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Department of Energy  
National Nuclear Security Administration  
Sandia Field Office  
P.O. Box 5400  
Albuquerque, NM 87185



NOV - 4 2016

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Mr. John E. Kieling  
Chief  
Hazardous Waste Bureau  
New Mexico Environment Department  
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Santa Fe, New Mexico 87505

NMED  
Hazardous Waste Bureau

Subject: Submittal of the Mixed Waste Landfill (MWL) Updated Reference Documents Cited in the MWL Long-Term Monitoring and Maintenance Plan for Sandia National Laboratories/New Mexico, Environmental Protection Agency Identification Number NM5890110518

Dear Mr. Kieling:

The Department of Energy/National Nuclear Security Administration and Sandia Corporation are submitting the enclosed updated reference documents to the New Mexico Environment Department. This submittal is required within 30 days of the effective date of the updated documents, which is October 17, 2016.

This submittal is comprised of four documents used by personnel to perform monitoring activities at the MWL. The updated reference documents are:

- AOP 95-16 Sample Management and Custody
- FOP 08-22 Soil Vapor Sampling
- PLA 05-09 Groundwater Monitoring Health and Safety Plan
- SMO-QAPP Quality Assurance Project Plan for the Sample Management Office

Revisions include updates to keep the reference documents current and to reflect ongoing modifications and improvements in industry practices.

If you have questions, please contact Karen Oden of our staff at (505) 845-5162.

Sincerely,

James W. Todd  
Assistant Manager for Engineering

Enclosure  
cc: See Page 2

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**Submittal of Updated Reference Documents Cited in the  
Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan**

**Sandia National Laboratories  
Albuquerque, New Mexico  
EPA ID No. NM5890110518**

**CERTIFICATION STATEMENT**

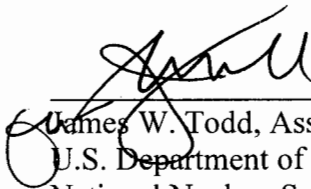
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.



\_\_\_\_\_  
Michael W. Hazen, Vice President  
Sandia Corporation  
Albuquerque, New Mexico  
Operator

31 Oct 2016

Date Signed



\_\_\_\_\_  
James W. Todd, Assistant Manager  
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National Nuclear Security Administration  
Sandia Field Office  
Owner

11/4/16

Date Signed

## **Enclosure A**

### **Updated Reference Documents Cited in the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan**

AOP 95-16 Sample Management and Custody  
FOP 08-22 Soil Vapor Sampling  
PLA 05-09 Groundwater Monitoring Health and Safety Plan  
SMO-QAPP Quality Assurance Project Plan for the Sample Management Office

October 2016

Sandia National Laboratories  
EPA ID No. NM5890110518

SANDIA NATIONAL LABORATORIES  
ANALYTICAL SERVICES DEPARTMENT (4131)

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**SAMPLE MANAGEMENT AND CUSTODY  
ADMINISTRATIVE OPERATING PROCEDURE**

**AOP 95-16  
Revision 06**

Author: Don Watenpaugh  
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SMO Packaging Coordinator

Date: August 2, 2016

Reviewer: Doug Perry  
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Date: October 3, 2016

Reviewer: Wendy Palencia  
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Date: October 5, 2016

Approved: Corey Robert White  
Corey Robert White  
SMO Operations Manager

Date: 10-5-16

Author: How frequently does this document need to be reviewed and/or revised?	Every 3 years, or when activities change.
Manager: Does this document need to be tracked?	Yes

EFFECTIVE DATE: 10/17/16

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## REVISION HISTORY

Revision	Effective Date	Summary of Changes
0	01/25/1995	New Document
1	04/08/1996	Administrative Updates
2	12/19/2003	Organization ownership change from Sandia ES&H to Environmental Restoration Project
3	03/28/2007	Changed revision cycle from 2 to 3 years. Organization ownership change from Sandia Environmental Restoration Project to Sandia ES&H Organization.
4	06/29/2011	Programmatic revisions include the addition of the Sample Management Analysis Request Tool (SMART) and the addition of Industrial Hygiene (IH) sampling. Other revisions are definition updates, sentence structure, grammar, and formatting. Additions include Revision History page, tracking box and footnote disclaimer
5	11/12/2013	Programmatic revisions include improvements to ARCOC processing, the addition of Bioassay sampling and changes to Industrial Hygiene (IH) sampling to include the use of the Radiological Process Knowledge Form (SF 6951-RRF). Chem101 and PKX050 were added to training requirements. The chemicals were removed from use in addition to removing the use of the fume hood. Added SMO QA Coordinator role. Other revisions include updating language to reflect current program elements and requirements.
6	10/17/2016	Removed SMO/SPF Building location. Deleted Attachment G for Holding Times and Preservation Techniques referred to Analytical Laboratory SMO-SOW. Removed SMO QA Coordinator role and added Compliance Requirement Management Staff role.

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## ACRONYMS AND ABBREVIATIONS

AOP	Administrative Operating Procedure
ARCOOC	Analysis Request and Chain-of-Custody
COC	Chain-of-Custody
CRM	Compliance Requirement Management
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
IATA	International Air Transport Association
IH	Industrial Hygiene
LOP	Laboratory Operating Procedure
PHS	Primary Hazard Screening
RMA	Radioactive Materials Area
RPDP	Radiation Protection Dosimetry Program
RPSD	Radiation Protection Sample Diagnostics
SARF	Sample Analysis Request Form
SMART	Sample Management Analytical Request Tool
SMO	Sample Management Office
SMO-QAPP	Sample Management Office Quality Assurance Project Plan
SNL/NM	Sandia National Laboratories/New Mexico
SOW	Statement of Work

## 1.0 PURPOSE, SCOPE, AND OWNERSHIP

### 1.1 Purpose

This administrative operating procedure (AOP) describes the handling of samples at Sandia National Laboratories/New Mexico (SNL/NM) Sample Management Office (SMO) and delineates requirements for the selection of sample containers, required sample volumes, holding times, preservation techniques and sample custody control and documentation. This procedure also contains basic requirements for packaging and shipping environmental, industrial hygiene, bioassay and waste characterization samples. Refer to the Sample Handling, Packaging and Shipping Laboratory Operating Procedure (LOP), LOP 94-03 for more detailed sample packaging and shipping requirements. This procedure implements Section 3.3.3, Sampling Handling and Custody Requirements, of the Sample Management Office/Quality Assurance Project Plan (SMO-QAPP).

### 1.2 Scope

This document applies to SNL/NM sampling projects that use the services of the SMO. Projects that reference this procedure or process samples through the SMO shall comply with this procedure. Samples, forms, and data submitted to the SMO for processing shall conform to the requirements in this procedure.

### 1.3 Ownership

The SMO owns this document. The SMO is responsible for preparing, revising, and distributing this document as necessary.

## 2.0 RESPONSIBLE INDIVIDUALS AND ORGANIZATIONS

The **SMO Operations Manager** is responsible for the following:

- Providing programmatic guidance leading to the development of this AOP.
- Reviewing and approving the procedure.
- Acting as liaison to the U.S. Department of Energy (DOE) and National Nuclear Security Administration/Sandia Field Office (NNSA/SFO) regarding sample management issues.

The **SMO Project Coordinator** is responsible for the following:

- Developing and maintaining the SNL/NM SMO Contract Statement of Work for Analytical Laboratories (SMO-SOW).
- Managing contractor laboratory services including procurement, routine performance assessments and general laboratory oversight.

The **Compliance Requirement Management Staff** is responsible for the following:

- Providing project data quality assurance guidance.
- Ensuring that this procedure is distributed to the appropriate personnel for project/program use.
- Ensuring that sufficient quality checks are in place to maintain the integrity of the SMO sample information management and analytical result database.
- Documenting non-conformances and corrective actions in accordance with the applicable SMO-QAPP.

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- Interfacing with the Records Management Coordinator for maintenance of project documentation and to resolve record management concerns for storage and maintenance of sampling and analysis records.

The **SMO Packaging Coordinator and SMO support staff** are responsible for receiving and packaging samples shipped through the Receiving/Mail & Material Movement Organization (10261, "Shipping and Receiving") to the contracted laboratories for analysis. SMO Packaging Coordinator(s) and Support Staff responsibilities include but are not limited to the following:

- Overseeing the day-to-day operations of the SMO Sample Packaging Facility and support personnel.
- Verifying proper sample collection documentation from field sampling personnel.
- Ensuring that sample custody is properly maintained and documented in accordance with the current SMO-QAPP.
- Ensuring all samples, with the exception of groundwater samples, dosimetry, or known non-radiological samples with a Clearance-Radiological Process Knowledge Form SF 6951-RRF (Attachment A) on file, receive a radiological survey by a Health Physics Radiation Control Technician (RCT) prior to shipment to an analytical laboratory.
- Ensuring samples are properly stored and packaged for shipment or delivery to the analytical laboratories in accordance with the SMO-QAPP, DOE, U.S. Department of Transportation (DOT) and International Air Transportation Administration (IATA) regulations. (Refer to LOP 94-03.)
- Interfacing with SNL/NM Shipping, Radiation Protection Operations and other SNL/NM on-site organizations;
- Ensuring Samples are shipped or delivered in a timely manner giving laboratories sufficient time to analyze samples within holding times.

The **SMO Customer(s)/Sampling Personnel** are responsible for sampling and initiating chain-of-custody documentation. Sampling personnel are responsible for performing the applicable activities prescribed in this procedure, including but not limited to:

- Utilizing the Sample Management Analysis Request Tool (SMART) to initiate and submit bottle orders, to produce container labels and to produce and submit the Analytical Request and Chain-of-custody (ARCOC) (Attachment B).
- Utilizing the Industrial Hygiene (IH) Sampling Analysis Request Form (SARF) chain-of-custody for industrial hygiene customers (Attachment C).
- Utilizing the Radiation Protection Dosimetry Program (RPDP) SARF chain-of-custody for RPDP customers (Attachment D).
- Providing the SMO with the Radiation Survey Documentation for samples coming out of a Radioactive Material Area (RMA).
- Working with the Radiation Protection program, and providing the SMO with a copy of the Clearance-Radiological Process Knowledge Form, SF 6951-RRF (Attachment A), for non-radiological samples. This is not mandatory, but will help expedite the process for shipping the samples.
- Labeling, using the correct containers, and preservatives for the materials to be analyzed.
- Documenting field parameters during the sampling event according to applicable sampling procedure(s).

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- Collecting sufficient volumes of samples for all analyses, including quality control analyses.
- Delivering samples to the SMO Packaging Facility according to chain-of-custody requirements and in secure/safe condition according to SMO requirements as stated in the Sample Handling, Packaging and Shipping Laboratory Operating Procedure (LOP 94-03).
- Delivering samples to SMO in a timely manner and communicating with SMO staff about short holding times and/or rush analysis requests.

The **Analytical Laboratory** is responsible for following the applicable SMO-SOW.

### 3.0 TRAINING QUALIFICATIONS

Personnel shall be trained and qualified as necessary to perform their assigned work. The Sandia Education and Training Organization provides basic training and qualification guidance. Training requirements are presented in activity-specific operating procedures with specific requirements for the tasks performed. Personnel shall be trained according to established training cycles to maintain proficiency. Training shall be updated to meet required frequency schedules when specified. Details of corporate training are outlined in the SMO-QAPP and are referenced in the current Primary Hazard Screening (PHS) document, PHS 972834764, SMO Packaging Facility Operations and in LOP 94-03.

SMO personnel and customers are responsible for adherence to training requirements stipulated in this procedure and the current SMO-QAPP and the SMO Packaging Facility Operations PHS as it pertains to each individual.

Personnel conducting activities in this document shall complete the following:

- Read this procedure and acknowledge electronically that you have read and understand this procedure.
- On the job training is not required.

### 4.0 SAMPLE DOCUMENTATION AND MATERIALS

#### 4.1 Bottle Order/Sample Request Form & Sample Containers

The Bottle Order/ Sample Request form is accessed through the SMART application. The completed and approved Bottle Order initiates the sampling process and is used to complete the ARCOG. The ARCOG may be obtained from the SMO home page, Electronic Forms link, or through the SMART application. Note that the SMART application is *not* used for the IH SARF or RPDP SARF chain-of-custody.

Recommended sample containers and chemical preservatives may be obtained by logging on to the SMO SMART application and completing the Bottle Order/Sample Request form. Most projects require that a bottle order be placed with the contract laboratory. (The IH and Bioassay projects do not utilize the SMO Bottle Order process.) It is recommended that bottle orders be submitted for approval to the SMO one to two weeks prior to sampling. The purpose of the bottle order is to:

- Initiate the sampling process.
- Notify the lab of the expected number of samples and analyses.
- Notify the lab of expected sampling dates.

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- Obtain appropriate sample containers from certified suppliers with analytical method specified and chemical preservatives if required. (Containers are inspected as covered in section 5.1).

#### 4.2 Analytical Request and Chain-of-custody (ARCOC or COC, SARF) Forms

The COC provides an accurate and defensible written and/or computerized record to trace the possession and handling of a sample from collection to completion of all required analyses. COC records provide a record of sample history and are critical for data integrity. Four different COC forms may be submitted to the SMO:

- Contract Laboratory Analysis Request and Chain-of-custody (ARCOC) (Attachment B)
- Industrial Hygiene SARF (IH SARF)(Attachment C)
- Radiation Protection Dosimetry Program Sample Analysis Request Form (RPDP SARF) (Attachment D)
- Onsite Laboratory/Radiation Protection Sample Diagnostics (RPSD) Sample Analysis Request Form (RPSD SARF) (Attachment E)

#### 4.3 Sample Label

A SMO SNL/NM sample label must be completed with indelible ink and affixed to each sample container prior to or during sampling. The example label in Attachment F is required for all samples submitted on an ARCOC. The sample label is produced after completion of the SMART application ARCOC and using the label printer. It may also be produced using a spreadsheet and a printer. A label printer is available for customer use at the SMO Packaging Facility and at the Environmental Restoration Field Office. The Sample Label information shall match the information on the corresponding ARCOC or SARF. Each completed sample label submitted on an ARCOC includes the following:

- SMO SNL/NM Sample Identification Number (The first 5 digits of the Sample Number are controlled and obtained from the SMO. The Sample fraction designation is assigned by the sampler.)
- ARCOC Number
- Sample location
- Date and time of sample collection
- Sample matrix type
- Chemical Preservative
- Analysis
- Collector's name
- SNL/NM Thunderbird logo

Samples submitted on a SARF chain-of-custody will contain a SARF chain-of-custody number and Sample Number.

