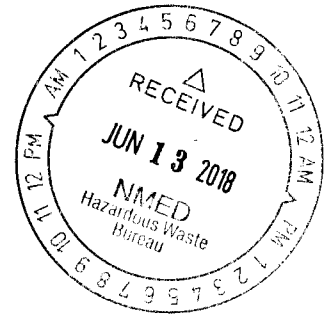




Department of Energy
 Carlsbad Field Office
 P. O. Box 3090
 Carlsbad, New Mexico 88221
JUN 13 2018

ENTERED



Ms. Mary McDaniel, Manager
 Quality and Contractor Assurance
 Nuclear Waste Partnership LLC
 P.O. Box 2078
 Carlsbad, NM 88221-2078

Subject: Carlsbad Field Office Report for Audit A-18-07, Nuclear Waste Partnership LLC
 Equipment Calibration Programs

Dear Ms. McDaniel:

The Carlsbad Field Office (CBFO) performed Audit A-18-07 of the Nuclear Waste Partnership LLC (NWP) Equipment Calibration Programs, April 3 – 5, 2018. The audit team concluded that the NWP Equipment Calibration Programs continue to adequately address the upper-tier requirements of the CBFO *Quality Assurance Program Document*, and implementing procedures evaluated were satisfactorily implemented and effective.

As described in the enclosed report, the audit team identified three concerns resulting in three Corrective Action Reports.

If you have any questions concerning the audit report, please contact me at (575) 234-7483.

Sincerely,

Martin Navarrete, Acting Director
 CBFO, Office of Quality Assurance

Enclosure

cc: w/enclosure

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U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

AUDIT REPORT

OF

NUCLEAR WASTE PARTNERSHIP LLC
CALIBRATION PROGRAM

AUDIT NUMBER A-18-07

April 3 – 5, 2018

CARLSBAD, NEW MEXICO



Prepared by:

Priscilla Yanez
Priscilla Yanez, CTAC
Audit Team Leader

Date:

6-13-18

Approved by:

Martin Navarrete
Martin Navarrete, Acting Director
CBFO Office of Quality Assurance

Date:

6-13-18

1.0 EXECUTIVE SUMMARY

Carlsbad Field Office (CBFO) Audit A-18-07 was conducted to evaluate the adequacy, implementation and effectiveness of Nuclear Waste Partnership LLC (NWP) quality assurance (QA) and technical activities for compliance with NQA-1-1989 Criterion 12, Control of Measuring and Test Equipment (M&TE), including NQA-1 Supplement 12S-1. The audit was conducted at the Waste Isolation Pilot Plant (WIPP) and the Skeen-Whitlock Building in Carlsbad, New Mexico, April 3–5, 2018. The audit team identified three conditions adverse to quality (CAQs) resulting in the areas of Environmental Monitoring, Maintenance, and Radiological Control. There were no isolated deficiencies requiring only remedial action to correct during the audit (CDA), no observations, and no recommendations offered for management's consideration. Corrective Action Reports (CARs), CDAs, Observations, and Recommendations are described in Section 6.0.

The activities were evaluated with respect to the calibration requirements defined in DOE/CBFO-94-1012, Revision 13, *Quality Assurance Program Document* (CBFO QAPD), and WP 13-1, Revision 38, *NWP Quality Assurance Program Description* (NWP QAPD).

The audit team concluded that, overall, the NWP Calibration Program continues to adequately address applicable upper-tier requirements and remains satisfactorily implemented and effective.

2.0 SCOPE

The scope of this audit included evaluation of NWP Calibration activities at the WIPP site for equipment used and/or installed for waste handling, radiation monitoring, environmental monitoring, and plant maintenance. Calibration of equipment used by the NWP Central Characterization Program (CCP) is performed separate from the WIPP site M&TE program and is evaluated at the Skeen-Whitlock Building. Evaluation of NWP/CCP calibration procedures for adequacy was based on the CBFO QAPD.

WP 10-WC.03, Revision 1, *NWP Equipment Calibration Program*, identifies six types of calibrated equipment that are covered by this program:

- Measurement and Test Equipment (M&TE)
- Monitoring and Data Collection (M&DC)
- Plant Installed Equipment
- Portable Radiation Monitoring Equipment
- Specialty Equipment
- NWP/CCP Waste Characterization Equipment

The following areas were evaluated individually to cover the calibration program:

- Radiological Control (RADCON)

- Environmental Monitoring
- Maintenance
- NWP Site Metrology (M&TE and M&DC)
- NWP/CCP Metrology

3.0 AUDIT TEAM

The audit team consisted of the following personnel:

Martin Navarrete	Quality Assurance Representative, Office of Quality Assurance, CBFO
Marty Fineran	Office of Quality Assurance, CBFO
Priscilla Yanez	Audit Team Leader, CBFO Technical Assistance Contractor (CTAC)
Paul Gomez	Auditor, CTAC
Bobby Hunt	Auditor, CTAC
Harley Kirschenmann	Auditor, CTAC
Joe Lopez	Auditor, CTAC
Dustin Stegman	Auditor, CTAC
Jack Walsh	Auditor, CTAC
Stephen Shafer	Technical Specialist in Training, CTAC

4.0 AUDIT PARTICIPANTS

Individuals contacted during the audit are identified in Attachment I. A pre-audit conference was held in the Support Building small conference room at the WIPP site and in conference room T-224 at the Skeen-Whitlock Building in Carlsbad, New Mexico, on April 3, 2018. The audit was concluded with a post-audit conference that was held in the Support Building small conference room at the WIPP site and in conference room T-224 at the Skeen-Whitlock Building in Carlsbad, New Mexico, on April 5, 2018.

5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Adequacy, Implementation, and Effectiveness

The following sections identify each of the calibration program elements evaluated during the audit. For each element, the audit team evaluated the associated implementing procedures to verify the adequate flow-down of upper-tier requirements, conducted interviews with responsible personnel, and reviewed randomly selected records to determine the effectiveness of NWP Calibration Program implementation.

NWP implementing procedures included in the audit are identified in Attachment II. Attachment III provides the Summary of the Audit Results. Details of the audit are contained in the following sections.

