

United States General Accounting Office

GAO

Report to the Secretary of the Army

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March 1992

OPERATION DESERT
SHIELD/ DESERT
STORM

Observations on the
Performance of the
Army's Hellfire Missile



92-16352



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**National Security and
International Affairs Division**

B-241507

March 30, 1992

**The Honorable Michael P. W. Stone
The Secretary of the Army****DTIC
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Dear Mr. Secretary:

We have reviewed selected aspects of the Army's experience with the Hellfire missile during Operation Desert Shield/Desert Storm to determine (1) how well the Hellfire performed, (2) whether any problems were experienced with the missile, and (3) what actions have been taken or are planned to address any identified problems. We are bringing these matters to your attention to ensure that the planned improvements are completed successfully.

Background

The Hellfire missile system is the main armament on the Army's Apache helicopter and the Marine Corps' Cobra helicopter. It is designed to defeat stationary or moving tanks from as far away as 6,500 meters with minimal exposure of the helicopter to enemy fire. The missile is guided by laser energy reflected from a target that has been illuminated by ground observers, the attack helicopter, or other helicopters. Upon striking the target, the missile's high-explosive charge produces a high velocity jet of molten metal to penetrate the tank.

The Army fielded the basic Hellfire missile system in 1985. In 1990, the Army began procuring an improved version of the missile—called the "interim improved Hellfire missile"—which is designed to defeat more formidable tanks than the basic missile. During Operation Desert Storm, the Army used basic Hellfire and did not encounter the more formidable tanks.

Results in Brief

During Operation Desert Storm, basic Hellfire missiles were effective against a variety of targets, not just enemy tanks. Some Apache units using the system, however, reported difficulty hitting their targets, and five Hellfire missiles were launched from Apaches without a launch command—four during training and one during ground maintenance.

The Army is reexamining the Hellfire's capabilities to determine whether its targets should be expanded beyond tanks. It is also taking actions to improve the reported accuracy and uncommanded launch problems.

Hellfire's Warhead Was Lethal Against Various Targets

Pilot/gunners reported that the Hellfire warhead was lethal against a wide variety of targets other than tanks. For example, during the predawn hours on the first morning of the air campaign, Hellfire was used to clear a corridor through Iraq's air defense systems in advance of the Air Force's initial attack. In addition, the troops reported that the missile was effective against such targets as bunkers, bridges, and artillery systems.

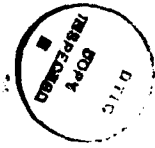
The Army is examining Hellfire's use during Operation Desert Shield/Desert Storm and is considering incorporating additional targets into plans for using the weapon.

Apache Units Reported Difficulty Hitting Targets

To achieve Hellfire's required probability of killing its targets, pilot/gunners must be able to hit their intended targets about 90 percent of the time. The limited data available on Hellfire's experience in Operation Desert Shield/Desert Storm, however, indicated several units achieved hit rates far below the requirement. For example, an initial assessment of interviews with pilot/gunners who fired 200 missiles showed a hit rate of about 65 percent.¹ In addition, data compiled by the Hellfire project office on 71 missiles fired by six different units between October 1990 and February 1991 showed an average hit rate of about 79 percent. The individual unit hit rates ranged from 25 to 100 percent, with three units scoring below the required percentage.

At least two units improved significantly after receiving additional training. Initially, the two units were hitting their targets only about 40 percent of the time and were losing confidence in the weapon. After investigating, the Army found that the pilot/gunners were not using techniques designed to maximize Hellfire's accuracy in the presence of obscurants, such as dust and blowing sand around the helicopter. These techniques include not locking onto or lasing a target until after the missile is launched. The techniques are described in training materials; however, they are not practiced because (1) training simulators do not replicate the obscurants and (2) only a small percentage of pilot/gunners ever fire a live missile in peacetime due to cost. Once the proper techniques were employed, the units' hit rate increased to about 90 percent.

¹Interviews conducted as part of data gathered by the Army Materiel Systems Analysis Activity.



