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The Honorable Carl Levin
Chairman
Committee on Armed Services
United States Senate

Subject*: Defense Acquisitions: Status of the Expeditionary Fire Support System*

The United States Marine Corps and the Special Operations Command determined in 1999 that there was a need for a weapon system that could be carried inside the V-22 Osprey and deployed to support assault operations. The Expeditionary Fire Support System (EFSS), which consists of a vehicle that tows a 120 mm mortar and another vehicle that tows an ammunition trailer, is one of the systems now being developed to meet this need.

In June 2005, the Marine Corps approved low-rate initial production of 6 EFSS units—each unit made up of two vehicles, a mortar and ammunition trailer. From May to July 2007, the Marine Corps Operational Test and Evaluation Activity, the independent test agency for the Marines, conducted initial operational testing and evaluation of the EFSS using refurbished developmental prototypes. The program office began receiving the low-rate production mortars in late October 2007 and is now going through the acceptance process. The delivery of the low-rate production vehicles to the government was delayed until mid-November 2007 so that problems identified during the summer 2007 operational test could be fixed. The EFSS full-rate production decision was initially scheduled for September 13, 2007, but has since been delayed.

As you requested, we reviewed the EFSS program and we provided a briefing to your office on September 12, 2007. This correspondence summarizes that briefing and incorporates additional information on program changes made through December 2007. Specifically, we reviewed (1) whether the EFSS design is meeting its key performance parameters and other critical requirements, (2) plans to overcome any identified performance shortfalls, and (3) how the current cost and schedule estimates compare to those estimated at contract award.

Results In Brief

The EFSS met all of its key performance parameters and 13 of 14 critical requirements during the operational test. The only critical requirement not met was

the mortars' maximum rate of fire. The EFSS also experienced several safety, performance and reliability problems during testing, which led the test activity to conclude that the EFSS was operationally effective with limitations and operationally suitable with limitations. Testing identified

- safety issues, including potential injury to a crew member riding in the ammunition support vehicle's rear seat;
- performance issues, including how fast the weapon can be fired and moved, and the vehicle's equipment-carrying capacity; and
- reliability issues, including mechanical failures, such as the inability to sufficiently cool the engine and vehicle-starting problems at altitude.

Also, because of delays getting test assets, cold weather testing that was planned for February 2007 was not conducted. Recently, the program office discovered a problem with the primer for the propellant section of the mortar's ammunition. If this problem is not resolved in time, the cold weather testing could be missed again.

The Marine Corps is working on a number of design changes to address the safety, performance and reliability problems identified to date. In response to the concerns you expressed to the Marine Corps on September 12, 2007, the Marine Corps delayed the EFSS full-rate production decision until after the safety, performance, and reliability shortfalls are shown to be corrected in testing planned for this winter, which will culminate with follow-on operational testing of production units in early 2008. The Marine Corps also approved additional limited production of six EFSS systems. This plan does not commit the government to any additional purchases, but allows the program office to obligate the fiscal year 2007 funding it had intended to use for full-rate production. According to the program office, the scope of follow-on testing has doubled from the previous plan and the test and evaluation master plan is being revised accordingly.

Since the original acquisition program cost and schedule estimate was approved in 2004, costs have increased by $15.5 million and the schedule has been extended by nearly 2 years. According to the program office, the cost growth is because of the additional scope of testing, the costs associated with ensuring the ammunition complies with safety requirements, and changes to the vehicle performance requirements. The program has also experienced major schedule delays because the Marine Corps was optimistic in its belief that using commercial off-the-shelf systems with some modifications could provide a solution to meet the need for an internally transportable system. Greater-than-anticipated design changes, coupled with the recent decisions to conduct additional testing, resulted in the deferral of the EFSS's initial operational capability from June 2006 to spring 2008. Because of the additional developmental work, the Marine Corps assumed more risk on the low-rate initial production option, which was changed from firm fixed price to cost reimbursable. Recently the Marine Corps authorized additional limited production before reaching agreement on the scope and price—an arrangement that can make it more difficult to control costs.