#### 4.4 Custody Seals

Sample custody seals are used to help determine unauthorized tampering of samples following collection until the time of sample preparation and analysis. Custody seals may be obtained from an SMO Packaging Facility representative. Initialed and dated seals must be affixed to sample containers before the samples leave the custody of the sampling personnel. IH containers, Volatile Organic Compound containers and Groundwater Monitoring container(s) are placed in a sealed plastic bag and the bag, not

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the container(s), is secured with the custody tape. Groundwater Monitoring containers' custody tape are not initialed.

- The custody seal is initialed and dated while the seal is affixed to the backing.
- The seal is then removed from the backing and affixed to the container in such a manner that it is necessary to break the seal in order to open the container.
- The custody seal may be removed by the person initiating or retaining custody of the sample (e.g., the sampling personnel or the analytical laboratory sample custodian).
- The integrity of the seal must be verified prior to its removal.
- A broken seal invalidates the sample and must be documented as a nonconformance.

#### **4.5 SNL/NM “Shipper” Form and Shipper’s Waybill**

The SNL/NM electronic shipping form, Web Shipper, is required on all sample shipments leaving SNL/NM except for samples that are hand delivered to local analytical laboratories. The Web Shipper and the commercial shipper's waybill complete the sample custody documentation and show possession of the sample from shipment to arrival at a contract laboratory. A copy of the Web Shipper form and shipper's waybill (if applicable) under which the samples are shipped shall be retained to document shipment of the sample(s). The SMO Packaging Facility Personnel are responsible for completing all shipping documentation per the current version of LOP 94-03.

### **5.0 SAMPLE MANAGEMENT PROCEDURES**

#### **5.1 Sampling Kit Procedure (Bottle Orders)**

Required sample containers and chemical preservatives are obtained by logging on to the SMO SMART application and completing the Bottle Order/Sample Request form. Most projects require that a bottle order be placed with the contract laboratory. IH and RPDP Bioassay programs do not require a Bottle Order.

The Bottle Order initiates the sampling process for the projects that utilize the ARCOG. The customer shall submit a Bottle Order request to the SMO utilizing the SMART application. Upon receipt, the SMO reviews the Bottle Order and submits it to the contract laboratory. The contract laboratory provides sampling kits according to the Bottle Order specifications. It is recommended that bottle orders be submitted for approval to the SMO one to two weeks prior to sampling. IH and RPDP projects do not utilize the SMART application for sampling kits.

The SMO shall provide oversight and ensure that the laboratories follow the SMO-SOW as it pertains to providing sampling kits. The laboratories shall have applicable procedures and processes in place. The SMO shall inspect sampling kits to determine that they are intact, accurate, and meet any specific written requirements associated with the SMO-SOW. Any errors or damage to sampling kits will be addressed in accordance with the SMO-SOW and procurement policies. Refer to the current version of LOP 94-03 in case of broken containers and preservative spills.

#### **5.2 Sampling Considerations**

For sampling requirements, refer to the Holding Time and Preservation Techniques matrix, in the SMO-SOW.

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**Sample Volume:** The volume of the sample collected should be sufficient to perform all the required analyses plus any additional volume needed to meet quality control requirements or repeat analyses. The minimum sample volume required for typical analytical procedures is listed in SMO-SOW, Holding Times and Sample Preservation Techniques. After the Bottle Order/Sample Request form is complete and approved, the required sample volumes will auto fill on the ARCOC when initiated. Laboratory-specific sample volume requirements may apply.

For the IH SARF chain-of-custody, the IH customer is responsible for meeting volume requirements.

**Sample Preservation:** Prior to sampling, the appropriate chemical preservative(s) is added to the sample bottles by the analytical laboratory. Due to the variety of chemical tests performed on samples, it may be impractical to chemically preserve samples during actual field collection. Following collection, most samples are cooled and maintained at  $<6^{\circ}\text{C}$  (i.e., stored in a cooler with ice or ice gel or in a refrigerator) to conform to temperature preservation requirements. Chemical and temperature preservation requirements are listed in SMO-SOW and will auto fill on the Bottle Order and the ARCOC forms.

For the IH SARF COC, the IH customer is responsible for meeting sample preservation requirements.

**Holding Times:** Holding time is the time interval between sample collection and sample preparation or analysis. Holding times are calculated in days or hours, according to the time units used in the U.S. Environmental Protection Agency (EPA) holding time requirements. That is, if the EPA-specified holding time is given in hours, then the analysis must be complete before the end of the last hour of the holding time when calculated from the sampling time. When the holding time is given in days, the analysis must be complete before the end of the day on which the holding time would expire as calculated from the sampling day. Recommended maximum holding times are listed in the SMO-SOW and should be adhered to. The SMO Packaging Facility will make every effort to ship the samples to the laboratory the same day of sampling, or as soon as practical.

SMO will make every effort to notify the laboratory when samples having less than 72 hours of the holding time remaining are to be shipped.

**Sample Storage:** All samples shall be stored in a secured location when not in the immediate custody of an individual. The samples should be stored under physical and environmental conditions commensurate with the preservation requirements and intended analysis. Sample integrity must be maintained during sample storage through access controls and documentation. Samples with temperature preservation requirements shall be placed in a sample storage refrigerator and allowed to equilibrate to the required temperature prior to shipment to a contract laboratory unless they are packaged for shipment immediately upon receipt.

Daily verification and documentation of storage temperature should be maintained when temperature is a preservation requirement. Additional measures must be taken to separate waste samples from non-waste samples in order to avoid cross-contamination. Trip blanks should be used as appropriate to determine sample contamination during sample storage and shipment.

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### 5.3 Sample Custody Procedure

Custody procedures provide an accurate record of sample history and shall be followed by SMO, field (sampling) and laboratory personnel to provide an accurate record of sample history.

By definition, a sample is in custody if it is:

- In one's possession,
- In view,
- In a controlled access area, or
- In transit following proper chain-of-custody procedures.

#### Sampling Team Member (Customer) Custody Procedure

A Sample Team Member is responsible for the care and custody of samples collected until sample custody is properly transferred. The following procedure shall be used to ensure proper control of samples:

- For the ARCOC, a project team member must submit to the SMO a Bottle Order at least 14 days prior to the requested delivery date for containers. The Bottle Order is initiated using the SMART application found on the SMO homepage. Once the Bottle Order is submitted, it will go through an SMO approval process and will be submitted to the appropriate analytical laboratory. Upon approval, all project team members will be notified. The approved Bottle Order is used by the customer to complete the ARCOC. From the approved Bottle Order, the Sample Matrix, Container Type and Volume, Preservative, Analysis Parameter and Method will pre-fill the ARCOC. SMART application Bottle Orders are not submitted for the IH or RPDP Bioassay SARF COC or the Onsite Laboratory (RPSD) Sample Analysis Request Form (RPSD/SARF).
- For the ARCOC, the Sample Team Member documents sample collection information: *Sample-No.-Fraction, Sample ID or Sample Location Detail, Pump Depth, Date/Time Collected, Collection Method, Sample Type, Filtered/Unfiltered sample* (refer to LOP 94-03).
- For the IH SARF COC, the sample team member will provide a completely filled form to include *IH Survey ID number, Submitted by name, Submission date, Analysis Requested, IH Sample #, Col. Date, Turn-Around-Time, Matrix*. The IH SARF COC is 2 pages. The second page is the received/relinquished page. The corresponding second page must include the IH Survey ID number.
- If samples are destined for the on-sight Radiation Protection Sample Diagnostics (RPSD) laboratory for analysis (i.e., gamma spec, alpha, beta, etc.), the customer shall complete either the paper form RPSD/SARF COC (Attachment E) provided by the RPSD laboratory or submit an electronic version of the SARF through the Sample Analysis Laboratory Information (SALI) system.
- For the ARCOC, sample container labels (Attachment F) shall be affixed to sample containers, or in some cases, to the re-sealable bag, and shall match information on the associated ARCOC. Sample labels shall be legible and completed in indelible ink. (Refer to LOP 94-03). Blank Sample Labels may be obtained by contacting an SMO Packaging Facility representative or may be printed from the SMO SMART Application. (See section 4.3.)
- All samples shall be accompanied with corresponding ARCOC, IH or RPDP SARF, COC, and/or RPSD SARF documentation.
- Samples shall be delivered to the SMO Packaging Facility for review of custody documentation prior to acceptance and transfer of custody to the SMO. (Refer to LOP 94-03).
- The SMO Packaging Coordinator shall process samples as required by LOP 94-03. Samples submitted by sampling team members to the SMO Packaging coordinator or support staff shall be

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clean, sealed, and intact. Sample container lids shall be secured with custody tape that has been initialed and dated. Glass containers are placed in re-sealable bubble bags and double bagged. If samples are from an area designated as a RMA, the sampling team member shall include the Radiation Survey Documentation (Attachment G) with the samples. (Refer to LOP 94-03).

- A sampling team member shall assist the SMO Packaging representative in verifying that all sample containers and request forms are correct and complete. (Refer to LOP 94-03).
- Upon complete verification, the sampling team member shall transfer custody of the samples to the SMO Packaging representative by signing, dating and noting the time on the appropriate *Relinquished By* line on the ARCO, IH or RPD SARF, COC, and/or RPSD SARF. The SMO Packaging representative shall then accept custody by signing, dating, and noting the time on the appropriate *Received By* line, below the *Relinquished By* signature.

#### Packaging Coordinator Procedure

- The SMO Packaging Coordinator shall relinquish samples to the contract laboratory by signing the *Relinquished By* line on the ARCO, SARF, or COC. The chain-of-custody documentation is then put into a re-closable plastic bag and placed inside the shipping container/cooler. The shipping container/cooler is then closed, secured, and sealed with custody tape and delivered to SNL/NM Shipping and Receiving personnel for shipment to contract laboratories. Included with the shipping container is a completed Web Shipper. The SNL/NM Shipping and Receiving Department shall be responsible for assigning the shipment to the appropriate commercial carrier (overnight air shipment is preferred) and for final labeling of the container/cooler. Non-hazardous samples may be hand-delivered to local analytical laboratories by the SMO after meeting all other requirements for packaging and shipping. Refer to LOP 94-03 for detailed sample handling, packaging, and shipping requirements and instructions.
- The SNL/NM Shipping/Receiving Department is responsible for completing the shipping documentation, including the waybill. The SMO shall retain a copy of all sample custody documents including shipping documentation.

#### Analytical Laboratory Custody Procedure

Sample custody is transferred to the contract laboratory at the time of sample receipt, after which the contract laboratory is responsible for maintenance of unbroken chain-of-custody. The analytical laboratory shall maintain the sample custody records until sample analysis is complete. Sample receipt requirements for the analytical laboratory are:

- Follow the current version of the SMO-SOW

#### Non-conformance and Corrective Action:

Any non-conformances and corrective actions related to processes described in this procedure and associated corrective actions will be documented, approved, and implemented in accordance with the requirements of the SMO-QAPP and the responsibilities identified in this procedure (Section 4.0). Non-conformances shall be identified by any personnel (e.g., SNL/NM staff; contractor; or contract analytical laboratory).

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## 6.0 RECORDS MANAGEMENT

The SMO shall maintain records to document activities and to provide support for possible evidential proceedings. Records that provide documentary evidence of quality shall be specified, prepared and maintained in accordance with appropriate SNL/NM record-keeping procedures. SMO records shall be transferred to the customer as well as to the Records Center for cataloging and storage in accordance with SNL/NM and DOE requirements. The following documentation required by this procedure should be submitted to the SMO Operations Manager or to the SMO Project Coordinator for review, approval, and storage in the Records Center:

- ARCOG, IH SARF COC, or RPDP SARF COC Record (hard copy to Records Center)
- Shipper form (hard copy to Records Center)
- Radiation Survey Documentation when applicable (hard copy to Records Center)
- Data package electronic file and Electronic Data Deliverable (EDD)
- Nonconformance and corrective action records
- Pertinent correspondence.

## 7.0 REFERENCES

International Air Transport Association (IATA) Dangerous Goods Regulations, current edition, 57<sup>th</sup> Edition (updated annually), International Air Transport Association (IATA), Montreal, Canada

Sandia National Laboratories/New Mexico Quality Assurance Project Plan for the SNL/NM Sample Management Office (SMO-QAPP), current revision, Sandia National Laboratories/New Mexico Sample Management Office, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico Sample Handling, Packaging and Shipping Laboratory Operating Procedure (LOP 94-03), current revision, Sandia National Laboratories/New Mexico Sample Management Office, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico Sample Management Office Statement of Work (SMO-SOW) for Analytical Laboratories, current revision, Sandia National Laboratories/New Mexico Sample Management Office, Albuquerque, NM

U.S. Environmental Protection Agency Code of Federal Regulations (CFR), CFR Title 49, Updated Quarterly as of October 1st, U.S. Environmental Protection Agency, Washington, DC

U.S. Occupational Safety and Health Administration Code of Federal Regulations (CFR), Title 29, Section 1910.1200, Updated Quarterly as of July 1st, U.S. Occupational Safety and Health Administration Government Printing Office, Washington, D.C.

