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United States General Accounting Office
Washington, DC 20548

August 29, 2001

The Honorable Kay Bailey Hutchison
United States Senate

Subject: U.S. Army's Procurements of Battle Effects Simulators

Dear Senator Hutchison:

This responds to your March 26, 2001, letter asking us to review the U.S. Army's procurements of battle effects simulators. The Army uses these simulators on training ranges to help prepare its soldiers for realistic combat conditions. The simulators fire pyrotechnic cartridges that simulate the sound, smoke, and flash of shells being fired from or striking targets, such as armored vehicles. There have been concerns surrounding the safety of the simulators currently being used by the Army and the possibility that U.S. companies may be excluded from full and open competition for new simulators.

As agreed with your office, we reviewed (1) the safety record of the Army's existing battle effects simulators, (2) the Army's plans for determining the safety and effectiveness of U.S.-produced simulators and cartridges, and (3) the possibility that the Army could rely on the Navy and the Marine Corps to determine the safety and effectiveness of U.S. products.

In brief, we found that the safety record for the Army's existing battle effects simulators includes more than 120 documented incidents of malfunctions, many of which resulted in injuries such as third-degree burns, loss of appendages, and lacerations. The Army has attempted to make the devices safer and suspended them from use numerous times. It is also in the process of assessing the safety and effectiveness of a new system from a foreign source. However, it does not plan to assess a U.S. produced system due to funding limitations. The Army could rely on the Marine Corps' planned type classification of a U.S. produced device to certify another qualified source for future competition.

Background

In 1999, five U.S. contractor teams responded to a solicitation from the Army's Tank, Automotive and Armaments Command to provide the Army with a new target system referred to as the Intermediate New Generation Army Target System. Army gunners will fire upon this target system from their armored vehicles to hone their skills for combat. According to Army officials, an important subcomponent of this new target system was a new battle effects simulator. However, during the selection process for the target system, the Army amended its solicitation by eliminating any possibility of orders for new battle effects simulators. Army officials stated this was done because none of the selected subcontractor's

simulators had been type classified, as required by Army Regulation 70-1, and funding was not available for certification testing. Type classification is the process through which the Army determines that a munitions item will be safe and effective for its intended purpose.

According to an Army official, after eliminating the requirement for the new battle effects simulator from the solicitation, the Army decided to continue using its existing simulators. These are referred to as the Armor Target Kill Simulator (ATKS) and the Hoffman device. The pyrotechnic cartridges that are fired from these devices were type classified from 1989 to 1992. One of the pyrotechnic cartridges, called the M21, simulates the bang and smoke of a tank or artillery gun. For the target system, the Army only intends to use the ATKS device.

Separate from the ongoing target system effort, the Army's Simulation, Training, and Instrumentation Command is in the process of acquiring new battle effects simulators and cartridges from a foreign source for a different program. It has requested officials at the Army Research, Development, and Evaluation Center, Picatinny Arsenal, New Jersey, to conduct type classification of the foreign simulators that would be used for this program and is providing funds to the Center for this effort. The Army currently plans to acquire 4,770 of these foreign battle effects simulators from fiscal years 2001 through 2013 at an estimated cost of approximately \$35.1 million, and it plans to begin fielding these devices in January 2002. According to the Army, the unit cost of the U.S. produced devices that could have been acquired as part of the new target system (had they been type classified) would have been about half as much as the foreign simulators.

ATKS And Hoffman Devices Have History Of Malfunctions Causing Injuries

The ATKS and Hoffman devices, along with the M21 cartridges, have a history of premature detonations and other malfunctions that have resulted in injuries to soldiers and civilian contractors. Army documents¹ indicate there have been 127 reported incidents since 1983. (In a typical year, the Army fires thousands of cartridges from these devices.) Many of these incidents have been classified as class "A" mishaps,² which are malfunctions "that have resulted in death or lost-time injury, are similar to previous malfunctions that have resulted in death or lost-time injury, are judged as having had an appreciable probability of causing death or lost-time injury, or that have adverse political implications."

Documented injuries include third-degree burns, lacerations, loss of appendages, and damage to hearing and eyesight. The most recent incident reported, according to the Army, occurred at Fort Knox, Kentucky, in September 2000 when an individual suffered third-degree burns, temporary loss of hearing, and other significant injuries when a chamber of M21 cartridges detonated while being loaded into the ATKS device.

¹ These documents are tracked in the Army's Malfunction Investigation Database, which can be located at <http://www.osc.army.mil/ib/ibq/surv/gen/surv.htm>.

² Prior to October 1, 1994, all incidents were recorded in the database as class A mishaps. Beginning on October 1, 1994, incidents were designated as A, B, or C, according to the severity of the incident; A being the most severe and C being the least severe.

Army regulations require that an investigation be conducted of a pyrotechnic device after a malfunction is reported so the cause can be determined and corrective action taken. Consequently, the Army has suspended use of the ATKS and Hoffman battle effects devices and M21 cartridges many times, and numerous engineering changes have been implemented to try to prevent future malfunctions. Nevertheless, the Army has been unable to eliminate malfunctions and injuries, and after each investigation, it has eventually allowed the remaining inventory of ATKS and Hoffman devices to be used.