Background

The EFSS consists of two prime mover vehicles, a 120-mm mortar, an ammunition trailer, digitized fire direction equipment (used to orient the weapon and compute firing data), a basic load of 34 rounds of ammunition and crew. The EFSS supports Marine operational maneuver from the sea and requires at least two MV-22 Osprey or two CH-53E sorties to deploy—one sortie to transport the vehicle and the 120-mm mortar,[1] and another sortie to carry the second vehicle and the ammunition trailer. A crew of five Marines is also divided between the two sorties.

During the early stages of the program, the program officials for the EFSS and for the Internally Transportable Vehicle worked closely to locate a single vehicle platform to fulfill the needs of both programs. Both vehicles share the same basic configuration, chassis, suspension, and the need to fit inside a V-22. The programs proceeded with an approach using non-developmental items and integrating commercially available components onto a common chassis. Because of their common design goals, the Marine Corps consolidated EFSS and the Internally Transportable Vehicle into a single contract. This allowed the Marine Corps to take advantage of common contract execution, fewer government personnel, and mutuality of vehicle design with anticipated subsequent cost and schedule savings. The Marine Corps also believed that the combined production of over 600 systems[2] would translate to a lower unit cost, because of economies of scale.

On November 10, 2004, following a competition, the Marines awarded a $12 million contract[3] with a hybrid structure including both firm fixed price and cost plus award fee line items for both EFSS and the Internally Transportable Vehicle to one prime contractor, General Dynamics Ordnance and Tactical Systems. As of November 10, 2004, the contract price was valued at $296 million. Both programs have separate line items in the budget, and once fielded, EFSS and the Internally Transportable Vehicle will be managed as separate programs for the life cycle of the systems.

In 2007, the EFSS received internal and external flight certification for both the MV-22 and the CH-53E aircraft. In July 2007, the operational test for EFSS was completed, and in August 2007 the production baseline for EFSS was approved. Table 1 lists significant program events.

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[1] This 120 mm mortar's interior is rifled, with a pre-engraved driving band that imparts rotation to the shell. More than 1000 units have been produced and have been in service with 24 armed forces in 22 countries, for over 10 years. The EFSS mortar tube can fire both rifled and smooth bore ammunition. EFSS is using rifled rounds produced by a French firm.

[2] The ITV acquisition objective increased to approximately 700 vehicles; the EFSS total buy is expected to be 70, including 4 developmental systems.

[3] The indefinite-delivery/indefinite-quantity contract allows for a certain amount of contract process streamlining. This type of contract provides for an indefinite quantity of supplies or services during a fixed period of time. The government places delivery orders (for supplies) or task orders (for services) against a basic contract for individual requirements. Minimum and maximum quantity limits are specified in the basic contract either as number of units or as dollar values. The Government uses this kind of contract when it cannot predetermine, above a specified minimum, the precise quantities of supplies or services that the government will require during the contract period.

Table 1: Major Program Events

Key events	Started	Completed
Milestone B – Program start		Nov. 2004
Milestone C: Conditional approval for low-rate initial production		June 2005
EFSS developmental testing – I	Mar. 13, 2006	Mar. 18, 2006
LRIP contract award		Sept. 2006
EFSS internal flight certification issued		May 2007
EFSS developmental testing – II	May 14, 2007	May 25, 2007
EFSS external flight certification issued		June 2007
EFSS operational test and evaluation	May 30, 2007	July 11, 2007
EFSS production baseline established production readiness review completed		August 31, 2007
Marines approve procurement of 6 production EFSS. This effort does not commit the government to additional units		September 21, 2007
EFSS low-rate initial production units delivered		October - November 2007
	Proposed	
EFSS follow-on operational test & evaluation (including cold weather testing)		February 2008 – March 2008
Full-rate production		Spring 2008
EFSS initial operational capability		Spring 2008
EFSS full operational capability		Fiscal year 2010

Source: U.S. Marine Corps.

