

KE-96-003

**AUDIT
REPORT**

**FACILITIES OPERATIONS
AND MAINTENANCE**

KENNEDY SPACE CENTER, FLORIDA

November 30, 1995



National Aeronautics and
Space Administration

OFFICE OF INSPECTOR GENERAL

National Aeronautics and
Space Administration

Office of Inspector General
John F. Kennedy Space Center
P. O. Box 21066
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Reply to Attn of:

W/KSC-OIG/AKE95004

November 30, 1995

TO: CD/Center Director, KSC

FROM: W/OIG Center Director, KSC

SUBJECT: Final Report
Facilities Operations and Maintenance
Assignment Number A-KE-95-004
Report No. KE-96-003

We have completed a survey of Facilities Operations and Maintenance at Kennedy Space Center (KSC). The objectives of this assignment were to determine whether:

1. KSC is in compliance with recommended facilities maintenance requirements.
2. Facilities maintenance requirements are reasonable and effective.

Our audit did not reveal any major problems with the facilities maintenance program at KSC. However, we did note three conditions which are discussed in the subject audit report.

1. Budget requirements for facilities maintenance have been based on a percentage of facilities current replacement value. We recommended that facilities maintenance budgets reflect actual assessed need rather than a metric which may not be relevant.
2. KSC has not fully implemented the NASA facilities maintenance requirements contained in NASA Management Instruction 8831.1A. We recommended that KSC management implement these requirements to improve management and controls over facility maintenance.
3. KSC does not consistently use Functional Management System codes for accounting and reporting annual maintenance costs. We recommended that KSC management seek a wavier until the new NASA accounting system and space shuttle program restructuring are complete.

Center Management concurred with our audit recommendations. The actions either taken or planned satisfactorily address our concerns. Consequently, the report recommendations are considered closed with the issuance of this report.

If you have any questions or need additional information, please call Len Diamond, Audit Manager, or me at 867-4664.

Len Diamond

Lanny L. Van Camp

(for)

Enclosure

cc:

W/C. Little, HQ

KSC/DA/A. Parrish

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HM/CIC/J. Nary (20 copies)

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION	3
OBJECTIVES, SCOPE, AND METHODOLOGY	5
OBSERVATIONS AND RECOMMENDATIONS	7
1. CRV METRIC DOES NOT REFLECT MAINTENANCE NEEDS AT KSC	7
2. MAINTENANCE REQUIREMENTS NOT FULLY IMPLEMENTED	11
3. USE OF FMS CODES NOT COST-BENEFICIAL AT KSC	15
GENERAL COMMENT	19
APPENDIX	A-1

ACRONYMS

AWP	Annual Work Plan
BMAR	Backlog of Maintenance and Repair
BOC	Base Operations Contractor
CRV	Current Replacement Value
FCA	Facility Condition Assessment
FMS	Functional Management System
FYFMP	Five-Year Facilities Maintenance Plan
KSC	Kennedy Space Center
NHB	NASA Handbook
NMI	NASA Management Instruction
NRC	National Research Council
PGOC	Payload Ground Operations Contractor
SPC	Shuttle Processing Contractor
SPI	Shuttle Processing Instruction
UPN	Unique Project Number

FACILITIES OPERATIONS AND MAINTENANCE

JOHN F. KENNEDY SPACE CENTER

EXECUTIVE SUMMARY

The Office of Inspector General has completed a survey of Facilities Operations and Maintenance at Kennedy Space Center (KSC).

Objectives

The objectives of the survey were to determine whether:

- (1) KSC is in compliance with recommended facilities maintenance requirements.
- (2) Facilities maintenance requirements are reasonable and effective.

Overall Results

Our survey did not reveal any major problems with the facilities maintenance program at KSC, and therefore, we have decided not to perform a detailed audit at this time. However, we did note the following conditions and have made recommendations to Center management.

1. The Office of Space Flight has required KSC to budget facilities maintenance using a metric that may not accurately reflect actual assessed maintenance needs. This is because NASA has adopted an industry recommended range for budgeting annual maintenance cost in the absence of more reliable data. We recommended that KSC ensure facilities maintenance budgets reflect Center assessed needs rather than a metric which may not be relevant.
2. KSC has not fully implemented the NASA facilities maintenance requirements contained in NASA Management Instruction (NMI) 8831.1A, entitled "Management of Facilities Maintenance." We recommended that KSC implement these requirements in order to improve management and controls over facilities maintenance.

3. KSC does not consistently use the Functional Management System (FMS) codes for accounting and reporting maintenance costs in the financial accounting system as required by NASA Handbook (NHB) 8831.2A. We recommended that KSC seek a waiver from the Associate Administrator, Management Systems and Facilities, in coordination with the Comptroller/Chief Financial Officer.

