



OFFICE OF THE INSPECTOR GENERAL

U.S. NUCLEAR REGULATORY COMMISSION
DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Evaluation of NRC's Network Storage Interruption

OIG-17-A-19
July 27, 2017



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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

**OFFICE OF THE
INSPECTOR GENERAL**

July 27, 2017

MEMORANDUM TO: Victor M. McCree
Executive Director for Operations

FROM: Dr. Brett M. Baker */RA/*
Assistant Inspector General for Audits

SUBJECT: EVALUATION OF NRC'S NETWORK STORAGE
INTERRUPTION (OIG-17-A-19)

Attached is the Office of the Inspector General's (OIG) evaluation report titled *Evaluation of NRC's Network Storage Interruption*.

The report presents the results of the subject evaluation. Following the June 26, 2017, exit conference, agency staff indicated that they had no formal comments for inclusion in this report.

Please provide information on actions taken or planned on each of the recommendations within 30 days of the date of this memorandum. Actions taken or planned are subject to OIG followup as stated in Management Directive 6.1.

We appreciate the cooperation extended to us by members of your staff during the evaluation. If you have any questions or comments about our report, please contact me at (301) 415-5915 or Beth Serepca, Team Leader, at (301) 415-5911.

Attachment: As stated



Office of the Inspector General

U.S. Nuclear Regulatory Commission
Defense Nuclear Facilities Safety Board

OIG-17-A-19

July 27, 2017

Results in Brief

Why We Did This Review

On November 16, 2016, at 4:45 a.m., the U.S. Nuclear Regulatory Commission's (NRC) Network Operations Center identified that access was lost to key information technology (IT) services, including availability to the network, remote access, internet, email and servers (file, print, and applications).

The Network outage was isolated to NRC headquarters; however NRC's regional offices were also affected by the interruption. This resulted in NRC excusing headquarters employees for the entire workday on November 17, 2016, and for 2 hours on November 18, 2016. It cost NRC an estimated \$941,739 to grant employees administrative leave for this time.

The Information Technology and Infrastructure Support Services (ITISS) contract provides NRC's IT services and is valued at \$160,269,761.50 as of June 2017. The ITISS contractor has one service provider – Dell Services Federal Government. The Global Infrastructure Development and Acquisition (GLINDA) contract will be the successor to ITISS beginning in September 2017.

The objective was to evaluate the NRC network storage service interruption that occurred on November 16, 2016, and identify opportunities for improvement and solutions moving forward.

Evaluation of NRC's Network Storage Interruption

What We Found

OIG evaluated the network storage interruption and its effect on agency operations, and identified opportunities for improvement in how NRC manages its IT services contract. OIG found weaknesses in the following areas:

- The contract modification process. Specifically, NRC inadvertently modified the ITISS contract disincentive fee.
- Administration of the ITISS contract. Specifically, NRC allowed the contractor to make all decisions on the data center storage system architecture.

Additionally, OIG identified multiple issues with how the ITISS contract was written and overseen. These issues relate to the number and relative weight of the Service Level Requirements included in the contract and the lack of associated penalties. Service Level Requirements are agreements between a service provider and end user that defines the level of service expected.

What We Recommend

This report makes four recommendations to improve NRC's processes, procedures, and operations under the next IT services acquisition (GLINDA). Management stated their agreement with the findings and recommendations in this report.

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ABBREVIATIONS AND ACRONYMS

ADM	Office of Administration
BPA	Blanket Purchase Agreement
COR	Contracting Officer's Representative
GLINDA	Global Infrastructure Development and Acquisition
IT	Information technology
ITISS	Information Technology and Infrastructure Support Services
DSFG	Dell Services Federal Government
NRC	Nuclear Regulatory Commission
OCIO	Office of the Chief Information Officer
OIG	Office of the Inspector General
RAID	Redundant array of independent disks
SLR	Service Level Requirement

I. BACKGROUND

Network Service Interruption

On November 16, 2016, at 4:45 a.m., the U.S. Nuclear Regulatory Commission's (NRC) Network Operations Center identified that access was lost to key information technology (IT) services, including availability to the network, remote access, internet, email, and servers (file, print, and applications). The network outage was isolated to headquarters; however, NRC's regional offices were also affected since they could not access centralized headquarters IT resources.

This resulted in NRC excusing headquarters employees for the entire workday on November 17, 2016, and for 2 hours on November 18, 2016, to allow restoration of IT services. This cost NRC an estimated \$941,739 to grant employees administrative leave for that time. All key services were restored at 12:00 p.m. on Friday, November 18, 2016, with the exception of shared drive availability, which was fully restored on Friday, November 25, 2016.

