IG-97-032

AUDIT REPORT

SPACE FLIGHT OPERATIONS CONTRACT PERFORMANCE METRICS

July 22, 1997

National Aeronautics and Space Administration

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National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001

Reply to Attn of: W

July 22, 1997

TO: Lyndon B. Johnson Space Center
Attn: AA/Director

FROM: W/Acting Assistant Inspector General for Auditing

SUBJECT: Final Report
Space Flight Operations Contract Performance Metrics
Assignment Number A-KE-96-006
Report Number IG-97-032

The NASA Office of Inspector General has completed an audit survey of the Space Flight Operations Contract Performance Metrics. Our audit survey revealed no significant weaknesses in the sample metrics reviewed. However, we determined that no provision was made for formal review of metrics during the performance of the contract. Several factors suggest that such a review would be in NASA's and the contractor's best interest. In addition, we noted several lessons learned which would benefit other contract acquisition teams developing performance based contracts for the first time. In our Management Letter Number M-IG-97-009, we suggested that the Associate Administrator for Procurement communicate these and other lessons learned to procurement personnel.

We received your written response to the discussion draft report on June 17, 1997, and noted that you concur with our recommendation. We have synopsized the response after the recommendation and have included the full response as Appendix 1 to the report. The planned actions are responsive to our recommendation. Consequently, the recommendation is considered closed for reporting purposes upon issuance of the final report.

If you have any questions or need additional information, please call Janice Goodnight at (281) 483-4773; Daniel J. Samoviski, Acting Director, Audit Division-A at Headquarters; or me at (202) 358-1232.

Robert J. Wesolowski

Enclosure

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SPACE FLIGHT OPERATIONS CONTRACT PERFORMANCE METRICS

INTRODUCTION

NASA consolidated major operations efforts of the Space Shuttle Program and the International Space Station Program under a single contract, the Space Flight Operations Contract (SFOC), NAS9-20000. Under this contract, accountability for operations will shift from NASA to the SFOC contractor. NASA will continue to maintain visibility into the contractor's operation and insight in key performance activities.

To achieve this shift in accountability, and to maintain visibility and insight, the SFOC Statement of Work (SOW) is written to reflect performance-based requirements. Each requirement includes specific standards of performance with maximum error rates. These measures, or metrics, will provide significant objective data to aid in periodic evaluations of the contractor's performance. NASA will use these evaluations to maintain insight into the health of the program and to determine the contractor's award fee.

The SFOC is a cost-plus-incentive-fee/award-fee contract. The award-fee feature is a tool to: (1) reward the contractor for its level of performance; and (2) motivate continued improvement. Under award-fee provisions, NASA may evaluate the contractor on any area of performance within the spectrum of the contract. However, a significant element of the award-fee evaluation will be the contractor's demonstrated performance in meeting or exceeding the SOW performance standards.

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OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The overall objective was to evaluate metrics included in the SOW to determine whether they:

- measure fulfillment of the SOW,
- are clearly understandable and obtainable, and
- are designed to ensure integrity of measurement data.

SCOPE AND METHODOLOGY

To satisfy the audit objectives, we interviewed key NASA personnel and reviewed pertinent documents. Specifically, we reviewed the process used by the Contract Acquisition Team (CAT) to develop performance metrics. In addition, we reviewed existing guidance for developing performance-based contracts and researched the experience of other organizations in developing and applying metrics. We based our conclusions on a review of sample metrics. Our sample included metrics for 17 of the 85 requirements presented in the SOW. The sample was selected on an interval basis from a sequential list in the SOW.

AUDIT FIELD WORK

We conducted the audit in accordance with generally accepted government auditing standards. Audit field work was performed from July to December 1996 at the Johnson Space Center and Kennedy Space Center.

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OBSERVATIONS AND RECOMMENDATIONS

OVERALL EVALUATION

The audit survey revealed no significant weaknesses which warrant our performing further audit work. We observed, however, that no provision was made for formal review of metrics during the performance of the contract. Without such a review, NASA could use obsolete or inappropriate metrics to evaluate the contractor's performance and determine award fee. Total award fee available to the contractor is $243 million.

RESULTS OF AUDIT

The audit results are discussed by objective in the following paragraphs.