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## ATTACHMENTS

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**ATTACHMENT C:  
Industrial Hygiene (IH) SARF Chain-of-custody**

SANDIA  
SNL NM  
SARF Chain of Custody Report

IH Survey ID:  Lab Log Batch ID: \_\_\_\_\_ Lab receiving sample  
 Sample location: TA1 897 1300

Submitted By: CASTILLO,R	Submission Date: _____
Charge code: _____	

Send Report To: SNL NM	Attention of: CASTILLOR
Address: _____	Email: _____
Phone: _____	Fax: _____

Analysis requested ( please be specific if possible )  
 CADMIUM

General comments to lab personnel  
 Additional Potential Hazards, Name and phone/pager of a person knowledgeable about the sample origin and hazards

IH Sample #	Lab ID	Col. Date	Tara-Arousal-Time	Matrix	Sample Comments
12345678901		11/17/2010	NORMAL ( 15 DAYS )	SWIPE	088750-001
12345678902			NORMAL ( 15 DAYS )	SWIPE	088750-002
12345678903			NORMAL ( 15 DAYS )	SWIPE	088750-003

Samples Checked For <input type="checkbox"/> Container Integrity <input type="checkbox"/> Sample Size <input type="checkbox"/> Sampling Label	Condition of Sample Receiver <input type="checkbox"/> Acceptable <input type="checkbox"/> Not Acceptable	Custody Seals <input type="checkbox"/> Present <input type="checkbox"/> Not Present
--	--	---

*This IH SARF is for example purposes only.*

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**ATTACHMENT D:  
RPDP SAMPLE ANALYSIS REQUEST FORM  
RPDP SARF**

**SAMPLE ANALYSIS REQUEST FORM (SARF)  
RADIATION PROTECTION DOSIMETRY PROGRAM (RPDP)**

Page 1 of 1

RPDP BATCH NO		RPDS LOG NO									
Customer Name: Goke, Sarah Hayes Organization: 4121 Mail Stop: 0651 Phone: 645-DOSE / 284-5588 Email: dosimetry@sandia.gov Prgm Name: Radiation Protection Dosimetry Program				Analytical Lab: _____ Lab Contact: _____ Contract No.: _____ Date Shipped: _____ Shipper No.: _____ RPDP Contact/Ph: Sarah Hayes Goke / 505 284 5598				Send Results to: RPDP P.O. Box 5800, MS-0651 Albuquerque, NM 87185 Email: dosimetry@sandia.gov FAX: 505 644 8313 Bill to: Sandia National Laboratories Accounts Payable Department P.O. Box 5800, MS-1383 Albuquerque, NM 87185-1383			
		Date Collected	Time Collected (0-24 HRS)	TAT	Sample Matrix	Qty/Tot Volume	Tare Wt	Rad Screen (cpm)	QC Set	EDD (Off-Site Labs): [ ] Yes [X] No	
Customer Sample ID	Lab Sample ID									Parameter / Method Requested	Lab Notes
Turn Around Time (TAT) Instructions ENTER DATE NEEDED BY: _____ (applicable to all samples)  N - Normal R - Rush U - Urgent				Special Instructions/Hazards Biological Sample - Treat With Caution Contact: Sarah Hayes Goke, 284-5598, pager (800) 237-6849				Sample(s) Condition on Receipt [ ] Normal [ ] Abnormal If abnormal, fill out the attached Sample Condition Upon receipt form and contact the customer about the sample condition before proceeding further.			
1. Relinquished by	Org.	Date	1. Received by	Org.	Date	2. Relinquished by	Org.	Date	2. Received by	Org.	Date
2. Relinquished by	Org.	Date	3. Relinquished by	Org.	Date	3. Relinquished by	Org.	Date	3. Received by	Org.	Date
3. Relinquished by	Org.	Date	4. Relinquished by	Org.	Date	4. Relinquished by	Org.	Date	4. Received by	Org.	Date
4. Relinquished by	Org.	Date	5. Relinquished by	Org.	Date	5. Relinquished by	Org.	Date	5. Received by	Org.	Date
5. Relinquished by	Org.	Date	6. Relinquished by	Org.	Date	6. Relinquished by	Org.	Date	6. Received by	Org.	Date

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**ATTACHMENT E:  
ONSITE LABORATORY (RPSD) SAMPLE ANALYSIS REQUEST**  
RPSD SARF

<b>Sandia National Laboratories</b> <b>Sample Analysis Programs</b>	<b>Sample Analysis Request Form</b> Page <u>    </u> of <u>    </u>
--	--

*To be completed by Customer*

**SHADED AREAS ARE FOR LAB USE ONLY**

Customer Name: _____ Customer Email ID: _____ Organization: _____ Phone:                 Sample _____ Location (Bldg/Rm): _____ Date Results Needed: _____ Project/Task Number: _____	Hazards/Special Instructions:   <input type="checkbox"/> Provide EDD	Batch Log No: _____ Logged By: _____
---	---	---

- |  |  |
|--|--|
| <input type="checkbox"/> RPOP - Rad Protection Operation<br><input type="checkbox"/> RPID - Dosimetry<br><input type="checkbox"/> RPSD - Sample Diagnostics<br><input type="checkbox"/> IH - Industrial Hygiene<br><input type="checkbox"/> DND -DeconDecom<br><input type="checkbox"/> EXT - External<br><input type="checkbox"/> SND - Source & Device<br><input type="checkbox"/> WM - Waste Management<br><input type="checkbox"/> OTH - Other | <input type="checkbox"/> EM - Environment Monitoring<br><input type="checkbox"/> EMAA - Ambient Air<br><input type="checkbox"/> EMWW - Waste Water<br><input type="checkbox"/> EMGW - Ground Water<br><input type="checkbox"/> EMTS - Terrestrial surveil<br><input type="checkbox"/> EMSW - Storm Water<br><input type="checkbox"/> CMC - Coop Monitoring Ctr<br><input type="checkbox"/> ER - Enviroment Restoration |
|--|--|

Customer Sample ID	Sample Type	Date/Time Collected	Sample Amount or Flow Rate	Requested Analysis	or COC#	ID	Screen(CPM)


Relinquished by \_\_\_\_\_ Date \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_

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**ATTACHMENT F:  
SAMPLE LABEL**  
<http://info.sandia.gov/esh/smo/>  
[https://info.sandia.gov/esh/smo\\_application](https://info.sandia.gov/esh/smo_application)

 <b>Sandia National Laboratories</b>		Volume:
		Type:
		Container of
*Sample ID:	*COC No:	
*Location:		
*Date:	*Time:	
*Matrix:	*Preservative:	
*Analysis:		
*Collector:		

**\*Required fields**

*This Sample Label is for example purposes only.*

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**ATTACHMENT G:  
Radiological Survey Form**  
[http://www-irm.sandia.gov/esh/radpro\\_procedures/forms/rsf.dot](http://www-irm.sandia.gov/esh/radpro_procedures/forms/rsf.dot)

Survey Number:

--

**RADIOLOGICAL SURVEY FORM**

Page: \_\_\_\_\_ of \_\_\_\_\_

Location:		Requester/Org:				Date:		Time:				
Purpose:				Request#:		RWP#:						
Instrument and Probe Type and Serial Number			Surveyor(s) Printed Name(s)			Surveyor(s) Signature/Date						
#	Item Description/Location	BETA-GAMMA ACTIVITY				ALPHA ACTIVITY				RADIATION SURVEY		
		Counting Data Attached: <input type="checkbox"/> YES <input type="checkbox"/> NO				Counting Data Attached: <input type="checkbox"/> YES <input type="checkbox"/> NO				Background: _____ mrem/hr		Radiation Type: <u>Gamma</u>
		% Eff.: <sup>(5)</sup> _____	Radionuclide: _____			% Eff.: <sup>(5)</sup> _____	Radionuclide: _____			Distance from Source <sup>(3)</sup>		
		Bkg. _____	dpm <sup>(3,4)</sup> _____	T.R.F. <sup>(6)</sup> _____	Bkg. _____	dpm <sup>(3,4)</sup> _____	T.R.F. <sup>(6)</sup> _____			mrem/hr		
		CPM	CPM	100cm <sup>2</sup>	CPM	CPM	100cm <sup>2</sup>					
<small><sup>(1)</sup> ND = No detectable activity above background <sup>(2)</sup> If other than 100 cm<sup>2</sup>, indicate area or record as 'dpm/probe' or 'dpm/LAW' (large area wipe). <sup>(3)</sup> T.R.F. = Total Removable Fixed <sup>(4)</sup> OC or CT = On Contact <sup>(5)</sup> %Eff-Removable-Direct</small>												
Remarks:										Reviewed by:		Date:

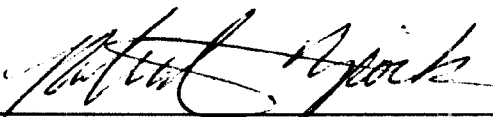
*This Radiological Survey Form is for example purposes only.*

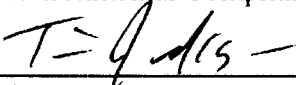
**IMPORTANT NOTICE:** A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network, 4100 Controlled Documents home page.

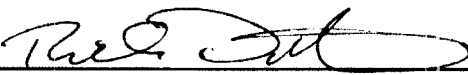
---

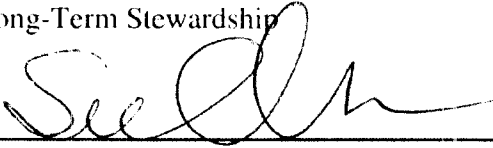
## SOIL VAPOR MONITORING FIELD OPERATING PROCEDURE

### FOP 08-22 Revision 4

**Author:**  **Date:** 10/5/2016  
Robert Ziock, Technologist  
Environmental Compliance and Monitoring

**Reviewer:**  **Date:** 06-Oct-2014  
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Long-Term Stewardship

**Reviewer:**  **Date:** 10/5/16  
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**Approved:**  **Date:** 10/13/16  
Sue Collins, Program Lead  
Long-Term Stewardship

<b>Author:</b> <i>How frequently does this document need to be reviewed and/or revised?</i>	Every three years
<b>Manager:</b> <i>Does this document need to be tracked?</i>	Yes

**EFFECTIVE DATE:**

10/17/2016

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## REVISION HISTORY

Revision	Effective Date	Summary of Changes
0	01/27/2009	Original Issue
1	05/27/2009	Section 6.3 – “Quality Control Sample Equipment Setup and Sampling Procedure” added.
2	06/09/2011	The rewrite makes FOP not specific to the CAMU. It now applies to soil vapor sampling at any SNL/NM site. Site-specific information for CAMU, CWL, MWL, and TA-V included in the attachments.
3	06/16/2014	Updates include methane gas monitoring and attachment for TA-III Classified Waste Landfill. On-the-Job Training, Authorized User List, and Tailgate Safety Briefing attachments removed. Table B-1 and purge time requirements removed from Attachment B. Updated Attachment C to reflect approval of the LTMMP.
4	10/17/2016	Removed all text referencing methane gas monitoring at TA-III. Added Section 1.1.3, Program Description; Section 7.0, Waste Management; 8.0, Quality Assurance; and 9.0, Data Management. Reorganized and updated Section 6. Updated Attachments A. Combined Attachments B, C, and E. Removed Attachments D, F, G, and H.

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## ACRONYMS and ABBREVIATIONS

<b>ALW</b>	activity level work
<b>AR/COC</b>	Analysis Request/Chain of Custody
<b>CAMU</b>	Corrective Action Management Unit
<b>CWL</b>	Chemical Waste Landfill
<b>FOP</b>	field operating procedure
<b>LTMMP</b>	Long-Term Monitoring and Maintenance Plan
<b>MWL</b>	Mixed Waste Landfill
<b>NMED</b>	New Mexico Environment Department
<b>OJT</b>	on-the-job training
<b>PHS</b>	primary hazard screening
<b>PID</b>	photoionization detector
<b>Sandia</b>	Sandia Corporation
<b>SAP</b>	sampling and analysis plan
<b>SMO</b>	Sample Management Office
<b>SNL/NM</b>	Sandia National Laboratories/New Mexico
<b>TA</b>	Technical Area
<b>TEDS</b>	Training and Employee Development System
<b>THA</b>	task hazard analysis
<b>VOC</b>	volatile organic compound

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## 1.0 PURPOSE, SCOPE, AND OWNERSHIP

### 1.1 Purpose

The purpose of this field operating procedure (FOP) is to provide guidelines and procedures for soil vapor monitoring at various Sandia National Laboratories/New Mexico (SNL/NM) sites. Soil vapor monitoring can consist of taking *in situ* real-time measurements and/or collecting samples from the vadose zone. This procedure shall be used, as applicable, based upon the regulatory requirements for each site. Site-specific information, requirements and protocol are summarized in site-specific permits, and in attachments to this FOP.

### 1.2 Scope

This FOP is applicable to all Sandia Corporation (Sandia) employees and contractors who perform soil vapor monitoring activities at SNL/NM. Soil vapor monitoring is routinely performed at the Corrective Action Management Unit (CAMU) containment cell, Chemical Waste Landfill (CWL), Mixed Waste Landfill (MWL), and Technical Area (TA)-V. Site-specific information is provided in Attachments A, B, C, and D for the CAMU, CWL, MWL, and TA-V, respectively. The general guidelines in this FOP may also be applied to non-routine soil vapor monitoring locations/events (*e.g.*, Tijeras Arroyo).

### 1.3 Ownership

The Analytical Services Department is responsible for development, approval, distribution, revision, and control of this procedure.

#### 1.3.1 Program Description

Soil vapor monitoring is performed as part of Long-Term Stewardship Program operations that are managed by the Analytical Services Department. The Long-Term Stewardship Program's goal is the long-term protection of human health and the environment from hazards associated with former Environmental Restoration Project sites (*e.g.*, CAMU, CWL, MWL), and minimization of Sandia's environmental liability by ensuring environmental compliance with the requirements provided in multiple New Mexico Environment Department permits.

## 2.0 RESPONSIBLE INDIVIDUALS AND ORGANIZATIONS

The **Department Manager** is responsible for the following:

- Providing programmatic guidance leading to the development of this FOP.
- Review and approval of the procedure.

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- Establishing and documenting field technician training in compliance with this FOP, site-specific permits (CAMU and CWL), and the MWL Long-Term Monitoring and Maintenance Plan (LTMMP).

The **Field Support Operations Project Lead** is responsible for the following:

- Coordinating with the Department Manager, Project Lead and Field Technicians regarding soil vapor sampling activities and the documentation of all required training.
- Assigning qualified Field Technicians to conduct the activities described in this procedure.
- Supervising the Field Technicians.
- On-the-job training (OJT), as necessary, for new personnel performing field activities. Document training by completing an OJT Form (EP 2009-OJT).
- Reviewing, implementing, and verifying the completion of all training required for Field Technicians.
- Providing Field Technicians with necessary equipment and supplies to conduct field work.
- Reviewing, revising, and maintaining technical work documents.

The **Project Lead** or designee is responsible for the following:

- Reviewing and concurring with this procedure and the related site-specific attachment(s).
- Providing overall coordination and management of site-specific soil vapor monitoring events.
- Providing copies of the relevant sections of the site-specific permit and sampling and analysis plan (SAP) (CAMU and CWL) and the MWL LTMMP for Field Technician review and signoff, prior to sampling.
- Reviewing field documentation and analytical results.
- Assisting with the revision of this procedure as necessary or every three years.

The **Field Technician** is responsible for the following:

- Completing all necessary and required training as specified by the Field Support Operations Project Lead. At a minimum, required training shall include the training defined in this FOP, site-specific permits (CAMU and CWL), and the MWL LTMMP.
- Maintaining requisite training status.
- Inspecting and maintaining equipment.
- Completing a program specific tailgate safety meeting form prior to each day's soil vapor monitoring activities. Program forms are available on the 4100 Controlled Documents webpage.
- Collecting and storing samples properly, when applicable.

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- 
- Delivering samples to the Sample Management Office (SMO) in a timely manner, relative to analytical holding times, when applicable.
  - Completing and reviewing field documentation forms.
  - Inspecting soil vapor monitoring locations during each sampling event and documenting the inspections along with any deficiencies and/or repairs, or breach of monitoring location security. Reporting deficiencies and/or breach of security to the Field Support Operations Project Lead and the Project Lead.
  - Providing recommendations for revisions to this procedure (*i.e.*, process improvement feedback as appropriate).

