OFFICE OF INSPECTOR GENERAL

U.S. Department of Energy

INSPECTION REPORT

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September 2018

MANAGEMENT OF CALIBRATION ACTIVITIES AT THE KANSAS CITY NATIONAL SECURITY CAMPUS

Department of Energy
Washington, DC 20585

September 12, 2018

MEMORANDUM FOR THE MANAGER, KANSAS CITY FIELD OFFICE

FROM: Debra K. Solmonson
Deputy Assistant Inspector General
for Audits and Inspections
Office of Inspector General

SUBJECT: INFORMATION: Inspection Report on "Management of Calibration Activities at the Kansas City National Security Campus"

BACKGROUND

One of the primary missions of the National Nuclear Security Administration (NNSA) is to ensure the safety, reliability, and performance of the Nation's nuclear weapons stockpile. NNSA's Kansas City National Security Campus (KCNSC) management and operating contractor is responsible for manufacturing and procuring nonnuclear stockpile components, including electronic, mechanical, and engineered material components. To verify the safety and reliability of these components, NNSA facilities are required to establish, document, and maintain a calibration program that will provide accurate and repeatable data that are traceable to national standards. Department of Energy Order 414.1D, *Quality Assurance*, requires that equipment used for inspections, tests, monitoring, or data collection shall be calibrated and that calibration processes should use established acceptance and performance criteria. Documentation used at KCNSC includes an equipment history file for each calibrated item, frequency of calibration, maintenance, out-of-tolerance reports, and calibration data. Given the Department's commitment to certify that nuclear weapons meet designated military operational specifications, we initiated this inspection to determine if KCNSC is effectively managing its calibration program.

RESULTS OF INSPECTION

Our review of calibration procedures at KCNSC did not find any significant issues with the management of the calibration program. In particular, we found that KCNSC had a process for calibrating Measuring and Test Equipment and observed several calibration activities where KCNSC appeared to follow the process to ensure Measuring and Test Equipment was calibrated, as necessary. Although we found that the program was effectively managed overall, we identified two opportunities for management's consideration where the program could be enhanced. Specifically, the Solumina manufacturing tracking database's ability to process the input of large quantities of calibration tool data is limited; and KCNSC's written *Calibration*

Procedure DC171 for multimeters does not contain specific instructions regarding the actions calibration technicians should take when data outside of established parameters occurs (i.e., reset requirements). To help enhance KCNSC's calibration program, we provided two suggestions that we believe could potentially decrease the risk of non-conforming products being accepted.

Database Processing Capacity

KCNSC officials told us that the Solumina manufacturing tracking database's ability to process the input of large quantities of calibration tool data is limited. According to KCNSC personnel, over 10,000 tool measurements are taken each day. This is significant because KCNSC management and operating contractor testing revealed that the Solumina manufacturing tracking database slows significantly and becomes unusable when large amounts of data are entered. Due to Solumina's processing capacity issue, KCNSC personnel told us that not all calibrated Measuring and Test Equipment used during the manufacturing of a product are entered into the Solumina manufacturing tracking database. Rather, a risked-based process is used to identify which tools are required to be entered into the database. For example, we were told by a senior KCNSC Technical Manager for Quality Engineering that the hand calibration tools identified in the *Inspections Measuring and Test Equipment Traceability Hand Tools* document are not entered into the Solumina manufacturing tracking database because the risk of going out-of-tolerance for these tools is low.

In addition, we noted that the Solumina manufacturing tracking database can conduct a reverse trace of Measuring and Test Equipment with a database search. However, because not all Measuring and Test Equipment are entered into the Solumina manufacturing tracking database, some reverse traceability[1] checks are not easily performed. In fact, several KCNSC calibration technicians and engineers told us that if Measuring and Test Equipment is not entered in the Solumina manufacturing tracking database, then a reverse trace would include assembling a team of engineers and technicians who would have to review other systems of record and documentation. In theory, this approach would likely take more effort than conducting a database search, which would be possible if all of the relevant information was contained in the Solumina manufacturing tracking database.

Accordingly, we believe KCNSC's calibration program would be enhanced by increasing the processing capacity of the Solumina manufacturing tracking database. In particular, increased processing capacity could allow the input of all Measuring and Test Equipment calibration data and potentially streamline the process of conducting reverse traces.

Calibration Reset Procedures

KCNSC's written *Calibration Procedure DC171* for multimeters does not contain specific instructions regarding the actions calibration technicians should take when data outside of established parameters occurs (i.e., reset requirements). Although the written policy could be improved, based on our observation of the actual work performed by the technician, no other

[1] When a calibration operation has been conducted, the organization must be able to identify both the equipment used to calibrate and the calibrated equipment itself. This traceability is required in the event that the equipment used for calibrating is found to be out-of-tolerance and may require recalibration.

questionable actions appeared to occur. NNSA Policy Letter NAP-24A, Section 3.9.1, *Inspection and Test*, Subpart B, states: "Inspection and test requirements and results shall be documented." However, during our review, we observed one instance when a KCNSC calibration technician deleted calibration data that indicated a multimeter was out-of-tolerance. Specifically, we observed a number of steps during the multimeter calibration process that produced data that were outside established limits, and the item had to be retested. After recalibration, the results of the multimeter calibration were found to be within established parameters, and the item test was considered satisfactory. During the recalibrations, the technician adjusted the computer program so that only the data within established parameters were recorded and the data outside certain parameters were not recorded. We were told that results were outside of the parameters because the off-the-shelf computer program that was conducting the test was running too fast for the multimeter to reset – not due to the item being out-of-tolerance. Although the calibration was repeated and the item found to be within tolerance, we determined that *Calibration Procedure DC171* did not provide adequate detail documenting the calibration process. In particular, we were unable to identify specific guidance regarding the actions calibration technicians should take when data outside of established parameters occurs (i.e., reset requirements). We were told by a KCNSC official that the technician who conducted the procedure had received adequate training to appropriately respond to the reset time issue with the off-the-shelf calibration program.