The audit team examined the results of the previous CBFO audit of the NWP Calibration Program (A-17-15), wherein three conditions adverse to quality (CAQs),

were identified. The three CAQs resulted in the initiation of CARs 17-021, 17-022, and 17-023. CAR 17-021 identified equipment not labeled to indicate the calibration status; CAR 17-022 related to calibration stickers not being placed in the Waste Handling Calibration Logbooks; CAR 17-023 related to a calibration certificate showing the calibration was performed at a different address than what was identified in the Qualified Supplier List.

During the performance of this audit, the audit team verified sustained corrective actions and observed instances similar to the CAQ resulting in CAR 17-022 from audit A-17-15. The observance of the similar CAQ during this audit resulted in the issuance of CAR 18-026. (See section 6.1, CAR 18-026.) All other corrective actions addressed the issues and were adequate in precluding recurrence.

5.2 Calibration Program Audit Details

5.2.1 RADCON Calibration Program

The audit team reviewed upper-tier program and radiation control (RADCON) working procedures (WP) for calibration processes prior to the audit in order to develop a checklist to use as a guide in assessing the compliance of the RADCON program with calibration requirements.

The audit team specifically reviewed:

- WP 13-1, Revision 38, *NWP QAPD*
- WP 10-WC.03, Revision 1, *NWP Equipment Calibration Program*
- WP 10-WC3010, Revision 30-FR2, *Periodic Maintenance Administration and Controlled Document Processing*
- WP 10-WC3011, Revision 39-F1, *Work Control Process*
- WP 12-5, Revision 21, *WIPP Radiation Safety Manual*
- WP 12-RC.01, Revision 11, *Quality Assurance Program Plan for Sampling Emissions of Radionuclides to the Ambient Air at the WIPP*
- WP 10-AD3029, Revision 13, *Calibration and Control of Monitoring and Data Collection Equipment*
- WP 10-AD3030, Revision 4, *Calibration Label Application and Control*
- WP 10-AD3031, Revision 4, *M&TE/M&DC Inspections*
- IC041072, Revision 10 IB, *Effluent Monitoring Skids A-1, A-2, A-3, and B2 Flow Instrumentation Calibration*
- IC041097, Revision 4, *Effluent Monitoring Station C FAS Flow Annual Calibration*
- WP 13-QA3012, Revision 23, *Supplier Evaluation/Qualification*

The audit team verified approximately 90 percent of the RADCON instrumentation that was used during the audit period. Approximately 180 instruments were available for selection and review. Two dosimeters were chosen, one iCAM and one Tennelec, in the Computerized History and Maintenance Planning System (CHAMPS) to verify

tracking: Bladewerx CAM 240-RI-000-1673, Canberra Centurm 411-RIC-007-153. Selection of instruments included Alpha Century continuous air monitors (CAMs), Bladewerx Alpha CAMs, Ludlum exposure rate and contamination survey meters used in waste handling operations, Canberra iSOLO's Alpha-Beta counters, Tennelec 5 Alpha-Beta counter units, fixed air sampler (FAS) units, Flow Boxes, portable air sampler (PAS), and electronic personal dosimeters.

The audit team commenced verification of RADCON equipment in the Contact-Handled (CH) Bay at the WIPP site and then proceeded to the Remote-Handled (RH) Bay. From there, equipment was examined in the TRUPACT Maintenance Facility where a large number of instruments were being tagged out-of-commission (OOC). The audit team then proceeded to the Instrument Room where the instruments were segregated. The team also verified instruments in Room 103, the Instrumentation & Control (I&C) Rad Instrument Shop, Station B, Station A, Station C, and the main I&C Shop areas.

The audit team verified that several instruments were tagged OOC. All instruments were appropriately tagged, including 11 iCAMs, 16 outdoor air samplers, and 8 PASs that were wrapped and tagged, were segregated as OOC in the Large Box Bay area. The Radiation Control Specialist accessed a Job Box cabinet for instruments that are OOC for smaller hand-held detectors, all items were appropriately tagged OOC.

The audit team reviewed several work packages from the CHAMPS against the site procedures and found that they adequately documented the calibration activities in accordance with site procedures.

<u>Work Order</u>	<u>Instrument</u>	<u>Serial #</u>
1743251	Tennelec 5XLB	240-RI-000-1027
1746006	Tennelec 5XLB	240-RI-000-1027
1746320	Tennelec 5XLB	240-RI-000-1027
1803208	Tennelec 5XLB	240-RI-000-1027
1630345	DMC 2000X Dosimeters	240-RI-000-1506
1626310	DMC 2000X Dosimeters	240-RI-000-1550

An issue was identified during the course of the verification of dosimeter instrument calibration. A total of 59 dosimeters were sent to the approved supplier (Ludlum) for calibration. Half of the dosimeters were returned not calibrated. This was due to the supplier not receiving the dosimeters unlocked prior to receipt. The audit team followed up on the approval process for the dosimeter calibration and interviewed the cognizant engineer. The interview led the team to the review of two procedures, WP 12-HP1320, Revision 1-FR1, *Operation of the DMC 2000X Electronic Dosimeter*, Section 1.2, and WP 12-HP2001, Revision 10-FR1, *Abnormal Radiological Conditions*, section 1.1. The work orders are controlled by Work Control. Upon discussion with the I&C Manager, the control was the responsibility of Metrology for shipments offsite. The procedures conflict with the process to calibrate the dosimeters per WP 10-AD3029, Revision 13, *Calibration and Control of Monitoring and Data Collection Equipment*, Section 3.0, Performance. Therefore, a concern was written resulting in CBFO CAR 18-028. (See section 6.1, CAR 18-028.)

The audit team investigated CBFO Field Representatives' and NWP's concerns for iSOLO units in the CH Bay. One concern was that the units were not set up to communicate to a computerized system to allow back-up records to be generated. Also, the system's software drivers are outdated and should be upgraded to increase the instruments' sensitivity, which could decrease the sample counting times. Three of four iSOLOs were tagged out for not meeting response check, power supply issues, and the other for memory issues. The team verified this concern was identified in NWP Issues Management Processing System WIPP Form 18-156, generated March 19, 2018. The team also investigated CBFO Issue Collection and Evaluation (ICE) Issue 920 and WIPP Form 18-165, generated March 21, 2018, for the iSOLO firmware and the potential for result differences between the units and for baseline drift. The team interviewed the Radiation Control Specialist during the tour of the CH bay and mentioned that the units should be upgraded for firmware by a Canberra field representative. No issues were cited due to the self-identification of the iSOLO unit upgrades.