### 3.0 TRAINING QUALIFICATIONS

Personnel conducting soil vapor monitoring shall complete all training required to perform work under this FOP and in accordance with site-specific permits and the MWL LTMMP:

- Field personnel shall sign an Authorized Users List (EP2009-AUL) to affirm they have read and understand this document, and agree to operate within the stated constraints.
- Read SNL/NM Corporate Policy ESH100 Environment Safety & Health.
- Required department training and training identified in the primary hazard screening (PHS) results.
- Read applicable site-specific training (*i.e.*, PHS, health and safety plan, etc.)
- Read applicable sections of site-specific permits and SAPs (CAMU and CWL), the MWL LTMMP, and comply with the related training program requirements.
- Document site-specific permit training requirements (CAMU, CWL) for a Field Technician (on file at the CAMU Administrative Trailer).
- OJT, as necessary, for new personnel performing field activities. Document training by completing an OJT Form (EP 2009-OJT).
- Complete training courses listed in Table 3-1.

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**Table 3-1. Training Course List**

Course Code	Course Title
CHM100	Chemical Safety
CHM103	Site Specific Chemical Safety
ELC105	Basic Electrical Safety (> 50 volts)
ENV100	OSHA Health & Safety Basic Training – General Worker (40 HR)
ENV103	OSHA Health & Safety Training Refresher (8 HR)
ENV112	Hazardous Waste & Environmental Management Training
ESH100	Environment Safety& Health Awareness
MCH200	Hand and Power Tool Safety
MED102	Standard First Aid
MED104	Heartsaver CPR
OTS101	Occupational Thermal Stress
PPE106	Personal Protective Equipment Training
PRS150	Pressure Safety Orientation
PRS250	Advance Pressure Safety
RAD102	General Employee Radiological Training

#### 4.0 HEALTH AND SAFETY

Activity level work (ALW) evaluations have been performed on the activities described in this FOP and are detailed in safety cases ALW 14-02 (CAMU) and ALW 14-11 (CWL and MWL). The evaluations were performed in conjunction with the PHS [SNL05A01119](#) (CAMU) and PHS [SNL11A00081](#) (CWL and MWL).

A task hazard analysis (THA) has been performed on the activities described in this FOP and is detailed in Section 4.1. The THA classifies the potential hazards and rates them based on the probability of occurrence. The THA lists control measures that will be used to mitigate the potential hazards. A site-specific PHS (see Section 9.0 for list of applicable PHSs) shall be completed prior to soil vapor monitoring activities to help identify potential hazards that can be expected when performing the work. The control measures may include exposure assessment surveys (by a SNL/NM industrial hygienist), courses, and training that are identified as part of the PHS results. This approach to identifying, rating, and controlling hazards is consistent with SNL/NM's Integrated Safety Management System initiative. Hazards classification is standard industrial hazards for activities identified in this FOP.

A tailgate safety meeting shall be conducted and documented on the program specific tailgate safety meeting form each day before the start of field activities.

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In the event that work is stopped due to:

- safety related issue(s),
- an injury incurred while performing the tasks identified in this procedure, or
- as the result of an audit,

the Field Technician shall immediately notify the Field Support Operations Team Lead, the Project Lead, and the Department Manager. The Field Technician shall seek the assistance of the Field Support Operations Team Lead for the mitigation of the hazard and the completion of a Work Resumption Authorization Form (EP 2009-WRA). The Department Manager shall sign the completed form prior to the restart of work.

#### **4.1 Task Hazard Analysis**

##### **Task Description - Soil Vapor Sampling for Volatile Organic Compounds**

Soil vapor samples are collected from the vadose zone at various SNL/NM sites (e.g., CAMU, CWL, MWL, TA-V) and are analyzed to determine levels of volatile organic compound (VOC) contaminants in the surrounding soil pore space. The samples are collected by connecting sample tubing on the soil vapor monitoring system directly to a sampling container (i.e., SUMMA<sup>®</sup> canister). The SUMMA<sup>®</sup> canister is under a vacuum and has a valve that when opened, draws in the vapor sample. Prior to sample collection, each monitoring location (port) is purged to remove stagnant air and draw representative soil vapor from the soil pore space surrounding the sampling port in the subsurface. VOC screening with a photoionization detector (PID) or equivalent detector shall be performed prior to sample collection to provide real-time data relative to stabilization of organic soil vapor concentrations during the purging process. (Note: VOC screening with a PID or equivalent detector during the purging and sampling process is not necessary for worker health and safety purposes). A THA is provided in Table 4-1.

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**Table 4-1. Task Hazard Analysis  
Soil Monitoring for VOCs**

**Level of Protection—Level D Personal Protective Equipment (safety shoes/boots, safety glasses)**

Potential Hazard	Hazard Rating	Control
Chemical (various VOCs)	SIH	<ul style="list-style-type: none"> <li>There will be no contact with contaminated soils during soil vapor monitoring activities. Soil vapors can be monitored using a photoionization detector as part of the purging process for VOC sampling. Historically VOC levels have been low (parts per million). Eating, drinking and smoking will not be permitted while performing soil monitoring activities.</li> </ul>
Physical <ul style="list-style-type: none"> <li>Heat stress</li> <li>Cold stress</li> <li>Sunburn</li> <li>Mechanical hazards</li> <li>Pinch points</li> <li>Strains, and lifting hazards</li> <li>Slips, trips, falls</li> <li>Motor vehicle accident</li> <li>Electrical</li> <li>Vacuum (negative pressure)</li> </ul>	SIH	<ul style="list-style-type: none"> <li>Soil vapor monitoring activities are not physically demanding. Workers will be trained on heat stress, cold stress, and sunburn hazards. Sunscreen will be provided.</li> <li>Appropriate inspections of equipment will be performed prior to use.</li> <li>Leather work gloves will be worn when handling steel cable and removing vault covers.</li> <li>Proper lifting techniques will be reinforced.</li> <li>Proper housekeeping will be maintained.</li> <li>Holes around monitoring area will be filled or covered to eliminate slip, trip hazards.</li> <li>Seat belts will be worn anytime drivers and passengers are in a moving motor vehicle.</li> <li>Proper ground fault circuit interrupter devices will be used for the electric equipment and tested before each use.</li> <li>A management approved pressure safety data package is in place for equipment used for soil vapor sampling.</li> </ul>
Radiological	SIH	<ul style="list-style-type: none"> <li>There are no radiological hazards specifically related to soil vapor monitoring at the Corrective Action Management Unit, Chemical Waste Landfill, Mixed Waste Landfill, and Technical Area V.</li> </ul>
Fire	SIH	<ul style="list-style-type: none"> <li>Fire extinguishers will be located in mobile equipment.</li> </ul>

Notes: SIH -- standard industrial hazards  
VOC - volatile organic compound

## 5.0 EQUIPMENT AND MATERIALS

The equipment and materials required for performing VOC soil vapor sampling are as follows:

- Analysis Request/Chain-of-Custody (AR/COC) forms and sample labels.
- Logbook (if applicable).
- Field forms:
  - Soil Vapor Sampling Log Form (LTS 2015-004).
  - Inspection form (site-specific or Soil Vapor Monitoring Inspection Log Form (LTS 2015-005)).

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- AC power provided by ground fault circuit interrupter (GFCI) outlets.
- Vacuum pump, purge chambers, and sampling manifold assemblies.
- Flow rate meter.
- Vacuum gauge.
- PID.
- SUMMA<sup>®</sup> canister(s).
- Gas cylinder containing ultra-pure nitrogen gas.
- Key(s) to unlock padlocks.

See Attachments A (CAMU) and B (CWL, MWL, and TA-V) for site-specific equipment.

## 6.0 FIELD PROCEDURES

Soil vapor sampling for VOCs involves pre-sampling preparation, monitoring system and equipment inspection, equipment set up and purging/sample collection, quality assurance sample collection, and shipment of samples to the analytical laboratory. The following sections detail the overall soil vapor sampling procedure in the sequence the activities will be performed.

### 6.1 Pre-Sampling Preparations

The following shall be completed before soil vapor sampling can begin:

- 1) Obtain AR/COC and sample control numbers from the Sample Management Office Home Page. Prepare and print out AR/COC and sample labels.
- 2) Obtain Soil Vapor Sampling Log Form (LTS 2015-004).
- 3) Inspection form (site-specific or Soil Vapor Monitoring Inspection Log Form (LTS 2015-005)).
- 4) Obtain PID from the SNL/NM Safety and Health Instrumentation Program.
- 5) Obtain the SUMMA<sup>®</sup> canisters from the SMO.

### 6.2 Equipment Setup and Sample Methodology

See Attachments A (CAMU) and B (CWL, MWL, and TA-V) for site-specific equipment setup and sample methodology.

### 6.3 Calculating Purge Times

The purge time is a function of the volume of the sampling tube, well casing if applicable (CAMU only), soil vapor screen that need to be purged, and the flow rate through the sampling tube. A minimum of three sampling tube, well casing if applicable (CAMU only), and soil vapor screen volumes are purged at each location before a sample is collected.

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Volume calculations for cylindrical pipes and sampling tubes are as follows:

$$V = \pi r^2 h \text{ where: } V = \text{volume}$$
$$r = \text{radius}$$
$$h = \text{height}$$

Minimum pump running time to evacuate three sampling tube/well volumes from each sampling port is calculated as follows:

$$t = (V/Q)*3 \text{ where: } t = \text{time}$$
$$V = \text{volume}$$
$$Q = \text{flow rate}$$

Site-specific purge volumes are based upon individual soil vapor monitoring location construction details.

#### **6.4 Quality Assurance Equipment Setup and Sample Collection**

See site-specific quality assurance requirements in Attachments A (CAMU) and B (CWL, MWL, and TA-V), and site-specific permits (CAMU and CWL) and the MWL LTMMP for collecting duplicate, split, and field and trip blank samples if applicable.

##### **Duplicate and Split Samples**

A duplicate environmental sample is collected in order to estimate the overall reproducibility of the sampling and analytical process. Collect the duplicate sample immediately after the original environmental sample or simultaneously to reduce variability caused by time and/or sampling mechanics.

##### **Field Blank Sample**

A field blank sample is submitted to assess whether contamination of an environmental sample may have resulted from ambient field conditions. The sample is prepared in the field by collecting an ultra-pure nitrogen gas sample.

##### **Trip Blank**

A trip blank of ultra-pure nitrogen gas collected at a location not affected by the possible contaminant(s) of concern, is used to identify contaminants introduced into samples during transit to the laboratory.

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## 6.5 Inspections

Inspections of soil vapor monitoring locations and equipment shall be performed in accordance with site requirements (*i.e.*, permits, MWL LTMMP). An example of a Soil Vapor Monitoring Inspection Log Form (LTS 2015-005) is available on the 4100 Controlled Documents webpage. (Note: Inspection frequency and the format of inspection forms may vary based on site-specific requirements detailed in applicable permits or regulatory documents.) Deficiencies and repairs shall be documented per site requirements.

## 6.6 Shipping Samples to Laboratory

Take the SUMMA<sup>®</sup> canisters, the completed AR/COC, and a copy of the completed Soil Vapor Sampling Log Form to the SMO for shipment to the laboratory.

## 7.0 WASTE MANAGEMENT

Waste is managed in compliance with SNL/NM Corporate Policy ESH100 Environmental Safety & Health.

## 8.0 QUALITY ASSURANCE

See Section 6.4 for quality assurance equipment setup and sample collection.

## 9.0 DATA MANAGEMENT

After sample analysis, the laboratory will deliver the data package results electronically and/or by over-night mail delivery. The SMO will review and process the electronic data file and the hardcopy data package using the SMO-05-03, Contract Verification Review Procedure and the SMO 05-04, Procedure for Electronic Data Deliverable Processing. Data validation is performed upon the request of the Project Lead using AOP 00-03, Data Validation Procedure for Chemical and Radiochemical Data for the Sample Management Office. The Project Lead is responsible for using professional judgment in evaluating the data quality.

## 10.0 RECORD

Analytical reports will be provided with acceptable quality assurance/quality control. The following records will be maintained at the Customer Funded Record Center:

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- authorized user list
- sampling and analytical results
- field forms
- inspection forms
- logbooks (if applicable).

Sampling results shall be kept electronically in the Environmental Data Management System database. Copies of logbooks (if applicable), authorized user list, field and inspection forms shall be maintained at the CAMU Administrative Trailer for the CAMU, CWL, and MWL per site-specific permits (CAMU and CWL) and the MWL LTMMP. Training records shall be kept electronically in the Training and Employee Development System (TEDS) database. TEDS shall be accessible from the CAMU Administrative Trailer.

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## 11.0 REFERENCES

AOP 00-03, “Data Validation Procedure for Chemical and Radiochemical Data for the Sample Management Office”, SNL/NM, Sample Management Office, (latest edition).

New Mexico Environment Department (NMED), March 2012. “New Mexico Solid Waste Rules, Solid Waste Management Act, Article 8 and Article 9, Solid Waste Rules 20.9.2 – 20.9.10 NMAC”. New Mexico Environment Department Solid Waste Bureau, Santa Fe, New Mexico.

New Mexico Environment Department (NMED), January 2015. Resource Conservation and Recovery Act Facility Operating Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Hazardous and Mixed Waste Treatment and Storage Units and Post-Closure Care of the Corrective Action Management Unit,” New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico,

PLA 04-01, “Health and Safety Plan for the CAMU Containment Cell”, SNL/NM, Environmental Programs and Assurance, (latest edition).

SMO-05-03, “Contract Verification Review Procedure”, SNL/NM, Sample Management Office, (latest edition).

SMO 05-04, “Procedure for Electronic Data Deliverable Processing”, Sample Management Office, (latest edition).

SNL PHS # SNL05A01119 “CAMU Containment Cell Monitoring”, SNL/NM, (latest edition).

SNL PHS # SNL06A00497 “Vadose Zone Monitoring at the Mixed Waste Landfill”, SNL/NM, (latest edition).

SNL PHS # SNL11A00081 “Environmental Programs Soil Vapor Well Sampling”, SNL/NM (latest edition).

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**Attachment A**  
**Corrective Action Management Unit**  
**Site-Specific Information**

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## **Corrective Action Management Unit (CAMU) Introduction and Background**

Soil moisture monitoring requirements for the CAMU are defined in the Resource Conservation and Recovery Act Facility Operating Permit, EPA ID No. NM5890110518, Attachment H, Section H.5 (NMED January 2015).