Planned Improvements

The Hellfire project manager and instructor pilots told us that Apache pilot/gunners need additional realistic weapon employment training. The instructor pilots stated that the single most important factor to improve effectiveness would be additional training on the effects of obscurants and the proper switch settings and techniques available to mitigate those effects. These instructor pilots based their opinion on their direct participation in the conflict and their review of numerous video tapes of actual engagements made by Apache's on-board camera.

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The Army Aviation Center plans to improve Hellfire training. The center has recommended adding 2 weeks to the training program to focus on the skills required to effectively employ Hellfire under realistic battlefield conditions. The center also plans to upgrade the training simulators to replicate the effects of dust and blowing sand around the helicopter.

The deputy Apache program manager told us that other training improvements are planned. For example, the program office is studying the acquisition of a mobile mission simulator to increase the amount of simulator time available to Apache units. This and other options to improve pilot/gunner skills are being studied and recommendations on which options to implement will be made at the completion of the Army's analysis scheduled for March 1992.

Hellfire Missiles Were Launched Without a Launch Command

During Operation Desert Shield/Desert Storm, Apache helicopters launched five Hellfire missiles without a launch command. Four of the uncommanded launches occurred in-flight during training missions, and one occurred during ground maintenance. Army officials investigating the launches said there were no reported injuries or damage from the training launches. The ground launch, however, narrowly missed other parked aircraft, flew low across an active Air Force runway, and hit an Air Force bomb storage area causing extensive property damage and minor injuries to 2 soldiers.

Causes and Planned Improvements

The Army's Hellfire project office investigated the causes of the uncommanded launches and plans to draft a report by May 1992 on the results of the investigation and the corrective actions required to prevent recurrence. The Hellfire chief engineer said that the investigation had identified two causes—a defective switch and poor wiring connections. Two of the uncommanded launches resulted from a defective weapon select switch in the Apache, which shorted and sent a fire signal to the missiles. In

October 1991, the Apache program office directed the Apache manufacturer to complete a no-cost modification to correct the problem. At the completion of our work in February 1992, about 597 Apaches had been modified, and the remaining 78 were to be completed by May 1992, according to an Apache program official.

The other three launches apparently resulted from poor wire connections in an Apache circuit designed to prevent uncommanded launches. To address this problem immediately, the Army inspected the wiring connections on all Apaches and plans additional checks every 240 flight hours. For the long term, the Hellfire project office has identified changes to the launcher circuits that will prevent any future occurrence. The Apache program manager has asked Army Headquarters for authority to reprogram \$5.6 million in fiscal year 1992 Apache modification appropriations to modify the Hellfire launchers and test sets.

Scope and Methodology

We interviewed officials and obtained documents—such as Army performance assessments, after action reports, and materiel inspection reports—on Hellfire's performance during Operation Desert Shield/Desert Storm from the Army's Hellfire project office and other organizational components within the U.S. Army Missile Command located at Redstone Arsenal, Alabama. We also obtained information on Hellfire's performance from the Desert Storm Special Study Project co-located with the Center for Army Lessons Learned, Ft. Leavenworth, Kansas; the Army Materiel Systems Analysis Activity, Aberdeen Proving Grounds, Maryland; the Army Aviation Center, Fort Rucker, Alabama; and the Apache program office at the U.S. Army Aviation Systems Command, St. Louis, Missouri. Because much of the data from Operation Desert Shield/Desert Storm were fragmented and anecdotal, the hit rates included in this report should be viewed as approximations.

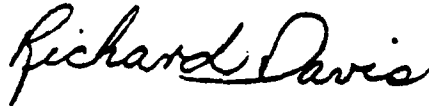
Because we are not making any recommendations, we did not obtain official agency comments on this report. However, we discussed our findings and conclusions with the Hellfire project manager and other officials at the U.S. Army Missile Command, the U.S. Army Aviation Systems Command, and the Army Aviation Center and considered their views in preparing this report.

We conducted our review from June 1991 to February 1992 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretary of Defense, the Director of the Office of Management and Budget, and appropriate congressional committees.

Please contact me at (202) 275-4141 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix I.

Sincerely yours,

A handwritten signature in cursive script that reads "Richard Davis".

Richard Davis
Director, Army Issues

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