KSC Management concurred with our audit recommendations. The actions, either taken or planned, satisfactorily address our concerns. Therefore, the report recommendations are considered closed with the issuance of this report. Management's response is included, in part, in the report and, in whole, as Appendix A to the report.

These observations are discussed in detail in the Observations and Recommendations section of this report.

INTRODUCTION

Benefits Derived from Preventive Maintenance at KSC

The key to a successful maintenance program is an understanding of (1) the recurring cost required for facilities maintenance and (2) the direct impact of facilities condition on mission accomplishment. The following excerpt was written by Al Rose, EG&G Florida, Inc., and published in the February 1995 issue of *P/PM TECHNOLOGY*. It is included in our report to illustrate the benefits derived from an effective preventive maintenance program at KSC.

During a routine infrared inspection of a C-5 switchyard, the KSC Base Operations Contractor (BOC) discovered a "hot spot" on a 115 KV disconnect switch. The delta temperature was only 17 degrees Fahrenheit; however, it was only loaded to 10% of capacity. At that loading, you would expect to find no temperature variance. Additional inspections were taken to verify the temperature which confirmed that the switch did have a problem. To put the importance of this discovery in perspective, a failure of this switch would cause a blackout of 95% of the electrical system that feeds all of the space shuttle's processing and launching facilities. Because of the Predictive Maintenance Program in place at KSC, the BOC was able to avert an electrical failure which would have cost the Center \$540,000 at a minimum.

Background

Facilities maintenance is the recurring day-to-day work required to preserve facilities (buildings, structures, grounds, utility systems, and collateral equipment) in such a condition that they may be used for their designated purpose over an intended service life. Facilities maintenance includes the cost of labor, materials, and parts. An effective maintenance program is important because it minimizes or corrects wear and tear and, consequently, forestalls major repairs. At KSC, facilities maintenance is the responsibility of three directorates: Shuttle Operations (Shuttle), Payload Operations (Payload), and Installation Operations (Installation). Routine facilities maintenance operations are performed by three major contractors: The Shuttle Processing Contractor (SPC); the Payload Ground Operations Contractor (PGOC); and the Base Operations Contractor (BOC). KSC also funds maintenance

facilities used on the Cape Canaveral Air Station. Since the maintenance on these facilities is the responsibility of the Air Force, we did not include these maintenance activities in our review.

NASA policy requires the cost-effective and timely maintenance and repair of facilities at a level that protects and preserves the capabilities, capital investment, and NASA missions without jeopardizing the health and safety of personnel or mission performance. The National Research Council (NRC) recommends that agencies budget annual facilities maintenance expenditures at 2 to 4 percent of the facilities' Current Replacement Value (CRV). NASA has adopted this recommended range for budgeting annual maintenance costs in the absence of more reliable data.

According to the KSC Comptroller's Office, the Fiscal Year 1995 budget for routine facilities maintenance is about \$72 million. CRV for facilities at KSC is \$3.3 billion. The Fiscal Year 1995 budget equates to 2.2 percent of KSC's facilities CRV.

OBJECTIVES, SCOPE, AND METHODOLOGY

The NASA Office of Inspector General has completed a survey of facilities operations and maintenance at KSC.

Objectives

The purpose of our survey was to evaluate KSC's facilities maintenance program and to determine whether any conditions exist that warrant further in-depth review. Specifically, the objectives of the survey were to determine whether:

- (1) KSC is in compliance with recommended facilities maintenance requirements.
- (2) Facilities maintenance requirements are reasonable and effective.

Scope and Methodology

The scope of the survey was limited to facilities maintenance activities at KSC and did not include any review of facilities operations. The survey was performed in accordance with generally accepted government auditing standards and included such examinations and tests of applicable controls and documentation that were considered necessary under the circumstances. Specific areas of our survey included:

- o Identifying NASA and KSC directives applicable to facilities maintenance.
- o Identifying other major sources of facilities maintenance criteria.
- o Determining whether NASA and KSC directives are adequate to ensure an economical and efficient maintenance program at KSC.
- o Determining whether KSC is complying with the major requirements of the NASA and KSC directives.
- o Evaluating KSC's current and planned funding of facilities maintenance for adequacy.

To accomplish these tasks, we reviewed applicable NASA directives and other criteria, KSC budgets, and KSC self-assessments relating to facilities maintenance. We interviewed key Headquarters and KSC personnel and inspected several major KSC facilities. We also reviewed KSC's calculation and the related

supporting documentation of the facilities CRV. The field work was limited to maintenance responsibilities of the KSC directorates and, as such, did not include a review of contractor maintenance operations. The survey field work was conducted at KSC during February and March 1995.