EFSS Meets Most Requirements, but Experienced Safety, Performance and Reliability Problems

According to Marine Corps Operational Test and Evaluation officials, EFSS met all of its tested key performance parameters as well as met 13 of 14 critical requirements, but also experienced several safety, performance and reliability problems during operational testing. The Marine Corps Operational Test and Evaluation Activity conducted the EFSS' initial operational testing and evaluation in three phases (amphibious, desert, and high altitude) to determine whether the system is operationally effective and operationally suitable.

The EFSS most critical requirements are expressed in two levels. At the top are four overarching key performance parameters that are considered essential for effective military capability. See table 2.

Table 2: Key Performance Parameters

Key Performance Parameter	Requirement
Transportability	110 nautical mile lift internal to CH-53E and MV-22 (threshold=objective)
Fire Range	Unassisted indirect fire maximum range for standard high explosive projectile at least 7 km (threshold), 14 km (objective)
Range Error	Achieve range error probable of 0.6% of range (threshold), 0.3% of range (objective) and a deflection error probable of 0.6% of range (threshold), 0.1% of range (objective) for high explosive at two-thirds of maximum range
Net Ready	Data system should interface with specified DOD networks.

Source: U.S. Marine Corps.

Note: The threshold value is the minimum acceptable performance requirement to satisfy a need. The objective value is what is desired by the user.

The second level of requirements, critical requirements, address transportability, lethality, and technical fire direction. See table 3, EFSS critical requirements.

Table 3: Critical Requirements

Requirement type	Critical requirement details
Transportability and mobility	Unload time of 5 minutes (threshold) and 3 minutes (objective) for external lift
	Embarkation time between 10 and 20 minutes (threshold) and between 5 and 10 minutes (objective) for internal lift
	Debarkation time between 5 and 10 minutes (threshold) and between 3 and 5 minutes (objective) for internal lift
	Ability to transport the crew, crew personal equipment, section equipment, and basic load of ammunition (threshold=objective)
	Average off-road speed of 5 mph
	Average unimproved road speed of 10 mph
	Transportable by US C-130 aircraft and larger (threshold=objective) without disassembly or modification
	Transportable by all US Navy amphibious ships, Military Sealift Command ships and contracted cargo ships (threshold=objective)
Lethality	Capable of firing ordnance of 105mm in diameter or larger (threshold=objective)
	Capable of firing a variety of specified existing ammunitions types
	Maximum rate of fire of 4 rounds per minute (threshold), 16 rounds per minute (objective) for one minute for all specified ammunition types
	Sustained rate of fire of 2 rounds per minute (threshold), 6 rounds per minute (objective) for all ammunition types
Technical fire direction	Capable of determining ballistic solutions (threshold=objective)
	Permit the crew to manually enter/edit all technical fire control data (threshold=objective)

Source: U.S. Marine Corps.

Of the 14 critical requirements, one was changed after contract award in 2004. The sustained rate of fire was reduced from four rounds per minute to two rounds per minute. The program office attributed this change to a typographical error found in

the requirements documentation. Additional changes were to noncritical requirements including

- an increase in the time allowed for some mortar timed events;
- added improved on-road speed of 35 miles per hour; and
- a decrease in the basic ammunition load from 50 to 100 rounds of munitions to 34 rounds.[4]

Currently, there is no armor requirement for the vehicles, but the Marines are developing both a permanent and an add-on armor kit that will enhance survivability.[5]

In September 2007, the test activity concluded that the EFSS was operationally effective with limitations and operationally suitable with limitations. The system met its vertical-transport, maximum-range, and accuracy key performance parameters. The test activity determined that the information-exchange key performance parameter did not require testing because this communication component had been previously tested. The system also met 13 of 14 critical requirements. It did not meet the critical requirement related to maximum rate of fire. The system also did not meet some noncritical requirements for timed events, which involve rate of fire, first round response, shift out of traverse, and emplacement and displacement. Although required times were achieved on occasion, the preponderance of observed times took longer than required. In addition, the test activity found that the EFSS vehicles were capable of carrying all required equipment, but not securely. Other performance, safety, reliability issues, as well as mechanical failures were identified, as summarized in table 4.