The audit team verified the calibrated ranges for iCAM instrument detectability, as provided by the cognizant engineer. The iCAM quote included a description of the flow rate range, pressure drop, leakage rate, alpha, and beta detection efficiencies. The item was adequate to meet the expected performance basis as described in procedure WP 10-WC.03, Revision 1, *NWP Equipment Calibration Program*.

The audit team verified the equipment calibration room for RADCON instruments. The inventory included 5 Ludlum instruments on shelves labeled "Ready for Use," 16 Ludlum instruments on two shelves labeled "Not Operations Checked but Ready for Use," 2 Sabre Alert air sampling instruments and 2 iSOLO units from Canberra were found "Ready for Use." To calibrate and response check the small instruments, the audit team verified the radioisotope source log and sources used to calibrate equipment including 239-Pu, 90-Sr, 230-Th, 99-Tc, 137-Cs, and 241-Am. All sources were verified to have been National Institute of Standards and Technology (NIST) traceable, tracked in the RADCON database tracking system, and found to be secured.

The audit team verified the graded approach to ordering RADCON equipment which requires that the request from the Management Level Determinations include vendor calibrations and certificates of calibration. The calibration is being accomplished using national recognized processes including American National Standards Institute (ANSI) N323 or equivalent, and NIST traceable radiation standards or equivalent.

The audit team visited the air monitoring stations in WIPP Building 365 (Station B), Building 364 (Station A), and above the Waste Handling Building (Station C). The maintenance procedures utilized for the air monitoring are IC041097, Revision 4, *Effluent Monitoring Station C FAS Flow Annual Calibration*, and IC041072, Revision 10 IB, *Effluent Monitoring Skids A-1, A-2, A-3 and B2 Flow Instrumentation Calibration*.

- Station B's FAS equipment included 365-CAM-018-001 calibrated 3-29-18 and daily checked at 0806, as well as Ludlum 2360/43-93, 240-RI-000-1297,

calibrated 8-16-2017, daily logged as 4-4-2018; and Flow Box calibrated 2-14-2018.

- Station A's FAS equipment included 364-IP-022-003 calibrated 11-29-2017; 364-IP-022-001 calibrated 6/30/16, tagged OOC (tag # 17-FO-031 dated 7/19/17); and 364-IP-022-002 calibrated 3-20-2018.
- Station C's FAS equipment included 411-IP-008-001 calibrated 12-21-2017; the automatic back-up system was running due to maintenance being performed to change out a pump motor (tagged out 3-25-2018).

The audit team concluded that, overall, the requirements for RADCON Calibration were adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.2.2 Environmental Monitoring Calibration Program

The audit team conducted interviews with responsible personnel and reviewed the following implementation procedures relative to environmental sampling to determine the degree to which the procedures adequately address upper-tier requirements:

- WP12-RC.01, Revision 11, *Quality Assurance Program Plan for Sampling Emissions of Radionuclides to the Ambient Air at the WIPP*
- IC041074, Revision 7, *Calibration of MOD and LOW DP Transmitters 41-B-812, 41-B-813, 41-B-814, 41-B-815, 41-B-834, 41-B-861, 41-B-863, and 41-B-979*
- IC041087, Revision 0 TRN 2, *Calibration of Suction Flow Transmitters for 41-B-956 and 41-B-957*
- IC041072, Revision 10 IB, *Effluent Monitoring Skids A-1, A-2, A-3, and B2 Flow Instrumentation Calibration*
- IC041096, Revision 6 TRN 1, *Calibration of Station C Mass Flow*
- IC041097, Revision 4, *Effluent Monitoring Station C FAS Flow Annual Calibration*
- IC041098, Revision 6, *U/G Exhaust Mass Flow Measurement System Calibration for Fans 700A, 700B and 700C*
- IC413000, Revision 7 TRN1A, *Station B Mass Flow Measurement System Loop 41A001W2001*
- IC413005, Revision 0 TRN1, *Calibration of Flow Indicating Transmitters for U/G Exhaust Fans*

Results of the review indicate that the procedures adequately address upper-tier requirements.

The audit team evaluated equipment used for monitoring plant emissions and maintaining the plant air flow systems. The engineered items and systems are defined in WP 12-RC.01, Revision 11, *Quality Assurance Program Plan for Sampling Emission of Radionuclides to the Ambient Air at the WIPP*. Components evaluated are included in the following procedures using FAS units that continuously monitor radionuclide emissions, as well as the flow control systems used to monitor the ventilation and filtration systems at the WIPP site:

- IC041072, Revision 10 IB, *Effluent Monitoring Skids A-1, A-2, A-3, and B2 Flow Instrumentation Calibration*
- IC041074, Revision 7, *Calibration of MOD and LOW DP Transmitters 41-B-812, 41-B-813, 41-B-814, 41-B-815, 41-B-834, 41-B-861, 41-B-863, and 41-B-979*
- IC041096, Revision 6 TRN 1, *Calibration of Station C Mass Flow*
- IC041097, Revision 4, *Effluent Monitoring Station C FAS Flow Annual Calibration*
- IC413000, Revision 7 TRN1A, *Station B Mass Flow Measurement System Loop 41A001W2001*

The audit team conducted interviews with responsible personnel and reviewed the procedures used for calibration of the WIPP emissions monitoring equipment. The team examined equipment and verified the presence of calibration stickers noting calibration dates and due dates for recalibration. The CHAMPS is utilized to control the actual calibration of the emission monitoring systems equipment. Calibration activities are conducted utilizing Preventative Maintenance (PM) work orders. The work orders include the use of the Continuous Use calibration procedures that include IC041072; IC041074; IC041096; IC041097, and IC413000. These procedures utilize attachments that document the calibration activities and, when completed, become the Record of Calibration.