***Management
Controls
Reviewed***

We reviewed management controls in the following areas:

- o Written policies and procedures for facilities maintenance.
- o Facilities maintenance plans, both short-term and long-term.
- o Facility condition assessments.
- o Maintenance management systems for tracking the condition and maintenance of facilities.

Areas where management controls could be strengthened were identified and are described in the Observations and Recommendations section of this report.

OBSERVATIONS AND RECOMMENDATIONS

Overall Results

Our survey did not reveal any major problems with the facilities maintenance program at KSC, and therefore, we have decided not to perform a detailed audit at this time. However, we did note the following conditions and have made appropriate recommendations.

1. The Office of Space Flight has required KSC to budget facilities maintenance using a metric that may not accurately reflect actual assessed maintenance needs. This is because NASA has adopted an industry recommended range for budgeting annual maintenance cost in the absence of more reliable data. We recommend that KSC ensure facilities maintenance budgets reflect Center assessed needs rather than a metric which may not be relevant.
2. KSC has not fully implemented the NASA facilities maintenance requirements contained in NMI 8831.1A, entitled "Management of Facilities Maintenance." We recommend that KSC implement these requirements in order to improve management and controls over facilities maintenance.
3. KSC does not consistently use the FMS codes for accounting and reporting of maintenance costs in the financial accounting system as required by NHB 8831.2A. We recommend that KSC seek a waiver from the Associate Administrator for Management Systems and Facilities in coordination with the Comptroller/Chief Financial Officer.

These observations and recommendations are described in detail below.

1. CRV METRIC DOES NOT REFLECT MAINTENANCE NEEDS AT KSC

The Office of Space Flight has required KSC to budget facilities maintenance using a metric which may not accurately reflect actual assessed maintenance needs. This is because NASA has adopted the NRC's recommended annual funding requirement of 2 to 4 percent of facilities CRV as an adequate maintenance standard. Accordingly, the Office of Space Flight has required KSC to budget between 2 to 4 percent of facilities CRV for maintenance costs in prior years' program operating plans. Because of the aging of mission critical facilities and the hazards of mission-oriented activities at KSC, the use of the CRV metric could result in insufficient funding levels for annual maintenance. Consequently, in future years, KSC may be unable to maintain facilities at a level that protects and preserves the capabilities, capital investment, and

***Facilities
Maintenance
Standards***

Agency mission without jeopardizing the health and safety of personnel or mission performance.

NASA, through NMI 8831.1A, adopted the NRC's recommended annual funding requirement of 2 to 4 percent of facilities CRV for annual facilities maintenance. However, the NMI states that "this is a benchmark and should not be used as a substitute for accurate facility condition assessments or requirements-based budgeting." According to NHB 8831.2A, the 2 to 4 percent range is an adequate maintenance standard for maintaining facilities in a steady-state condition and should be used until an independent analysis of facilities condition assessment trends indicate otherwise.

Actual maintenance needs can only be determined through proper evaluation and oversight of facilities and associated operations at the center level. The NRC report, Committing to the Cost of Ownership, Maintenance and Repair of Public Buildings, recommends a range of 2 to 4 percent for routine maintenance as an absolute minimum. In addition, the report states that where neglect of maintenance has caused a backlog of needed repairs, spending must exceed this minimum level until the backlog has been eliminated.

The NRC report addresses public buildings, such as administration buildings, health care facilities, schools, and various other public facilities. For those types of public buildings at KSC, the 2 to 4 percent range is probably appropriate. However, many facilities at KSC are not for general purpose uses but are for mission critical and potentially hazardous operations. These include the orbiter processing facilities, vehicle assembly building, launch pads, and various other shops located around the Center. Consequently, a budget of 2 to 4 percent of those facilities' CRV may not be sufficient to meet annual maintenance needs.

***KSC's Fiscal Year
1994 Actual
Maintenance
Cost***

We found that KSC budgets 2 percent of facilities CRV for maintenance, as recommended by the NMI. According to cost data obtained from the KSC Comptroller's office, KSC's actual Fiscal Year 1994 maintenance costs overall were 2.2 percent of total facility CRV.

***Future Maintenance
Needs at Risk***

While 2 percent of CRV was determined to be sufficient for the Payload directorate, future maintenance needs may be at risk for the Installation and Shuttle directorates. Officials from the Installation directorate indicated that although maintenance budgets are sufficient to cover current maintenance requirements, they had concerns that continued funding constraints may impact their ability to meet future maintenance needs. Currently, the Installation directorate is reporting a Backlog of Maintenance and Repair (BMAR) valued at \$89 million. This equates to 6 percent of Installation's CRV.

