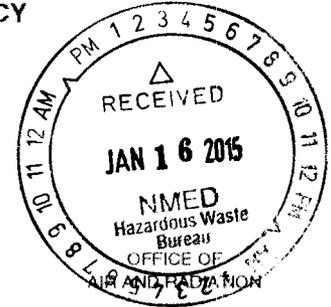


ENTERED



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460



JAN 15 2015

Mike Brown
Quality Assurance Manager
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, NM 88221-3090

Dear Mr. Brown:

The U.S. Environmental Protection Agency conducted a quality assurance (QA) audit of the Sandia National Laboratory-Carlsbad Office (SNL-CO), Waste Isolation Pilot Plant (WIPP) quality assurance (QA) program. EPA conducted this audit remotely from May 1–29, 2014, and onsite at SNL-CO from July 22–24, 2014. The purpose of the audit was to verify implementation of SNL-CO's QA program relative to the requirements of American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA) Standard NQA-1-1989, "Quality Assurance Program Requirements for Nuclear Facilities," as required by Title 40 of the Code of Federal Regulations (40 CFR) 194.22. SNL-CO, a Department of Energy (DOE) facility, is responsible for evaluating the long-term performance of the WIPP repository.

During this audit, the EPA audit team reviewed documents and records provided by SNL-CO and interviewed SNL-CO personnel in Carlsbad, New Mexico. EPA QA auditors evaluated the SNL-CO WIPP QA program against the NQA-1-1989 elements listed below to ensure compliance with EPA regulations:

- Element 1, "Organization."
- Element 2, "Quality Assurance Program."
- Element 4, "Procurement Document Control."
- Element 5, "Instruction, Procedures and Drawings."
- Element 6, "Document Control."
- Element 7, "Control of Purchased Items and Services."
- Element 8, "Identification and Control of Items."
- Element 9, "Control of Processes."
- Element 10, "Inspection."
- Element 11, "Test Control."
- Element 12, "Control of Measuring and Test Equipment."
- Element 13, "Handling, Storage, and Shipping."
- Element 14, "Inspection, Test, and Operating Status."
- Element 15, "Control of Nonconforming Items."



- Element 16, "Corrective Action."
- Element 17, "QA Records."

Based on this audit, the EPA audit team determined that the SNL-CO WIPP QA program complies with these NQA-1-1989 elements and continues to have sufficient independence, authority and resources to verify the quality of items and activities that are important to long-term isolation of transuranic (TRU) waste. The enclosed report (EPA Docket No. A-98-49: II-A1-115; EPA-HQ-OAR-2001-0012-0444) details EPA's evaluation.

EPA did not identify any nonconformances in SNL-CO's QA program relative to the requirements of ASME NQA-1-1989. The enclosed report supports our determination.

If you have any questions regarding this QA audit report, please contact Lindsey Bender at (202) 343-9479 or bender.lindsey@epa.gov.

Sincerely,



Tom Peake
Director

Center for Waste Management and Regulations

Enclosure

cc: Electronic Distribution
Alton Harris, DOE HQ
Joe Franco, CBFO
Dennis Miehl, CBFO QA
Martin Navarrete, CBFO QA
Raymond Lee, EPA HQ
Nick Stone, EPA Region 6
Trais Kliphuis, NMED
Ricardo Maestas, NMED
Site Documents

DOCKET NO: A-98-49; II-A1-115
EPA AIR E-DOCKET NO: EPA-HQ-OAR-2001-0012-0444

**EPA AUDIT OF THE SANDIA NATIONAL LABORATORY-CARLSBAD OFFICE
QUALITY ASSURANCE PROGRAM**

MAY 1–29, 2014
JULY 22–24, 2014

**U. S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
CENTER FOR WASTE MANAGEMENT AND REGULATIONS
WASHINGTON, DC 20460**