ITISS Contract

NRC's IT services are provided through the Information Technology and Infrastructure Support Services (ITISS) contract and valued at \$160,269,761.50.¹ Dell Services Federal Government (DSFG) has been the single service provider for ITISS since it began in February 2011 and will continue providing services until the contract's termination in August 2017. The successor to the ITISS contract, Global Infrastructure and Development Acquisition (GLINDA), will begin in late 2017. GLINDA services will be similar to those provided under the ITISS contract. However, there will be multiple vendors providing the services.²

¹ Figure as of June 9, 2017.

² Any reference to "GLINDA" in this report will be to the "GLINDA acquisition." GLINDA is not a single contract, but six Blanket Purchase Agreements (BPA). A BPA is a simplified method of filling anticipated repetitive needs for supplies or services by establishing "charge accounts" with qualified sources of supply. Requests for supplies or services under a BPA are known as "calls."

Responsible Offices

The Office of the Chief Information Officer (OCIO) plans, directs, and oversees resources to ensure the delivery of IT and information management services that are critical to support the mission, goals, and priorities of the agency. OCIO is responsible for the ITISS contract and will also oversee the GLINDA acquisition. The Office of Administration (ADM), through its Acquisition Management Division, performs selection, negotiation, and administration of contracts, grants, and interagency agreements in support of agency offices, and ensures contracted goods and services are delivered as required, on time, and in accordance with agreed upon terms, conditions and costs.

Roles and Responsibilities of the Contracting Officer and Contracting Officer's Representative

Contracting officers assigned to the Acquisition Management Division have worked on the ITISS contract over the course of its administration. Contracting officers are responsible for ensuring performance of all necessary actions for effective contracting, ensuring compliance with the terms of the contract, and safeguarding the interests of the United States in its contractual relationships. Contracting officers, in furtherance of their contract administration activities, designate a contracting officer's representative (COR) to assist in the technical monitoring or administration of a contract. The CORs play a critical role in ensuring that contractors meet the commitment of their contracts by assisting contracting officers in managing their contracts. The ITISS contract has had a series of successive CORs, one serving at a time, since February 2011.

II. OBJECTIVE

The objective was to evaluate the NRC network storage service interruption that occurred on November 16, 2016, and identify opportunities for improvement and solutions moving forward.

III. FINDINGS

OIG evaluated the network storage interruption and its effect on agency operations, and identified opportunities for improvement in how NRC manages its IT services contract. Specifically, OIG identified weaknesses in the following areas: (a) the contract modification process, and (b) the administration of the ITISS contract regarding allowing the contractor to make all the decisions on the storage system architecture. Additionally, OIG identified a management issue regarding the ITISS contract Service Level Requirements (SLR)³. OIG makes four recommendations to improve NRC's processes, procedures, and contract administration under the next IT services contract (GLINDA).⁴

A. NRC Inadvertently Modified the ITISS Disincentive Fee

In 2015, NRC, without recognizing that it had done so, modified the ITISS contract disincentive fee from 5 percent to 2 percent. The modification occurred because of inadequate internal controls over contract modification. As a result, NRC will only recover only \$223,300 due to the network shutdown, when it could have recovered \$558,266 had the disincentive fee remained unmodified. Improving internal controls over

³ A Service Level Requirement is an agreement between a service provider and the end user that defines the level of service expected from the service provider.

⁴ OIG notes that issues with contract administration are a recurring issue. In 2012, OIG conducted an *Audit of NRC's Contract Administration of the EPM (Enterprise Project Management) Contract*, OIG-12-A-18. OIG determined that there was a lack of effective internal controls governing administration of the contract, specifically over the invoice review process.

contract modification can prevent this type of error from occurring with other contracts, including the GLINDA acquisition.

What Is Required

Government Accountability Office (GAO) Standards for Internal Control in the Federal Government and the Federal Acquisition Regulations

NRC management should design control activities to achieve objectives and respond to risks. The control activities are the policies, procedures, techniques, and mechanisms that enforce management's directives to achieve the entity's objectives and address related risks, including agency contracts. Additionally, it is NRC's policy that the acquisition of supplies and services supporting the agency's mission is planned, awarded, and administered efficiently and effectively.

Under Section 1.602.2 of the Federal Acquisition Regulations, contracting officers are responsible for ensuring performance of all necessary actions for effective contracting, ensuring compliance with the terms of the contract, and safeguarding the interests of the United States in its contractual relationships.