Officials from the Shuttle directorate indicated that there are maintenance projects which are not being addressed because of budget constraints. Several major maintenance projects have been addressed through Construction of Facilities projects. However, with the continued reduction of Construction of Facilities and shuttle processing funds, officials are concerned that the necessary levels of maintenance needed to support shuttle operations may not be achieved. The Shuttle directorate has established a preliminary BMAR of \$60 million. The \$60 million is based on the Shuttle directorate's initial Facility Condition Assessment (FCA). The initial FCA identified system discrepancies and projects to eliminate the discrepancies. Upon completion of a component-level FCA, the BMAR is expected to be significantly higher.

Conclusion

While the 2 to 4 percent range allows NASA to measure annual maintenance costs on an Agencywide basis, it may not reflect actual maintenance needs from center to center. Based on the results of our survey, a budget of 2 to 4 percent of facilities CRV is not sufficient for maintenance at KSC. Although we did not identify facilities which pose immediate threats to KSC personnel or missions, we have concerns that continued use of the CRV as a mechanism for budgeting maintenance activities could result in future funding levels which are not sufficient to meet acceptable maintenance standards. Because of the unique facilities at KSC, we recommend that KSC ensures facilities maintenance budgets reflect Center assessed needs rather than a metric which may not be relevant.

RECOMMENDATION 1 KSC should ensure that the Shuttle directorate completes its facilities condition assessment.

Management's Response Concur. A facility condition assessment software applications program for storing assessment data was developed in 1994 and implemented in Lockheed Martin Facilities Operations and Support in January 1995. Nearly 3,000 of the 10,000 items have been inspected and reported to date.

Still in work are a Shuttle Processing Instruction (SPI) for managing the program and a committee search for software to develop cost estimates where repair or replacement is necessary. Publication of the SPI is estimated to be in January 1996. The Facility Operations and Support facility condition assessment is estimated to be completed by October 1996. The Shuttle Ground Systems Directorate (TE) is responsible for implementing this recommendation.

Evaluation of Management's Response The actions taken and/or planned satisfactorily address our recommendation.

RECOMMENDATION 2 KSC should ensure that annual maintenance budgets are based on actual assessed needs rather than a percentage of CRV.

Management's Response Concur. The KSC Comptroller's Office in conjunction with applicable Project Control Office staffs will ensure that the annual maintenance budgets are based on the actual assessed needs rather than a percentage of CRV. All future budget requests will be based upon the need that facilities and their collateral systems can satisfy their mission support requirements. A growing capability within Lockheed Martin Facility Operations and Support will allow the increased use of predictive maintenance, reliability centered maintenance, and facility assessment to develop Backlog of Maintenance and Repair (BMAR) and a proactive maintenance program.

Evaluation of Management's Response The actions planned will satisfactorily address our audit recommendation.

2. MAINTENANCE REQUIREMENTS NOT FULLY IMPLEMENTED

KSC has not fully implemented the NASA facilities maintenance requirements contained in NMI 8831.1A. KSC officials cited inadequate systems, insufficient funding, and last year's contractor strike as reasons for not complying with maintenance requirements. If the Center does not implement these requirements, then it could result in a maintenance program that does not adequately preserve facilities for their designated purpose over their intended service life.

The NMI 8831.1A contains six facilities maintenance requirements:

- Provide "world-class" aerospace research, test, operational, and support facilities through cost-effective and timely maintenance of facilities at a level that preserves the capabilities, capital investment, and supporting missions without jeopardizing the health and safety of personnel and mission performance, or causing unnecessary deterioration of facilities.
- Manage and perform maintenance work efficiently by using maintenance management systems which include, as a minimum, annual work plan, backlog of deferred maintenance, and a work control system.
- Define, categorize, and cost facilities maintenance as outlined in NHB 8831.2.
- Perform detailed installation-level facility condition assessments at least every five years.
- Utilize accepted standards as a guideline to assist in determining facilities maintenance funding requirements, such as the NRC's recommended 2 to 4 percent of CRV for funding maintenance and repair.
- Utilize the NASA Real Property Data Base program to compute and report estimated facilities current replacement value for real property and for estimating the recommended 2 to 4 percent funding level for maintenance and repair.

The NHB 8831.2A provides guidance and recommendations for implementing these requirements which will protect and preserve NASA facilities in a cost-effective manner while efficiently performing the Agency mission. During our survey work, we

noted that some NASA requirements have not been fully implemented by KSC. These requirements are described below.

Five-Year Facilities Maintenance Plan

The NHB recommends that a Five-Year Facilities Maintenance Plan (FYFMP) be developed for long-term maintenance and resources planning. The FYFMP is also the basis for the Annual Work Plan (AWP), which is required by the NMI and described below. Our survey work showed that two KSC directorates, Shuttle and Installation, have not yet prepared FYFMP's. However, the Installation directorate is currently working with the BOC to draft an FYFMP. The Payload directorate has developed an FYFMP.

