

**IG-99-038**

**AUDIT  
REPORT**

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**PERFORMANCE EVALUATION PLAN FOR THE  
EARTH OBSERVING SYSTEM DATA AND  
INFORMATION SYSTEM CORE SYSTEM CONTRACT**

**September 8, 1999**

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National Aeronautics and  
Space Administration

**OFFICE OF INSPECTOR GENERAL**

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## Acronyms

ECS	Earth Observing System Data and Information System Core System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
GAO	General Accounting Office
OIG	Office of Inspector General
PEP	Performance Evaluation Plan
PBC	Performance-Based Contracting
SOW	Statement of Work

W

September 8, 1999

TO: Y/Associate Administrator for Earth Science  
100/Director, Goddard Space Flight Center

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Final report on the Performance Evaluation Plan for the Earth Observing  
System Data and Information System Core System (ECS) Contract  
Assignment Number A9902600  
Report Number IG-99-038

The subject final report is provided for your use. Please refer to the Results in Brief for the overall audit results. We have incorporated your comments into the final report, as appropriate, and included them in their entirety as a report appendix. The recommendation will remain open for reporting purposes until corrective action is completed. Please notify us when action has been completed on the recommendation, including the extent of testing performed to ensure corrective actions are effective.

If you have questions concerning the report, please contact Mr. Daniel J. Samoviski, Program Director for the Earth and Space Science Audits, at (301) 286-0497, or Mr. Robert Williams, Audit Program Manager, at (818) 354-9769. We appreciate the courtesies extended to the audit staff. See Appendix E for the report distribution.

**[original signed by]**

Russell A. Rau

Enclosure

cc:

B/Chief Financial Officer  
B/Comptroller  
BF/Director, Financial Management Division  
G/General Counsel  
H/Associate Administrator for Procurement  
JM/Director, Management Assessment Division

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Y/Audit Liaison Representative

# NASA Office of Inspector General

IG-99-038  
A9902600

September 8, 1999

## Performance Evaluation Plan for the Earth Observing System Data and Information System Core System (ECS) Contract

### Introduction

The NASA Office of Inspector General is performing an audit of the Earth Observing System Data and Information System Core System (ECS). The ECS constitutes a major component of the Earth Observing System Data and Information System (EOSDIS). The EOSDIS will be a geographically distributed system that will support the operation and management of the Earth Observing System (EOS) in-orbit payloads and U.S. observatories and facilitate a wide range of scientific research on the Earth System and interactions of its components. The ECS consists of a flight system<sup>1</sup> and a science system.<sup>2</sup> The overall audit objective is to evaluate NASA and contractor program and project management processes for the ECS, including oversight and administration of related contracts. During the audit, we identified a condition related to the ECS contract. Due to pending negotiations on a major contract modification, we are providing this report for management's immediate attention. Other aspects of the objectives may be addressed in another report. See Appendix A for details on our scope and methodology and Appendix B for prior audit coverage.

NASA awarded contract NAS5-60000 to Hughes Applied Information Systems, Inc.<sup>3</sup> in March 1993 for \$766 million. The 10-year cost-plus-award-fee contract is for the development and operation of the ECS. The current contract value is \$868.6 million, an increase of \$102.6 million from the original contract value.

### Results in Brief

The ECS contractor's performance is not linked to the contract's Performance Evaluation Plan. The current award fee plan relies on subjective evaluations by Government personnel as the basis for award fee determinations. NASA generally considers this type of evaluation less desirable than a performance-based evaluation plan. The current plan does not contain objective measures of performance and, therefore, does not sufficiently

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<sup>1</sup> The flight system will command and control the EOS spacecraft and instruments.

<sup>2</sup> The science system will process, archive, and distribute science data.

<sup>3</sup> As a result of the December 1997 merger with Hughes Electronics, Raytheon Corporation became the prime contractor for ECS; however, the Government has not officially recognized this change because the contractor has only recently submitted its novation package to the Administrative Contracting Officer at the Defense Contract Management Command for approval.

link performance objectives to the award fee. Consequently, the contractor could receive inappropriate award fee payments. NASA is currently restructuring the contract to address technical, cost, and schedule problems and has already restructured two key aspects of the contract to incorporate the precepts of performance-based contracting (PBC)<sup>4</sup> in the statement of work (SOW) and quality assurance plan. However, ECS program and contracting officials have not revised the Performance Evaluation Plan (PEP) to reflect a performance-based approach to evaluating contractor performance. Given the pending negotiation to definitize several outstanding change orders, the Contracting Officer has a significant opportunity at this time to incorporate changes into the PEP.