Prior to performing work field technicians shall complete/document all required training as indicated in Table 1 of FOP 08-22, *Soil Vapor Sampling, PLA 04-01, Health & Safety Plan for the Corrective Action Management Unit*, and Attachment of the F the Resource Conservation and Recovery Act Facility Operating Permit, EPA ID No. NM5890110518.

### **CAMU Soil Vapor Sampling Network**

The CAMU uses the following two monitoring subsystems to monitor for volatile organic compounds (VOCs) as supplemental data for the CAMU Vadose Zone Monitoring System (VZMS) leak detection program:

**CSS** – The six Chemical Waste Landfill Sanitary Sewer (CSS) vertical monitoring well points are positioned between the CAMU containment cell and the sanitary sewer line. The monitoring well points are approximately 20 feet (ft.) deep. The bottom of each well contains a 2-foot section of galvanized steel screen to support soil vapor sampling. The remaining length is constructed of 2-inch diameter, galvanized steel pipe that protrudes 2 ft. above ground and is sealed with a threaded PVC cap with a sampling port.

**VSA** - The Vertical Sensor Array (VSA) consists of eleven pairs of vertically oriented monitoring locations. Five are located on both the eastern and western margins of the containment cell. The eleventh monitoring location is situated at the northern end of the cell. Each VSA location contains two soil vapor sampling screens that are 5 ft. and 15 ft. beneath the containment cell sub-liner. The soil vapor screens are 1-foot-long by 2-inch diameter and are connected to polyethylene tubing with an inner diameter of 0.25-inches. The tubing extends approximately 50 ft. and terminates at a sampling port located in an above ground enclosure.

### **Equipment Setup and Sampling Procedure**

Figure A-1 shows a general schematic of the vacuum pump, sampling manifold, and SUMMA<sup>®</sup> canister setup for collecting an environmental sample. The vacuum pump is turned on to draw gas from the sampling tubing. The flow valve is opened to allow the gas to flow at a rate compatible with the total sampling time (purge). Record the flow rate to determine when sufficient purge gas has been removed.

The amount of gas to be drawn from the system during the purge should be more than enough to remove the resident gas (the old gas) in the system. The recommended minimum volume of gas

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removal is three sampling tube, well casing if applicable (CSS only), and soil vapor screen volumes. Because minimum purge times are so small, they have been increased to a required purge times that are consistent with historical purge times (ASSOP 04-01, “*Activity Specific Standard Operating Procedure for Active Soil-Gas Sampling Using Method TO-14 at the Corrective Action Management Unit (CAMU)*”, SNL/NM Environmental Restoration Project, November 2001) which meet or exceed the minimum established criteria.

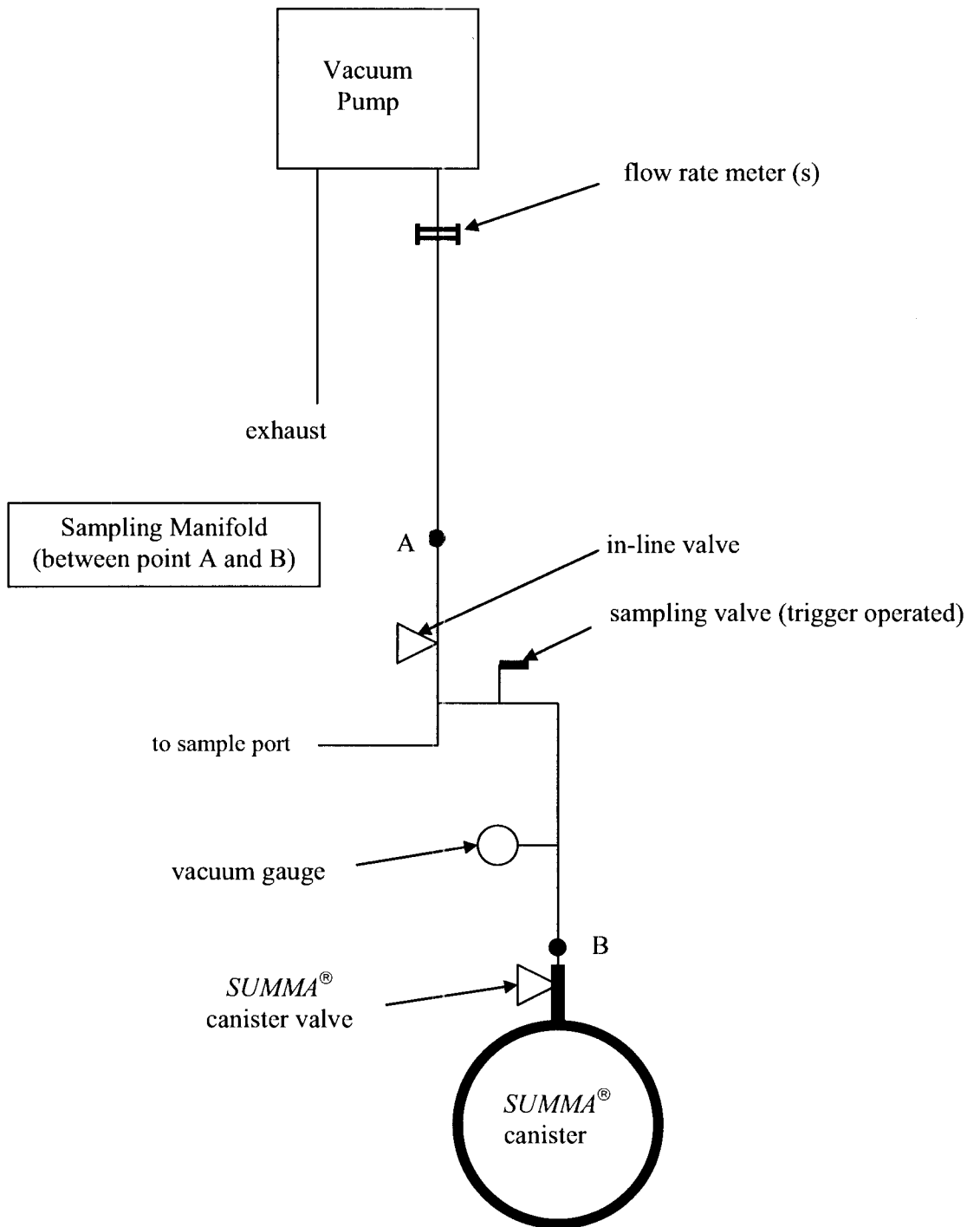
### Detailed procedure

Record the required information on the Soil Vapor Sampling Log Form (LTS 2015-004).

- 1) Connect intake tube of vacuum pump to sampling port.
- 2) Connect sampling manifold to vacuum pump
- 3) Connect sample container (*i.e.*, SUMMA<sup>®</sup> canister) to sampling manifold.
- 4) Close in-line valve and sampling valve.
- 5) Open SUMMA<sup>®</sup> canister valve and record initial vacuum displayed on the vacuum gauge. (Note: The nominal vacuum at SNL/NM, approximate elevation 5,400 feet, is 23 to 25 inches [in] mercury [Hg]).
- 6) Close the SUMMA<sup>®</sup> canister valve.
- 7) Open the in-line valve.
- 8) Apply vacuum to the system by turning on pump and record the start time.
- 9) Purge sampling tube, well casing if applicable (CSS locations only), and soil vapor screen. Use the purge volumes specific and flow rate meter values to calculate the purge times.
- 10) Obtain continuous photoionization detector (PID) measurements from the vacuum exhaust port.
- 11) Wait until the correct volume has been extracted and record the final PID measurement.
- 12) Close in-line valve and turn off vacuum pump. Record stop time (sampling time) and open SUMMA<sup>®</sup> canister valve until the vacuum gauge on the manifold reaches approximately minus 10 in. Hg then close the SUMMA<sup>®</sup> canister valve. Record the ending vacuum. (Note: The analytical laboratory, requests that approximately minus 10 in. Hg of vacuum remain in the SUMMA<sup>®</sup> canister at completion of sampling.)
- 13) Remove manifold from the SUMMA<sup>®</sup>.
- 14) Fill out date and sampling time on sample label and attach it to SUMMA<sup>®</sup> canister tag. Do not attach sample label to canister itself.
- 15) Complete Analysis Request/Chain-of-Custody.

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**Figure A-1**  
**Vacuum Pump, Sampling Manifold, and SUMMA<sup>®</sup> Canister Setup**

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### **Quality Assurance Samples**

The following quality assurance samples shall be collected:

- One trip blank of ultra-pure nitrogen gas collected at a location not affected by the possible contaminant(s) of concern.
- One field blank of ultra-pure nitrogen gas collected at the first sampling location.
- One duplicate sample collected at a CSS location.
- One duplicate sample collected at a VSA 5-ft location.
- One duplicate sample collected at a VSA 15-ft location.

Collect quality assurance samples with an ending vacuum value of minus 10 in. Hg remaining in the SUMMA<sup>®</sup> canisters.

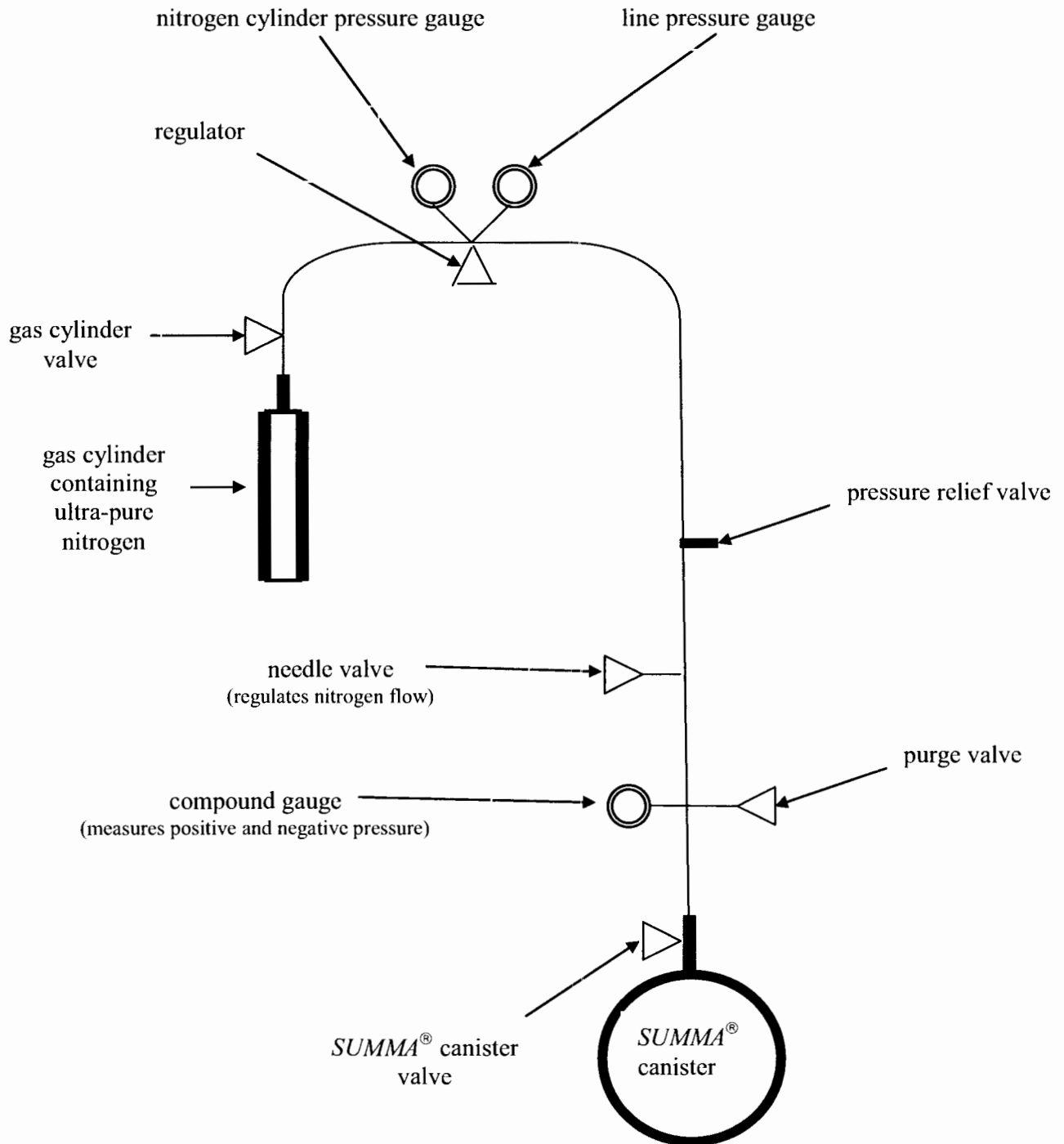
### **Field Blank and Trip Blank Equipment Setup and Sampling Process**

See Figure A-2 for a general schematic of the vacuum pump, sampling manifold, and SUMMA<sup>®</sup> canister setup for collecting field blank and trip blank.

- 1) Close needle valve, purge valve, and regulator.
- 2) Connect regulator manifold assembly to SUMMA<sup>®</sup> canister and cylinder containing nitrogen gas.
- 3) Open nitrogen gas cylinder valve.
- 4) Adjust regulator to 8 pounds per square in. (psi) line pressure.
- 5) Adjust needle valve until compound gauge measures positive 8 psi.
- 6) Close nitrogen gas cylinder valve.
- 7) Open purge valve to purge line.
- 8) Close purge valve when compound gauge measures zero.
- 9) Repeat steps 3 through 8 a total of two times.
- 10) Open nitrogen gas cylinder valve.
- 11) Open SUMMA<sup>®</sup> canister valve.
- 12) Close SUMMA<sup>®</sup> canister valve when compound gauge measures approximately minus 10 in. of Hg (see site-specific attachments for ending vacuum values) .
- 13) Close nitrogen gas cylinder valve.
- 14) Open purge valve.
- 15) Disconnect regulator manifold assembly from SUMMA<sup>®</sup> canister and nitrogen gas cylinder.
- 16) Close needle valve, purge valve, and regulator.

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**Figure A-2**  
**Field Blank and Trip Blank Sampling Regulator Manifold and SUMMA® Canister Setup**

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**Attachment B**

**Chemical Waste Landfill, Mixed Waste Landfill, and Technical Area V**

**Site-Specific Information**

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### **Chemical Waste Landfill (CWL) Background**

Soil vapor sampling at the CWL shall be performed under the New Mexico Environment Department (NMED) approved Post-Closure Care Permit (PCCP) (NMED October 2009 and subsequent revisions), in conformance with the “Soil-Gas Sampling and Analysis Plan,” Permit Attachment 3 (NMED October 2009). In all cases, the requirements of the PCCP Sampling Analysis Plan (SAP) take precedence over those of any other referenced or listed document and/or procedure, including FOP 08-22, *Soil Vapor Sampling*.