1. ***DO METRICS MEASURE FULFILLMENT OF THE SOW?*** We considered two factors to satisfy the first objective. *First, as a group, would the metrics encompass critical aspects of the SOW?* Six of the seven major SOW segments contain metrics. (The remaining segment encompasses level-of-effort activities for which metrics are not appropriate.) Drafters of the metrics identified **critical** or **core** activities in each of these segments and developed metrics for those activities.

Second, do the metrics focus on a measurable outcome or output? Each metric reviewed includes a **measurable outcome** or **output** that addresses timeliness, quality, etc. Each also specifies a standard and maximum error rate against which performance can be measured.

The approach taken by the CAT addresses appropriate segments of the SOW, encompasses critical activities, and appears sound. However, we believe the true test of each metric's usefulness for evaluating performance of the SOW will come as it is used.

2. ARE METRICS UNDERSTANDABLE AND OBTAINABLE? NASA officials believe that each metric is **understandable** to the contractor because a team of NASA and contractor representatives developed the metric. Their work included in-depth discussions within the team and consultation with other knowledgeable representatives of the respective parties outside the team.

For each metric reviewed, the designated team leader said that the highest level of performance specified for the metric had been achieved in the past. Therefore, it would be **obtainable** under the new contract. Further, in many cases, the same groups who did the work under previous contracts will be doing the work under the SFOC.

3. ARE METRICS DESIGNED TO ENSURE INTEGRITY OF MEASUREMENT DATA? Based on discussions with NASA/contractor team leaders and the auditor's general knowledge of subject areas, we did not identify instances where integrity of the data would be questioned due to the metric's design. A vulnerability may exist, however, since the contractor will collect the data upon which evaluation of performance will be based. NASA officials noted that the potential to conceal actual results is mitigated because many of the activities are very critical and highly visible.

Further, surveillance plans that should address this vulnerability are being developed. Such plans will include audits or inspections to verify data reported by the contractor or other documentation supporting the performance. However, the Agency has specified no time line for completion of these surveillance plans. We will monitor the Agency's progress on this issue.

Because of the review described above, we have no immediate concerns that warrant additional work with respect to the three audit objectives. However, we did note a condition that we believe warrants the Agency's attention.

NO FORMAL REVIEW OF METRICS IS PLANNED

No formal mechanism or plan has been established for a complete review of metrics during the contract performance period. Such a review would confirm each metric's usefulness or highlight needed improvements. The experience of other government organizations in developing and applying results oriented performance measures suggests that conducting such a review would be in the best interests of the Shuttle and the Station Programs. Because no plan has been developed for a formal review, the Agency may not evaluate metrics for appropriate changes. As a result, evaluators could use obsolete or inappropriate metrics when assessing the contractor's performance to determine award fee.

Experience of Other Government Organizations

We discussed the development and application of performance measures with officials of federal, state, and local government organizations that have experience with performance measures. The Department of Energy has awarded several performance-based contracts. Officials who participated in the acquisitions found that changes to initial measures were necessary after scheduled reviews or regulatory changes. Texas state and Phoenix city officials reported similar experience.

Changes to SFOC Metrics May Be Necessary

Several factors suggest that changes to initial metrics in the SFOC may also be necessary.

1. Metrics Difficult to Develop - Drafters characterized the task of developing performance metrics for the SFOC as "very difficult." Most participants indicated that while they had technical knowledge of the work requirements, they had no experience with structuring the requirements for completion form and developing associated standards. Consequently, after using the metrics, the Agency may need to change existing metrics, particularly in the levels of performance designated (standard of excellence, expectation, and maximum error rate).

2. Levels of Performance May be Inappropriate - Levels of performance specified may not be appropriate for the contractor as NASA removes itself from day-to-day activities. NASA officials used historical data as the basis for deciding levels of performance assigned to the metrics. This data reflects performance that included NASA's involvement in day-to-day activities. These levels may no longer be appropriate for the contractor as NASA removes itself from day-to-day activities. As new data becomes available, the Agency can determine whether adjustments are needed.

3. Transition of Tasks and Elements - Finally, transition of tasks to the contractor and the addition of other elements, such as the Solid Rocket Booster and the External Tank to the SFOC, could warrant changes to the existing metrics.

