUs to confirm the performance is at least equivalent to that of the WCUs used during IOT&E.