The audit team verified that PM personnel performing in-plant calibration activities obtain calibrated instruments from the M&TE Control Area, verify calibration of the instruments, and record the serial numbers of the M&TE used.

The CHAMPS system is also used to schedule and track the recalibration of plant-installed equipment at the appropriate calibration interval.

During the audit, the auditor identified a concern while reviewing the CH Waste Handling Calibration Logbook. There was no objective evidence of a current calibration sticker for Loop 41F05926A and Loop 41F06323 in the CH Waste Handling Calibration Logbook. (See Section 6.1, CAR 18-026.)

The audit team concluded that, with the exception of the concern identified above, the Environmental Monitoring Calibration Program activities were adequately defined, satisfactory in the implementation, and effective in achieving the desired results.

5.2.3 Maintenance Calibration Program

The audit team conducted interviews with responsible personnel and reviewed the following implementing procedures to determine the degree to which the procedures address upper-tier requirements:

- WP 10-WC.03, Revision 1, *NWP Equipment Calibration Program*
- WP 10-AD.01, Revision 10, *Metrology Program*
- WP 10-AD3015, Revision 8, *Tool Crib Administration*

- WP 10-AD3028, Revision 17, *Calibration and Control of Measurement and Test Equipment*
- WP 10-AD3029, Revision 13, *Calibration and Control of Monitoring and Data Collection Equipment*
- WP 10-AD3030, Revision 4, *Calibration Label Application and Control*
- WP 10-AD3031, Revision 4, *M&TE/M&DC Inspections*
- WP 10-WC.03, Revision 1, *NWP Equipment Calibration Program*
- DC025000, Revision 9 TRN 2, *Backup Diesel Generator 25P-E-503 and 25P-E-504 Instrumentation Calibration*
- DC025018, Revision 8T5, *Fire Pump Mercoid Pressure Switch Calibration (LCO)*
- IC041013, Revision 7 ID, *Hot Cell, RH Filter DP LOOP, AHUS 41-B-877A, 41-B-877B and 41-B-877C HEPA and MOD Filters, and RH Area AHU 41-B-807, LOW Filter DP Loop Annual Calibration*
- IC041059, Revision 2 TRN 1, *Calibration Of CR10 Data Loggers*
- IC041064, Revision 4, *Air Dryers and Receivers 41-K-001, 41-K-002, 41-K-015, 41-K-016, 41-D-109 Pressure Indicator Calibration*
- IC472000, Revision 5 TRN 5, *472-MMP-007-001 Meteorological Instrumentation Calibration*
- PM384000, Revision 4 TRN 1, *Salt Hoist Air Compressor Temperature and Pressure Switch Calibration*
- IC041095, Revision 7 TRN1, *Annual Diesel Fire Pump 45-G-602 Temperature and Oil Pressure Gauge Calibration*

The review of the procedures indicated that upper-tier requirements are adequately addressed.

Twelve completed work orders involving calibrations were reviewed. Eleven of these work orders were completed correctly and within the required calibration period. One of the work orders reviewed, WO# 1734189, was completed 9 months after the required recalibration date. This condition resulted in issuance of a CAR. (See Section 6.1, CAR 18-027.)

The audit team entered the underground (UG) to review the calibration status of radiological equipment used in the Radiological Boundary Area. A total of 23 radiological instruments were reviewed and all were within the required annual calibration dates. The audit team observed NWP personnel performing required daily calibrations of these instruments. All instruments were calibrated properly and were readied for use.

The audit team also conducted an examination of calibrated M&TE stored in the UG tool crib. All M&TE stored in the UG was found to be within required calibration dates with the exception of one digital multi-meter, which was segregated and controlled by tool crib personnel until it could be taken above ground to be recalibrated. All M&TE in the UG was segregated from non-calibrated tools in a locked storage cabinet.

The audit team examined a sample of training documentation for personnel conducting maintenance on calibrated equipment and all required training had been completed and

was current during the time the maintenance activities were being conducted.

The audit team determined that the Maintenance Calibration Program activities evaluated were adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.2.4 NWP Site Metrology Program

The audit team evaluated the implementation of the NWP Site Metrology Program [control of M&TE and M&DC equipment] in accordance with the CBFO QAPD and WP 10-AD.01, Revision 10, *Metrology Program*. It was determined that the requirements of these documents are adequately documented in the following NWP implementing procedures:

- WP 10-WC.03, Revision 1, *NWP Equipment Calibration Program*
- WP 10-AD3028, Revision 17, *Calibration and Control of M&TE*
- WP 10-AD3029, Revision 13, *Calibration and Control of Monitoring and Data Collection Equipment*
- WP 10-AD3030, Revision 4, *Calibration Label Application and Control*
- WP 10-AD3031, Revision 4, *M&TE/M&DC Inspections*

All M&TE and M&DC equipment under calibration control is identified in a FileMaker Pro database managed by the Metrology Laboratory. From this database separate M&TE and M&DC equipment lists can be generated. The lists are customizable to contain data from the FileMaker Pro database. The lists identify the item number, description, manufacturer, model, and serial number. Approximately 429 M&TE items and 168 M&DC items were identified on the lists. Several M&TE and M&DC item certificates of calibration were reviewed to verify that calibrations are traceable to NIST, international, or intrinsic standards in accordance with ANSI/NCSL Z540.

The audit team examined numerous M&TE and M&DC items in the Metrology Laboratory, Industrial Hygiene Laboratory, and the Environmental Building 918B. All calibration labels were verified to be correctly applied, legible, and not damaged.

The current Metrology Office Checkout After Hours Log was reviewed and found acceptable. It identified that items AD1397, Digital Multi Meter, and AD1482, Battery Load Tester, were checked out by a Field Supervisor on 3/29/18, which is in accordance with the implementing procedure.

Usage Reports are identified for each piece of M&TE and M&DC equipment. The M&TE Status Report, developed from the FileMaker Pro database, identifies M&TE usage. The report identifies the instrument ID number, system, equipment number, package number, dates used, and the name of the user. The report can be customized to add or delete information reported.

