IG-98-018

AUDIT REPORT

NASA DATA CENTER GENERAL CONTROLS - SHUTTLE PROCESSING DATA MANAGEMENT SYSTEM

KENNEDY SPACE CENTER, FLORIDA

July 20, 1998

National Aeronautics and
Space Administration

OFFICE OF INSPECTOR GENERAL

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ACRONYMS

CAPSS	Computer Aided Planning and Scheduling System
KSC	Kennedy Space Center
NASA	National Aeronautics and Space Administration
PRACA	Problem Reporting and Corrective Action
SPDMS	Shuttle Processing Data Management System
USA	United Space Alliance
VM	Virtual Machine
VSE	Virtual Storage Extended

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EXECUTIVE SUMMARY

INTRODUCTION

The Kennedy Space Center (KSC) is the National Aeronautics and Space Administration (NASA) Center of Excellence for launch and payload processing. The Shuttle Processing Data Management System (SPDMS) supports various critical applications in processing the Shuttle for launch.

The United Space Alliance (USA) is responsible for the daily operation and management of SPDMS. The USA operates the SPDMS data center under the Space Flight Operations Contract at an estimated annual cost of $2 million.

OBJECTIVE

The objective of this audit was to determine whether KSC has established an adequate management control structure to provide a reliable computing environment, including:

- physical and environmental protection; and
- operating procedures applicable to general computer operations, library management, data communications, storage management, backup/recovery, and software change management.

Details on scope and methodology are in Appendix A.

RESULTS OF AUDIT

Overall, the KSC management control structure for SPDMS provides a reliable computing environment. The USA has done a commendable job of establishing data center physical and environmental protection controls and operating procedures for the SPDMS environment. However, controls associated with the monitoring of unauthorized system access attempts can be improved. KSC has not documented procedures for monitoring unauthorized access attempts in one computing environment. Lack of procedures could result in potential security compromises.

RECOMMENDATION

NASA should improve controls over SPDMS operations by documenting procedures to monitor unauthorized access attempts.

MANAGEMENT'S RESPONSE

KSC concurred with the recommendation and has established procedures to help improve controls. We consider the corrective action responsive to the intent of the recommendation.

OBSERVATION AND RECOMMENDATION

PROCEDURES FOR MONITORING UNAUTHORIZED SYSTEM ACCESS ATTEMPTS

KSC has not documented procedures to monitor access violation attempts in one SPDMS computing environment. NASA Automated Information Security Handbook, NHB 2410.9A, requires implementation of protective measures to prevent misuse and abuse of computing resources. Protective measures should include the development and implementation of procedures to determine whether unauthorized accesses are being attempted. Without written procedures, responsibilities for monitoring and following up may be unclear and unauthorized access attempts may not be appropriately addressed. Lack of documented procedures could lead to a compromise in this SPDMS environment.

The SPDMS data center houses a variety of hardware, including two IBM 9000 mainframes. IBM's Virtual Machine (VM) is the SPDMS main operating system, with the Virtual Storage Extended (VSE) operating system running under VM. The SPDMS supports various applications that are important to the daily operation of Shuttle processing.

A majority of the critical SPDMS applications run in the VM environment. Examples of critical applications include the Computer Aided Planning and Scheduling System (CAPSS) and the Problem Reporting and Corrective Action (PRACA). The CAPSS provides an automated tool to plan, schedule, and manage resources for processing more than one Shuttle for launch. The PRACA provides a means to maintain and track all problems and implemented corrective actions associated with space flight and related ground operating support systems.

The VSE environment supports two applications: the Material Support System and the Shop Floor Control Data Collection. The Material Support System processes requirements for all parts, equipment, tools, and materials used in ground processing. The Shop Floor Control Data Collection provides an on-line status of daily tasks being performed on space flight elements (for example, solid rocket boosters and external tank) and ground support equipment used in processing space flight elements.