[4]This was included as a concept of employment in the Capabilities Development Document, stating: "The basic load can be between 50 and 100 rounds of various munitions or a mix of munitions that can be adequately transported by the EFSS prime and ammunition movers." In other words, the 50 to 100 EFSS ammunition basic load (per section) was a concept of employment and not a Marine Corps Combat Development Command requirement. The basic load of ammunition is now required to be 34 rounds per EFSS.

[5]Congress has provided procurement funding for armor protection.

Table 4: Factors Limiting EFSS Capability

Performance shortfall	Impact on program
Safety	Issues related to ammunition trailer and its inability to be towed safely pose a risk of injury to the crew member riding in rear seat of vehicle. Three incidents involving the trailer occurred during the EFSS operational test.
Performance	Measures associated with timed events and the inability of the vehicle to securely carry all required equipment impact performance. Also, issues involving the mortar sight's being difficult for operators to use and problems using the shock mount were documented.
Reliability	The mortar's mean rounds between operational mission failure did not meet the threshold. The reliability requirements are separate for the mortar and the vehicles. o The transport barrel clamps were not stout enough to prevent the mortar tube from rotating. This contributed to brake damage on one mortar during movement. o Each prime mover vehicle's physical configuration was different. This prevented the test team from interchanging parts on several occasions.
Mechanical failures	o The compressor for the air ride system and Central Tire Inflation System was not robust enough to support all the air powered systems on the vehicle. o The cooling system was not able to cool the engine and transmission sufficiently during operations. o The vehicles had difficulty starting at altitude.
Other issues & test limitations	o Due to delays in getting test assets, cold weather testing that was planned for February 2007 was not conducted. o Testing was not executed in extreme cold, high humidity, or extreme heat (up to 125 degrees Fahrenheit). EFSS was tested at temperatures of up to 115 degrees.

Source: Marine Corps Operational Test and Evaluation Activity and EFSS program office.

In addition to the issues identified during operational testing, the program office recently determined that there is a design issue with primer for the propellant of the mortar round that could affect the insensitive munition certification—essentially, the primer in the tail of the mortar ignites the propellant.[6] One aspect of the insensitive munition testing is a drop test of the mortar to ensure it does not go off in case the munition is mishandled. The United States successfully drop tested the round 9.3 feet onto a steel plate while the mortar was at 125 degrees Fahrenheit. France uses the same mortar round and tested it at a 9.3 feet drop at 160 degrees Fahrenheit. The primer ignited the propellant, which burned but the round did not explode. According to the program office, the design has been changed and the solution completed retesting for insensitive munition certification on December 12th, in time to conduct cold weather testing now scheduled to occur early in 2008. Data analysis of the test results is ongoing.

In light of the limitations identified during operational testing and the system's limited armor protection, the Director of the Marine Corps Operational Test and

[6] An insensitive munition is one that will not detonate under any condition as other than its intended mission to destroy a target. Section 2389, Title 10 of the U.S. Code provides that the Secretary of Defense shall ensure, to the extent practicable, that insensitive munitions under development or procurement are safe throughout development and fielding when subjected to unplanned stimuli. DOD Directive 5000.1 (Jan. 2003) states all systems containing energetics shall comply with insensitive munitions criteria.

Evaluation Activity described the EFSS as a "niche" capability. The system is intended to accompany Marines on foot and travel cross-country. According to the Director, as long as the EFSS is used within these strict operating limits, the system can be used safely. Test activity officials also indicated that EFSS provides a capability not currently fielded in the operating forces. The Marine Corps Operational Test Activity recommended prior to fielding the system, that safety, performance, and reliability issues should be addressed, that developmental testing should be completed, and that follow-on operational test and evaluation, including cold weather testing, should be conducted.

Full-Rate Production Decision Delayed until Completion of Follow-On Testing

In response to the concerns you expressed on September 12, 2007, the Marine Corps delayed the planned September 13, 2007, EFSS full-rate production decision until spring 2008. The EFSS program office is now working to address performance shortfalls by testing fixes in developmental testing and verifying those fixes in follow-on testing planned for this winter and spring 2008.