JANUARY 2015

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ACRONYMS

ASME	American Society of Mechanical Engineers
B	boron
Ca	calcium
CAR	Corrective Action Report
CBFO	Carlsbad Field Office
CFR	Code of Federal Regulations
Cs	cesium
CTAC	Carlsbad Field Office Technical Assistance Contractor
DOE	U.S. Department of Energy
EDTA	ethylenediaminetetraacetic acid
EPA	U.S. Environmental Protection Agency
EPA/DC	Environmental Protection Agency Docket Center
Fe	iron
FY	fiscal year
ICP-AES	inductively coupled plasma atomic emission spectroscopy
ICP-MS	inductively coupled plasma mass spectrometry
LANL-CO	Los Alamos National Laboratory-Carlsbad Office
Mn	manganese
Na	sodium
NQA	nuclear quality assurance
NWP	Nuclear Waste Partnership, LLC
PA	Performance Assessment
PPM	parts per million
QA	quality assurance
QAPD	Quality Assurance Program Document
S/N	serial number
SNL-CO	Sandia National Laboratory-Carlsbad Office
TRU	transuranic
WIPP	Waste Isolation Pilot Plant

WJC West

William Jefferson Clinton West

1.0 EXECUTIVE SUMMARY

This report presents results of the U.S. Environmental Protection Agency (EPA) audit of the Sandia National Laboratory-Carlsbad Office (SNL-CO), Waste Isolation Pilot Plant (WIPP) quality assurance (QA) program. EPA conducted this audit remotely from May 1–29, 2014, and onsite at SNL-CO from July 22–24, 2014. The purpose of the audit was to verify implementation of SNL-CO’s QA program relative to the requirements of American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA) Standard NQA-1-1989,¹ “Quality Assurance Program Requirements for Nuclear Facilities.” SNL-CO, a Department of Energy (DOE) facility, is responsible for evaluating the long-term performance of the WIPP repository.

During this audit, the EPA audit team reviewed documents and records provided by SNL-CO and interviewed SNL-CO personnel in Carlsbad, New Mexico. EPA QA auditors evaluated the SNL-CO WIPP QA program against selected NQA-1-1989 elements to ensure compliance with EPA regulations at Title 40 of the Code of Federal Regulations (40 CFR) 194.22.

Based on this audit, the EPA audit team determined that the SNL-CO WIPP QA program complies with the NQA-1-1989 elements selected for this audit and continues to have sufficient independence, authority and resources to verify the quality of items and activities that are important to long-term isolation of transuranic (TRU) waste.

EPA did not identify any nonconformances in SNL-CO’s QA program relative to the requirements of ASME NQA-1-1989. This report documents these audit activities.

This report documents these audit activities. This information will be provided through EPA’s Electronic Docket (via regulations.gov) at EPA-HQ-OAR-2001-0012-0444 and the official Air Docket, in accordance with 40 CFR 194.22 (a)(1). EPA’s Air Docket A-98-49 is located at the Air and Radiation Docket in the EPA Docket Center (EPA/DC), WJC West, Room 3334, 1301 Constitution Avenue, NW, Washington, DC, 20004.

2.0 BACKGROUND

2.1 Regulatory Background

In accordance with 40 CFR 194.22(a)(1), EPA requires DOE to implement a QA plan that establishes the following NQA standards developed by ASME:

1. ASME NQA-1-1989.
2. ASME NQA-2a-1990 Addenda, Part 2.7, to ASME NQA-2-1989.
3. ASME NQA-3-1989 (excluding section 2.1(b) and (c) and section 17.1).

The regulation at 40 CFR 194.22(a)(2) requires DOE to implement its QA plan for all items and activities that are important to the long-term isolation of TRU waste within the WIPP. The

¹ 40 CFR 194.22(a)(1) states that DOE’s QA program shall comply with the requirements of the 1989 version of the ASME NQA-1 standard.

regulation at 40 CFR 194.22(e) provides EPA with the authority to conduct audits to verify the proper establishment and implementation of QA programs for the WIPP.

2.2 Organizational Background

DOE's Carlsbad Field Office (CBFO) is responsible for management of the WIPP. This responsibility includes oversight of the characterization of TRU waste bound for the WIPP and emplacement of the waste at the disposal site near Carlsbad, New Mexico. As stated in the CBFO Quality Assurance Program Document (QAPD), "The mission of the CBFO is to protect human health and the environment by operating the WIPP for safe disposal of TRU waste and by establishing an effective system for management of TRU waste from generation to disposal."

SNL-CO operates as scientific advisor to DOE regarding the long-term performance of the WIPP repository. SNL-CO conducts the Performance Assessment (PA) on behalf of DOE to demonstrate that the WIPP meets EPA's release requirements for radionuclides. The PA is a risk-based assessment based on field and laboratory analyses, scientific models and software code developed and performed by SNL-CO. SNL-CO performs all activities supporting the WIPP under the CBFO QAPD.