The Geotechnical Engineering Equipment Checkout List is hard copy and identifies the M&DC equipment ID number, description of the item, operator/user, calibration date,

and checked-in date. Other owners of M&DC record equipment use on a typical Excel spreadsheet. The Environmental organization's spreadsheet identifies instrument description and ID, model and serial numbers, date in service, calibration date and due date, calibration frequency, and status. Safety/Industrial Hygiene records usage on a hard copy datasheet. This document identifies the equipment and ID, description of use, date of use, and name of the user.

Databases are available for each M&TE item in the master database maintained by the Metrology Office. Owners of Industrial Hygiene and Environmental Sampling maintain calibration history on separate computer databases backed up by a server. Geotechnical Engineering maintains usage history on a hard copy and recorded data from the procedure used.

The audit team verified that the Metrology Office has a FileMaker Pro master database of M&TE equipment containing the required characteristics of: calibration and calibration expiration dates, recall frequency, M&TE ID number, item description, manufacturer, and model and serial numbers. It was verified that the Metrology Office for M&TE and the Owners for M&DC equipment maintain a calibration history database to support adjustments of recall frequency, decisions on retirement of equipment, or need for additional equipment.

The Metrology Office has developed a calibration history database available from the FileMaker Pro database. Safety/Industrial Hygiene uses an equipment check-out log in addition to recording usage of sound dosimeters on the Hearing Conservation Program datasheet. Also, heat stress monitors, indoor air quality monitors, acoustic calibrators, and dust meter calibration status is maintained in an Excel database.

The Metrology Office provides the Owner and Cognizant Manager with the out-of-tolerance (OOT) vendor data on the Out-Of-Tolerance Notification form EA10AD3029-1-0 when this condition is determined. A Commitment Tracking System (CTS) item is established by the Metrology Office for a period of 10 working days against the Owner, notifies the Instrumentation and Control Manager, and sends a copy of the OOT notice to the QA Manager. Upon receipt of the OOT notification from the Metrology Office, the Owner researches the usage databases to determine the equipment and/or systems that might be affected by the OOT M&DC equipment since the last calibration. The Owner/User's response on the OOT Notification form refers to this information when preparing the corrective action to be taken when needed. Justification for no corrective action is stated when applicable.

The M&DC Environmental equipment Owner and the VOC [volatile organic compounds] Program Manager were notified on 4/28/16 of an OOT condition for item ZE0159 as identified by the calibrating service provider. Disposition by the VOC Program Manager was to take the item out of service.

An OOT Notification for PV1304, Backflow Preventer Tester, was issued to Site Systems Engineering Cognizant Engineer (CE) and Cognizant Manager (CM) on 3/5/18. Response was provided to recalibrate the equipment that the Backflow Preventer Tester was used on.

All responses to the OOT conditions were deemed technically acceptable to support the disposition. Responses were received by the Metrology Office in a timely manner. The audit team verified by review of the Metrology files that the final M&TE OOT Notification forms identified above is filed in the vertical 1-hour fire-rated cabinet in the Metrology Laboratory in Building B459, and that the equipment history in the master database was updated.

The site CTS automatically provides a notification each day to the responsible party within the 5 days prior to the due date for action closure. This has been very effective to assure timely disposition of the OOT notification. In addition, the Metrology Office personnel are aware of due dates as well, and monitor the status of completion.

The audit team verified that the Metrology Office issues a list of M&TE and M&DC equipment due for calibration each month, and that it is issued commensurate with the first working day of the month. The recall lists for 4/2/18 for M&TE and M&DC (5 separate reports), and for 2/28/18 for M&TE and M&DC (4 separate reports) were reviewed. The M&DC recall reports are issued to the contacts responsible for the M&DC equipment. The M&TE Recall Report identifies item ID number, description, manufacturer, model and serial number, recall date and vendor. The M&DC reports identify item number, manufacturer, model and serial number, due date, owner and vendor.

It was verified that M&TE and M&DC equipment is properly labeled and stored in such a manner that the equipment will not be subjected to extremes outside the manufacturer's recommendations.

M&TE items are stored in the Metrology Office. Items are stored on shelving which is well identified for items ready for issue or requiring calibration. Shelving is well separated to preclude items requiring recalibration to be issued. All items to be issued are identified with calibration labels identifying the calibration status. The Metrology Office is environmentally controlled to meet the characteristics of this checklist item. M&TE and M&DC items were observed in the Metrology Office controlled access area. The shelves on which such items are placed are identified by a sign stating "CAUTION – DO NOT USE OUT OF CALIBRATION." Calibration labels have been removed from the items in preparation for shipment to calibration vendors.

Further, a shelf identified as "CAUTION – DO NOT USE – EQUIPMENT TO BE EXCESSED" contained about 15 items. The calibration labels were removed from the items.

Environmental Engineering (Site Engineering) stores their items in Building 918B. Items that are stored in the building are generally free from extreme environmental characteristics. No items required tagging. Several items were reviewed for proper identification and calibration information.

M&DC Industrial Hygiene equipment items are stored in Building 451 in the Industrial Hygiene Laboratory. The storage room is located within a buffer area which prevents

any extremes of dust, heat, and fumes. Air conditioning allows for moderate temperature and humidity. Several items were reviewed for proper identification and calibration information.

M&TE records are stored in 1-hour fire-rated cabinets in the Metrology Office. The storage area is secure with access limited to the Metrology Office personnel. The M&TE 1-hour fire-rated cabinet is a 4-drawer vertical file cabinet.

The Industrial Hygiene M&DC records are stored in Building 451 (Safety Building) on the first floor. The records are in a locked 1-hour fire-rated, 4-drawer vertical cabinet until dispositioned according to the Records Inventory and Disposition Schedule (RIDS).

The Environmental Sampling records are stored in 1-hour fire-rated, 4-drawer cabinets on the second floor of Building 451 (Safety Building). The storage cabinets are locked.

Geotechnical Engineering records are stored in a 1-hour fire-rated, locked file cabinet in the file room of the Engineering Building.

During this current audit, the receipt inspection process, including use of qualified suppliers, was verified by review of receiving document packages for Davis anemometer, item QV1463, dated 3/22/18; sound dosimeter, item PI0023, dated 2/14/18; Tachometer, item RM1293, dated 2/14/18; and pressure calibrator, item PV1425, dated 2/14/18. No issues resulted from the review of the current receipt inspection process.