Initially, the program office sought approval to enter into full-rate production by fielding one EFSS battery out of a production buy of 66 units.[7] The program office wanted to field one battery and get approval for full-rate production based on addressing outstanding performance, safety, and testing issues. On September 12, 2007, we briefed your staff that, as initially planned, the full-rate production decision would be made before the first production quantities had been delivered or tested, fixes to the problems discovered in operational testing were proven, and cold weather performance could be tested.

Since our briefing, the Marine Corps approved additional limited production of six EFSS units to field one artillery battery.[8] This plan does not commit the government to any additional purchases, but allows the program office to obligate the fiscal year 2007 funding it had intended to use for full-rate production. The Marine Corps plans to address the limitations the test activity identified by (1) collaborating with the testers and revising the EFSS Test and Evaluation Master Plan, (2) addressing performance shortfalls, and (3) conducting follow-on operational testing on production units in the February-March 2008 time frame. According to Marine Corps Operational Test and Evaluation Activity officials, they will conduct the follow-on test (which includes durability and cold weather events).

The Director of the Marine Corps Operational Test and Evaluation Activity described the plan as an unusual commitment of resources beyond the initial operational test and evaluation event. He noted that normally in non-major acquisition programs such as the EFSS program, the testing activity does not retest and evaluate fixes for

[7] An EFSS battery consists of six rifled towed mortars, 12 prime movers (vehicles), six ammunition trailers, five Battery Support Vehicles, ammunition suite, and support package.

[8] These systems are in addition to the six low-rate initial production systems purchased with fiscal year 2006 funding.

deficiencies it identified during operational testing. Normally, test activity staff return to verify the program office's fixes once they are in place. For EFSS, the test activity reached an agreement with the program office to update the Test and Evaluation Master Plan. This update includes additional combined developmental and operational testing followed by the testers verifying that the fixes work during the follow-on operational test and evaluation event.

According to the program office, the scope of follow-on testing has doubled from the previous plan. In the area of safety, a roll cage and an improved trailer tongue, or hitch, are being tested.[9] In addition, the program office is experimenting with different settings on the brakes, and is lowering the ammunition trailer's tire pressure to reduce bouncing. Regarding mechanical failure and reliability, the program office believes it has identified the fixes for all of the mechanical failures listed in table 4 and made several other design changes. For example, to address the cooling deficiency, a lower gearing is used that reduces the load on the engine and consequently the engine's cooling needs. Overall vehicle weight was reduced and is better centered. To address the high altitude starting problem, the existing glow plugs were replaced with a higher temperature glow plug.[10] Also, an intake air heater and controller were added to pre-heat the intake air in low ambient air temperatures. Changes were also made to the lower control arm to improve manufacturability. The lower control-arm design change reduced the number of pieces for the steel arm from 23 to 15 pieces. This reduces manufacturing time, labor, and ultimately allows reduced long-term production and life-cycle costs.

Program Cost Growth and Delays Resulted Primarily from Underestimated Development Effort

Since the original acquisition-program cost-and-schedule estimate was approved in 2004, the cost has increased $15.5 million and the schedule has been extended by nearly 2 years. The EFSS required more development than the Marine Corps expected, which resulted in some cost growth, a significant contract delay, delayed production deliveries, and less information at decision points.

Cost Increases Related to Program Scope

The total program cost increased from $675.7 million in 2004 to $691.2 million in 2007 (in fiscal year 2004 dollars). The cost growth of $15.5 million was all in research and development, which increased from $47.5 million to $63.0 million. According to the program office, cost growth is driven by three factors. First, funding that was added for future development will instead be used for the cost increase associated with the increased scope of ongoing developmental testing and follow-on testing.[11] Second,

[9] The program office extended the trailer hitch to improve trailer stability and safety.

[10] A glowplug is a heating device used to aid starting diesel engines.

[11] According to the program manager, they are deferring developmental efforts that had been added in 2012 and 2013 to improve the digitized fire direction center equipment and provide it with software digital capability, upgrade the precision extended range munition, and enhance the insensitive munition (IM) illumination capability.