Prior to performing CWL soil vapor sampling, field technician must meet all training requirements as specified in the PCCP.

### **CWL Soil Vapor Sampling Network**

The CWL soil vapor sampling network consists of the following five soil vapor monitoring wells: UI-1, UI-2, D-1, D-2, and D-3. The UI designation refers to “Upper Intermediate” indicating the general depth horizon that these wells are designed to sample. The D designation refers to “Deep” and is similarly indicative of the sampling depth interval. There are three soil vapor sampling ports associated with each of the UI series wells and five soil vapor sampling ports associated with each of the D series wells. One soil vapor screen at each sampling depth consists of a 2 feet (ft.) long by 0.31 inches (in.) inner diameter stainless steel screen that is attached to a 0.215 in. stainless steel tube that extends to the surface.

### **Mixed Waste Landfill (MWL) Background**

Soil vapor sampling at the MWL shall be performed under the NMED approved LTMMP (NMED January 2014), and in conformance with the “Soil-Vapor Sampling and Analysis Plan for the Mixed Waste Landfill,” LTMMP Appendix D. In all cases, the requirements of the LTMMP SAP take precedence over those of any other referenced or listed document and/or procedure, including FOP 08-22, *Soil Vapor Sampling*.

Prior to performing soil vapor sampling at the MWL, field technicians shall read the pertinent sections of the LTMMP.

### **MWL Soil Vapor Sampling Network**

The MWL soil vapor sampling network consists of the following five soil vapor monitoring wells: MWL-SV-01, MWL-SV-02, MWL-SV-03, MWL-SV-04, and MWL-SV-05. The soil vapor implant at MWL-SV-01 and MWL-SV-02 consists of a 0.5 ft. long by 0.5 in. diameter stainless steel screen. It is attached to a nominal 0.25 in. diameter polyethylene tube that extends 41 ft. to the ground surface and a sampling port.

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The soil vapor sampling systems at MWL-SV-03, MWL-SV-04, and MWL-SV-05 consists of three Flexible Liner Underground Technologies (FLUTE™) multi-port soil-vapor monitoring wells with five sampling ports per location. Each sampling port consists of FLUTE™ spacer (volume of 0.9 liters) are set at 50, 100, 200, 300, and 400 foot depths and attach to nominal 0.25 in. diameter polyethylene tubing.

### **Technical Area V (TA-V) Background**

Soil vapor monitoring is performed under the NMED issued a Compliance Order on Consent (NMED April 2004) to the United States Department of Energy and Sandia Corporation, and supplement a Corrective Measures Evaluation for the TA-V area of groundwater contamination. In all cases, the requirements of established or approved regulatory-approved work plan requirements for soil sampling take precedence over those of any other referenced or listed document and/or procedure, including FOP 08-22, *Soil Vapor Sampling*.

### **TA-V Soil Vapor Sampling Network**

The TA-V soil vapor sampling network consists of three soil vapor monitoring wells (TAV-SV01, TAV-SV02, and TAV-SV03), with soil vapor sampling ports at depths of approximately 50 ft., 100 ft., 150 ft., 200 ft., 250 ft., 300 ft., 350 ft., 400 ft., 450 ft., and 500 ft. below ground surface. The soil vapor screen at each location consists of a 1-ft. long by 0.5-in. diameter stainless steel screen. It is attached to 0.25 in. outside diameter stainless steel tube that extends to the ground surface and a sampling port.

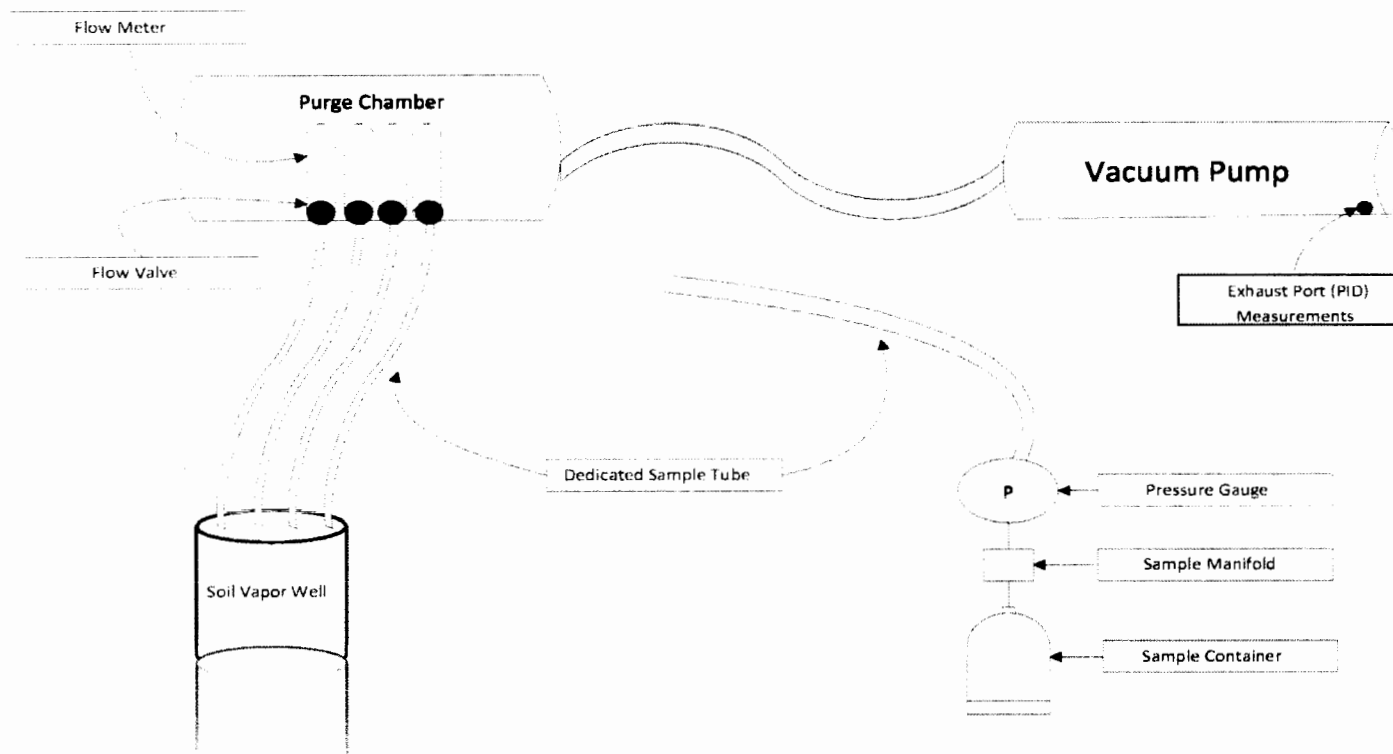
### **Equipment Setup and Sampling Procedure**

The tubing for the sampling system can be assembled by the client or purchased from a vacuum or pressure manufacturer. The geometry of the system is shown in Figure B-1. The tubing for each port is connected to the inlet of the sampling system. The vacuum pump is turned on to draw gas from the sampling tubing. The flow valve is opened to allow the gas to flow at a rate compatible with the total sampling time (purge). Record the flow rate to determine when sufficient purge gas has been removed.

The amount of gas to be drawn from the system during the purge should be more than enough to remove the resident gas (the old gas) in the system. Since the flow in the system may be laminar, it is difficult to remove all of the old gas. Turbulent flow is better in that it removes the gas along the wall more quickly; therefore, based on subject matter expert calculations, equipment shall have the capability for turbulent flow or a minimum drawdown of 0.5 bar (~7.3 psi vacuum), and assuming that laminar flow velocity at the tubing wall is zero.

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**Figure B-1, Vacuum Pump, Sampling Manifold, and SUMMA<sup>®</sup> Canister**

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The recommended minimum volume of gas removal is three tube volumes. The more gas that is purged from the system, the more distant the origin of the gas sampled in the formation. The apparent limit is that the sampling purge volumes withdrawn should not be a significant influence on the natural flow field in the formation between sampling events.

### Detailed procedure

Record the required information on the Soil Vapor Sampling Log Form (LTS 2015-004).

1. Connect purging chamber to vacuum pump.
2. Connect well or port specific sampling tube extension to the sampling system.
3. Connect sample tube to the purge chamber.
4. Apply a vacuum to the system.
5. Open the flow meter to the flow rate compatible with the volume to be extracted and record the start time.
6. Note the vacuum on the pressure gauge (the extraction pressure).
7. Obtain continuous photoionization detector measurements from the vacuum exhaust port (if required).
8. Wait until the correct volume has been extracted.
9. Close the flow valve on the flow meter and record the stop time.
10. Wait until the pressure has recovered to near ambient (optional).
11. Disconnect sample tube from purge chamber.
12. Connect sample manifold to the sample container (e.g., SUMMA® canister).
13. Connect sample tube to the sample manifold.
14. Open the sample container valve and record container pressure on the sample manifold pressure gauge.
15. Open sample manifold valve and let the collection volume fill until the pressure again returns to approximately minus 10 inches of mercury (Hg) (Note: The analytical laboratory, requests that approximately 10 in. Hg of vacuum remain in the SUMMA® canister at completion of sampling).
16. Close the valve on sample container and disconnect from sampling manifold.
17. Repeat steps 3 to 15 at each sample interval.

Additional sampling systems may be used to collect field quality samples including field blank and duplicate samples by simultaneous or in-series collection methods. It is best practice to remove gas remaining in the sample tubing or sampling manifolds any longer than necessary. Each sampling system should be equipped with valves that allow the system to be flushed with an inert gas (e.g., nitrogen gas).

The sampling systems are designed to minimize the dead end volumes in the system on the upstream side of the flow valve (e.g., the pressure gauge connection). This reduces the possible accumulation of old gas in the tubing system and allows a thorough flow of gas during the purge cycle.

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### **Sampling Tube Volume and Purge Time Calculations**

Vapor Well Volume = (V soil vapor screen, or FLUTE™ spacer, or vapor implant + V of sampling tube)

V to purge = 3 \* (Vapor Well Volume)

Minimum pump run time to evacuate three volumes from each sampling port is calculated as follows:

$t = V \text{ to purge} / Q$  where: t = time

V = volume

Q = flow rate (to be determined in the field based on equipment limitations)

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## GROUNDWATER MONITORING HEALTH AND SAFETY PLAN

### PLA 05-09 Revision 07

**Author:** Tim Jackson **Date:** 04-Oct-2014  
Tim Jackson, Staff Member  
Long-Term Stewardship

**Reviewer:** Michael Skelly **Date:** 04 OCT 2016  
Michael Skelly, Staff Member  
Environmental Restoration

**Reviewer:** Don Schofield **Date:** 10/10/2016  
Don Schofield, Staff Member  
Environmental Compliance and Monitoring

**Approved:** Sue Collins **Date:** 10/11/2016  
Sue Collins, Program Lead  
Long-Term Stewardship

<i>Author:</i> How frequently does this document need to be reviewed and/or revised?	Every <b>three</b> years, or when activities change.
<i>Manager:</i> Does this document need to be tracked?	Yes

**EFFECTIVE DATE:** 10/17/2016

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### LIST OF FORMS

<u>EP 2009-ALW</u> – Environmental Planning – <u>Activity Level Work Evaluation Form</u>
<u>EP 2009-AUL</u> – Environmental Planning – <u>Authorized Users List</u>
<u>EP 2009-OJT</u> – Environmental Planning – <u>On-the-Job Training</u>
<u>EP 2009-WRA</u> – Environmental Planning – <u>Work Resumption Authorization Form</u>
<u>LTS 2015-001</u> – <u>Health &amp; Safety Meeting Form</u>
<u>LTS GW-2012-005</u> – <u>Work Request Form</u>

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## REVISION HISTORY

Revision	Effective Date	Summary of Changes
1	10/10/2005	New document
2	08/16/2007	Formatting changes. Updated section 2, Roles and Responsibilities; section 3, Training Qualifications; section 11, References.
3	03/04/2010	Formatting changes. Added work planning and control information to section 6, Task Hazard Analysis. Updated section 3, Training Qualifications; section 11, References.
4	01/24/2012	Formatting changes. Revision history changed from 2 years to 3 years. Removal of some forms (attachments) and replaced with hyperlinks to where the forms can be found. Updated section 3, Training Qualifications; section 11, References.
5	06/16/2014	Revised Work Planning and Controls requirements per Engineered Safety Implementation and included Mixed Waste Landfill Long Term Monitoring and Maintenance Plan HASP reference.
6	01/23/2015	Update sections with current Work Planning and Controls reference, and consistency with other groundwater monitoring documents.
7	10/17/2016	Updates include text format, technical content in various sections, and Health & Safety Meeting form.

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## ACRONYMS AND ABBREVIATIONS

<b>AOP</b>	administrative operating plan
<b>EOC</b>	Emergency Operations Center
<b>FOP</b>	field operating procedure
<b>GMP</b>	Groundwater Monitoring Program
<b>HASP</b>	health and safety plan
<b>KAFB</b>	Kirtland Air Force Base
<b>LOP</b>	laboratory operating procedure
<b>LTS</b>	Long-Term Stewardship
<b>OJT</b>	on-the-job training
<b>PHS</b>	primary hazard screening
<b>PLA</b>	plan
<b>PPE</b>	personal protective equipment
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>SAP</b>	sampling and analysis plan
<b>SNL/NM</b>	Sandia National Laboratories, New Mexico
<b>SMO</b>	Sample Management Office
<b>THA</b>	task hazard analysis
<b>TWD</b>	technical work document

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## 1.0 PURPOSE, GOALS AND OBJECTIVES

Sandia Corporation conducts general groundwater surveillance monitoring for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) at Sandia National Laboratories, New Mexico (SNL/NM). Monitoring is performed on a site-wide basis as part of the Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP). The GMP includes groundwater surveillance and site-specific groundwater monitoring at LTS/Environmental Restoration (ER) Operations sites with ongoing groundwater investigations.

This health and safety plan (HASP) covers groundwater monitoring operations that are detailed in associated regulations, requirements, and technical work documents (TWD) (i.e., administrative operating procedures [AOP], field operating procedures [FOPs], laboratory operating procedures [LOP], sampling analysis plans [SAP], and mini-SAPs).