5.2.5 NWP/CCP Metrology Program

The audit team interviewed personnel and reviewed documentation to verify compliance of NWP/CCP to the requirements of CBFO QAPD section 2.4.6, Use and Control of M&TE, and section 2.4.7, Calibration. Personnel interviewed included the Packaging Maintenance Engineer, M&TE Custodian, Records Clerk, Logistics Manager, and a Records Analyst. The team verified the adequacy of CCP-QP-016, Revision 22, *CCP Control of Measuring and Testing Equipment*.

The following procedures were also found to have adequately implemented the CBFO QAPD requirements:

- CCP-QP-008, Revision 26, *CCP Records Management*
- WP 15-PM3525, Revision 12, *Preparation and Processing of Shipping Authorizations*
- WP 15-PC3044, Revision 10, *Quality Credit Card Purchases*

The following areas were verified to be compliant with procedural requirements: identification and labeling; establishment of recalibration intervals; use of an M&TE recall system; controls for managing out-of-tolerance M&TE; methods for extending recalibration due dates when necessary; and the content of M&TE certificates of

calibration. A review of the M&TE database on the Integrated Data Center (IDC) was performed and as well as a sample of original certificates of calibration which are in the CCP Records area. Also, a review of a selection of procurement records for the calibration of CCP M&TE was performed and the records were verified to be maintained in accordance with the NWP/CCP/General RIDS dated February 8, 2017.

The audit team also evaluated M&TE used for CCP Mobile Loading activities at the Los Alamos National Laboratory Airport Avenue facility. The team examined the following equipment and verified the presence of calibration stickers: Torque Wrench, Pressure Indicator, Helium Leak Standard, Load Cell/Cell Scale, and Omega Test Gauge, noting calibration dates and due dates for recalibration.

The audit team concluded that the requirements for NWP/CCP Metrology were adequately established for compliance with upper-tier requirements, satisfactory in the implementation of these requirements, and effective in achieving the desired results.

5.2.6 Software Quality Assurance

The audit team evaluated software with respect to NWP's Equipment Calibration Program. Multiple software applications were found to be referenced in the NWP implementing procedures for this audit. The audit team evaluated the software applications in accordance with the CBFO QAPD and the NWP QAPD.

Specifically, the audit team evaluated Software Quality Assurance (SQA) in accordance with section 6 of the CBFO QAPD and the NWP QAPD. A recent surveillance (S-17-35) had previously evaluated Revision 13 of the CBFO QAPD, specifically on SQA implementation by all WIPP program participants, and determined that NWP had incorporated the SQA requirements of the CBFO QAPD, Revision 13.

The audit team reviewed the following procedures that pertain to NWP's Equipment Calibration Program:

- WP 10-AD3029, Revision13, *Calibration and Control of Monitoring and Data Collection Equipment*
- WP 10-AD3015, Revision 8, *Tool Crib Administration*
- WP 10-AD.01, Revision10, *Metrology Program*
- WP 10-AD3007, Revision 8, *Use and Control of Rigging Components*
- WP 16-2, Revision16, *Software Screening and Control*

The audit team met with NWP's QA personnel to discuss the SQA process in general and review the above procedures to determine how the SQA process was being implemented from a SQA perspective, and how the CBFO QAPD, Section 6, Software Requirements, was being implemented. NWP QA personnel required that all WIPP software application/database go through a rescreening of WP 16-2, Revision 16, *Software Screening and Control*. The software rescreening will account for all NWP software to ensure that an inventory of software is maintained and controlled in accordance with the CBFO QAPD, Revision 13. NWP QA personnel stated that the

rescreening of all NWP software is an ongoing process and the inventory of NWP software is continuously being updated.

The audit team reviewed the current Controlled Software Log dated 10/19/17, which was satisfactorily implemented. Also, requested was a list of any other NWP software that is not controlled. NWP QA personnel stated that there was an Uncontrolled Software Log, but it had not been updated since last year.

The following databases associated with the NWP procedures listed were reviewed by the audit team:

- Qualified Suppliers List (QSL) application in procedure WP 13-QA3012, *Supplier Evaluation/Qualification*
- Master Database in WP-10-AD.01, *Metrology Program*
- M&DC Database in WP-10-AD3029, *Calibration of M&TE*
- M&TC Database in WP-10-AD3028, *Calibration & Control of Monitoring and Data Collection Equipment*
- CHAMPS Database in WP-10-WC.03, *NWP Equipment Calibration Program*

The audit team observed the use of FileMaker Pro software for the M&TE, M&DC, Rigging, and Toolcrib databases. As described in WP 16-IT 1004, *WIPP TARP for the Acquisition of IT Resources*, Revision 1, FileMaker Pro is not supported by Information Resource Management (IRM) personnel, yet may be allowed as a nonstandard database application in extreme circumstances. The audit team verified that the M&TE, M&DC, Rigging and Toolcrib databases have gone through the 16-2 re-screening. In discussions with IRM personnel, the audit team learned they are in the process of moving all known FileMaker Pro applications to a software platform that is supported by IRM.

Overall, the procedures reviewed and software applications evaluated during the audit provided evidence that the applicable requirements for SQA controls by NWP in accordance with the NWP's Equipment Calibration Program are adequately established for compliance with upper-tier requirements, satisfactorily implemented, and effective in achieving the desired results.

6.0 SUMMARY OF DEFICIENCIES

6.1 Corrective Action Reports (CARs)

During the audit, the audit team may identify conditions adverse to quality (CAQs) and document such conditions on corrective action reports (CARs). CAQs are defined as follows:

Condition Adverse to Quality (CAQ) – An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, nonconformances and technical inadequacies.

Significant Condition Adverse to Quality – A condition which, if uncorrected, could have a serious effect on safety, operability, waste confinement, transuranic waste site certification, regulatory compliance demonstration, or the effective implementation of the QA Program.

The following three CARs, initiated as a result of Audit A-18-07, have been transmitted to NWP under a separate cover. A brief description of each CAR is provided below.