[13] According to EFSS program officials, the scheduled was designed to meet an initial operational capability that coincided with the first Marine Expeditionary Unit deployment using the MV-22 and help save on ammunition

funding was added for the costs associated with ensuring the ammunition is compliant with "insensitive munition" requirements that had not been included in the first approved program baseline. And third, changes made to the performance capabilities of the vehicles, such as an increase in on-road speed from 10 to 35 miles per hour, required some additional development funding. The program office is also considering whether to combine the 2009 and 2010 planned procurements of 48 systems into fiscal year 2009 to achieve economy of scales savings.

According to the program office, each EFSS will cost in the range of $570,000 to $680,000 in base year 2004 procurement dollars. The procurement unit cost calculation excludes the engineering, program management, logistics planning, spares, and cost of 20 years of ammunition currently projected at $501.7 million to $548.3 million. However, the program office is concerned that recent unfavorable exchange rate changes could increase the unit cost of the systems, driven by the cost of the French-built mortar.

Original Schedule Proved Optimistic

The program has experienced major schedule delays because the Marine Corps was optimistic in its belief that using commercial off-the-shelf systems with some modifications could provide a solution to meet the need for an internally transportable system. The EFSS program's 2005 risk management plan notes the EFSS schedule is aggressive with little flexibility to accommodate schedule slips. According to the program office, the schedule was driven by the first deployment date for the first equipped Marine Expeditonary Unit aboard the MV-22. Also, according to the program manager, a compressed development and test schedule was chosen to help save on ammunition cost (by combining pre-operational test work up with some training events, thereby using fewer rounds of ammunition). The program office also thought it could meet the EFSS requirements by using a mostly commercial-off-the-shelf system, but meeting the MV-22 transportability key performance parameter required more development than anticipated.

The ambitiousness of the development schedule was evident when the Marine Corps made a production decision in June 2005, before the development scope was fully recognized.[13] Partly because of the additional development scope that had to be negotiated, it took over a year to exercise the production option. The Marine Corps exercised the low-rate initial production option in September 2006, and at the same time the government assumed more development risk because it changed the option type from firm fixed price as originally awarded in the contract to cost reimbursable. The selection of contract type is generally a matter of risk allocation: fixed-price contracts place the risks associated with performing the contract on the contractor; cost reimbursement-type contracts place minimal risk on the contractor. The risk associated with performance shifts between the parties depending on the type of contract selected. The shift in contract type was done, according to the program

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cost (by combining pre-operational test work up with some training events; thereby using fewer rounds of ammunition).

office, because the design remained extremely uncertain and more developmental work was needed than originally anticipated.[14]

Many changes have had to be incorporated into the design so the system would meet the MV-22 cabin size and weight restrictions because the internal MV-22 transportability requirement affects the wheel weight, vehicle balance, and vehicle dimensions. In addition, the issues that arose early in development involving the vehicle's axle, hub assembly, driveshaft, chassis and electrical system have been addressed in response to an earlier operational assessment on the internally transportable vehicle program. These design changes were incorporated into the EFSS development vehicles while they were being delivered to the government. The program office subsequently used them for operational testing. Program officials informed us that production deliveries were delayed partly because the contractor's efforts were diverted to refurbishing the prototypes for testing. As a result of the introduction of design changes onto refurbished development vehicles, the operational test vehicles had different physical configurations. According to program officials, the first production vehicles were delivered in mid-November 2007, 4 months after operational testing ended.

The test schedule also allowed no time to fix problems identified during EFSS developmental test phase II. This test phase ended about 5 days before operational testing began. There was no time allotted to analyze development test results and make changes to the systems used in operational testing, to incorporate solutions into production representative assets, as is normally done before operational testing. As a result, operational testing bore more burden of discovery than normal. The timed events EFSS failed to meet in operational testing were the same timed events it could not meet in development test phase II. Ultimately, EFSS's initial operational capability has been delayed from June 2006 to spring 2008 because of the developmental and operational test problems. This delay has not decoupled the EFSS schedule from the first Marine Expeditionary Unit deployment with V-22s, which is currently projected to take place in the fall of 2008, because that deployment was delayed.