The VM and VSE environments are protected by logical security software products that are well established in the mainframe market. The software products provide logical security by

identifying and verifying users and allowing only authorized users access to protected system resources. The products also detect and log unauthorized access attempts.

USA management has assigned a person to monitor and investigate unauthorized access attempts. Operating procedures outlining requirements and responsibilities for monitoring unauthorized access attempts have been documented for the VM environment. However, similar procedures have not been documented for the VSE environment.

RECOMMENDATION

The NASA KSC Center Director should direct that an approved operating procedure for monitoring unauthorized access attempts in the VSE environment is documented and implemented. The operating procedure should address how unauthorized access attempts will be identified for logging, how frequently violation reports should be produced, responsibility for reviewing and investigating violation reports, and requirements for documenting evidence resulting from review and investigation.

MANAGEMENT'S RESPONSE

KSC concurred with the recommendation. KSC revised its procedure for reviewing unauthorized access attempts in the VM environment to include the VSE environment.

The full text of management's response is in Appendix B.

EVALUATION OF MANAGEMENT'S RESPONSE

The action taken by management was responsive to the intent of the recommendation. We consider this recommendation closed for reporting purposes.

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The objective of the audit was to determine whether KSC established an adequate management control structure to provide for a reliable SPDMS computing environment, including:

- physical and environmental protection; and
- operating procedures that provide for the reliable management of computer operations.

SCOPE AND METHODOLOGY

The scope of the audit was limited to the SPDMS at KSC. As part of the audit, we interviewed KSC civil service personnel and USA contractor personnel to understand the general SPDMS controls and procedures. We reviewed pertinent requirements from the NASA Automated Information Security Handbook. We also reviewed standards, policies, and procedures that USA established for SPDMS. We toured the SPDMS facility and reviewed reports to evaluate physical security and environmental conditions.

MANAGEMENT CONTROLS REVIEWED

We reviewed general operating policies, procedures, and standards for the following SPDMS data center functions:

- physical and environmental protection;
- general computer operations;
- library management;
- job scheduling;
- data communications;
- storage management;
- file retention and backup/recovery procedures; and
- software change management procedures.

We found that management controls in the above areas were adequate.

AUDIT FIELD WORK

We performed field work at KSC from February through November 1997. We conducted the audit in accordance with generally accepted government auditing standards.

MANAGEMENT'S RESPONSE

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

eply to Attn of: HM

JUN 2 4 1998

TO: NASA Headquarters
Attn: W/Assistant Inspector General for Auditing

FROM: AA/Director

SUBJECT: Office of the Inspector General (OIG) Draft Report on Audit of NASA Data Center General Controls at KSC, Assignment Number A-HA-97-021

This is in response to the subject OIG draft report dated May 4, 1998. We offer the following comments for your consideration:

OIG RECOMMENDATION 1

The KSC Center Director should assure that approved operating procedures for monitoring unauthorized access attempts in the Virtual Storage Extended (VSE) environment are established, implemented, and documented. The operating procedures should address how unauthorized access attempts will be identified for logging, how frequently violation reports should be produced, responsibility for reviewing and investigating violation reports, and requirements for documenting evidence resulting from review and investigation.

KSC RESPONSE

Concur. The written audit procedure for the Virtual Machine (VM) system was dated and signed on August 9, 1996. This documented procedure has been thoroughly reviewed by Ms. Mindy Vuong, Auditor-in-Charge of the subject audit. After reviewing the documented procedure for the VM system, Ms. Vuong concluded that all the criteria noted in the recommendation are met by the VM system procedure.

MANAGEMENT'S RESPONSE

With regard to the VSE system, the corrective action taken by the United Space Alliance (USA) Information Technology Lead was to incorporate the VSE audit procedures with the VM procedures. The operating procedures for monitoring unauthorized access attempts in the VM environment are now in force and govern the VSE system, effective February 10, 1998. KSC considers the recommendation closed as of that date.

If you have any questions, please contact James Nary, KSC Audit Liaison Representative, at (407) 867-7809.

Roy D. Bridges, Jr.

Enclosure

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