Annual Work Plan

The NMI requires that an AWP be developed for use as the basis for planning, budgeting, and scheduling annual facilities maintenance work. Our survey work showed that only the Payload directorate had developed an AWP. As with the FYFMP, the Installation directorate is currently working with the BOC to draft an AWP.

Backlog of Maintenance and Repair

The NMI requires that a backlog of deferred maintenance be maintained. Accordingly, the NHB recommends that a BMAR be maintained and updated annually at the end of each fiscal year. The BMAR consists of unfunded facilities maintenance work that is required to bring facilities to a condition that meets acceptable maintenance standards. Maintenance funded from current resources is considered to be "scheduled" and, therefore, not a part of the BMAR. Our survey work showed that the Payload and Installation directorates established a BMAR when they performed an FCA in 1992. The Shuttle directorate has not yet completed a detailed FCA and, therefore, has not established an accurate BMAR.

Facility Condition Assessments

The NMI requires that an FCA be performed at least once every five years to (1) provide objective, auditable evaluations of facilities condition; (2) estimate facilities maintenance requirements; and (3) validate and update the BMAR. Our survey work showed that the Shuttle directorate has not yet performed a detailed FCA but is currently planning its first one. The Payload and Installation directorates jointly performed an FCA during 1992 and, as a result, were able to establish a facilities BMAR as described in the previous section. In addition, the Installation directorate performs a 20 percent assessment each year so that in 5 years, a 100 percent facility assessment will have been completed.

***Shuttle Directorate's
Plans for
Compliance***

Of the three KSC directorates, Shuttle has been the least successful in meeting maintenance requirements. The major reasons cited for noncompliance were (1) the lack of an automated maintenance management system and (2) insufficient funding for an FCA in prior years. Shuttle is currently evaluating available automated maintenance programs and expects to procure and implement one soon. While use of an automated system is suggested in the NHB, it is not required by the NMI. According to the Shuttle directorate, however, use of an automated system would enable the SPC to produce the information necessary to (1) develop accurate plans, both AWP's and FYFMP's, and (2) establish an accurate BMAR.

Regarding the FCA, Shuttle has initiated its first component level inspections. The FCA will cover 100 percent of the facilities assigned to the directorate and should provide an accurate BMAR. The 100 percent FCA will be followed by annual 20 percent FCA's.

***Installation
Directorate Near
Compliance***

Officials from the Installation directorate stated that the major reason an AWP or FYFMP had not been developed is that BOC labor strikes during the prior year delayed preparation of the plans. We noted, however, that the BOC recently submitted a "first draft" AWP, and it is being reviewed by the Installation directorate.

Conclusion

We believe the NASA requirements discussed above are effective maintenance tools and important management controls. The requirements should, therefore, be fully implemented by the three KSC directorates. Noncompliance with these requirements could result in a facilities maintenance program that does not preserve facilities in such a condition that they may be used for their designated purpose over an intended service life.

RECOMMENDATION 3

KSC should ensure that all directorates develop both Five-Year Facilities Maintenance Plans and Annual Work Plans as recommended by NHB 8831.2A.

Management's Response

Concur. As your audit report indicates the Payload Directorate is already in compliance. The Base Operations Contractor/Installation Operations Directorate (BOC/IM) AWP has also been completed. The Shuttle Ground Systems Directorate has the following actions completed or planned.

An implementation plan for full predictive maintenance integration is in work. A maintenance task team will issue a report concerning the development of a five-year maintenance plan. Components of the plan which still need to be worked include setting facility

conditions, establishing an accurate and complete BMAR, and addressing the long term training requirements to match maintenance technology.

***Evaluation of
Management's Response***

The actions taken and/or planned satisfactorily address our audit recommendation.

RECOMMENDATION 4

KSC should ensure that all directorates perform Facility Condition Assessments at least once every five years as required by NMI 8831.1A.

Management's Response

Concur. As your audit report indicates only the Shuttle Directorate was not in compliance with your recommendation as of the date of issuance of the report. A 100% facility condition assessment project is now in work and nearly 30% complete. Once it has been completed the program will be divided up into near equal segments such that each segment will be inspected within a five year cycle.

***Evaluation of
Management's Response***

The action taken satisfactorily addresses our audit recommendation.

RECOMMENDATION 5

KSC should ensure that all directorates maintain Backlogs of Maintenance and Repair and update them at least annually at the end of each fiscal year as required by NMI 8831.1A.

Management's Response

Concur. KSC Directorates will maintain Backlogs of Maintenance and Repair and update them annually at the end of each fiscal year as required by NMI 8831.1A. Each KSC Directorate will maintain this data and it will be updated annually starting October 1996. Specifically a report format for presenting BMAR data is needed. It will also be necessary to develop applications software to construct a preliminary BMAR spreadsheet from existing data fields in the facility condition assessment program as well as deferred corrective and program maintenance requirements yet to be funded.

