Dark Eagle

The Army, in coordination with the Navy and industry, is currently using rapid prototyping authorities to deliver a prototype ground-launched long range hypersonic weapon, termed Dark Eagle. Not enough data are yet available to evaluate the residual combat capabilities of the Dark Eagle. Testing must incorporate operationally representative targets and environments to support this evaluation and the fielding of one battery with the Dark Eagle system.

System Description

Dark Eagle is a prototype surface-to-surface, long range hypersonic weapon system composed of one launcher and two missiles with canisters. The missile is composed of the Common Hypersonic Glide Body (C-HGB) and a two-stage rocket booster developed by the Navy. The initial Dark Eagle Battery will include a Battery Operations Center and four Transporter Erector Launchers (TELs), each including two missiles.

Program

The Dark Eagle is a rapid prototyping program. In March 2019, the Secretary and Chief of Staff of the Army directed the accelerated delivery of a prototype ground-launched hypersonic weapon with residual combat capability. In developing the Dark Eagle, the Army is working with other Services through a Joint Service Memorandum of Agreement on hypersonic design, development, testing, and production. The Navy program is the Conventional Prompt Strike program. The Army program is the Dark Eagle ground launch capability. The Navy is the design authority for the two-stage rocket booster and the C-HGB, while the Army is responsible for C-HGB production and the design of the ground-launch capability. STRATCOM will identify targets and develop missions for strategic deployment of the joint hypersonic capabilities.

The Army Rapid Capabilities and Critical Technologies Office selected two prime contractors to build and integrate components of the Dark Eagle prototype. In FY19, the Army awarded an Other Transaction Authority (OTA) agreement to Dynetics to produce the first commercially manufactured set of prototype C-HGB systems. The Army awarded a second OTA agreement to Lockheed Martin as the Dark Eagle prototype system integrator.

The Army plans to field the first battery with four TELs and a Battery Operations Center with an inert training canister by FY21. New equipment training (NET) and soldier handling and familiarization with the system began in FY21. In addition, the Army and Navy plan to conduct three Joint Flight Campaign (JFC) test shots. JFC-1 will consist of a missile fired from a launch pad, JFC-2 will consist of a missile fired from a launcher with soldier

involvement, and JFC-3 will consist of a missile fired from a launcher by soldiers.

The Army plans to achieve a residual combat capability when the Army fields one battery with the Dark Eagle system, the updated technical and tactical Fire Control System is available, and the unit is trained. The Army intends to achieve an initial operational capability with the delivery of the second battery.

Major Contractor

Lockheed Martin and Dynetics Technical Solutions – Huntsville, Alabama.

Test Adequacy

The Dark Eagle has not yet developed a Test and Evaluation Master Plan or equivalent document to define the T&E strategy needed to support the determination of either residual combat capability or initial operational capability. The Dark Eagle program has thus far been relying on the Navy and their Conventional Prompt Strike program to evaluate weapon lethality. In FY20, the Navy performed a sled test of the Conventional Prompt Strike warhead, also used by the Dark Eagle, at the Holloman Air Force Base High Speed Test Track, which provided data for validating the lethality modeling and simulation (M&S) tools against materials and targets of interest. The value of the data acquired was limited, as it focused on data for lethality model validation, and did not test against operationally representative targets. Similarly, in March 2020 the Navy conducted a Flight Experiment-2, in which a Conventional Prompt Strike missile was fired from the Pacific Missile Range Facility Barking Sands. The flight test provided warhead performance data, but also lacked operationally representative targets. Neither program has yet performed arena testing on the operationally representative warhead, which is fundamental to the development of the lethality model.

Performance

Effectiveness

Not enough data are yet available to evaluate the effectiveness of the Dark Eagle residual combat capability. Lethality testing to date has not provided direct evidence of the weapon's lethal effects against intended targets due to lack of operationally representative targets in sled and flight tests. Incorporating representative targets into the Joint Flight Campaign tests would provide both lethality and effectiveness data and support validation of weaponeering models.

Suitability

Not enough data are yet available to evaluate the Dark Eagle suitability of the residual combat capability.

Survivability

No data are currently available to evaluate the survivability of Dark Eagle in a contested environment. In coordination with the Navy, the Army intends to evaluate the survivability of Dark Eagle by M&S only increasing the risk to the survivability assessment unless the modeling and simulation tools are adequately verified, validated, and accredited.

Recommendations

The Army should consider the following recommendations as the program transitions to a program of record:

1. Develop a plan for effectively transitioning prototypes for production, fielding, operations, and sustainment under the Middle Tier Acquisition rapid fielding pathway to facilitate development of an adequate Dark Eagle T&E strategy.
2. Develop a T&E strategy that includes integrated testing, operational testing, live fire testing, and cybersecurity assessments to credibly demonstrate the required Dark Eagle effectiveness, suitability, lethality, and survivability.
3. Incorporate operationally representative targets and environments into Conventional Prompt Strike/Dark Eagle flight tests and other lethality and survivability tests.
4. Collaborate with the Navy to develop and execute 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.

5. Collaborate with the Navy and Air Force to identify and leverage common practices, test corridors and infrastructure, test data, and M&S capability across the family of hypersonic weapon systems.