Mechanism Needed to Ensure Review of Metrics

A mechanism is needed to ensure that necessary changes resulting from these or other factors are identified and facilitated. Users of the metrics may observe strengths and weaknesses as metrics are used and can recommend that revisions be made through the provision for contract changes. However, a formal, coordinated review of all metrics at a specified point during the performance of the SFOC would facilitate changes and ensure that the effect of these changes on other metrics is assessed.

Unless reevaluation of initial metrics occurs, the Agency could use obsolete or inappropriate metrics for the evaluation of contractor performance. A significant element of determining award fee will be the Contractor's demonstrated performance in meeting or exceeding the SOW performance standards. Total award fee available to the contractor during the basic performance period (October 1, 1996, through September 30, 2002) is $243 million. This equates to approximately $20 million for each six-month evaluation period.

Our audit showed that metrics should be reviewed to identify and facilitate necessary changes. Such a review, conducted at a specific

point during the performance of the contract, would allow users to examine metrics and coordinate any changes with those in other segments of the SOW.

RECOMMENDATION

The Manager, Space Shuttle Program Office, should select an appropriate point during performance of the contract and conduct a complete review to evaluate effectiveness of metrics presented in the SOW.

Management's Response

Concur. We agree that a formal, coordinated review of all metrics would provide assurance that the Program management team is using the most meaningful and appropriate metrics available to monitor the contractor's performance in support of the Program and the contract requirements. Therefore, a formal focused review of the total set of metrics would be appropriate after the contract has been in effect for a period of time. Accordingly, we will perform such a review after the first year of operation under the contract. The target schedule would be the last week of October 1997.

Evaluation of Management's Response

Actions planned by NASA management are responsive to the recommendation and we consider it closed for reporting purposes.

MAJOR CONTRIBUTORS TO THIS AUDIT

JOHNSON SPACE CENTER	Janice L. Goodnight, Program Director, Human Exploration and Development of Space June Glisan, Program Assistant
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JUN 17 1997

Reply to Attn of: BQ-97-024

TO: W-JS/Program Manager, Human Exploration and Development of Space

FROM: AA/Director

SUBJECT: Management Response to OIG's Discussion Draft Report, Space Flight Operations Contract Performance Metrics, A-KE-96-006

As discussed with your office, JSC opted to waive an exit conference, and respond directly to the discussion draft report. We acknowledge that the audit survey revealed no significant weaknesses in the sample metrics reviewed, and the work did not continue to the audit phase. We also reviewed the management letter issued to the Associate Administrator of Procurement that suggested lessons learned from the SFOC process be disseminated to Agency procurement personnel. Therefore, in this response we are addressing only the recommendation, which stated:

"The Manager, Space Shuttle Program Office, should select an appropriate point during performance of the contract and conduct a complete review to evaluate effectiveness of metrics presented in the SOW."

We agree that a formal, coordinated review of all metrics would provide assurance that the Program management team is using the most meaningful and appropriate metrics available to monitor the contractor's performance in support of the Program and the contract requirements. Assessment of the value of all the metrics is an inherent part of the management responsibilities for both NASA and the contractor. Therefore, a formal, focused review of the total set of metrics would be appropriate after the contract has been in effect for a period of time. Accordingly, we will perform such a review after the first year of operation under the contract and schedule a discussion of the review for the first Contract Management Review thereafter. The target schedule would be the last week of October 1997.

Paragraph 1.1.2.2 of the contract requires a Performance Measurement System report to be submitted on a monthly basis which documents the performance against the Statement of Work (SOW) metrics, as well as other lower level metrics which have been defined by the NASA and contractor managers to be valuable indicators of specific performance in their areas. There are currently over 200 of these additional metrics, and the associated NASA and contractor managers are empowered to change these by mutual agreement if they determine that the metrics are inappropriate or insufficient. The SOW metrics can also be changed if necessary; however, this change would require approval by the Program Manager and Contracting Officer's Technical Representative (COTR) and the issuance of a modification to the contract SOW.

With this planned action, and your acceptance of it, we will consider the recommendation closed on issuance of the final report. This recommendation will be considered for postclosure validation in accordance with Agency guidelines and OMB Circular A-50. If you have any questions, please contact Pat Ritterhouse at 281-483-4220.

George W. S. Abbey

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BQ/PRitterhouse:5/28/97:34220
Rewritten:6/13/97

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