

Long Range Hypersonic Weapon (LRHW) – Dark Eagle



In 1QFY24, the Army and Navy initiated a risk reduction campaign to complete prior to conducting another flight test for the Long Range Hypersonic Weapon (LRHW) (Dark Eagle). In 3QFY24, during integrated launch sequence testing, the Army replicated the faults experienced during previous flight tests and verified the implementation of the necessary corrective actions. Later in 3QFY24, flight testing continued with a successful launch of the Navy's prototype All-Up-Round (AUR). In 4QFY24, the Army intended to conduct a missile test as part of Joint Flight Campaign (JFC)-IGNITE, follow-on test to JFC-2, from the Army's LRHW (Dark Eagle) prototype transporter-erector-launcher (TEL) but this test did not occur.

SYSTEM DESCRIPTION

The LRHW (Dark Eagle) is a prototype surface-to-surface long range strategic fires system composed of one TEL and two AUR missiles (designed by the Navy) packaged in Army AUR canisters (AUR+C). The initial LRHW battery will include a battery operations center (BOC) and four TELs, each with two AUR+C. The Middle Tier of Acquisition (MTA) rapid fielding effort only consists of the BOC and TELs.

The AUR is composed of the Common Hypersonic Glide Body and a Navy-developed two-stage rocket booster in a canister designed for the Army's LRHW TEL. The Navy, under the Conventional Prompt Strike (CPS) program, is producing the same AUR and placing it in Navy canisters for launch from *Zumwalt*-class destroyers and *Virginia*-class submarines.

MISSION

Army commanders will use the LRHW (Dark Eagle) to engage adversary high-payoff and time-sensitive targets. U.S. Strategic Command, with direction from the National Command Authority, will serve as the employment authority for LRHW missions.

PROGRAM

The Army Rapid Capabilities and Critical Technologies Office was responsible for developing and

fielding prototype LRHW equipment to the first unit equipped. In August 2023, the Army determined the LRHW program will use the MTA rapid fielding approach and transferred the LRHW (Dark Eagle) program, consisting of the BOC and TEL, to Program Executive Office Missiles and Space. The Army is still developing the LRHW Master Test Strategy and plans to submit the strategy for DOT&E approval by 4QFY25. The Army intends to field two additional batteries of LRHW to complete the MTA rapid fielding phase by FY27.

The Navy's CPS program designed the AUR+C and elements of the weapons control system for the Army's LRHW (Dark Eagle) program in FY23. The Army plans to integrate the AUR+C with its weapon control system to field a BOC and four TELs to the LRHW unit upon the completion of a successful flight test.

» MAJOR CONTRACTORS

- Lockheed Martin Corporation – Huntsville, Alabama (BOC and TEL, system integration prototype)
- Dynetics, a subsidiary of Leidos – Huntsville, Alabama (TEL trailer and Common Hypersonic Glide Body)

TEST ADEQUACY

As recommended in the FY21 and FY23 Annual Reports, the Army is still developing the LRHW Master Test Strategy. The plan is to submit it for DOT&E approval by 4QFY25.

The test strategy should include the following considerations: a concept of employment consistent with the expected operational and threat environment; an operational demonstration that includes strategic-level mission planning; test and evaluation in a full-spectrum contested environment, including representative targets; and validated modeling and simulation (M&S), combined with ground and subscale test data to support evaluation of operational effectiveness, lethality, suitability, and survivability.

As recommended in the FY21 and FY23 Annual Reports, the Army continues to collaborate with the Navy to develop an LFT&E Strategy. The Army needs to incorporate representative targets and environments into flight tests and other live lethality and survivability tests. The Army should continue to collaborate with the Navy and Air Force to identify and leverage common practices, test corridors and infrastructure, test data, and M&S capabilities across the family of hypersonic weapon systems.

The Navy conducted a warhead arena test in 1QFY24 and a sled test in 2QFY24. As noted in the FY22 and FY23 Annual Reports, the initial CPS sled and flight tests did not include operationally representative targets and consequently provided no direct validation of the weapon's lethal effects. The Navy included some threat-representative targets in the recent sled test. The Navy, supported by Lawrence Livermore National Laboratories, is still processing the results of these

tests. DOT&E will provide an independent assessment of the operational effectiveness and lethality when the Navy provides the data. The Navy is further investigating methods to obtain effectiveness and lethality data by incorporating representative targets into the CPS flight tests. Until the Army and Navy make an adequate determination of AUR lethality, uncertainty in weaponeering tools could result in excessive employment requirements or failure to meet warfighter objectives.

The Army has not yet evaluated the effects of a full-spectrum (kinetic, non-kinetic, electromagnetic, cyber) threat-contested environment on the performance of the AUR, TEL, or BOC. This includes an end-to-end cyber survivability testing that includes a cooperative vulnerability and penetration assessment and an adversarial assessment. The Army is relying on the Navy's use of a combination of M&S, component testing, and hardware-in-the-loop evaluations to evaluate full-spectrum survivability of the AUR in the representative threat environment.

In 4QFY24, the Army intended to conduct a missile test as part of JFC-IGNITE from the Army's LRHW (Dark Eagle) prototype TEL but this test did not occur. The LFT&E Strategy for the AUR, written by the Navy, and incorporating Army-specific targets and environments, will be submitted for DOT&E approval in 2QFY25.

PERFORMANCE

» EFFECTIVENESS, SUITABILITY, AND SURVIVABILITY

Insufficient data are available to evaluate the operational effectiveness, lethality, suitability, and survivability of the LRHW system.

RECOMMENDATIONS

As recommended in the FY23 Annual Report, the Army should:

1. Continue efforts to develop the LRHW Master Test Strategy that includes integrated testing, operational testing, live fire testing, and cybersecurity assessments to credibly demonstrate the required Dark Eagle operational effectiveness, lethality, suitability, and survivability and submit for DOT&E approval.
2. Continue collaboration with the Navy on the LFT&E Strategy that adequately verifies and validates required M&S tools to create credible weaponeering and mission planning tools in support of the proposed operational fielding dates.
3. Include full-spectrum survivability demonstration in a contested environment during an operational demonstration.
4. Conduct end-to-end cyber survivability testing to include a cooperative vulnerability and penetration assessment and adversarial assessment.

5. Validate M&S outputs and combine with ground test data to support design of experiments and evaluation of operational effectiveness, survivability, and lethality.
6. Incorporate operationally representative targets and environments into flight tests and other lethality and survivability tests, as recommended since the FY21 Annual Report.
7. Continue collaboration with the Navy and Air Force to identify and leverage common practices, test corridors and infrastructure, test data, and M&S capabilities across the family of hypersonic weapon systems.