What We Found

NRC Inadvertently Modified the ITISS Contract Disincentive Fee

NRC modified the ITISS disincentive fee from 5 percent to 2 percent, without recognizing or intending to do so. The ITISS contract disincentive fee is a financial compensation paid by DSFG to NRC for the loss in productivity caused by performance below the contract requirements. In 2013, DSFG appealed to NRC on several occasions to reduce the ITISS contract disincentive fee percentage. However, NRC advised DSFG that if it was able to sustain at least 85 percent service level requirement pass rate during the remaining quarters of Fiscal Year 2013, the agency would then consider reducing the disincentive fee percentage.

Approximately 2 years later, in April 2015, NRC issued a modification of the ITISS contract to DSFG. Attached to the modification was a "Schedule of Supplies or Services" which listed the price DSFG would charge NRC for a particular supply or service. The Schedule of Supplies and Services included over 300 contract pricing lines. On the schedule, but not recognized by the branch chief who authorized the contract modification, was a reduction in the disincentive fee from 5 percent to 2 percent. Once the modification was signed, the disincentive fee was reduced.

Why This Occurred

Lack of Adequate Internal Controls

NRC inadvertently modified the disincentive fee because the agency lacks adequate internal controls related to contract modification. NRC's Acquisition Management Division Acquisition Instruction AMD #2012-01, *Review Thresholds for Contract and Order Documents*, establishes review thresholds for acquisition related documents to ensure proper internal controls within the Acquisition Management Division. Acquisition Management Division Acquisition Instruction #2010-06, *Contract File – Modification Log* specifies the documentation required to support a contract modification. AMD #2010-06 does not require documentation to support a notable change such as the lowering of the disincentive fee.

There are frequent situations where multiple individuals from the Acquisition Management Division work on a contract modification. This was the case for the 2015 ITISS contract modification – a cognizant contracting officer⁵ and branch chief were involved in the modification.

Both individuals were involved because the cognizant contracting officer did not have the appropriate warrant level⁶ to authorize the contract modification. Therefore, the branch chief signed and authorized the

⁵ The cognizant contracting officer is responsible for making decisions that affect the contract and for ensuring the accuracy, and completeness, of contract file documentation.

⁶ A contracting officer's warrant delegates authority to enter into, administer, or terminate contracts and make related determinations and findings. Contracting officers may bind the Government only to the extent of the authority delegated to them. Contracting officers shall receive from the appointing authority clear instructions in writing regarding the limits of their warrant authority. FAR 1.602-1(a).

contract modification. However, they did not recognize that the listed disincentive fee, included by the contractor in the price schedule, was a change in the contract term, resulting in a reduction in the disincentive fee.

Why This Is Important

NRC Could Have Recovered More Disincentives Fees

NRC could have recovered more money had the contract disincentive fee remained at 5 percent. At 5 percent, NRC could have recovered \$558,266 for the quarter during which the network storage service interruption occurred. Instead, NRC will only recover the 2 percent disincentive fee from DSFG, or \$223,300. It is imperative that NRC establish proper contract modification internal controls to prevent a similar scenario with the GLINDA acquisition and other agency contracts.

The disincentive fee is the only monetary penalty that will be imposed upon DSFG for the network storage interruption, despite the outage costing NRC an estimated \$941,739 to grant employees administrative leave. Under the current contract terms, the agency cannot seek reimbursement for that money. If there were another extended interruption to key contract services, the only available remedy to NRC would be to withhold the 2 percent disincentive fee.

Recommendations

OIG recommends that the Executive Director for Operations

1. Update Acquisition Management Division Acquisition Instruction #2010-06, *Contract File – Modification Log*, to specific requirements for the file documentation that should be included when modifying contract terms.

B. NRC Relinquished Control of Storage System Architecture Decisions to the Contractor

NRC relinquished control of storage system architecture (architecture) decisions to the contractor, contrary to the agency's guidance. NRC was not involved in the decisions because it lacked an office level policy

requiring an evaluation of architecture to ensure it was meeting NRC's needs. Without such a policy in place, NRC may not be aware of the risks associated with the architecture selected by the contractor and the need to formulate a plan to mitigate those risks.

What Is Required

Management Directive (MD) 2.8, *Integrated Information Technology/Information Management (IT/IM) Governance Framework*

Management Directive 2.8 establishes a framework to ensure efficient and effective governance of information technology/information management investments. The framework encompasses activities spanning the full lifecycle of IT investments, including strategic planning and enterprise architecture, IT investment management, and project management. The IT investment management process follows the continuous sequence of selecting, monitoring and controlling, and evaluating the investment and associated activities throughout its lifecycle.