***Evaluation of
Management's Response***

The actions planned will satisfactorily address our audit recommendation.

**3. USE OF FMS
CODES NOT
COST-BENEFICIAL
AT KSC**

KSC does not consistently use the FMS codes for accounting and reporting of maintenance costs in the financial accounting system as required by NHB 8831.2A. KSC does not consistently report maintenance cost in the accounting system because requiring contractors to account for and report annual maintenance costs at such a detailed level is not cost-beneficial. According to KSC officials, to fully comply with the NHB, KSC would have to expend a significant amount of resources, both civil service and contractor, to capture cost data that is available through "off-line" facilities maintenance reports. In addition, it is not cost-beneficial to incur added contract costs when both the financial accounting system and current contract structure at KSC will be changing significantly within the next year.

***FMS Code Reporting
Requirement***

According to NHB 8831.2A, Section 1.2.1, "Facilities Maintenance Cost Account Codes," NASA Headquarters must report to the Office of Management and Budget and Congress on how NASA spends its facilities maintenance funds. Although there is no formal reporting period, NASA Headquarters must be able to respond to the Office of Management and Budget or Congress upon request. In the absence of any other formal reporting mechanism, NASA Headquarters established FMS codes to capture maintenance expenditures. The FMS codes are defined in the NASA Financial Management Manual. The NHB states that field installations will use the FMS codes for accounting and reporting to NASA Headquarters on facilities maintenance funds.

Currently at KSC, the Shuttle and Payload directorates account for and report annual maintenance cost using the FMS codes in off-line reports. Only the Installation directorate records cost data into the NASA accounting system; however, the data is reported under the predominant FMS codes and includes both facilities maintenance and operations costs.

***Shuttle and Payload
Directorates Find
"Off-line" Reports
More Cost-effective***

According to the Shuttle and Payload directorates, requiring their respective contractors to modify the monthly 533 reports to capture maintenance costs by FMS code would be cost prohibitive. For example, to fully comply with the NHB, the PGOC would be required to report costs for five Unique Project Numbers (UPN's) over eight FMS codes. This would result in 40 additional lines (5 UPN's x 8 FMS codes) on the monthly 533 report. The Payload directorate estimated a \$2 to \$3 million cost over a 9-year period to modify the PGOC monthly 533 report.

In lieu of modifying the monthly 533 report, the Shuttle and Payload directorates have established off-line reports to capture maintenance costs by FMS code. While the Payload directorate will incur over \$550,000 (\$60,000 a year for 9 years) to obtain the off-line report, the cost is significantly less than the estimates for the modified 533 report. Consequently, the Payload directorate saved approximately \$1.5 to \$2.5 million by using the off-line report. Although neither the Shuttle nor Payload directorates enter the cost data from the off-line reports into the financial accounting system, it can be provided to NASA Headquarters as required.

The cost data from the off-line reports cannot be entered into the accounting system without offsetting the maintenance cost already reported under the monthly 533 report. Since the monthly 533 reports capture costs by Work Breakdown Structure rather than specific work performed, the Shuttle and Payload directorates cannot readily identify maintenance costs already reported. Consequently, entering data from the off-line reports into the accounting system without modifying the monthly 533 report results in a duplication of reporting and an overstatement of maintenance costs.

***Installation
Directorate
Uses Predominant
FMS Codes***

The Installation directorate inputs maintenance and operations costs into the NASA accounting system using predominant FMS codes rather than the level of detail intended by the NHB reporting requirement. For example, operations and maintenance cost under the Buildings and Structures function is allocated to eight different UPN's because it is funded by Program Mission Support and Research Operations Support. The Installation directorate selects the predominant FMS code for each of those eight UPN's and reports total costs in the financial accounting system under eight accounting lines. Using the predominant FMS codes for each accounting line was deemed appropriate by the directorate because, during the 1993 Institutional Budget Restructuring exercise, the Comptroller allowed a similar use of this principle to determine the functional classification of each facility based on the predominant function of that facility.

According to Installation officials, to fully comply with the NHB, they would have to segregate maintenance and operations costs and then report them using the FMS codes. The Buildings and Structures function would be charged to eight *operations* accounting lines (one FMS code per UPN) and 23 *maintenance*

accounting lines (multiple FMS codes for some UPN's). Consequently, the Installation directorate would report annual maintenance and operations cost in the financial accounting system under 31 accounting lines (23 + 8) for the Buildings and Structures function alone. This is a factor of 3.875 (31/8). If this factor is applied to the 111 accounting lines on the BOC that would be candidates for maintenance cost allocations, then the Installation directorate could be reporting as many as 430 (111 x 3.875) accounting lines in the financial accounting system to comply with the NHB.

