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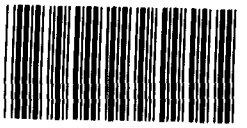
Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives

February 1993

ARMY ACQUISITION

Effective Subcontractor Oversight Needed Before Longbow Apache Production



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National Security and
International Affairs Division

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February 22, 1993

The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In response to your request, we have reviewed the Army's oversight of the prime contractor for the Apache helicopter and the prime contractor's oversight of subcontractors working on component parts of the helicopter. Our objectives were to review (1) the Army's past efforts to have the prime contractor correct weaknesses in its subcontractor oversight, (2) the extent to which weaknesses in subcontractor oversight might have contributed to problems found with parts, (3) the latest efforts to improve the prime contractor's oversight of its subcontractors, and (4) the implications of the latest efforts on the Apache and Longbow programs.

As you know, we have conducted a series of reviews over the past 3 years that have identified serious, long-standing problems with certain components of the Army's AH-64 Apache helicopter, produced by the McDonnell Douglas Helicopter Company (MDHC), the prime contractor since 1982.[1] In July 1991, the on-site Defense Plant Representative Office (DPRO)[2] placed MDHC in a Contractor Improvement Program[3] because of serious deficiencies in its process controls, including its system for oversight of subcontractors. However, in August 1992, the DPRO removed the company from the improvement program because of the contractor's planned improvements. The DPRO's identification of deficiencies in the oversight of subcontractors is particularly important because about 80 percent of the Apache's production is done by subcontractors.

[1]Apache Helicopter: Serious Logistical Support Problems Must Be Solved to Realize Combat Potential (GAO/NSIAD-90-294, Sept. 28, 1990); Apache Helicopter: Reliability of Key Components Yet to Be Fully Demonstrated (GAO/NSIAD-92-19, Oct. 3, 1991); Operation Desert Storm: Apache Helicopter Was Considered Effective in Combat, but Reliability Problems Persist (GAO/NSIAD-92-146, Apr. 20, 1992).

[2]The DPRO, which is located at the contractor's plant and is a part of the Defense Logistics Agency, provides government oversight of contractor operations.

[3]Under the Contractor Improvement Program, the contractor is asked to identify the root causes of its performance problems and to provide a plan for correcting the problems. If the contractor fails to make significant progress within 1 year, the government is to consider debarring the contractor from future contracts.

Background

As part of a larger effort to improve government oversight at contractor plants, the DPRO assumed responsibility from the Army for oversight of MDHC on June 30, 1990. This oversight responsibility includes ensuring company compliance with cost, delivery, technical, and quality requirements, as well as other contract terms.

Military Specification MIL-Q-9858A, "Quality Program Requirements," effective December 1963, requires primary contractors, such as MDHC, to ensure that all supplies and services procured from their subcontractors conform to contract requirements. Specifically, in overseeing its subcontractors, the prime contractor is responsible for (1) selecting qualified subcontractors; (2) ensuring that all applicable design, quality, and technical requirements are provided to the subcontractors; (3) evaluating the adequacy of the subcontractors' products; and (4) ensuring that the subcontractors are informed early about problems with their products and that these problems are corrected.

In August 1989, the Army awarded MDHC a full-scale development contract to modify some of the existing Apache helicopters. The modified helicopter will be known as the "Longbow Apache." MDHC is developing the airframe modifications to accommodate the Longbow enhancement and is responsible for the total integration of the airframe, radar, and missile systems.

Results in Brief

Oversight weaknesses have been long-standing at MDHC, and past efforts to correct them have not been effective. For example, between 1986 and 1990, the Army conducted five studies that identified weaknesses in subcontractor oversight. During this period, MDHC responded with various corrective action plans; however, these plans were not fully effective. The Army did not do all it could have done to encourage MDHC to correct the identified weaknesses. For example, the Army could have reduced MDHC's progress payment rate until needed corrections were made, but it did not.[4] Rather, it granted waivers and deviations from the contract requirements. The Army sometimes withheld amounts from the final payment as part of the waiver and deviation process.

Past problems with parts for the Apache helicopter can be attributed at least in part to MDHC's lack of adequate attention to overseeing the work of its subcontractors. For example, MDHC provided inaccurate airframe

[4]The progress payment rate is the percentage of the costs incurred by the contractor in producing an item that the government pays, usually on a monthly basis, before the government accepts the item. The government pays the remainder of the total cost of the item when it accepts the item.

drawings to the subcontractor and allowed it to produce at least 646 Apaches using these drawings.