## **Background**

The ECS contract has been problematic with significant delays. The entire ECS as originally envisioned is no longer affordable. Consequently, Goddard Space Flight Center (Goddard) procurement officials issued a Request for Proposal December 8, 1998, to restructure the contract. The new Approach, Option A+, is intended to rescope the contract to meet the highest priority requirements for data products and services while saving projected overrun costs as feasible. The procurement strategy includes the following:

- Revising the SOW and Functional and Performance Requirements Specification to reflect the current program requirements. The contract has been without an up-to-date technical, cost, and schedule baseline for more than a year. The contract restructuring will result in a new baseline for managing the contract and measuring performance.
- Obtaining an estimate-to-complete proposal based on the revised SOW and specification. The project has 10 outstanding, undefinitized contract actions issued in response to programmatic changes. An estimate-to-complete proposal will eliminate the need to negotiate the old change orders, because all the changes will be incorporated into the revised requirements.

Earth Science Data and Information System (ESDIS) project officials and Goddard procurement officials are evaluating the contractor's proposal for the contract modification. The contractor has proposed an increase of about \$100 million to the contract. Procurement officials expect to definitize the modification prior to the scheduled August launch of the *Terra* spacecraft.

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<sup>4</sup> Performance-based contracting means structuring all aspects of an acquisition around the purpose of the work to be performed as opposed to either the manner by which the work is to be performed or broad and imprecise statements of work.

## **Need for Revised Performance Evaluation Plan**

**Finding.** Earth Science Data and Information System project management and Goddard contracting officials have not revised the ECS contract Performance Evaluation Plan to reflect the PBC performance requirements detailed in the revised SOW. Revision has not occurred because project management and contracting officials did not recognize the importance of ensuring that the Performance Evaluation Plan is congruent with the performance requirements of the revised contract SOW. As a result, NASA may not be able to effectively motivate the contractor to complete the work at an acceptable level, and the contractor could be awarded fees<sup>5</sup> that do not reflect its achievement of contract requirements.

**Requirements for a Performance-Based Contract.** Federal Acquisition Regulation Subpart 37.601 states that performance-based contracting methods are intended to ensure that required performance meets certain quality levels and that total payment, including performance incentives, is related to the degree that services performed meet contract standards. Performance-based contracts: (a) describe requirements in terms of needed results rather than the methods of performing the work; (b) use measurable performance standards and quality assurance surveillance plans; (c) specify procedures for reducing fee when services are not performed or do not meet contract requirements; and (d) include performance incentives where appropriate.

In March 1996, the NASA Administrator issued direction on how performance-based contracting techniques should be implemented. The Government defines performance-based contracting as contracting for results, not just best efforts. All aspects of an acquisition are structured around the purpose of the work performed. PBC techniques include: using objective, measurable performance requirements and quality standards in developing SOWs; selecting contractors using performance as a consideration; determining contract type and incentives in accordance with a fair assessment and assignment of performance risk; and performing contract surveillance and administration for insight only into essential areas of contractor performance while conserving Government resources. Policy and training modules for developing performance-based SOW's are in NASA Program Directive 5600.2B, "Statement of Work – Guidance for Writing Work Statements," December 1997.

**Implementation of Performance-Based Contracting.** The ECS contract awarded in March 1993 was not originally a performance-based contract. We commend Goddard officials for restructuring the contract to incorporate performance-based principles. However, the PEP remains surveillance intensive, and award fees are based on the subjective evaluation of contractor performance. The project management office uses the PEP to carry out the award fee determination activities required by the contract. The PEP contains no measurable performance standards that link to the performance requirements

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<sup>5</sup> Available award fee at contract inception was \$86.9 million. This amount may change as a result of the contract restructuring.

detailed in the revised SOW and payment of award fee. A NASA Headquarters performance-based contracting expert stated that the PEP needs improvement because it does not tie to performance and lacks measurable performance standards. For example, the PEP lists “Resource Efficiency – Did the contractor use manpower and equipment in an economic and effective manner?” as a general evaluation criterion. Once evaluation factors are selected, standards should be developed for measuring contractor performance. This evaluation factor has no performance standard, such as an acceptable employee turnover rate. See Appendix C for details on current evaluation criteria.

