

# OFFICE OF THE INSPECTOR GENERAL

# QUALITY ASSURANCE PRACTICES FOR THE AN/FMQ-7 OPTICAL TELESCOPE PROCUREMENT

Report No. 95-047

December 2, 1994

**Department of Defense** 

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#### Acronyms

AFOTEC	Air Force Operational Test and Evaluation Center
DCMAO	Defense Contract Management Area Operations
PQDR	Product Quality Deficiency Report
SEON	Solar Electro-Optical Network
SOON	Solar Observing Optical Network
RSTN	Radio Solar Telescope Network





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#### MEMORANDUM FOR ASSISTANT SECRETARY OF THE AIR FORCE (FINANCIAL MANAGEMENT AND COMPTROLLER) DIRECTOR, DEFENSE LOGISTICS AGENCY

#### SUBJECT: Audit Report on Quality Assurance Practices for the AN/FMQ-7 Optical Telescope Procurement (Project No. 4CF-8009)

### Introduction

We are providing this report for your review. We performed the audit in response to a referral from the DoD Hotline concerning an allegation regarding improper contract quality assurance practices by the Defense Contract Management Area Operations Dallas, Texas (DCMAO Dallas), on an Air Force contract for upgrading the Air Force's solar electro-optical network (SEON).

The complainant alleged that DCMAO Dallas showed favoritism to the contractor, Electrospace Systems, Inc. (Electrospace), because DCMAO Dallas did not properly and completely investigate the cause of a product deficiency. The complainant stated that the alleged favoritism occurred when DCMAO Dallas prepared an investigation report that contained only the contractor's response to a product quality deficiency report (PQDR) with no Government input. The complainant further stated that the investigative report was full of erroneous findings.

## Audit Results

We did not substantiate the allegation regarding improper contract quality assurance practices at DCMAO Dallas. We found no evidence that the DCMAO Dallas showed favoritism to Electrospace in the PQDR investigation. The Category I PQDR investigation report incorrectly stated that the Government conducted a concurrent investigation with the contractor. However, we concluded that the inaccurate statement in the investigation report had no bearing on the remainder of the investigative report. We did not determine the accuracy of the contractor's input into the investigation report.

The Air Force Operational Test and Evaluation Center (AFOTEC) prepared a Category I PQDR during first-article site testing in Hawaii of the upgrade to the AN/FMQ-7 optical telescope (the optical telescope). As a result of the testing, AFOTEC identified a deficiency in the software used in the upgraded system.

AFOTEC identified the deficiency in a Category I PQDR sent to DCMAO Dallas for investigative support. DCMAO Dallas prepared an investigative report on the PQDR but only included the Electrospace position on the deficiency.

DCMAO Dallas did not perform a complete investigation of the AFOTEC PQDR because the optical telescope system and its software were in Hawaii with the telescope. The quality assurance specialists in Dallas, Texas, could not review the software.

DCMAO Dallas believed that the PQDR was probably invalid because the upgraded system had not passed first-article testing and was not Governmentowned property. However, the urgency of a Category I PQDR caused DCMAO Dallas to request Electrospace's immediate response to the PQDR and to prepare an investigative report containing only Electrospace's response. A Category I PQDR refers to a problem that can, if uncorrected, cause death, severe injury, or severe occupational illness; cause major loss or damage to equipment or to a system; or directly restrict combat or operational readiness.

Air Force Technical Manual TO 00-35D-54, "USAF [United States Air Force] Deficiency Reporting and Investigating System," April 15, 1991, addresses deficiency reporting during test and evaluation. The technical manual contributed to confusion and misunderstandings between the various DoD Components that were involved in the procurement and administration of the upgrade for the optical telescope. The technical manual does not distinguish between reporting deficiencies on items that are Government-owned and items that are not Government-owned. The technical manual instructs that PQDRs sent across DoD Component lines be handled in accordance with Joint Regulation, Defense Logistics Agency Regulation (Joint Regulation) 4155.24, "Product Quality Deficiency Report Program," July 20, 1993. Joint Regulation 4155.24 only addresses procedures for handling PQDRs that have been prepared on Government-owned items.