We recognize that KCNSC's calibration technicians receive training; however, to enhance KCNSC's calibration program, we believe that the calibration procedures should be revised to provide specific documented guidance regarding the actions that should be taken when data outside of established parameters occurs. For example, the guidance could include the time periods required to reset the computer program, instructions that allow the technician to not record the results outside of the established parameters, or instructions regarding how many times a multimeter calibration procedure step can be reset before being identified as out-of-tolerance.

SUGGESTED ACTIONS

To address the opportunities to enhance KCNSC's calibration program identified in this report, we suggest the Manager, Kansas City Field Office:

1. Evaluate if the Solumina manufacturing tracking database can be updated to increase its processing capacity to allow acceptance of all calibration data for Measuring and Test Equipment and to streamline the reverse trace process.

2. Consider revising *Calibration Procedure DC171* to provide specific guidance regarding the actions to be taken when data outside of established parameters occurs (i.e., reset requirements).

Attachments

cc: Deputy Secretary
Chief of Staff

OBJECTIVE, SCOPE, AND METHODOLOGY

OBJECTIVE

We conducted this inspection to determine if the National Nuclear Security Administration's Kansas City National Security Campus is effectively managing its calibration program.

SCOPE

Our review focused on Kansas City National Security Campus calibration procedures, processes, and training. We conducted fieldwork at the National Nuclear Security Administration in Germantown, Maryland, and the Kansas City National Security Campus in Kansas City, Missouri, between June 2017 and September 2018. The inspection was conducted under Office of Inspector General project number S17IS011.

METHODOLOGY

To accomplish the inspection objective, we:

- Reviewed relevant Federal laws and regulations, Department of Energy policies and procedures, site-specific calibration procedures, as well as prior reports issued by the Office of Inspector General;

- Interviewed Department, National Nuclear Security Administration, and contractor officials;

- Evaluated and confirmed Kansas City National Security Campus calibration equipment and manufacturing databases; and

- Observed calibration activities and reviewed inventory data.

We conducted this performance inspection in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*. Those standards require that we plan and perform the inspection to obtain sufficient, appropriate evidence to provide a reasonable basis for our conclusions and observations based on our inspection objective. We believe the evidence obtained provides a reasonable basis for our conclusions and observations based on our inspection objective. Accordingly, the inspection included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the inspection objective. In particular, we assessed implementation of the *Government Performance and Results Modernization Act of 2010* and found that although no specific performance measure for calibration at the Kansas City National Security Campus could be located, performance measures, in general, were applicable. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our inspection. Finally, we relied on computer-processed data, to some extent, to satisfy

our objective related to the overall management of the calibration program. We confirmed the validity of such data, when appropriate, by reviewing source documents and conducting physical observations.

An exit conference was waived by the National Nuclear Security Administration on August 30, 2018.

PRIOR REPORTS

- Audit Report on *Subcritical Experiment Activities at the Nevada National Security Site* (OAS-L-15-08, June 26, 2015) was conducted at the National Nuclear Security Administration's Nevada National Security Site to determine whether the Department of Energy had effectively managed subcritical experiment activities performed at the Nevada National Security Site's U1a Complex. The report's findings pertaining to calibration determined that machine shop calibration deficiencies affecting the quality of machined parts contributed to delays in completion of experimental projects. Although no recommendations were provided, the report did suggest that project management tools should be consistently applied when planning and executing subcritical experiments.

- Audit Report on *Department of Energy Quality Assurance: Design Control for the Waste Treatment and Immobilization Plant at the Hanford Site* (DOE/IG-0894, September 30, 2013) was conducted to determine if Bechtel National, Inc., the contractor for the Department of Energy's Waste Treatment and Immobilization Plant, was missing design control documentation for the Waste Treatment and Immobilization Plant, and as such, could not demonstrate that equipment was appropriately manufactured. The findings of the report pertaining to calibration determined that supplier calibration records were not received to verify the repair of a known deviation. Department management concurred with the recommendation that Bechtel National, Inc. ensure suppliers provide documentation to support that equipment repairs have been implemented and tested to confirm that they meet safety requirements. This occurred because the Department's oversight of Bechtel National, Inc.'s quality assurance program lacked focus, and Bechtel National, Inc. had also not effectively implemented its own quality assurance procedures.

- Inspection Report on *Implementation of Nuclear Weapons Quality Assurance Requirements at Los Alamos National Laboratory* (INS-L-11-02, July 8, 2011) was conducted to determine if Department of Energy/National Nuclear Security Administration Weapon Quality Policy requirements were being appropriately applied within the National Nuclear Security Administration's Los Alamos National Laboratory nuclear weapons programs. The finding of this report pertaining to calibration determined that untimely calibration of measurement equipment was part of the recurring deficiencies of the quality management system. Although no recommendations were included, the report did suggest that the Manager, Los Alamos Site Office, and the Quality Assurance Manager, Los Alamos Site Office, continue to fully implement quality assurance throughout the Los Alamos National Laboratory and ensure that Los Alamos addresses recurring deficiencies consistent with the requirements of Department of Energy/National Nuclear Security Administration Weapon Quality Policy.

FEEDBACK

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