3.0 PURPOSE AND SCOPE

The purpose of this EPA audit was to verify that the SNL-CO WIPP QA program properly implements all applicable elements of ASME NQA-1-1989. The scope of this EPA audit was limited to QA oversight of activities that are important to the long-term isolation of TRU waste as represented by documentation provided by SNL-CO.

4.0 DEFINITIONS

Finding: A determination that a requirement of the NQA standards has not been properly established or implemented. A finding requires a response.

Concern: A judgment that a finding may occur in the future and, depending on the magnitude of the issue, may or may not require a response.

Quality: The reliability of a specific item or activity that is important to the long-term isolation of TRU waste in the WIPP. "Quality achievement" is the responsibility of operational groups that directly produce such an item or perform such an activity. "Quality assurance/verification" is the responsibility of QA groups that do not produce such an item or perform such an activity.

5.0 EPA AUDIT LOGISTICS

5.1 Audit Schedule

On July 22–24, 2014, EPA conducted QA audits of four DOE programs working on the WIPP project in Carlsbad, New Mexico. For purposes of efficiency, EPA conducted the audits in two parallel tracks with one Lead QA Auditor responsible for each track. Track A included limited-

scope audits of the CBFO QA program (see Docket No. A-98-49; II-A1-117 or eDocket No. EPA-HQ-OAR-2001-0012-0446) and the Nuclear Waste Partnership (NWP) QA program (see Docket No. A-98-49; II-A1-118 or eDocket No. EPA-HQ-OAR-2001-0012-0447). Track B completed audits of the SNL-CO QA program (this report) and the Los Alamos National Laboratory-Carlsbad Office (LANL-CO) QA program (see Docket No. A-98-49; II-A1-116 or eDocket No. EPA-HQ-OAR-2001-0012-0445). EPA began the SNL-CO QA audit remotely in May 2014 and began the LANL-CO QA audit remotely in June 2014. The other members of the EPA audit team participated in all four audits. This report addresses only the results of EPA’s audit of the SNL-CO QA program; the docket numbers cited above provide results of the other three EPA QA audits.

5.2 Team Members

The Track B audit team consisted of one EPA employee and three support contractors. Table 1 lists all members of the EPA audit team, along with each person’s affiliation and function during this audit.

Table 1. EPA Quality Assurance Audit Team Members – Track B

Audit Team Member	Audit Responsibility	Affiliation
Lindsey Bender	EPA QA Audit Team Leader	EPA
Patrick Kelly	Lead QA Auditor	SC&A, Inc.
Kira Darlow	QA Auditor	SC&A, Inc.
Karl Lindblad	QA Auditor-in-Training	SC&A, Inc.

Prior to this audit, Lindsey Bender (EPA) evaluated the qualifications of the SC&A auditors listed in Table 1. Ms. Bender found that the SC&A auditors were qualified based on their:

- Working knowledge and understanding of the NQA standards.
- Training.
- On-the-job training.

In addition, Ms. Bender evaluated the qualifications of Mr. Kelly to be a Lead Auditor in oversight of DOE QA audits specific to NQA-1-1989 and found that he is qualified in this capacity based on his:

- Communication skills.
- Technical qualifications.
- Specific understanding of NQA.

Mr. Lindblad was an auditor-in-training during this audit; his qualifications as a QA auditor will be addressed in a subsequent EPA QA audit report.

EPA held one entrance meeting and one exit meeting that included personnel from all four audited organizations, identified in Table 2. Some of these personnel may have been interviewed during one of the other three audits; however, only the personnel interviewed as part of this SNL-CO QA audit are identified in Table 2.