**Change in Contracting Approach.** PBC is a change in business approach for NASA, including the Goddard contracting office. Perhaps more important, PBC represents a major culture shift for program office personnel. The ECS contract was awarded in 1993, predating PBC. Therefore, the contract reflects a common business paradigm of that time; that is, the Government makes the decisions and the contractor works under continuous oversight. The PBC concept changes management's approach from providing oversight to gaining insight.<sup>6</sup> The Government identifies a requirement, develops standards for measurement, and allows the contractor to determine how to meet the requirement. The ECS systems under development (flight and science systems) have only recently reached the level of maturity to allow the Government to generate clearly defined performance requirements. Change takes place slowly; therefore, the contracting officials did not recognize the importance of ensuring that the PEP is congruent with the performance standards of the revised contract SOW. The contracting officer, the contracting officer's technical representative, and project managers focused on implementing the PBC concept in the contract SOW and the Quality Assurance Plan, allowing the contractor to determine how to meet the requirements. However, project management and Goddard contracting officials did not update the PEP, in part, because they placed emphasis on solving technical problems associated with system development as discussed below.

**System Development Priorities.** Project management officials focused their attention on software development priorities. Both ECS systems under development have experienced delays and cost overruns. For example, in September 1998, Raytheon terminated the original flight operating system development after several years of work because of the lack of sufficient progress. Subsequently, Raytheon began development of a new system. Project management officials monitored the new software development closely as their top priority and believed that the ECS contract was sufficient to support this change in development activities. Also, project management officials have had to emphasize correcting technical problems within both systems throughout their development.

**Award Fee Payments.** Under the ECS contract, the project management office bases award fee on a subjective evaluation of the contractor's performance. In the absence of measurable performance standards in the PEP, the contractor may not be motivated to provide quality performance and the project management office could award fees that do

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<sup>6</sup> Oversight required formal Government involvement and approval of contractor actions. With insight, however, the Government monitors the contractor's effort.



not reflect contractor achievement of the requirements.

### **Recommendation, Management's Response, and Evaluation of Response**

**The Director, Goddard Space Flight Center should direct the Earth Science Data and Information System project office, in close coordination with the procuring contracting officer, to revise the Performance Evaluation Plan to link award fee payments to specific cost, schedule, and performance objectives in the restructured ECS contract.**

**Management's Response.** Concur. The Director stated that the plan will be revised with an objective of making it a motivator for contractor performance. Management anticipates that final corrective action will be completed by November 1, 1999. Additionally, management offered some comments regarding statements made in the audit report. The complete text of management's comments is in Appendix D.

**Evaluation of Response.** The actions planned by management are responsive to the recommendation. The recommendation is resolved but will remain undispositioned and open until agreed-to corrective actions are completed.

## **Appendix A. Objectives, Scope, and Methodology**

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### **Objective**

Our overall audit objective is to evaluate NASA and contractor program and project management processes for the ECS. For this portion of the audit, we reviewed project management office plans for restructuring the contract to determine whether performance-based principles were included in the ECS contract and associated documents.

### **Scope and Methodology**

During the audit we:

- Interviewed Earth Science and Data Information System representatives and procurement personnel to obtain background information and documents.
- Reviewed the contractor's ECS Restructure Proposal for contract NAS5-60000, dated February 1999.
- Visited the contractor's facility and interviewed the management staff.
- Toured the Goddard Distributed Active Archive Center and interviewed the manager.
- Reviewed Federal Acquisition Regulation Subpart 37.602, "Elements of Performance Based Contracting."
- Reviewed the NASA Administrator's guidance for implementing performance-based contracting, dated March 1996.
- Reviewed NASA Procedures and Guidelines 5600.2B, "Statement of Work - Guidance for Writing Work Statements," December 1997.
- Reviewed the "NASA Award Fee Contracting Guide," December 2, 1997.
- Reviewed contractor award fee history.
- Consulted NASA procurement official regarding performance-based contracting.

### **Management Controls Reviewed**

We reviewed the following management controls:

- NASA Procedures and Guidelines 7120.5A, "NASA Program and Project Management Processes and Requirements," April 3, 1998.
- NASA Procedures and Guidelines 5300.4, "Management of Government Quality Assurance Functions for NASA Contracts," December 24, 1997.
- EOS program mission statement and organizational structure for administering the ECS contract.
- Draft "Earth Science Data and Information System Project Plan," February 1, 1999.
- NASA guidance for performance-based contracting.