Currently, MDHC is implementing a new corrective action plan to overcome the weaknesses in quality assurance, product definition, and program management identified by the DPRO. However, according to the DPRO commander, sufficient data needed to analyze the corrective actions' effectiveness will not be available before July 1993.

The steps that the DPRO and MDHC take to improve subcontractor oversight are particularly important because MDHC will rely on subcontractors to do much of the work under its $5 billion Longbow Apache contract. Without adequate improvements in its subcontractor oversight, MDHC's ability to deliver quality products under its Longbow contract could be adversely affected.

The Army Did Not Ensure Adequate Subcontractor Oversight by MDHC

In the past, the Army did not ensure that MDHC corrected weaknesses in subcontractor oversight. Between 1986 and 1990, the Army conducted five studies, and the Defense Logistics Agency conducted one, that identified deficiencies in MDHC's oversight of its subcontractors. As a result of these studies, the Army repeatedly requested that MDHC improve its oversight system, and MDHC responded with several corrective action plans. However, the corrective plans were directed more toward correcting the symptoms of the problems, rather than toward identifying the systemic or root causes of the problems. In addition, the Army has been pursuing corrective action on key Apache hardware and structural components for several years under its Apache Reliability Improvement Program.

Although the Army studies repeatedly found similar deficiencies, the Army did not exercise several available options that could have prompted MDHC to seriously address its oversight problems. For example, the Army could have (1) placed MDHC in the Contractor Requiring Special Attention Program,[5] (2) reduced MDHC's progress payment rate, (3) stopped aircraft production, or (4) delayed or denied other government contract awards.

To the contrary, the Army took steps that indicated MDHC's performance was acceptable. For example, it (1) issued major waivers and deviations to specifications when aircraft did not meet the contract specifications;

[5]This program was the Army's equivalent to the Defense Logistics Agency's former Contractor Improvement Program. In 1987, the Army placed MDHC in the program because the contractor was delinquent on deliveries under its spares contracts. The Army never placed MDHC in the program because of inadequate oversight of subcontractors or problems with quality.

(2) agreed to change certain contract specifications to levels that MDHC could achieve; and (3) periodically accepted, without waivers, parts not meeting specifications. Several officials who were in the Army's plant representative office at MDHC told us that the major reason the Army had taken these actions was that its primary mission goal was to field aircraft.

The Army had approved major waivers or deviations from the contract requirements or specifications for all 761 Apache helicopters delivered as of December 31, 1992. For example, waivers and deviations were approved for aircraft that contained (1) 30-millimeter area weapon systems that did not meet requirements for accuracy, (2) engine control cables from unapproved sources, (3) airframes with certain rivet holes either not at the specified locations or drilled too large, (4) main rotors that did not meet specifications, and (5) transmissions with clutches that did not meet specifications for reliability. In addition, the Army issued a waiver to accept future Apache helicopters with 30-millimeter area weapon systems that do not meet original requirements for accuracy because the Army had not approved two engineering change proposals to retrofit the Apache fleet with improvements to the area weapon system's accuracy in time to meet the remaining delivery dates. As a result, no Apache will be accepted without a major waiver or deviation.

As part of the waiver and deviation process, the Army sometimes withheld amounts from the final payment. For example, at times, various amounts were withheld because the Apache's 30-millimeter gun did not meet its accuracy requirements. These amounts varied from a high of $200,000 per aircraft in December 1990 to a low of $20,000 per aircraft in January 1993. Withheld amounts are generally returned when a problem is corrected. The Army has returned all but $20,000 per aircraft of the amounts withheld because of gun accuracy problems.

The Army agreed to reduce contract specifications when the contractor has not been able to meet them. For example, on May 15, 1991, the Army and MDHC agreed to (1) conduct an accuracy test for the area weapon system, (2) require that the system meet only 1 of the required 19 test shots, and (3) change the original contract accuracy specifications to whatever the system was able to meet for the remaining 18 shots. The test results indicate that the area weapon system passed 16 of the 19 test shots and that this level of accuracy was acceptable.[6]

[6]As you requested, we are evaluating tests conducted by the Army and MDHC in January 1992 to determine whether the test conditions allowed for an adequate assessment of the area weapon system's accuracy, endurance, and reliability. This issue will be discussed in a separate report.

In our three previous Apache helicopter reports, we discussed the Army's and MDHC's past efforts to address the area weapon system's inaccuracy and other problems. In October 1991, we reported that the Army expected to incur about $17 million in parts and other costs to retrofit Apaches with an improved version of the 30-millimeter area weapon system.