Table 2. Personnel Participating in Audit Meetings

Name	Affiliation and Title/Position	Entrance Meeting	Interview	Exit Meeting
Angela Guerin	SNL-CO, Document Control		✓	
Berry Pace	CTAC, QA Programs Manager	✓		
Bill Allen	NWP, QA	✓		
Cindi Castillo	CTAC, QA Auditor/Observer	✓		✓
Dana C. Bryson	CBFO, Deputy Manager			✓
Denise Chacon	SNL-CO, Procurement		✓	
Dennis Miehls	CBFO, Senior QA Specialist	✓		✓
Fran Ito	NWP	✓		
Gene Safley	SNL-CO, QA Lead	✓	✓	
Grace Duran	SNL-CO, Records Lead		✓	✓
Jim McVay	NWP	✓		
Laurie Smith	LANL-CO, QA Manager	✓		✓
Martin Navarrete	CBFO, Senior QA Specialist	✓		✓
Michael R. Brown	CBFO, QA Director	✓		✓
Ned Z. Elkins	LANL-CO, Program Director	✓		
Paul Shoemaker	SNL-CO, Senior Manager			✓
Porf Martinez	CTAC, Regulatory Assurance Manager	✓		
Priscilla Y. Martinez	CTAC, QA Auditor/Observer	✓		✓
Regina Sides	CBFO, QAD			✓
Shelly R. Nielsen	SNL-CO, QA	✓	✓	✓
Steve Davis	SNL-CO, QA Assessment Task Lead	✓	✓	✓
Steve Kouba	RES, Manager EPA Compliance Program	✓		
Tammy Reynolds	NWP, Deputy Recovery Manager			✓
Val Cannon	NWP, QA	✓		✓
Venessa Rodriguez	SNL-CO, Records		✓	

6.0 PERFORMANCE OF THE AUDIT

The EPA audit team reviewed records provided by SNL-CO and interviewed SNL-CO personnel to evaluate implementation of the requirements in ASME NQA-1-1989. SNL-CO stated, and EPA concurred, that NQA-1-1989, Element 3, “Design Control” and Element 18, “Audits” are not applicable to work currently performed by SNL-CO.

The remaining 16 NQA-1-1989 elements listed below are applicable to work currently performed by SNL-CO and were therefore evaluated during this audit.

- Element 1, “Organization.”
- Element 2, “Quality Assurance Program.”
- Element 4, “Procurement Document Control.”
- Element 5, “Instruction, Procedures and Drawings.”
- Element 6, “Document Control.”
- Element 7, “Control of Purchased Items and Services.”

- Element 8, “Identification and Control of Items.”
- Element 9, “Control of Processes.”
- Element 10, “Inspection.”
- Element 11, “Test Control.”
- Element 12, “Control of Measuring and Test Equipment.”
- Element 13, “Handling, Storage, and Shipping.”
- Element 14, “Inspection, Test, and Operating Status.”
- Element 15, “Control of Nonconforming Items.”
- Element 16, “Corrective Action.”
- Element 17, “QA Records.”

The EPA audit team reviewed documents and records provided by SNL-CO and interviewed SNL-CO personnel to evaluate implementation of the requirements in ASME NQA-1-1989 for these elements, using NQA-1-1989 checklists. The checklists and this report will be available on line through the EPA Electronic Docket (via regulations.gov) at EPA-HQ-OAR-2001-0012-0444 and EPA’s Air Docket A-98-49, located at the Air and Radiation Docket in the EPA/DC WJC West, Room 3334, 1301 Constitution Ave., NW, Washington, DC, 20004. In addition to the 16 elements listed above as evaluated during EPA’s audit, EPA also reviewed SNL-CO procedure NP 18-1, Revision 9, Audits and Surveillances. However, SNL-CO is not currently performing any audits; therefore, the EPA audit team did not complete a checklist for Element 18.

The EPA audit team toured the SNL-CO laboratory facilities, which are located adjacent to the SNL-CO offices, and conducted a limited review of laboratory practices and records. EPA’s limited the laboratory evaluation to the extent necessary to complete the applicable NQA-1-1989 checklists. EPA did not evaluate the technical adequacy of the laboratory or the usability of the data produced by the laboratory.

As a result of these audit activities, EPA determined that the SNL-CO WIPP QA program complies with these NQA-1-1989 elements and has sufficient independence, authority and resources to verify the quality of items and activities that are important to long-term isolation of TRU waste.

7.0 FINDINGS AND CONCERNS

The EPA audit team did not identify any findings or concerns relative to the NQA-1-1989 elements discussed above.

8.0 CONCLUSIONS

The EPA audit team reviewed records and interviewed personnel to determine the compliance of the SNL-CO WIPP QA program with ASME NQA-1-1989. Based on the sample of records reviewed and interviews conducted during this audit, EPA determines that SNL-CO complies with the standard.