#### Objectives

The objectives of the audit were to evaluate the contract quality assurance practices on the contract for the upgrade of the optical telescope and to evaluate internal controls applicable to the quality assurance function.

#### Scope and Methodology

We reviewed contract procurement documents at Sacramento Air Logistics Center, McClellan Air Force Base, California, for the period from contract solicitation, May 10, 1990, through contract modification number 6, January 14, 1994. We reviewed contract administration documents at DCMAO Dallas for the period from receipt of the Category I PQDR, October 14, 1993, through May 20, 1994. We interviewed the SEON Program Manager, the procurement contracting officer for the SEON upgrade, the AFOTEC test director for the SEON upgrade, and DCMAO Dallas quality assurance specialists and software engineers. Contract F04606-91-C-0038 for the SEON upgrade was awarded to Electrospace on November 7, 1990. The contract price is \$11,068,291.

This economy and efficiency audit was conducted from March through August 1994 in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD. We did not use computer-processed data or statistical sampling procedures to perform the audit. We performed the audit at the organizations listed in Enclosure 2. No prior audits covered this contract.

#### **Internal Controls**

We evaluated DCMAO Dallas internal controls that applied to receiving and processing PQDRs. We determined that controls were adequate to provide reasonable assurance that assets were protected against fraud, waste, and abuse. We found no evidence that the cognizant DCMAO Dallas quality assurance specialist at Electrospace had circumvented internal controls. Theferefore we did not review the implementaton of the DoD Internal Management Control Program as it related to this matter.

#### Background

Mission of the Solar Electro-Optical Network (SEON). The SEON monitors solar activity 24 hours a day using the AN/FMQ-7 solar observing optical network (SOON) and the AN/FRR-95 radio solar telescope network (RSTN). The SEON observes and displays significant solar events as they occur and provides data to the space environmental support system. The space environmental support system in turn alerts DoD and other Government agencies about these solar occurrences. As of August 1994, the SEON consists of five SOONs and four RSTNs distributed among six locations as shown in the following table.

Site	Equipment
Palehua, Hawaii	SOON, RSTN
Holloman AFB, New Mexico	SOON
Sagamore Hill, Massachusetts	RSTN
Ramey, Puerto Rico	SOON
Learmonth, Australia	SOON, RSTN
San Vito, Italy	SOON, RSTN

**SEON Upgrade Contract.** On November 7, 1990, the Air Force competitively awarded firm-fixed-price contract F04606-91-C-0038 to Electrospace. The goal of the contract was to replace obsolete components of the SEON while upgrading capabilities and improving network efficiency and the consistency of data within the network.

The original contract specified delivery and acceptance of the first SOON and RSTN for September 30, 1992, at Palehua, Hawaii. As of June 6, 1994, the Air Force had not accepted the first SOON and RSTN.

Testing and acceptance is at a SEON site because the solar stimuli necessary for testing the upgraded system cannot be duplicated at the contractor's manufacturing facility or in a laboratory. Palehua is the only U.S. site that has both the SOON and RSTN components of the network.

**Contractor Request for Equitable Adjustment.** On August 23, 1993, Electrospace submitted a request for equitable adjustment to the Air Force for \$730,918 for claimed program changes in the first-article validation process that was to demonstrate Electrospace's capability to manufacture an acceptable product. Asserting that the Government disrupted the first-article validation process, Electrospace claimed that the program and contract schedule changes were caused by Government delays in the review and approval process of key program baselines. In addition, Electrospace claimed that the Government unilaterally changed the application of a contract clause. On January 4, 1994, the Government denied Electrospace's request.

**Operational Test and Evaluation.** Operational test and evaluation is part of the first-article validation process and consists of test, negotiation, corrective action, and retest phases. AFOTEC initiated the 120-day test phase of the upgraded system on September 25, 1993. The SOON system locked up 22 minutes into the test phase because of a software problem, and the test was aborted. AFOTEC prepared 49 PQDRs during this test.