In the past, the Army also accepted, without waiver, Apache main rotor blades that failed when the materials in the blades separated. As a result, the Army had to remove the blades from the helicopter long before the blades' required time between removal was reached. This problem, known as "debonding," surfaced shortly after the Army began to field the Apache in July 1986. Severe debonding can cause the blades to vibrate excessively and force the pilot to land the aircraft. Defense Logistics Agency representatives who have been at the subcontractor's plant since 1986 told us that before 1989, MDHC had taken a position that its drawings and processes were adequate to produce the blades and refused to make changes to the drawings or processes. For several years, the Army reinforced this view by accepting the blades without waivers. According to these representatives, there was little concern about the blades' quality; rather, the main motivation was to deliver aircraft to the Army.

In 1989, Army plant representatives informed MDHC that they would no longer accept blades that did not meet contract specifications without a waiver. MDHC then started working with the blade subcontractor to identify and correct the problems. MDHC and the blade subcontractor made some revisions to the blade manufacturing process. A senior MDHC official stated that the blade improvements were incorporated into production starting in November 1989 and that fielded blades were reworked from 1989 to 1992 to add improvements. As a result, the blade's time between removal has increased, but the improved blade has not yet demonstrated the time between removal required by the contract. Our September 1990 and October 1991 reports addressed the problems with the main rotor blades and discussed the efforts to improve them.

Weaknesses in MDHC's Subcontractor Oversight Contribute to Problems With Other Parts

Weaknesses resulting from the lack of adequate oversight have contributed to long-standing problems with other Apache parts. These parts include the airframe and nuts used in the strap pack assembly.

Airframe

MDHC provided the Apache airframe subcontractor with drawings that were not completely accurate. An airframe subcontractor representative said that Apache airframe drawings had not been completely accurate since production began in 1982 and that MDHC had been reluctant to correct them. We examined a number of examples of inaccurate drawings, including drawings in which the same holes were specified at different locations. A government plant representative said that since MDHC was reluctant to correct the drawings, the subcontractor's manufacturing personnel had to develop their own methods to resolve the problems. In September 1990, MDHC sent a letter to the company stating its decision to stop considering most of the subcontractor's requests to change the drawings. Specifically, the letter states:

> ". . . [MDHC] will no longer entertain most [requests] . . . to change engineering due to an engineering error which has existed prior to the current production lot . . . . This decision is based upon numerous factors, most notably the fact that [the subcontractor] has been producing and [MDHC] has been accepting hardware built in the 'as built' configuration in excess of 646 ship sets."

In July 1992, an MDHC official told us that there had been an oral revocation of the September 1990 letter. Another MDHC official said the company's current policy is that drawing changes will be made to either correct errors or enhance producibility of the airframe. In June 1992, a subcontractor representative said that at the beginning of 1992 MDHC had agreed to make a few changes to the drawings. However, in December 1992, DPRO officials said that the airframe drawings were not completely correct.

Strap Pack Assembly Nuts

The Apache main rotor's four strap packs, part of the main rotor hub system, are comprised of a series of 22 steel straps that help secure and control the main rotor blades. In October 1990, MDHC did not provide a new subcontractor with the heat treatment requirements for nuts used to

assemble the strap pack. As a result, the subcontractor did not heat treat the nuts, and MDHC allowed the untreated nuts to enter its production system. Untreated nuts are more brittle and not as strong as heat-treated ones. MDHC discovered the error when some nuts broke during the production process. Government plant representatives said that MDHC was able to purge virtually all untreated nuts from the production stock. MDHC officials said that the problem with the heat treatment has been corrected. However, MDHC later dropped the nut subcontractor from its approved supplier list because of quality and delivery problems.

Too Soon to Tell Whether Problems Have Been Corrected

MDHC has developed and begun to implement the corrective action plan required as a result of being placed in the Contractor Improvement Program in July 1991. However, according to the DPRO commander, sufficient data is not yet available to determine whether MDHC has improved its subcontractor oversight.

As part of the implementation of its corrective plan, MDHC significantly changed several company procedures and practices related to subcontractor oversight. In August 1992, the DPRO removed MDHC from the improvement program because MDHC was implementing its corrective action plan.

To monitor MDHC's implementation of the plan and its effect on improving the oversight system, the DPRO is using a series of performance measures referred to as "health indicators." The indicators track contractor performance data, such as the numbers of defective units, product quality deficiency reports, waivers, and products passing quality tests on the first attempt. The indicators are consistent with generally recognized and accepted measurement standards in both the private and public sectors.[7]

The Army, when it was responsible for oversight, did not have similar health indicator data to use for comparison purposes, and the DPRO did not develop baseline data before placing MDHC in the improvement program. Consequently, the DPRO cannot yet measure MDHC's progress toward improving its oversight. The DPRO will need to collect and analyze more health indicator data before an analysis can be made of the corrective actions' effectiveness. The DPRO commander said that he would not expect to see the indicators showing consistent improvement in MDHC's performance before July 1993.