In light of the decision to delay the full-rate production decision, the Marine Corps is negotiating a second buy of six EFSS units as a firm-fixed price option to the original contract. However, until a final agreement is reached on the scope and price, the program office exercised an undefinitized option. Exercise of an undefinitized option authorizes work before reaching agreement on the terms and conditions for the work. According to the EFSS program manager, because of delays in the program because of design changes, operational pressure to be available for the first marine expeditionary unit's deployment using the V-22, as well as the time needed for the Defense Contract Management Agency to audit proposed part prices and labor and other rates, they have gone forward with exercising an undefinitized option. We have previously reported that undefinitized contracts put the government at risk because they provide little incentive for the contractor to control cost until the terms of the

[14] The program office uses a hybrid contract structure covering both EFSS and the Internally Transportable Vehicle and includes logistics support, systems development, and ammunition as cost plus award fee lines, production options as firm fixed price lines, and an indefinite delivery/indefinite quantity line for the Internally Transportable Vehicles.

work are finalized or definitized.[15] In addition, the government does not have much bargaining power over the work done during the undefinitized period. The program office expects to have a definitized option between December 2007 and January 2008.

Agency Comments and Our Evaluation

We provided a draft of this report to the Department of Defense and it chose to provide technical comments, which were incorporated as appropriate.

Scope and Methodology

We focused our review efforts on the EFSS program, although it shares contract solicitation and execution with the Internally Transportable Vehicle program.

To determine whether the current EFSS met its key performance parameters and other critical requirements, we first assessed whether any requirements had changed by comparing the program's requirements documented in the 2004 Capabilities Development Document with subsequent revisions; we also reviewed the integrated performance specification and the requirements traceability matrix. We discussed identified requirements changes with the EFSS program office—Marine Corps Systems Command, Product Group 14 (Armor and Fire Support Systems)—located at Quantico, Va. We also discussed changes in requirements with a representative from the Marine Corps Combat Development Command, the organization responsible for establishing the EFSS requirements. We obtained and analyzed the results of major test events, including EFSS developmental test phases I and II, ITV operational assessment, and EFSS operational test. We discussed the test results with the EFSS tester, the Marine Corps Operational Test & Evaluation Activity, also located at Quantico, Va. We interviewed the program office staff, including the program manager and lead engineer and Marine Corps Operational Test & EvaluationActivity staff, including the Director and the Fire Support Operational Test Project Officer and discussed the performance shortfalls documented in the test reports.

To identify the Marine Corps's plans to address performance shortfalls, we reviewed the plans listed in the proposed acquisition decision memorandum for the full-rate production decision planned in September 2007. We discussed the program office's plans to address the problems discovered in developmental and operational testing with program and test officials. We interviewed program officials and discussed the advantages and disadvantages of conditionally moving forward with this decision. After the Marine Corps decided to postpone the EFSS full-rate production decision, we discussed the impact this delay has on the overall program and the schedule for testing the planned EFSS fixes as well as the cold weather testing.

To determine how the current cost and schedule estimate compares to those estimated at contract award, we reviewed the contract, life-cycle cost estimates and compared the 2004 approved acquisition program baseline to the current one. We

[15] GAO, *Defense Acquisitions: Success of Advanced SEAL Delivery System Hinges on Establishing a Sound Contracting Strategy and Performance Criteria*, GAO-07-745, (Washington D.C.: May 24, 2007).

met with program office officials, including the contracting officer and his staff, to discuss, and where possible document, the reasons for any changes in the estimates and their overall impact on the program. We did not determine the appropriateness of the change in LRIP option type from firm fixed price to cost reimburseable, which was exercised in September 2006.

We conducted our review from July 31, 2007 to December 21, 2007, in accordance with generally accepted government auditing standards.

As agreed with your office, unless you announce its contents earlier, we will not distribute this report further until 6 days from its date. At that time, we will send copies to the Secretary of Defense, the Commandant of the Marine Corps, and interested congressional committees. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov. If you or your staff have any questions concerning this report, please contact me at (202) 512-4841. Key contributors to this assignment are David Best, Bonita Oden, Laura Holliday, and Greg Campbell.

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Acquisition and Sourcing Management