CBFO CAR 18-026

There is no objective evidence of current calibration stickers for Loop 41F05926A and Loop 41F06323 in the CH Waste Handling Calibration Logbook after calibration of the equipment. (The calibration sticker cannot be applied directly to the equipment so it is applied in the logbook.)

WP 13-1, Revision 38, NWP QAPD – Section 2.5.1 # 5, states in part: "All calibrated monitoring, measuring, testing, and data collection equipment shall be labeled to indicate the calibration status, the date calibrated, the calibration due date or usage equivalent, and the identification of any limitations. (When it is impractical to apply a label directly to an item, the label may be affixed to the instrument container or some other suitable means may be used to reflect calibration status.)"

IC041074, Step 5.5A, requires a calibration sticker to be placed in the CH Waste Handling Calibration logbook after calibration of the equipment.

CBFO CAR 18-027

There was no objective evidence provided to support that the delinquent periodic maintenance (PM) requirements of 10-WC3010 were satisfied between July 2017 and February 2018 for work order 1734189 to complete the maintenance calibration required by DC025018, Revision 8T5, *Fire Pump Mercoird Pressure Switch Calibration*," which is an annual fire pump pressure switch calibration. The PM was completed 9 months after the original due date, and 5 months after the last review required by WP 10-WC3010.

WP 10-WC3010, Revision 30-FR1, *Periodic Maintenance Administration and Controlled Document Processing*, Section 3.9, Step 1, states in part: "3.9 PM Overdue/Delinquent Management Prepare a Delinquent PM Report (EA10WC3010-4-0) documenting the reason for nonperformance of the scheduled PM." Additionally, DC025018, Revision 8T5, *Fire Pump Mercoird Pressure Switch Calibration (LCO)*, Section 1.0, Purpose/Scope, states: "This Work Control Document (WCD) provides instructions for performing the ANNUAL Electric Fire Pump pressure switch calibrations in building 456."

CBFO CAR 18-028

After review of two procedures, WP 12-HP1320, Revision 1-FR1, *Operation of the DMX 2000X Electronic Dosimeter*, Section 1.2, and WP 12-HP2001, Revision 10-FR1,

Abnormal Radiological Conditions, Section 1.1, the audit team determined the work orders are controlled by Work Control. Upon discussion with the I&C Manager, the control is the responsibility of Metrology for shipments offsite. The procedures conflict with the process to calibrate the dosimeters per WP 10-AD3029, Revision 13, *Calibration and Control of Monitoring and Data Collection Equipment*, Section 3.0, Performance.

If dosimeters are not working or are out of calibration, there is no action beyond WP 12-HP2001, Revision 10-FR1, Section 1.1, "STOP WORK" to remedy the situation, such as writing an "Action Request."

WP 13-1, Revision 38, *NWP QAPD*, Section 2.1.2, IMPLEMENTING PROCEDURES, states: "Individuals performing work will comply with implementing procedures; however, when work can NOT be accomplished as described in the implementing procedure or accomplishment of such work would result in an undesirable situation, condition adverse to quality, or an unacceptable safety risk, the work shall be suspended and the procedures changed in accordance with the approved procedure change process." WP 12-HP2001, Revision 10-FR1, *Abnormal Radiological Conditions*, Section 1.0, "OUT-OF CALIBRATION OPERABILITY-CHECK INSTRUMENT DISCOVERED IN USE"

6.2 Deficiencies Corrected During the Audit (CDAs)

Corrected During the Audit (CDA) – Isolated deficiencies that do not require a root cause determination or actions to preclude recurrence, and where correction of the deficiency can be verified prior to the end of the audit. Examples include one or two minor changes required to correct a procedure (isolated), one or two forms not signed or dated (isolated), and one or two individuals who have not completed a reading assignment.

During the audit, the audit team may identify CAQs. The audit team members and the Audit Team Leader (ATL) evaluate the CAQs to determine if they are significant. Once a determination is made that the CAQ is not significant, the audit team member, in conjunction with the ATL, determines if the CAQ is isolated requiring only remedial action and, therefore, can be corrected during the audit. Deficiencies that can be classified as CDA are those isolated deficiencies that do not require a root cause determination or actions to preclude recurrence, and those for which correction of the deficiency can be verified prior to the end of the audit.

Upon determination that the CAQ is isolated, the audit team member, in conjunction with the ATL, evaluates/verifies any objective evidence/actions submitted or taken by the audited organization and determines if the condition was corrected in an acceptable manner. Once it has been determined that the CAQ has been corrected, the ATL categorizes the condition as a CDA.

No CDAs were identified or corrected during the audit.

7.0 SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS

During the audit, the audit team may identify conditions that warrant input by the audit team to the audited organization regarding potential problems or suggestions for program improvement. The audit team members, in conjunction with the ATL, evaluate these conditions and classify them as observations or recommendations (using the following definitions). Once a determination is made, the audit team members, in conjunction with the ATL, categorize the conditions appropriately.

Observation – A condition that is determined not to be a violation of procedure or requirement at the time but, if not controlled or addressed, may result in a CAQ during future activities.

Recommendation – A suggestion that is directed toward identifying opportunities for improvement and enhancing methods of implementing requirements.

7.1 Observations

No Observations were identified during the course of this audit.

7.2 Recommendations

No Recommendations were offered for management consideration during the course of this audit.