[7]We developed a list of standards most often identified by 11 recognized performance measurement experts in government and private industry.

Although MDHC is no longer in the improvement program, the DPRO commander said that he would take appropriate action if MDHC either failed to resolve the deficiencies or if they recur. The DPRO's continued attention to this matter is important, given the ineffectiveness of past corrective action plans.

Corrective Actions Are Very Important for Longbow Contract

The DPRO's and MDHC's actions to improve subcontractor oversight will have little impact on the Apache program, but they are expected to have a significant impact on the Longbow Apache program. The early Apache program is nearing the end of production, with 761 of the total 811 Apaches already delivered to the Army as of December 1992. However, these corrective actions remain particularly important because MDHC will rely on subcontractors to do much of the work under the Longbow contract.

The Army's estimated cost for the Longbow Apache program is $5.4 billion, which includes $3 billion to modify 227 of the existing Apaches and $2.4 billion for the Hellfire missiles. Through this program, the Army will modify about 28 percent of the Apache fleet to the Longbow configuration. The Army plans to begin production in April 1995, with deliveries scheduled through the year 2000.

Recommendations

We recommend that the Secretary of Defense not commit production funds for the Longbow Apache modification program until the Director of the Defense Logistics Agency determines, through analyses of health indicators, that MDHC's oversight of subcontractors is adequate to ensure satisfactory performance.

Scope and Methodology

To accomplish our objectives, we analyzed government regulations and contract requirements related to subcontractor oversight, as well as related government, contractor, and subcontractor reports and studies. We reviewed MDHC corrective action plans submitted to the government as they related to subcontractor oversight issues. We interviewed MDHC engineering, contract, procurement, and quality assurance personnel and reviewed related company documents and reports. Also, we analyzed government and MDHC records associated with selected parts.

We interviewed cognizant subcontractor and on-site government oversight personnel and reviewed applicable reports and data, including government

analyses of MDHC responses to being placed on the Contractor Improvement Program. We also interviewed DPRO representatives to obtain their opinions on MDHC's progress in improving subcontractor oversight and reviewed the DPRO system of health indicators to measure MDHC's improvements.

We performed our work at MDHC offices in Mesa, Arizona, and Culver City, California; the Composite Structures Division of the Aluminum Corporation of America in Monrovia, California; the Teledyne Ryan Aeronautical Company in San Diego, California; the Defense Contract Management Area Operations Offices in Monrovia, San Diego, and Culver City, California; the Defense Contract Management District Office, West, El Segundo, California; the Defense Plant Representative Office, Mesa, Arizona; the Army Aviation and Troop Command in St. Louis, Missouri; and the Headquarters Defense Logistics Agency, Cameron Station, Alexandria, Virginia.

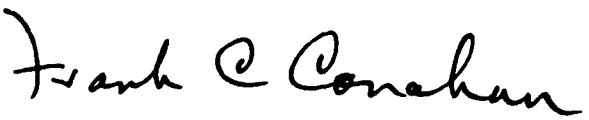
As requested, we did not obtain fully coordinated Department of Defense comments on this report. However, we did obtain oral comments on a draft of this report from representatives of the Office of the Secretary of Defense, the DPRO, and others. In addition, we obtained comments from representatives of MDHC. We have included their comments where appropriate.

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

As you requested, we plan no further distribution of this report until 20 days from its issue date. At that time, we will send copies to the Chairmen, House and Senate Committees on Appropriations and on Armed Services, Senate Committee on Governmental Affairs, and House Committee on Government Operations; the Secretaries of Defense and the Army; the Commander of the Defense Logistics Agency; and the Director, Office of Management and Budget.

This report was prepared under the direction of Henry L. Hinton, Jr., who may be reached at (202) 275-6226 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in the appendix.

Sincerely yours,



Frank C. Conahan
Assistant Comptroller General

Major Contributors to This Report

National Security and International Affairs Division, Washington, D.C.	David R. Warren, Associate Director Derek B. Stewart, Assistant Director Lawrence D. Gaston, Jr., Adviser
Kansas City Regional Office	Gary L. Billen, Assistant Director Lawrence A. Dandridge, Evaluator-in-Charge John G. Wiethop, Regional Management Representative Karen A. Rieger, Evaluator

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