AFOTEC resumed testing on February 28, 1994. As of June 10, 1994, AFOTEC completed the operational test phase of the SEON operational test and evaluation. Since operational test and evaluation testing began on September 25, 1993, AFOTEC prepared a total of 216 PQDRs against the contract.

**PQDR Processing.** During the first test of the upgraded systems, AFOTEC identified 49 deficiencies on the upgraded systems and issued 49 PQDRs on the SOON, RSTN, and combined SEON systems.

Of the 49 PQDRs, only 1 was considered significant enough to be designated as a Category I deficiency in accordance with Air Force Technical Manual TO 00-35D-54, chapter 4, because it was a software severity level 1 deficiency. A software severity level 1 deficiency involves a system malfunction caused by a software failure that prevents the accomplishment of a required operational or mission-essential capability or that jeopardizes personnel safety.

AFOTEC submitted the initial 49 PQDRs to the PQDR screening and action points at Sacramento Air Logistics Center. Sacramento Air Logistics Center reviewed the PQDRs and sent them to DCMAO Dallas for investigation by the cognizant Government quality assurance specialist located at Electrospace. DCMAO Dallas rejected all 49 PQDRs because the contract upgrades had not been accepted by the Government and thus the upgraded system was not a Government-owned item. DCMAO Dallas cited Joint Regulation 4155.24, which states that reporting product quality deficiencies across DoD Component lines applies to deficiencies detected on [only] new or reworked Governmentowned products.

Because of DCMAO Dallas' concern with and the implied severity of the Category I PQDR, DCMAO Dallas requested input from the contractor regarding the cause and remedy for the condition and prepared an investigative report on the Category I PQDR using the contractor's response.

#### Discussion

Allegation. The complainant alleged that DCMAO Dallas showed favoritism to the contractor because of the manner in which DCMAO Dallas handled an investigation of a PQDR. The complainant stated that DCMAO Dallas produced an investigative report on a Category I PQDR based only on the contractor's version of the problem, and that the report was full of erroneous findings.

Audit Response. We did not substantiate the allegation. No evidence indicated that the DCMAO Dallas showed favoritism to the contractor, Electrospace.

**PQDR Preparation.** Sacramento Air Logistics Center sent a Category I PQDR to DCMAO Dallas. The DCMAO Dallas quality assurance specialist at Electrospace then submitted the PQDR to the contractor for its response and prepared the investigative report with only the contractor's input. The quality assurance specialist indicated on the investigative report that DCMAO Dallas investigated the deficiency with the contractor and also stated that the PQDR was not valid because the deficient item was not Government-owned.

**PQDR Investigation.** The DCMAO Dallas investigation report contained only the contractor's opinion as to the nature, cause, and remedy for the deficiency. However, the nature of the deficiency was already known to the Air Force because AFOTEC wrote the PQDR during its testing of the system. Further, the AN/FMQ-7 upgrades were installed at the SOON site in Hawaii and were not available for the quality assurance specialist's investigation. Therefore, we concluded that use of only the contractor's input in the investigation of the deficiency was prudent and did not represent favoritism by DCMAO Dallas.

**Factual Content of the Investigation Report.** The Category I PQDR investigation report incorrectly stated that the Government conducted a concurrent investigation of the deficiency with the contractor. The DCMAO Dallas quality assurance specialist stated that including a statement of concurrent investigation in all investigative reports was routine practice. We discussed this practice with the chief of the Quality Assurance Branch, DCMAO Dallas, who then issued a memorandum to the branch quality assurance specialists. The memorandum cautioned them to respond clearly and to state in all reports the functions that the teams of quality assurance specialists actually performed. We concluded that the inaccurate statement in the investigative report had no bearing on the remainder of the investigative report. We did not determine the accuracy of the contractor's input into the investigative report.