9.0 REFERENCES

Calibration Record for Troll Pressure Transducer Model 700, S/N: 148736, Calibration Procedure SP-12-32, Revision 1; Mensor S/N: 611334 – Calibration Due 6/14/2014; Temperature Probe S/N: 307172 - Calibration Due 3/31/2015; records dated May 12, 2014 and May 28, 2014

Collection of Nuclear Waste Management Procedures, Activity/Project Specific Procedures, Analysis Plans and Test Plans

Contract between Boise State University and Sandia National Laboratories for Geophysical Investigation of the Shallow Subsurface, Section I, 8/11/11, ERMS557603, and Section II, June 14, 2011

Contract between PerkinElmer Health Sciences, Inc. and Sandia National Laboratories for Nexlon 300D ICP-MS including S10Autosampler and Polyscience Recirculator, Section I, February 11, 2013, ERMS559544

Corrective Action Verification, CAR IS-13-08-CAR-01, ERMS561401

Description of Dual Storage Facilities, provided May 8, 2014

Document Review Package for AP-165, ERMS560703, ERMS560704, ERMS560705, ERMS560707 and ERMS561138

Document Review Package for AP-168, ERMS561954, ERMS561955, ERMS561956 and ERMS561957

Document Review Package for NP 17-1, ERMS559928 and ERMS559930

Document Review Package for NP 18-1, ERMS556852, ERMS556853 and ERMS561901

Document Review Package for NP 6-2, ERMS561678 and ERMS561680

Document Review Package for SP 12-19, ERMS554665, ERMS554666, ERMS554667, ERMS554669 and ERMS561483

Document Review Package for SP 12-32, ERMS561935, ERMS561936, ERMS561937 and ERMS561940

Document Review Package for TP 14-01, ERMS556855, ERMS561691, ERMS561692 and ERMS561693

Document Review Package for TP 14-03, ERMS561695, ERMS561896, ERMS561897 and ERMS561898

Documentation Package, CAR IS-13-08-CAR-01, ERMS561398

Documentation Package, CAR W-13-05, ERMS560433–ERMS560435

Documentation Package, CAR W-13-12, in-process provided May 8, 2014

Documentation Package, CAR W-14-05, in-process provided May 8, 2014

Documentation Package, CARs April 2013 to April 2014, April 15, 2014

Experimental Determination of Lead Solubility in the Carbonate Systems to High Ionic

Strengths: A Pitzer Model Description, ERMS561907

Field Check for a Solonist Brand Electric Sounder (1000 ft), Solonist Model 101 Water Level Meter, S/N: 202678, October 22, 2012, ERMS558471

Form 18-1-1, Auditor Qualifications for Angela Guerin, ERMS550905, S. Davis, ERMS528392, and M. Chavez, ERMS544910

Form 18-1-2, Lead Auditor Qualifications for S. Davis, ERMS528392, and M. Chavez, ERMS544910

Form 18-1-3, Maintenance of Lead Auditor for S. Davis, ERMS560667, and M. Chavez, ERMS560984

Form No. 4-1-1, Revision 11, Procurement Review, 1000 PPM Standards for Ca, Na, Mn, Fe, B, Cs, 1 PPM ICP-MS Standard for Cs from Government Scientific Source, January 14, 2014, ERMS561585

Form No. 4-1-1, Revision 11, Procurement Review, Service Contract with PerkinElmer for Nexlon 300D ICP-MS including S10Autosampler and Polyscience Recirculator, January 24, 2013, ERMS559543

Form No. 4-1-2, Revision 11, Procurement Review, Geophysical Investigation of the Shallow Subsurface by Boise State University, March 6, 2013, ERMS559674

Form No. 4-1-2, Revision 11, Receipt Inspection, 1000 PPM Standards for Ca, Na, Mn, Fe, B, Cs, 1 PPM ICP-MS Standard for Cs from Government Scientific Source, January 23, 2014, ERMS561586

Form No. 4-1-2, Revision 11, Receipt Inspection, Geophysical Investigation of the Shallow Subsurface by Boise State University, March 6, 2013, ERMS559674

Form NP 17-1-2, Records Submittal, Receipt Inspection Training for C. Camphouse, ERMS558195