***Off-line Reports
Could Satisfy the
Intent of the NHB***

The Installation directorate is currently creating an "Information Data Warehouse System" which will accurately collect facility maintenance data consistent with the intent of the NHB. The off-line reports currently being used by the Shuttle and Payload directorates already capture maintenance cost data consistent with intent of the NHB. In view of the current NASA downsizing effort, the off-line reports provide an effective and efficient alternative to the resource intensive requirement currently imposed by the NHB. Although the data from the off-line reports will not be available in the financial accounting system, it could be submitted to NASA Headquarters on an as-needed basis.

***Significant Changes
at KSC***

In addition to the current impacts of the reporting requirement stated above, two other upcoming events could significantly impact how KSC complies with the NHB. First, the Agency is in the process of procuring a new integrated financial management system. It is unknown how data collection currently performed by FMS codes will be accomplished under the new system. Second, the Space Shuttle program is going through a major restructuring which will result in the consolidation of some of KSC's shuttle contracts into a single prime contract. Both of these events could have a significant impact on KSC's reporting requirements. Further, these events are scheduled to occur within the next year. It is not reasonable to incur added costs to the existing KSC contracts to comply with the NHB when reporting requirements will most likely be revised within the next year.

Conclusion

The NHB requirement to account for and report Center maintenance costs in the current financial accounting system using the FMS codes does not appear to be cost-beneficial at KSC. According to KSC officials, the resources required to report the number of accounting lines and contractor accruals needed to

number of accounting lines and contractor accruals needed to comply with the FMS codes are not cost-beneficial when there are off-line reports which will satisfy the intent of the NHB.

Further, with the upcoming changes to both the NASA financial accounting system and the space shuttle program, it is not reasonable to incur costs to modify contractor reporting requirements when they will be revised within the next year. In the interim period, we believe cost savings from using off-line reports, such as the \$1.5 to \$2.5 million estimated by the Payload directorate, could be put to better use performing actual maintenance rather than modifying contractor monthly 533 reports.

RECOMMENDATION 6

KSC should seek a waiver for the NHB reporting requirement from the Associate Administrator for Management Systems and Facilities in coordination with the Comptroller/Chief Financial Officer, until the new integrated financial management system and shuttle program restructuring are complete.

Management's Response

Concur. The KSC Comptroller will seek a waiver as recommended. A copy of the request for waiver will be provided to the KSC OIG approximately December 1, 1995.

***Evaluation of
Management's Response***

The action planned will satisfactorily address our audit recommendation.

GENERAL COMMENT

The staff of the NASA Office of Inspector General expresses their appreciation to the NASA Headquarters and KSC personnel contacted during this survey for their courtesy, assistance, and cooperation.

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National Aeronautics and
Space Administration
John F. Kennedy Space Center
Kennedy Space Center, FL 32899



Reply to Attn of: **HM-CIC**

NOV 21 1995

TO: W/OIG Center Director, KSC
FROM: CD/Director
SUBJECT: OIG Revised Draft Report on OIG Audit of
Facilities Operations and Maintenance,
Assignment Number A-KE-95-004

Reference your letter dated October 19, 1995, subject as
above, we have considered the six recommendations made in
your draft report.

We are concurring in all recommendations.

Our specific comments are enclosed.

for James A. Thomas
Jay F. Honeycutt

Enclosure

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HM-CIC/J. Nary
E. Gawronski
IM-PCM/C. Wynn
TM-SPO-1/R. English
W/OIG/L. Diamond
S. Massey
C. Seger

RECOMMENDATION 1

KSC should ensure that the Shuttle Directorate completes its facilities condition assessment.

KSC RESPONSE

Concur. A facility condition assessment software applications program for storing assessment data was developed in 1994 and implemented in Lockheed Martin Facility Operations and Support in January 1995. Nearly 3,000 of 10,000 items have been inspected and reported to date.

Still in work are a Shuttle Processing Instruction (SPI) for managing the program and a committee search for software to develop cost estimates where repair or replacement action is necessary. Publication of the SPI is estimated to be January 1996. The Facility Operations and Support facility condition assessment is estimated to be completed by October 1996. The Shuttle Ground Systems Directorate (TE) is responsible for implementing this recommendation.

RECOMMENDATION 2

KSC should ensure that the annual maintenance budgets are based on the actual assessed needs rather than a percentage of CRV.

KSC RESPONSE

Concur. The KSC Comptroller's Office in conjunction with applicable Project Control Office staffs will ensure that the annual maintenance budgets are based on the actual assessed needs rather than a percentage of CRV. All future budget requests will be based upon the need that facilities and their collateral systems can satisfy their mission support requirements. A growing capability within Lockheed Martin Facility Operations and Support will allow the increased use of predictive maintenance, reliability centered maintenance and facility assessment to develop Backlog of Maintenance and Repair (BMAR) and a proactive maintenance program.