What We Found

NRC Relinquished Control of Storage System Architecture Decisions to the Contractor

NRC relinquished control of the architecture decisions to the contractor. The ITISS Statement of Work specifies that the contractor "provide, track, and maintain offeror-supplied and Government furnished network components and devices which make up the NRC Information Technology Infrastructure." Staff were told that because a service was being purchased, it was up to the contractor to determine the equipment to purchase and its configuration. The ITISS contract was awarded as a performance-based contract. Under a performance-based contract, agencies define for the contractor a desired outcome and performance metrics that must be met, and the contractor determines the best way to meet those requirements and metrics.

The roles of OCIO staff were not specified in the ITISS contract management documentation. The COR is responsible for providing all technical direction to the contractor. However, other OCIO staff are subject matter experts in information technology areas, including data storage and the servers. These experts wanted to have technical conversations with the contractor, but were prevented from directly communicating with the contractor.

Why This Occurred

NRC Lacked Sufficient Internal Controls To Continually Re-evaluate Architecture

NRC relinquished control of the architecture decisions because of a lack of sufficient internal controls. These important decisions were made by the contractor, despite NRC having an MD requiring continual evaluation of enterprise architecture. As noted previously in this section, MD 2.8 establishes a framework to ensure efficient and effective governance of information technology/information management investments, including enterprise architecture. Despite this requirement, architecture decisions were left entirely to the contractor. Specifically, there is no OCIO policy requiring NRC subject matter experts to re-evaluate the storage system architecture, to determine whether it meets NRC needs. Without a specific OCIO requirement, the decisions are left entirely to the contractor.

Why This Is Important

NRC Unaware of Associated Risks

If NRC does not continually re-evaluate the adequacy of its storage system architecture, the agency will not be aware of the risks associated with the equipment the contractor selects. The storage configuration that failed on November 16, 2016, was RAID 5.⁷ OCIO subject matter experts

⁷ RAID (redundant array of independent disks) provides a way of storing the same data in different places. RAID arrays appear to an operating system as a single logical hard disk. NRC's Compellent Storage Array had three different RAID levels in its configuration located on different tiers of storage. The RAID levels configured in the Compellent Storage Array were RAID 5, RAID 6, and RAID 10. RAID 5 is based on block-level striping with parity and contains only a single disk. For RAID 6, a second parity scheme is

have stated that issues with RAID 5 were generally known across industry. However, the manufacturer best practices indicated that this was optimum for speed and performance. Therefore, had the subject matter experts been involved early on, NRC could have discussed with DSFG options to mitigate the known issues or other architecture options. OCIO has been developing a governance process to manage the transition from the ITISS contract to GLINDA acquisition. The GLINDA Blanket Purchase Agreements (BPAs) have one COR at the BPA level, with a separate COR assigned to manage each call under a BPA. This structure will increase the interaction between NRC staff and the contractors. During the transition from the ITISS contract to the GLINDA acquisition, NRC will be purchasing equipment from DSFG. OCIO has received an inventory list from the contractor and the GLINDA CORs will have to validate the equipment and become familiar with the IT architecture.

Recommendations

OIG recommends that the Executive Director for Operations

2. Develop and implement an internal OCIO policy that requires NRC subject matter experts to re-evaluate the storage system architecture.

included that is striped across two disks. There are several sets of mirrored drives striped across a single disk with RAID 10.

IV. MANAGEMENT ISSUE

ITISS Contract Issues

OIG identified multiple issues with how the ITISS contract was written and overseen. These issues are related to the number and relative weight of SLRs included in the contract, and the lack of associated penalties. (As noted in the background section of this report, SLRs are agreements between a service provider and the end user that defines the level of service expected from the service provider.) Specifically,

- There are more than 100 SLRs and only 1 COR monitoring the contractor's performance. It is unreasonable to expect that one person can appropriately and effectively monitor this number of SLRs and contractor performance requirements.
- Each SLR has equal importance regardless of the significance of that function. For example, the performance pass rate for file and print is weighed the same as network availability or Internet availability.
- The ITISS contract SLRs do not have an appropriate penalty for an extended interruption to key services. The network interruption resulted in NRC staff not being able to work for more than an entire day at the headquarters buildings. It cost NRC an estimated \$941,739 to grant employees administrative leave for that time. Under the ITISS contract, NRC cannot seek reimbursement for that money.