<b>Purpose</b>	To recognize and anticipate all potential hazards associated with performing groundwater monitoring activities at SNL/NM.
<b>Goals</b>	To perform groundwater sampling and surveillance activities with zero occupational injuries and reportable occurrences. The activities are described in detail in the associated TWDs.
<b>Objectives</b>	To perform work identified in the TWDs for groundwater monitoring activities by: <ul style="list-style-type: none"><li>• Planning work so that potential hazards are recognized and controlled.</li><li>• Following health and safety protocols to prevent hazards to workers and protection of the environment.</li><li>• Executing work <b>only</b> as it is identified and described in the TWDs for groundwater monitoring activities listed in section 3.0. The work shall be performed in a manner that protects personnel from hazards, thus preventing injury.</li><li>• Limiting work activities to authorized and trained personnel.</li><li>• Improving this document and work processes (if necessary) based on feedback from personnel, safety case discussions, and lessons learned.</li></ul>

## 2.0 RESPONSIBLE INDIVIDUALS AND ORGANIZATIONS

The **LTS Program Lead** is responsible for the following:

- Providing programmatic guidance leading to the development of this HASP.
- Budget planning for resources for implementation of this HASP.
- Reviewing and approving of this HASP.

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The **Project Lead** or designee is responsible for the following:

- Reviewing and recommending approval of the HASP.
- Providing overall coordination and management of the groundwater monitoring events.
- Providing regulatory or programmatic requirements.
- Reporting all information as required by regulations or directives.
- Assisting with the revision of this procedure every three years, or as necessary.

The **Field Support Operations Team Leader** is responsible for the following:

- Coordinating with the Department Manager, Project Lead and Field Technicians regarding groundwater sampling activities and the documentation of all required training.
- Supervising the field technicians.
- Providing on-the-job training (OJT) of new field technicians.
- Assigning field technicians (qualified by training and experience) to conduct the activities described in this HASP.
- Providing field technicians with necessary equipment and supplies to conduct field work.
- Reviewing and providing recommendations for revisions to this plan (if necessary).

The **Field Technicians** are responsible for:

- Stopping work if any operation threatens worker or public health and safety.
- Conducting tasks as described in the TWDs.
- Completing all necessary and required training as specified by the field support operations project leader.
- Conducting a health & safety meeting prior to the start of all field activities.
- Participate in the work Planning and Controls process, including the safety case discussions.
- Inspecting and maintaining equipment.
- Collecting, storing, and delivering samples to the Sample Management Office (SMO) in accordance with the SMO TWDs.
- Managing and disposing of waste as directed by completed Work Request Forms, and the field support operations project leader.
- Performing project inspections in accordance with associated TWDs.
- Completing and reviewing field documentation forms.
- Providing recommendations for revisions to this plan (if necessary).

### 3.0 TRAINING QUALIFICATIONS

Personnel conducting field activities shall complete all training required to perform work under this FOP and in accordance with site-specific permits and the Mixed Waste Landfill Long-Term Monitoring & Maintenance Plan:

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- Read applicable sections of SNL/NM Corporate Policy ESH100 Environment Safety & Health.
- Read applicable site-specific training (*i.e.*, PHS, health and safety plan, etc.).
- Read applicable sections of site-specific permits and SAPs, and comply with the related training program requirements.
- Read and sign ALW 13-01, Activity Level Work Evaluation Form for the Groundwater Program.
- Read and sign AOP 95-16, *Sample Management and Custody*.
- Read and sign LOP 94-03, *Sample Handling, Packaging and Shipping*.
- Read and sign FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements*.
- OJT for new field personnel performing groundwater monitoring activities if it pertains to any of the FOPs listed below. Document training by completing On-the-Job Training form (EP 2009-OJT).
- Read and sign FOP 03-02, *LTS Groundwater Level Data Acquisition and Management*. (**Note:** The training requirements denoted with an "\*" in Table 3.1 below are all that are required for FOP 03-02.).
- Read and sign FOP 05-02, *Groundwater Monitoring Equipment Field Check*.
- Read and sign FOP 05-03, *Groundwater Sampling Equipment Decontamination*.
- Read and sign FOP 05-04, *Groundwater Waste Management Plan*.
- Read and sign FOP 09-05, *Conducting Slug Test Using Data Logger & Pressure Transducer* (only necessary if conducting slug test).
- Read and sign FOP 10-01, *Borehole and Downhole Well Video Inspection*. (**Note:** The training requirements denoted with an "\*" in Table 3.1 below are all that are required for FOP 10-01).
- Field personnel shall sign the Authorized Users List (EP 2009-AUL) to affirm they have read and understand this document, and agree to operate within the stated constraints.
- Complete training courses listed in Table 3.1.

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**Table 3.1 Training Course List**

Course Code	Course Title
CHM100	Chemical Safety
CHM103	Site Specific Chemical Safety
ELC105	Basic Electrical Safety (> 50 volts)
ENV100	OSHA Health & Safety Basic Training – General Worker (40 HR)
ENV103	OSHA Health & Safety Training Refresher (8 HR)
ENV112	Hazardous Waste & Environmental Management Training
ENV216	RCRA - Less Than 90-Day Area Accumulation Area for Owners & Emergency Coordinators
ENV416	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers - Site-Specific
ESH100	ES&H Awareness
FKL153	Forklift Operator and Hands-On Training
MCH200	Hand and Power Tool Safety
MED102	Standard First Aid
MED104	Heartsaver CPR
OTS101	Occupational Thermal Stress
PKX050	Site Specific Packaging and Transportation of Hazardous Materials Training
PKX100	Basic Hazardous Material Transportation Training
PPE106	Personal Protective Equipment Training
PRS150	Pressure Safety Orientation
PRS250	Advanced Pressure Safety
RAD102	General Employee Radiological Training

**NOTES:**

- CPR = Cardiopulmonary Resuscitation
- ES&H = Environment, Safety and Health
- HR = hour
- OSHA = Occupational Safety and Health Administration
- RCRA = Resource Conservation and Recovery Act

**4.0 SCOPE OF WORK**

The scope of work covered by this HASP **only** includes the activities as they are identified and described in the TWDs listed in Section 3.0. This HASP **shall not** be utilized for any other work without the explicit authorization from the field support operations project leader or higher authority.

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## 5.0 PERSONAL PROTECTIVE EQUIPMENT

Personnel are required to wear the personal protective equipment (PPE) identified by the task hazard analysis described in Section 6.0. Level D PPE will be the minimum level of protection for all activities (Table 6.1).

## 6.0 TASK HAZARD ANALYSIS

All activities associated with this HASP shall be covered by the PHS. Activity Level Work Evaluation Form, EP 2009-ALW, was completed and approved according to PRG 15-01, *Work Planning and Controls*, and documented in the groundwater program safety case (ALW 13-01).

Task hazard analyses (THA) have been performed on all groundwater activities in conjunction with PHS SNL05A01241, *LTS Groundwater Monitoring Activities*. The PHS helps identify potential hazards that can be expected when performing the work. The THA classifies the potential hazards and rates them based on the probability of occurrence (Table 6.1). The THA identifies control measures that will be used to mitigate the potential hazards (Table 6.1). The control measures may include courses and training that are identified as part of the PHS results. This approach to identifying, rating, and controlling hazards is consistent with SNL/NM's Integrated Safety Management System. The hazards ratings are low for all activities identified in groundwater monitoring activities. Field technicians shall comply with PLA 13-02 during groundwater activities at the Mixed Waste Landfill, applicable FOPs when performing groundwater monitoring, in addition to requirements listed in this HASP.

Groundwater monitoring activities occur at various monitoring wells located on Kirtland Air Force Base (KAFB) and SNL/NM. The following is a list of activities performed:

- Equipment decontamination.
- Calibration of monitoring equipment.
- Collecting a depth-to-water measurement.
- Lowering of pumps and or monitoring equipment (camera, data logger, water level meter).
- Operating pumping equipment to purge the well (or sample line).
- Monitoring (measuring) chemical properties of water.
- Operating pumping equipment to fill sample bottles.
- Raising pumping equipment after samples have been collected.
- Raising monitoring equipment.
- Managing samples.
- Managing waste water.
- Performing borehole and downhole well video inspections of monitoring wells.
- Performing slug tests at monitoring wells.
- Performing data logger monitoring at monitoring wells.
- Documenting all activities.

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**Table 6.1. Task Hazard Analysis - Level of Protection – Level D PPE (safety shoes/boots, chemical safety goggles)**

Potential Hazard	Hazard Rating	Control
<p><b>Chemical</b></p> <ol style="list-style-type: none"> <li>1) Decontamination of pump tubing using a diluted nitric acid (HNO<sub>3</sub>) rinse and a detergent rinse.</li> <li>2) Groundwater containing volatile organic compounds (VOCs), nitrates &amp; nitrites.</li> <li>3) Sample preservatives include sodium hydroxide (NaOH), hydrochloric acid (HCl), HNO<sub>3</sub>, zinc acetate, and sulfuric acid (H<sub>2</sub>SO<sub>4</sub>). Standardized solutions include Zobell solution, potential of hydrogen (pH) buffers, electrical conductivity solution.</li> <li>4) Spill of liquids (water) during operation of drum handler.</li> <li>5) Generation of hot water and steam during equipment decontamination activities.</li> </ol>	Low	<p>Wear chemical safety goggles and latex or nitrile gloves when handling potential chemical hazards. Portable eyewash is located in sampling vehicle. No eating, drinking, and smoking will be permitted around sampling operations. All purge water is treated as a non-regulated waste (based on process knowledge of prior sampling) until analytical results show otherwise.</p> <p>Material Safety Data Sheets (MSDSs) kept in sampling vehicle or obtained through the SNL/NM Chemical Information System.</p> <p>Discharging (dumping) drums requires mandatory 2-person team and follows guidance in the equipment manual provided by the manufacturer.</p> <p>Use of steam cleaning equipment requires a mandatory 2-person team and follow guidance in the equipment manual provided by the manufacturer.</p>
<p><b>Mechanical</b></p> <ol style="list-style-type: none"> <li>1) Motorized reel for raising and lowering groundwater monitoring equipment.</li> <li>2) Hydraulic lift on back of sampling vehicle.</li> <li>3) Operation of forklift.</li> <li>4) Operation of drum handler.</li> <li>5) Operation of field vehicles</li> </ol>	Low	<p>Be aware of potential pinch points. Do not wear loose fitting clothing, dangling badges or jewelry when operating this equipment.</p> <p>Keep equipment within maintenance schedule and compliance. Keep current with training requirements. Requires use of "spotter" personnel when deemed necessary for safe operations.</p>

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**Table 6.1. Task Hazard Analysis - Level of Protection – Level D PPE (safety shoes/boots, chemical safety goggles) (concluded)**

Potential Hazard	Hazard Rating	Control
Physical <ol style="list-style-type: none"> <li>1) Heat exhaustion &amp; hypothermia.</li> <li>2) Sunburn.</li> <li>3) Lifting injury from equipment, pumps, and 55-gallon drums containing purge water.</li> <li>4) Operation of water level meter (shoulder strain).</li> <li>5) Lowering and raising groundwater monitoring equipment (back strain).</li> <li>6) Slips, trips, and falls.</li> <li>7) Tools.</li> </ol>	Low	<ol style="list-style-type: none"> <li>1) Weather conditions are addressed in Health &amp; Safety Meeting. Workers trained on heat exhaustion &amp; hypothermia. Wear appropriate clothing and hydrate as necessary.</li> <li>2) Provide workers with sunscreen.</li> <li>3) Use proper lifting techniques. Utilize hydraulic lift on back of sampling vehicle and a forklift with a SNL/NM approved drum handler.</li> <li>4) Use water level meter support device.</li> <li>5) A motorized reel is used to lower and raise the pump.</li> <li>6) Maintain proper housekeeping of work area. Use step stools.</li> <li>7) Use correct tools and inspect them prior to use.</li> </ol>
Radiological	Low	There are no radiological hazards associated with routine groundwater monitoring activities.
Fire	Low	Fire extinguishers are located in mobile equipment.
Biological <ul style="list-style-type: none"> <li>• Snakes, rodents, insects</li> </ul>	Low	Care will be taken to observe that the well casings pose a potential for insects and other animals. Immediate area around wells will be kept clean and places of refuge for biological hazards minimized.

## 7.0 WORK PRACTICES

The following work practices will be enforced:

- All personnel must comply with Occupational Safety and Health Administration, U.S. Department of Energy, and SNL/NM requirements regarding health and safety.
- No task will be performed until a PHS and THA has been prepared and reviewed with the personnel performing the task.
- All personnel must conduct their activities in a manner pursuant to the contents of this HASP.
- A health & safety meeting will be held prior to starting the day's sampling activities.
- Any unnecessary contact with potentially contaminated substances must be avoided. This includes contact with potentially contaminated surfaces and/or equipment.
- Eating, drinking, smoking, chewing gum or tobacco, or any other hand-to-mouth activities are prohibited in the sampling vehicle lab.

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- A “buddy system” is implemented for all groundwater sampling activities. A “buddy system” is defined as a system of organizing personnel into work groups in such a manner that each member of the work group is designated to be observed by at least one other member in the group. The purpose of the “buddy system” is to provide rapid assistance to sampling personnel in the event of an emergency. In addition, a person is required to report his/her destination when leaving the other team member(s).
- All members of the sampling crew will carry a cell phone or portable radio capable of contacting the Emergency Operations Center (EOC).
- All members of the sampling crew will carry an EOC pager so they can be notified of any KAFB emergencies or weather alerts.
- An ABC fire extinguisher will be located in each of the field sampling vehicles.
- An eyewash device will be located in each of the sampling vehicles.
- A First Aid kit will be located in each of the sampling vehicles.

## 8.0 HEALTH & SAFETY MEETING

A field technician or field support operations project leader must conduct a health safety meeting and fill out a Health & Safety Meeting Form prior to the start of groundwater sampling activities. The person conducting the meeting must possess knowledge of groundwater sampling activities and the topics discussed in this HASP. All personnel/visitors who attend the meeting must document that they have attended and understood the meeting by signing the Health & Safety Meeting Form.

## 9.0 SHUTDOWN OF WORK ACTIVITIES

All individuals have the authority to shutdown groundwater monitoring activities if they feel that safety is being compromised. A shutdown could be the result of the following:

- Personnel not following health and safety protocols.
- Not having the appropriate safety gear on site (eyewash, first aid kit, fire extinguisher, appropriate PPE).
- Inadequate equipment or equipment failure.
- Weather
  - If lightning is observed within 5 miles (25 seconds from time of flash to thunder) or the EOC issues a lightning warning (via EOC pager).
  - High winds (greater than 40 miles per hour).
  - Severe snow storms (discretion of sampling crew).
  - Severe rain storms (discretion of sampling crew).
  - Severe heat or cold (discretion of sampling crew).
  - Tornado warnings (via EOC pager).
- Unsafe conditions around sampling location (discretion of sampling crew).