Milestones and Estimated Completion Dates:

RCM analysis training of systems engineers - Complete

Predictive maintenance integration into total maintenance program - October 1999

BMAR based on completed facility condition assessment - October 1997

First annual budget supported by completed BMAR - October 1997

The Shuttle Ground Systems Directorate (TE) is responsible for implementing this recommendation.

RECOMMENDATION 3

KSC should ensure that all directorates develop both Five-Year Facilities Maintenance Plans and Annual Work Plans as recommended by NHB 8831.2A.

KSC RESPONSE

Concur. As your audit report indicates the Payload Directorate is already in compliance. The Base Operations Contractor/Installation Operations Directorate (BOC/IM) AWP has also been completed. The Shuttle Ground Systems Directorate has the following actions completed or planned.

An implementation plan for full predictive maintenance integration is in work. A maintenance task team will issue a report concerning the development of a five-year maintenance plan. Components of the plan which still need to be worked include setting facility conditions, establishing an accurate and complete BMAR, and addressing the long term training requirements to match maintenance technology.

MILESTONES AND ESTIMATED COMPLETION DATES:

Publication of the Facility Maintenance Task Team Report - Complete

Completion PDM implementation plan - TBD

Documentation of facility condition standards - October 1996

Completed BMAR - October 1996

Completed long term training program - TBD

First draft five-year plan format and content - October 1996

The Shuttle Ground Systems Directorate (TE) is responsible for implementing this recommendation.

RECOMMENDATION 4

KSC should ensure that all directorates perform Facility Condition Assessments at least once every five years as required by NMI 8831.1A.

KSC RESPONSE

Concur. As your audit report indicates only the Shuttle Directorate was not in compliance with your recommendation as of the date of issuance of the report. A 100% facility condition assessment project is now in work and nearly 30% complete. Once it has been completed the program will be divided up into near equal segments such that each segment will be inspected within a five year cycle.

Milestones and Estimated Completion Dates:

A 100% facility condition assessment is scheduled for completion by October 1996. A minimum of 20% of all items to be inspected will then be done annually starting in October 1996.

The Shuttle Ground Systems Directorate (TE) is responsible for implementing this recommendation.

RECOMMENDATION 5

KSC should ensure that all Directorates maintain Backlogs of Maintenance and Repair (BMAR) and update them annually at the end of each fiscal year as required by NMI 8831.1A.

KSC RESPONSE

Concur. KSC Directorates will maintain Backlogs of Maintenance and Repair and update them annually at the end of each fiscal year as required by NMI 8831.1A. Each KSC Directorate will maintain this data and it will be updated annually starting October 1996. Specifically a report format for presenting BMAR data is needed. It will also be necessary to develop applications software to construct a preliminary BMAR spreadsheet from existing data fields in the facility condition assessment program as well as deferred corrective and program maintenance requirements yet to be funded.

Milestones and Estimated Completion Dates:

Develop BMAR spreadsheet and report format - January 1996

Validate BMAR application software - September 1996

Produce first BMAR report - October 1996

The Shuttle Ground Systems Directorate (TE) is responsible for implementing this recommendation.

RECOMMENDATION 6

KSC should seek a waiver for the NHB reporting requirement from the Associate Administrator, Management Systems and Facilities, in coordination with the Comptroller/Chief Financial Officer, until the new accounting system and Shuttle Program restructuring are complete.

KSC RESPONSE

Concur. The KSC Comptroller will seek a waiver as recommended. A copy of the request for waiver will be provided to the KSC OIG approximately December 1, 1995.

The KSC Comptroller's Office, Financial Management Division (AC-FMD) is responsible for implementing this recommendation.

In addition to the above responses to specific recommendations we also offer the following comments: Page 9, second to the last sentence, backlog number should be revised to \$89M to reflect the figure at the end of FY 1994.

the 1990s, the number of people in the UK who are aged 65 and over has increased from 10.5 million to 13.5 million, and the number of people aged 75 and over has increased from 4.5 million to 6.5 million (Office for National Statistics 2000).

There is a growing awareness of the need to address the needs of older people, and the need to ensure that the health care system is able to meet the needs of older people. The Department of Health (2000) has set out a strategy for the health care system, which includes a commitment to improve the health care system for older people. The strategy includes a commitment to improve the health care system for older people, and to ensure that the health care system is able to meet the needs of older people.

The Department of Health (2000) has set out a strategy for the health care system, which includes a commitment to improve the health care system for older people. The strategy includes a commitment to improve the health care system for older people, and to ensure that the health care system is able to meet the needs of older people. The strategy includes a commitment to improve the health care system for older people, and to ensure that the health care system is able to meet the needs of older people.

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