Form NP 17-1-2, Records Submittal, Receipt Inspection Training for B. Malama, ERMS554701

Form NP 18-1-4, Limited Scope Surveillance Report of Control of Samples and Standards/Chain of Custody, IS 14-04, ERMS562299

Form NP 18-1-4, Limited Scope Surveillance Report of Core Sample Logging and Management, IS 13-01, ERMS558716

Form NP 2-1-1, Qualification and Training for C. Camphouse, ERMS548415, and B. Malama, ERMS557132

Form NP 2-1-2, Receipt Inspection Training Records for C. Camphouse, ERMS557696, and B. Malama, ERMS544536

ISO-9001 Certification, Procurement Package for Omega Engineering, Inc. Omega S-Beam Load Cell, Record-in-Progress, observed July 22, 2014

Limited Calibration Certificate, Document No: 56013_11596366, March 31, 2014, ERMS561916

Limited Calibration Certificate, Document No: 56013_11622752, April 2, 2013, ERMS599801

Memorandum evaluating M. Chavez, ERMS560985

Memorandum from Paul Shoemaker to WIPP Records Center, re: Approved Access List for SNL WIPP Records Center and SNL WIPP Proprietary and Privileged Records, January 28, 2013, ERMS559128

NP 1-1, Organization and QA Program, Revision 7, February 12, 2008

NP 12-1, Control of Measuring and Test Equipment, Revision 8, August 17, 2010

NP 13-1, Control of Samples and Standards, Revision 6, November 22, 2011, and Revision 7, November 10, 2014

NP 16-1, Corrective Action, Revision 6, June 19, 2007

NP 17-1, Records, Revision 9, April 17, 2013

NP 18-1, Audits and Surveillances, Revision 9, January 5, 2012

NP 20-1, Test Plans, Revision 5, September 17, 2008

NP 20-2, Scientific Notebooks, Revision 10, April 9, 2013

NP 2-1, Qualification and Training, Revision 9, September 29, 2006

NP 4-1, Procurement, Revision 11, October 30, 2012

NP 5-1, Implementing Procedures, Revision 6, April 3, 2013

NP 6-1, Document Review Process, Revision 8, October 13, 2009

NP 6-2, Document Control Process, Revision 5, February 18, 2014

NP 9-1, Analyses, Revision 9, December 18, 2012

QAPD, Quality Assurance Program Document, DOE/CBFO-94-1012, Revision 11, June 2010

Quality Levels for WIPP Activities - FY14 (Approved Suppliers List), downloaded April 24, 2014

Sandia National Laboratories Scientific Notebook, Balance Calibration Log Book Balance Calibration Records, Leslie Kirkes, June 13, 2013, Balance Nos. Mettler PM 4000, AT 4000 and Mettler Toledo AT 261

Sandia National Laboratories Scientific Notebook, ICP-AES Logbook-2, November 2006iii

SNL WIPP Program Description, November 4, 2011

SNL WIPP QA Surveillance IS-14-04, ERMS562299

SNL-CO Organizational Structure, April 23, 2013

SP 1-1, QA Grading, Revision 7, April 7, 2008

SP 12-32, Pressure Transducer Calibration Using the Mensor CPC 6000, Revision 1, April 8, 2014

SP 12-5, Depth-to-Water Measurement Using a Solonist Brand Electric Sounder, Revision 2, February 1, 2010

SP 13-1, Chain of Custody, Revision 5, April 12, 2012

SP 13-2, Core Sample Logging and Management, Revision 4, December 14, 2006

SP 17-1, Records Center Operations, Revision 8, January 28, 2010

SP 5-1, Engineering Drawings, Revision 2, January 21, 2008

TP 03-01, Test Plan for Testing of Wells at the WIPP Site, Revision 3, July 13, 2010

TP 08-02, Iron, Lead, Sulfide and EDTA Solubilities, Revision 0, March 25, 2008

Visual confirmation of markings to indicate calibration status: Weights S/N: 34855 and Thermometer CPC 6000, observed July 22, 2014

Visual Confirmation of Tag Out for FLUM E System Data Acquisition System, Tag No. 820, October 13, 2013, observed July 22, 2014

Well H-9bR Video Log, ERMS558348

WIPP Receipt Inspectors, April 8, 2014