Air Force Guidance. The Air Force guidance was unclear for preparing PQDRs on Category I deficiencies and deficiencies discovered on non-Government-owned items as opposed to items accepted and owned by the Government.

Air Force Technical Manual TO 00-35D-54 provides guidance for processing PQDRs during development, acquisition, and test and evaluation. The technical manual was revised on January 15, 1994, and clarifies some issues that would have had an impact on the Category I PQDR that produced the DoD Hotline allegation. The revised Air Force guidance no longer categorizes software deficiencies differently from other deficiencies. All Category I PQDRs now apply to conditions that, if uncorrected, would cause death, severe injury, or severe occupational illness; would cause major loss or damage to equipment or

to a system; or would directly restrict combat or operational readiness. Had this January 15, 1994, revision been in effect at the time of the testing of the system, the PQDR would probably not have been classified Category I.

Clarification of the Air Force Technical Manual. Further clarification and revision of the technical manual is necessary to explain how deficiencies on non-Government-owned items should be handled. The Air Force technical manual refers to transmitting deficiency reports across DoD Component lines in accordance with Joint Regulation 4155.24; however, Joint Regulation 4155.24 covers deficiency reports only on Government-owned items. The technical manual does not address procedures for processing deficiency reports on non-Government-owned software and hardware. We informed Air Force Materiel Command, which has overall responsibility for the technical manual, of our concerns regarding the ambiguity and lack of guidance for processing deficiencies on non-Government owned items. Air Force Materiel Command indicated that it will work with the other Military Departments and the Defense Logistics Agency to reach an agreement on how to process deficiency reports on non-Government-owned software and hardware. Two Inspector General, DoD, letters were sent to the Air Force Materiel Command voicing our concerns and understanding of the corrective actions that needed to be taken (Enclosure 1). Because the Air Force Materiel Command said that it would clarify the technical manual, we did not make any recommendations.

#### **Management Comments**

Because this report contains no findings and recommendations, written comments were not required, and none were received.

Courtesies extended to the audit staff are appreciated. If you have questions about this audit, please contact Mr. Salvatore D. Guli, Audit Program Director, at (703) 604-9288 (DSN 664-9288) or Mr. C. J. Richardson, Audit Project Manager, at (703) 604-9294 (DSN 664-9294). The distribution of this report is listed in Enclosure 3. The audit team members are listed inside the back cover.

Robert J. Lieberman Assistant Inspector General for Auditing

Enclosures

# Memorandum About the Air Force Technical Manual



ENCLOSURE 1 (Page 1 of 6)

2 If you have any questions or comments, please call me on (703) 604-9288 (DSN 664-9288) or Mr. C. J. Richardson, Project Manager, on (703) 604-9294 (DSN 664-9294). fuli Salvacore D. ĞUI Contract Management Directorate Enclosure

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### 2 Section 1-8 SOFTWARE DEFICIENCIES This paragraph indicates that modified deficiency reporting procedures could be used to correct minor software deficiencies. There is no explanation as to what constitutes modified procedures nor is there a reference to another document that would describe modified deficiency reporting procedures. Section 1-9 CROSS COMPONENT REPORTING This paragraph should include Section 1-9.1 a statement that indicates AFI 21-115 (AFR 74-6), Product Quality Deficiency Report Program, addresses only Government owned items. Chapter 2 DEFICIENCY REPORTING DURING TEST AND EVALUATION This chapter does not emphasize the distinction between deficiency reporting during OTEE on Government owned and non-Government owned equipment. It does not indicate that only PODRs on Government owned equipment can be formally transmitted across component lines in accordance transmitted across component lines in accordance with AFI 21-115 (AFR 74-6), Product Quality Deficiency Report Program, nor does it indicate how Contract Administration Office assistance can be requested for the resolution of deficiencies on non-Government owned items. Assistance in resolving deficiencies on items not owned by the Covernment about the resolution of the covernment. Government should be requested through normal communication channels established between the Program Manager, the Procurement Office, and the Contract Administrative Office. This chapter should also indicate that, if there are warranties that can be invoked, they are generally on Government owned items only. The 216 first article deficiencies that were reported The as PQDRs that we reviewed during the hotline audit all erroneously indicated that the item was under warranty. The warranty did not commence until the item had been accepted by a signed DD-250. The item was undergoing first article test and had not been accepted. 2-4 ORIGINATING POINT Section RESPONSIBILITIES Section 2-4.1.4 The use of a SF 368, PRODUCT QUALITY DEFICIENCY REPORT, to report deficiencies on items not yet accepted (no DD-250, etc.) is