8.0 LIST OF ATTACHMENTS

Attachment I: Personnel Contacted During the Audit
Attachment II: NWP Implementing Procedures Evaluated
Attachment III: Summary Table of Audit Results

PERSONNEL CONTACTED DURING THE AUDIT				
NAME	ORGANIZATION/ DEPARTMENT	PRE- AUDIT MEETING	CONTACTED DURING AUDIT	POST- AUDIT MEETING
Ballew, Veronica	NWP/QA Programs/Supplier Quality Manager	X	X	X
Boatwright, Wesley	RES/EM&H VOC Program Manager		X	
Boyea, Amy	NWP/QA Admin.		X	X
Brewer, Danny	Metrology Lab/Engineering Technician		X	
Burns, Scott	NWP/Packaging Engineer			X
Carter, Mitch	LANL/Logistics Manager MLU		X	
Farmer, Alberta	TFE/Records Clerk		X	
Fisher, Jerry	NWP Packaging Maintenance Engineer	X	X	
Hunter, Frank	I&C/FWS	X	X	
Jimenez, Hector	NWP/Engineer		X	
Jimenez, Richard	RES/EM&H Environmental Specialist		X	
Kesterson, Tom	Safety IH Engineer		X	
Lewis, Ed	Geo Technical Engineering		X	
Martinez, Porf	CTAC/Deputy Manager		X	
Mason, Randy	WC/Manager	X	X	X
McBride, Don	NWP/Engineering		X	
McDaniel, Mary	NWP/Q&CA Manager	X		
Miller, Carla	NWP/QA Sr. Quality Analyst		X	
Mills, Charles	RCD&E Manager		X	X
Pace, Berry	NWP/Records/Issues Management		X	X
Ramirez, Mike	NWP/CCP	X		
Rodriguez, Patty	NWP/Work Control Lead		X	
Saiz, Sheri	QA Staff Admin.	X	X	X
Sanchez, J.R.	Metrology Lab/Engineering Technician		X	
Satterfield, Jim	NWP/RADCON Supervisor	X	X	
Scheel, Happy	NWP/M&TE Custodian	X	X	X
Sellmer, Todd	NWP/Manager, Packaging	X		
Wentworth, Diane	NWP/Readiness Assurance	X		

PERSONNEL CONTACTED DURING THE AUDIT				
NAME	ORGANIZATION/ DEPARTMENT	PRE- AUDIT MEETING	CONTACTED DURING AUDIT	POST- AUDIT MEETING
Yturralde, Jewell	TFE/Records Analyst		X	X

Implementing Procedures Evaluated During A-18-07			
Number	Doc. Number	Rev.	Document Title
1.	10-AD.01	10	Metrology Program
2.	10-AD3007	8	Use and Control of Rigging Components
3.	10-AD3015	8	Tool Crib Administration
4.	10-AD3028	17	Calibration and Control of Measurement and Test Equipment
5.	10-AD3029	13	Calibration and Control of Monitoring and Data Collection Equipment
6.	10-AD3030	4	Calibration Label Application and Control
7.	10-AD3031	4	M&TE/M&DC Inspections
8.	10-WC.03	1	NWP Equipment Calibration Program
9.	10-WC3010	30-FR2	Periodic Maintenance Administration and Controlled Document Processing
10.	10-WC3011	39-F1	Work Control Process
11.	12-5	21	Waste Isolation Pilot Plant Radiation Safety Manual
12.	12-HP1320	1-FR1	Operation of the DMX 2000X Electronic Dosimeter
13.	12-HP2001	10-FR1	Abnormal Radiological Conditions
14.	12-RC.01	11	Quality Assurance Program Plan for Sampling Emissions of Radionuclides to the Ambient Air at the Waste Isolation Pilot Plant
15.	13-1	38	NWP Quality Assurance Program Description
16.	13-QA3012	23	Supplier Evaluation/Qualification
17.	15-PC3044	10	Quality Credit Card Purchases
18.	15-PM3525	12	Preparation and Processing of Shipping Authorizations
19.	16-2	16	Software Screening and Control
20.	CCP-QP-008	26	CCP Records Management
21.	CCP-QP-016	22	CCP Control of Measuring and Testing Equipment
22.	DC025000	9 TRN2	Backup Diesel Generator 25P-E-503 and 25P-E-504 Instrumentation Calibration
23.	DC025018	8T5	Fire Pump Mercoid Pressure Switch Calibration (LCO)
24.	IC041013	7 ID	Hot Cell, RH Filter DP LOOP, AHUS 41-B-877A, 41-B-877B and 41-B-877C HEPA and MOD Filters, and RH Area AHU 41-B-807, LOW Filter DP LOOP annual Calibration

Implementing Procedures Evaluated During A-18-07			
Number	Doc. Number	Rev.	Document Title
25.	IC041059	2 TRN 1	Calibration of CR10 Data Loggers
26.	IC041064	4	Air Dryers and Receivers 41-K-001, 41-K-002, 41-K-015, 41-K-016, 41-D-109 Pressure Indicator Calibration
27.	IC041072	10 1B	Effluent Monitoring Skids A-1, A-2, A-3, and B2 Flow Instrumentation Calibration
28.	IC041074	7	Calibration of MOD and LOW DP Transmitters 41-B-812, 41-B-813, 41-B-814, 41-B-815, 41-B-834, 41-B-861, 41-B-863, and 41-B-979
29.	IC041087	0 TRN 2	Calibration of Suction Flow Transmitters for 41-B-956 and 41-B-957
30.	IC041095	7 TRN 1	Annual Diesel Fire Pump 45-G-602 Temperature and Oil Pressure Gauge Calibration
31.	IC041096	6 TRN 1	Calibration of Station C Mass Flow
32.	IC041097	4	Effluent Monitoring Station C FAS Flow Annual Calibration
33.	IC041098	6	U/G Exhaust Mass Flow Measurement System Calibration for Fans 700A, 700B and 700C
34.	IC413000	7 TRN 1A	Station B Mass Flow Measurement System Loop 41A001W2001
35.	IC413005	0 TRN 1	Calibration of Flow Indicating Transmitters for U/G Exhaust Fan
36.	IC472000	5 TRN 5	472-MMP-007-001 Meteorological Instrumentation Calibration
37.	PM384000	4 TRN1	Salt Hoist Air Compressor Temperature and Pressure Switch Calibration

Summary Table of Audit Results

Audit Elements	Concern Classification				QA Evaluation		
	CARs	CDAs	Obs	Rec	Adequacy	Implementation	Effectiveness
RADCON	1				A	S	E
Environmental	1				A	S	E
Maintenance	1				A	S	E
NWP M&TE					A	S	E
NWP/CCP M&TE					A	S	E
TOTALS	3				A	S	E

Definitions

A = Adequate
 I = Indeterminate
 NA = Not Adequate
 S = Satisfactory

E = Effective
 M = Marginal
 NE = Not Effective

CAR = Corrective Action Report
 CDA = Corrected During Audit
 Obs = Observation
 Rec = Recommendation