Some Army test range officials contend that the history of incidents involving the ATKS and the Hoffman devices demonstrates that they are not safe when used with the M21 cartridge and that they need to be replaced. These test range officials limit use of the devices or will not permit their personnel to work with the devices due to the history of mishaps with these systems. As an alternative, in 1996, the Army Tank, Automotive and Armaments Command purchased 105 commercially available, U.S.-produced Omega 36 simulator devices for test purposes at Fort Knox, Kentucky. Even though the Omega 36 devices have not been formally type classified by the Army, range managers said that in 5 years of use they have experienced no safety problems with them. According to one range official, 33,000 commercially available cartridges have been expended from Omega 36 devices on his range with no safety problems.

Army Has No Plans to Type Classify A U.S. Produced Simulator System

In 1996, Army type classification officials at the Army Research, Development and Evaluation Center began the process of type classifying a new foreign-produced battle effects simulator and cartridges at the request of and with funds from the Army's Simulation, Training, and Instrumentation Command. The Center has no plans to type classify any U.S. simulator system because the officials state they do not have the necessary funds available.³ According to the Army officials responsible for type classification, they would require approximately 2 years and \$2 million to complete the safety certification of each pyrotechnic device. Army officials acknowledged that this estimate might be comparatively more expensive and time-consuming than type classifications conducted by other military services. However, they pointed out that the Army requires its tests to be carried out in a broad range of operational scenarios, including extreme weather conditions in various climates as well as increasingly complex electromagnetic environments.

Navy and Marines Intend To Type Classify U.S. Battle Effects Simulator

An alternative available to the Army to potentially acquire a safer simulator system than the ATKS and Hoffman devices could be to rely on a type classification the Marine Corps plans to fund, and the Navy plans to conduct, for a U.S. produced battle effects simulator.

³ In February 1995, the Army Materiel Command requested Army officials responsible for type classification at Picatinny Arsenal to assess the potential of the Titan Dynamics Omega 36 simulator system to meet the Army's needs for a safer and less expensive replacement for its current simulator system.

The Marine Corps plans to acquire new battle effects simulators because it considers the ATKS and Hoffman devices to be unsafe. In doing so, it plans to fund type classification of the U.S.-produced Omega 36 simulator at the Navy's test facility at Crane, Indiana. According to Navy officials, this effort would require approximately 18 months and \$1.16 million. The testing would also cover extreme environmental conditions and increasingly complex electromagnetic environments.

The Marine Corps estimates the Omega 36 simulator will be considerably less expensive than the foreign-produced device currently being assessed by the Army. Because each military service generally honors type classifications conducted by the other services, the Navy's type classification could allow the U.S manufacturer to compete for Army battle effects simulator contracts in the future.

Conclusion and Recommendation for Executive Action

The history of incidents involving the Army's current simulation devices indicates they are not safe. At least one U.S. produced device is already in use at some Army locations, even though it is not type classified. Since the Army may not have funds available to conduct another type classification, we recommend that the Secretary of Defense direct the Army to consider using the type classification planned to be carried out by the Navy for the Marine Corps on a U.S. produced device to provide it with another potentially safer and less expensive source for battle effects simulators and cartridges.

Agency Comments

We obtained oral comments on a draft of this correspondence from the Office of the Secretary of Defense and the Army, and additional comments by electronic mail from the Army. They agreed with our findings, conclusion, and recommendation. The Army stated that if the Marine Corps effort is successful, and the Marines acquire a type classified device that meets the training community's needs and is less costly, the Army will consider using it.

In addition to its comments, the Army also provided a number of technical comments. We incorporated these comments where appropriate.

Scope and Methodology

We reviewed the safety record of the Army's current battle effects simulators by obtaining system specific documentation from the Army Safety Center at Rock Island Arsenal, Illinois, and the Army Type Classification Office at the Army Research, Development, and Evaluation Center, Picatinny Arsenal, New Jersey, and interviewing officials at those locations. We also interviewed Army officials at various training range facilities, including Fort Knox, Kentucky, about their experiences with battle effects simulators and cartridges. We visited the Naval Surface Warfare Center at Crane, Indiana, and spoke with Navy officials regarding their type classification and materiel release processes and specific testing procedures for battle effects simulators. We also met with the Program Manager for Training

Systems for the Marine Corps and discussed type classification and material release procedures along with training needs of the Marine Corps.

We conducted our review from May to August 2001 in accordance with generally accepted government auditing standards.

We are sending copies of this correspondence to the Secretary of Defense, the Secretary of the Army, and the Commandant of the Marine Corps. If you have any questions, please contact me on (202) 512-4841. Contributors to this report were Jeffrey T. Hunter, Kristin A. Pamperin, Charles A. Ward, and Joseph H. Zamoyta.

Sincerely yours,

A handwritten signature in black ink that reads "James F. Wiggins". The signature is written in a cursive style with a large, looping initial "J".

James F. Wiggins
Director, Acquisition and Sourcing Management