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3 misleading. This form does not have a data item to indicate whether or not the item is Government We suggest that this form only be used for owned. Government owned items whether or not they cross component lines; if there is doubt as to ownership of the item, use the worksheet as shown in figure 2-1 of the Technical Manual, a PQDR can be 2-1 of the Technical Manual, a PQDR can be prepared later if it is determined to be a government owned item. In addition, this form does not indicate whether the deficiency is quality or design related (see comments on para. 2-7.1.2, below) or whether the deficiency is due to contractor error, vague or inaccurate contract specifications, or as a result of testing to user requirements rather than to contract specifications. Section 2-5 SCREENING POINT RESPONSIBILITIES 2-5.4 Section This paragraph states that the screening point will ensure that the test director(s) concur with the Deficiency Reports prior to their release. Paragraph 2-5.1 states that the screening point is the test director. Section 2-5.5 Again, the note accompanying this paragraph should indicate that only PQDRs on Government owned items should be transferred across component lines in accordance with AFI (Also see Section 3-4.4.2) 21-115. Section 2-7 THE DEFICIENCY REVIEW BOARD Section 2-7.1.1 This paragraph contains the statement that "The SM [Single Manager] should task the DPRO to assure the contractor is following the approved reporting process." This reporting process should apply to all contractors, not just those with a DPRO. The correct reference should be CAO (Contract Administration Office) rather than DPRO. Section 2-7.1.2 This paragraph indicates that the T&E DRB [Deficiency Review Board] will rank order all open Deficiency Reports unless verified by the action point as guality-related. Quality-related deficiencies are defined in Section 1-5.27 but there is no indication why they are not to be ranked by the Deficiency Review Board nor does this Manual give any indication as to the significance of quality-related Deficiency Reports

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4 as opposed to others (design, etc.). If there is a difference in how each type is handled, tracked, investigated, and/or resolved it should be indicated in this Manual. 2-2 TEE DR Process Figure The entry point (circle) on the chart for "Government originator discovered deficiency" contains an incorrect reference. The correct reference should be Paragraph 2.4, not 2.7. We would appreciate your comments on the above items no later than July 18, 1994 so they can be incorporated into our audit report as necessary. If we agree on changes to the Technical Manual prior to issuing the draft report, there will be no need for recommendations for changes to the Manual and a formal response by the Air Force to the draft audit will not be needed. Please call me or Mr. Michael Tully at (703) 604-9294 or DSN 664-9294 if you have any questions or wish to discuss the proposed changes to the manual. Thank you. Michards C.J. Richardson Project Manager

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# **Organizations Visited or Contacted**

### **Department of the Air Force**

Air Force Materiel Command, Wright-Patterson Air Force Base, OH Sacramento Air Logistics Center, McClellan Air Force Base, CA Detachment 1, Air Force Operational Test and Evaluation Center, Scott Air Force Base, IL

## **Defense Organizations**

Defense Contract Audit Agency, Richardson, TX Defense Logistics Agency, Alexandria, VA Defense Contract Management Area Operations Dallas, TX Joint Logistics Systems Center, Wright-Patterson Air Force Base, OH

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Federal Supply Service, General Services Administration, Arlington, VA

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# **Audit Team Members**

Paul J. Granetto Salvatore D. Guli C. J. Richardson Michael J. Tully Sanford J. Stone Ana M. Myrie