Lessons Learned Moving to GLINDA

NRC has learned from the ITISS contract experience. In the GLINDA acquisition, there will be a COR at the BPA level with CORs assigned to manage the BPA calls. This approach will allow more hands on monitoring and minimize failure, as long as the agency provides adequate guidance and support to those involved in managing the contract. The GLINDA acquisition will have standardized templates and appropriate breakdown of work for the CORs. Each COR at that BPA level will be delegated authority by the CO. However, none of this has been formalized into an overall contract governance plan. Additionally, NRC will

also have an integrator who will be responsible for helping with the transition to the GLINDA acquisition, implementing the SLRs, and with processes and procedures. Given that the GLINDA acquisition will have multiple vendors, multiple CORs, and an integrator, it is imperative that NRC develop and implement a GLINDA acquisition governance plan.

Recommendations

OIG recommends that the Executive Director for Operations

3. Develop and implement GLINDA Service Level Requirement(s) that specify required service availability and performance requirements, from an end user's perspective, for email access and network file access (e.g., P:, G:, R:, S: drives).
4. Develop and implement a GLINDA contract governance plan.

V. CONSOLIDATED LIST OF RECOMMENDATIONS

OIG recommends that the Executive Director for Operations

1. Update Acquisition Management Division Acquisition Instruction #2010-06, *Contract File – Modification Log*, to specify requirements for file documentation that should be included when modifying contract terms.
2. Develop and implement an internal OCIO policy that requires NRC subject matter experts to re-evaluate the storage system architecture.
3. Develop and implement GLINDA Service Level Requirement(s) that specify required service availability and performance requirements, from an end user's perspective, for email access and network file access (e.g., P:, G:, R:, S: drives).
4. Develop and implement a GLINDA contract governance plan.

VI. AGENCY COMMENTS

An exit conference was held with the agency on July 10, 2017. Prior to this meeting, after reviewing a discussion draft, agency management provided comments that have been incorporated into this report, as appropriate. As a result, agency management stated their general agreement with the findings and recommendations and opted not to provide formal comments for inclusion in this report.

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

The objective was to evaluate the NRC network storage service interruption that occurred on November 16, 2016, and identify opportunities for improvement and solutions moving forward.

Scope

The evaluation focused on reviewing the events leading up to the network interruption that occurred on November 16, 2016, and the subsequent actions taken by the program office. The evaluation also assessed contract management for the current IT contract, the Information Technology and Infrastructure Support Services (ITISS) contract, and the succeeding contract, the Global Infrastructure Development and Acquisition (GLINDA) acquisition.

The evaluation was conducted at NRC headquarters from January 2017 to May 2017. Internal controls related to the evaluation's objective were reviewed and analyzed. Throughout the evaluation, auditors considered the possibility of fraud, waste, and abuse in the program.

Methodology

OIG reviewed relevant Federal criteria for this evaluation, including the Government Accountability Office's *Standards for Internal Control in the Federal Government*.

OIG reviewed internal documents, including

- NRC Management Directive and Handbook 2.8, *Integrated IT/IM Governance Framework*.
- NRC Management Directive and Handbook 11.1, *NRC Acquisition of Supplies and Services*.

- NRC's *Guidance and Procedures for Federal Acquisition Certification Requirements for Contracting Professionals*.
- NRC's *Guidance: Warrant Limitations*
- NRC's *Acquisition Instruction #2012-01: Review Thresholds for Contract/Order Documents*
- NRC's *Acquisition Instruction #2010-06: Contract File – Modification Log*
- NRC's *Capital Planning and Investment Control Policy*.

OIG reviewed DSFG *Incident Report and In-Depth Problem Analysis* and *Root Cause Analysis* report. OIG also reviewed ITISS contract documents, including the Statement of Work and incorporated Service Level Requirements, contract modifications, and DSFG invoices for a 6 month period (September 2016 – February 2017); and internal GLINDA acquisitioning documents, including the Blanket Purchase Agreement Statement of Work, transition and governance documents, and the DSFG inventory list for purchase. Additionally, OIG reviewed the *ITISS Market Research Report*, developed by Ernst & Young.

OIG conducted interviews of NRC staff and management to gain an understanding of the roles and responsibilities of staff to resolve the network interruption, management and modifications of the ITISS contract, and the governance process of the GLINDA acquisition. Auditors interviewed staff from OCIO, ADM, and the Office of the General Counsel. OIG also interviewed the ITISS contractor, DSFG.

We conducted this evaluation in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*.

The evaluation was conducted by Beth Serepca, Team Leader; Kristen Lipuma, Audit Manager; Ebaide Esoimeme, Auditor; and Janelle Wiggs, Auditor.

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COMMENTS AND SUGGESTIONS

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