We considered controls adequate except that controls needed to be strengthened to ensure that performance-based contracting principles are applied to all elements of the ECS contract. Details are in the finding section of the report.

**Audit Field Work**

We performed the audit field work for this portion of the audit from March through June 1999 at Goddard and NASA Headquarters. We conducted the audit in accordance with generally accepted government auditing standards.

## Appendix B. Summary of Prior Audit Coverage

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### General Accounting Office (GAO)

**“GAO Testimony Before the Committee on Science, House of Representatives-Earth Observing System, Cost and Research Issues,” March 6, 1996, GAO/T-NSIAD-96-116.** EOS has three major components: (1) a system of satellites to collect key climate-related data; (2) a data and information system to operate the satellites and process, archive, and distribute the data; and (3) teams of scientists to develop algorithms for converting sensor data into useful information and for conducting research using the information.

Congress was concerned about the affordability of EOS; therefore, NASA changed the program’s emphasis in fiscal year 1992 from a complete Earth system-measuring program to a measurement program. The EOS was redesigned, and the estimated cost through 2000 was reduced to \$11 billion. The program’s budget through 2000 was further reduced in fiscal year 1993 to \$8 billion and to \$7.25 billion in fiscal year 1995. NASA recognized that the program as designed in early 1995 was not affordable in an environment of declining budgets and developed a strategy to build an EOS research community.

### Office of Inspector General

The NASA Office of Inspector General (OIG) conducted three audits relating to the ECS contract.

**“Subcontract Management of the EOSDIS Core System Contract,” Report Number GO-95-010, September 26, 1995.** The OIG addressed four concerns: (1) subcontractors’ award fees for cost control were inconsistent; (2) subcontractors’ performance for various events was not properly documented; (3) subcontractor costs were billed in excess of funding limitations; and (4) performance measurement system reviews of subcontractors were not performed. The report contained recommendations to help manage EOSDIS subcontractors. Planned actions were considered responsive to the intent of the recommendations.

**“Subcontract Management of the EOSDIS Core System Contract Award Fee Determinations,” Report Number GO-97-006, August 22, 1994.** The report addressed two concerns: (1) award fees for cost control were in excess of actual contractor performance and (2) the ECS contractor’s performance measurement system was not reviewed. The report contained recommendations to control award fees and to review the contractor’s performance measurement system. Planned actions were considered responsive.

**“EOSDIS Core System Contract Status,” Assignment Number A-HA-97-054.** At the time of the review, the ECS was having problems and was behind schedule. To correct the problems, management took the following actions:

- Issued a stop-work-order to Hughes Electronics. The Distributed Active Archive Centers at Goddard and Langley completed the work.
- Devised a point system to establish criteria for measuring performance.

## **Appendix C. Performance Evaluation Plan**

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The Performance Evaluation Plan, dated May 22, 1997, for the ECS contract lacks standards for measuring performance. The PEP states that its purpose is to provide both general and specific criteria to serve as a basis for the periodic evaluation of the contractor's performance. Award fee is determined on the basis of this evaluation.

### **General Evaluation Criteria**

General evaluation criteria are presented in Section 6.0 of the PEP. The criteria are structured as questions with no measurable standard for performance:

- a. Resource Efficiency – Did the contractor use manpower and equipment in an economic and effective manner?
- b. Ingenuity and Innovativeness – Did the contractor see and develop original solutions to problems that resulted in savings of time, money, manpower, or improvement to performance or software, hardware, and/or system operations?

### **Performance Evaluation Categories**

Section 4.1 of the PEP contains four performance evaluation categories: Technical and Operational Performance, Business Management, User Satisfaction, and Cost Control. The specific criteria within each category are in sections 7.1, 7.2, 7.3, and 7.4 of the PEP.

Section 7.1, "Technical and Operational Performance," states that the contractor will be evaluated against meeting specification requirements and elements such as:

- a. Utilization of competent and experienced personnel throughout the contracting effort, and the extent to which these people have been used to provide effective management, technical continuity, and technical quality;
- b. Response to change orders and technical direction including resolution of action items.

These criteria and evaluation categories do not comply with the payment structure for performance-based contracts as discussed in the finding segment entitled, "Requirements for a Performance-Based Contract."

**Appendix D. Management's Response**

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