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- 
- Any unsafe condition(s) noted during performance of groundwater monitoring activities or off-normal events.

In the event that work is stopped due to:

- Safety-related issues,
- an injury incurred while performing the tasks identified in this procedure, or
- as the result of an audit,

the field technicians shall immediately notify the project coordinator, field support operations project leader, the project leader, and the department manager. The field technicians shall seek the assistance of the field support operations project leader for the mitigation of the hazard and the completion of a Work Resumption Authorization Form (EP 2009-WRA) as required by PRG 15-01, *Work Planning and Control*. The department manager shall sign the completed form prior to the restart of work.

## **10.0 EMERGENCY RESPONSE PLAN**

During groundwater monitoring activities, the potential for fire, explosion, or unplanned release of radionuclides or RCRA regulated hazardous waste or waste constituents that would significantly threaten human health or the environment is very low. In the unlikely event of an emergency, the SNL/NM EOC will provide coordination, resources, and appropriate emergency equipment on an as-needed basis. In case of an emergency:

- Stop work.
- Alert other personnel in the affected area.
- Evacuate the immediate area.
- Notify the appropriate resources or points of contact listed in Table 10.1.

**Table 10.1. Points of Contact and Emergency Telephone Numbers**

<b>Resources and Contact</b>	<b>Telephone Number</b>
SNL/NM Incident Command System (Fire, Ambulance, etc.)	911 (505-844-0911 from cell phone)
SNL/NM Medical Clinic	845-8159
SNL/NM Non-Emergency Number	311 or 844-6515
Poison Control Center	272-1222
Sandia Security / Key Service	North: 844-4657 South: 845-3114
ES&H concerns	844-6515
National Response Center (Environmental Emergencies)	800 822-9761
<b>Personnel to Notify if an Incident Occurs</b>	
SNL/NM Staff Member Tim Jackson	office: 284-2547 mobile: 263-6639
SNL/NM Staff Member Michael Skelly	office: 284-2483 mobile: 270-5170
SNL/NM Staff Member Don Schofield	office: 844-4088 mobile: 259-7098
SNL/NM Department Manager Darrell Fong	office: 284-6357 mobile: 506-6632
Center 4100 ES&H Coordinator Noel Duran	office: 284-9707 mobile: 270-8822

**10.1 Directions to SNL/NM Medical Facilities**

From Technical Area I (TA-I) proceed to Harding Boulevard and/or Wyoming Boulevard. On Hardin Boulevard proceed west to Wyoming Boulevard. Turn right (north) on Wyoming Boulevard and travel north to F Street. Turn right (east) on F Street and proceed to 7<sup>th</sup> Street. The medical facility is located at the west end of Building 831 at the intersection of F and 7<sup>th</sup> Streets.

From Technical Area II (TA-II) proceed to East Ordnance Road. Proceed west on East Ordnance Road to Wyoming Boulevard. Turn right (north) to F Street. Turn right (east) on F Street and proceed to 7<sup>th</sup> Street. The medical facility is located at the west end of Building 831 at the intersection of F and 7<sup>th</sup> Streets.

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From **Tijeras Arroyo** proceed to the Landfill Road. Proceed southwest on Landfill Road to Pennsylvania Street. Turn right on Pennsylvania Street and travel northwest to Wyoming Boulevard. Turn right (north) on Wyoming Boulevard and travel north to F Street. Turn right (east) on F Street and proceed to 7<sup>th</sup> Street. The medical facility is located at the west end of Building 831 at the intersection of F and 7<sup>th</sup> Streets.

See Attachment A for Emergency Routes to SNL/NM Medical Clinic location map.

## 11.0 REFERENCES

Sandia National Laboratories, Corporate Policy ESH100 Environment Safety & Health, SNL/NM.

Sandia National Laboratories, Sample Management Office, AOP 95-16, *Sample Management and Custody* (latest edition), SNL/NM.

Sandia National Laboratories, Sample Management Office, LOP 94-03, *Sample Handling, Packaging and Shipping* (latest edition), SNL/NM.

Sandia National Laboratories, Environmental Programs and Assurance Department, FOP 03-02, *Long Term Environmental Stewardship Water Level Data Acquisition and Management* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, FOP 05-02, *Groundwater Monitoring Equipment Field Check for Water Quality Measurements* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, FOP 05-03, *Groundwater Monitoring Equipment Decontamination* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, FOP 05-04, *Groundwater Monitoring Waste Management* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, FOP 09-05, *Conducting Slug Test Using Pressure Transducer and Data Logger* (latest edition), SNL/NM.

Sandia National Laboratories, Environmental Programs and Long-Term Stewardship, FOP 10-01, *Borehole and Downhole Well Video Inspection*, (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, PLA 13-02, *Mixed Waste Landfill Long-Term Monitoring and Maintenance Health & Safety Plan* (latest edition), SNL/NM.

Sandia National Laboratories, Environmental Programs and Assurance Department, PHS SNL05A01241, *Long Term Environmental Stewardship Groundwater Monitoring Activities* (latest edition), SNL/NM.

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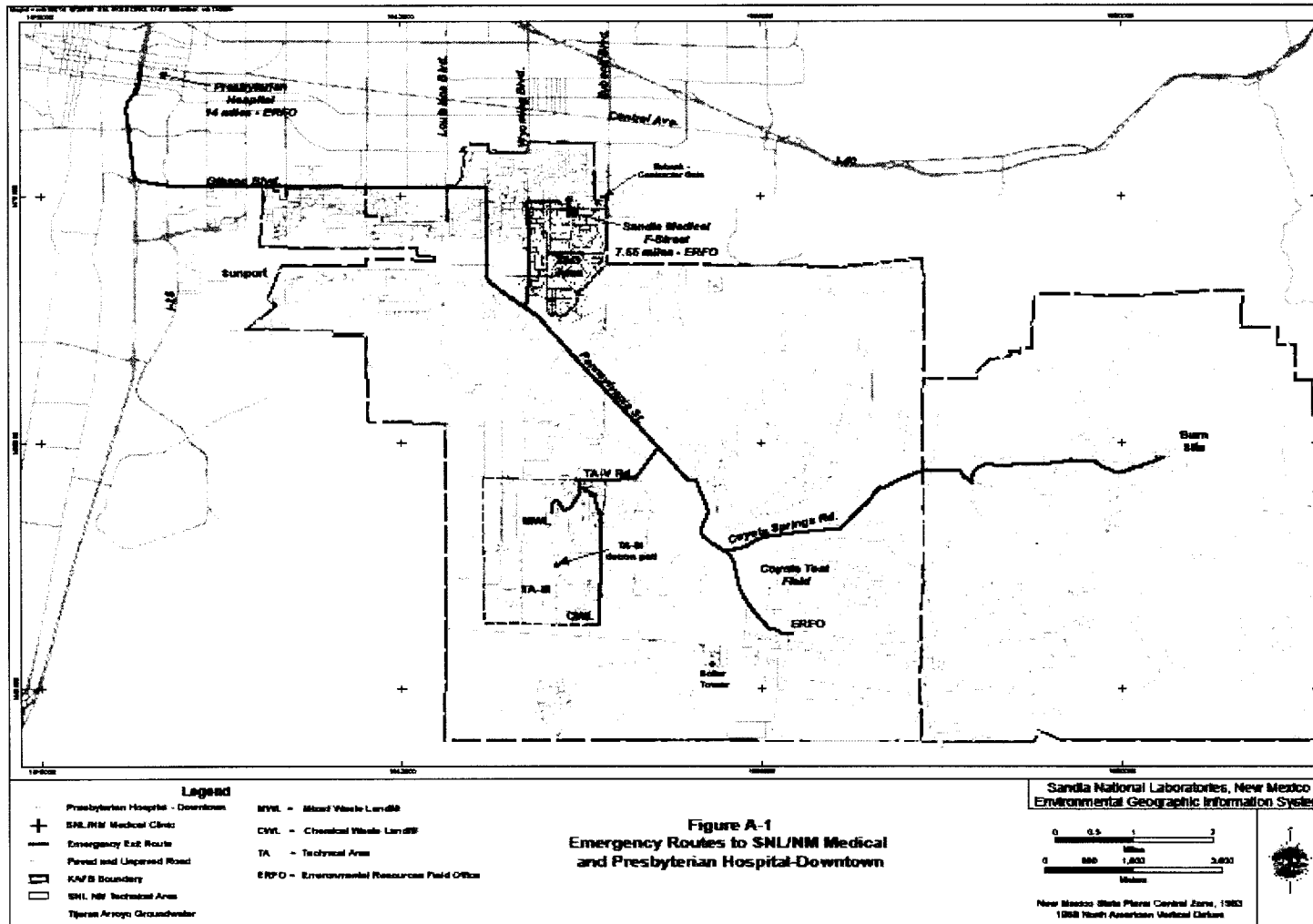
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## **Attachment A**

### **SNL/NM Medical Facilities Location Map**

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SANDIA NATIONAL LABORATORIES  
ANALYTICAL SERVICES PROGRAM

QUALITY ASSURANCE PROJECT PLAN for the  
SAMPLE MANAGEMENT OFFICE

SMO-QAPP  
Revision 4

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<b>Author:</b> How frequently does this document need to be reviewed and/or revised?	Every 3 years
<b>Manager:</b> Does this document need to be tracked?	Yes

EFFECTIVE DATE: October 17, 2016

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## REVISION HISTORY

Revision	Effective Date	Summary of Changes
0	December 18, 2003	New document.
1	March 28, 2007	Compare previous revision for changes.
2	April 9, 2010	Compare previous revision for changes.
3	November 12, 2013	Updated language to reflect current program elements and requirements. Attachments were revised.
4	October 17, 2016	Updated functional responsibilities and references to reflect current program elements and requirements. Attachments were removed.

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## ACRONYMS AND ABBREVIATIONS

AIS	Assurance Information System
AOP	Administrative Operating Procedure
APHA	American Public Health Association
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
CFRC	Customer Funded Records Center
CRM	Compliance and Requirements Management
CVR	Contract Verification Review
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U. S. Department of Transportation
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
ES&H	Environment, Safety and Health
IATA	International Air Transportation Administration
ISO	International Organization for Standardization
LOP	Laboratory Operating Procedure
LQAP	Laboratory Quality Assurance Plan
NNSA	National Nuclear Security Administration
OP	Operating Procedure
PE	Performance Evaluation
POC	Point of Contact
OSHA	Occupational Safety and Health Administration
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RPPM	Radiological Protection Procedures Manual
RPSD	Radiation Protection Sample Diagnostics
SAP	Sampling and Analysis Plan
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
SMO	Sample Management Office
SOW	Statement of Work
SPF	Sample Packaging Facility
TEDS	Training Education and Development System

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## **1.0 INTRODUCTION**

### **1.1 General Information**

This document provides the quality assurance (QA) requirements for activities performed by the Sandia National Laboratories, New Mexico (SNL/NM) Sample Management Office (SMO). Part A contains program elements and requirements from U.S. Department of Energy (DOE) Order 414.1D Admin Chg 1, *Quality Assurance*, and the Code of Federal Regulations (CFR), 10 CFR 830 Subpart A, *Nuclear Safety Management, Quality Assurance Requirements*, and meets Corporate Process CG100.6, *Ensure Quality Outcomes*. Part B of this Quality Assurance Project Plan (QAPP) provides information that conforms to U.S. Environmental Protection Agency (EPA) QA/R-5, *EPA Requirements for Quality Assurance Project Plans*. Additional QA guidance is provided in other QA documents from SMO customer programs, (i.e., Long-Term Stewardship, Environmental Restoration, Environmental Systems, Waste Management, Environmental Compliance and Monitoring, Industrial Hygiene, Dosimetry, and facilities Decontamination and Demolition programs). These documents are upper-tier documents to this QAPP. Waste management documents include, radioactive, mixed, and hazardous waste protocols.

The mission of the SMO is to provide centralized management of samples and analyses performed by contract laboratories. The primary QA objective of the SMO is to ensure that data is of adequate technical quality and content to meet programmatic data quality objectives (DQO).

For the purpose of this QAPP the words “other programs” mean various Waste Management, Environmental Monitoring, Facilities Decontamination and Demolition, and other sampling programs at SNL/NM.

## **2.0 PART A: PROGRAM REQUIREMENTS**

### **2.1 Criterion 1, Program**

#### ***2.1.1 Background, Purpose, Scope, and Ownership***

The purpose of Part A of this document is to meet requirements of QA activities within SNL/NM. This QAPP provides guidance for other QAPPs or lower-tier plans and procedures written to meet project specific requirements as identified by external regulators. Lower tier activities either fall within the scope of this QAPP, or are covered by an appropriate QA program.

The SMO coordinates with customers to have samples analyzed for potential contaminants. Data from high-quality analyses is essential for environmental regulatory decision-making and critical for data defensibility. Commercial laboratories under contract to SMO perform analysis of

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samples. The SMO is responsible for procuring the contracts and continuously monitoring the data deliverables (both hardcopy and electronic) for compliance with contract and customer requirements. In order to assess the technical performance of the contract laboratories, performance evaluation samples are evaluated and periodic audits are performed. The SMO conducts contract verification review, electronic data processing, and manages the data validation process in accordance with Sandia National Laboratories (SNL) procedures. Additionally, the SMO provides sample packaging services, acts as the liaison between programs and the contract laboratories, and provides sample information management and data base maintenance for sample tracking and analytical results. Other tasks performed by the SMO may include sampling planning and coordination and sampling services.

Although the SMO provides sample and data management, it is not the owner of the samples or data. The final disposition of samples and data is the responsibility of the programs that generate the samples.

During the lifetime of this QAPP, it is anticipated that some of the requirements and procedures of the SMO may change. This QAPP will be updated every three years, and changes provided to appropriate customers as required for information, review, concurrence, or approval. The SMO owns this document. The SMO is responsible for preparing, revising, and distributing this document as necessary.

### **2.1.2 Applicability**

This document applies to all SMO activities as outlined in Section 2.1.1.

The requirements set forth in this QAPP are applicable to personnel involved in the SMO as SNL/NM employees or as contractors. Sub-contracted activities are to be done in accordance with contract requirements, this QAPP, or covered by an appropriate QA program.

### **2.1.3 Requirements**

SNL applicable policies, procedures, regulatory requirements, and DOE guidance that must be considered when planning and implementing activities can be found in this QAPP or other program QAPPs.

### **2.1.4 Functional Structure**

Position titles, lines of authority, and management processes including planning, scheduling, and providing resources for work can be found in SNL Facilities and Human Resources corporate processes and procedures: [FAC100.1](#), [HR100.1](#), and [HR100.2](#).

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### **2.1.5 Functional Responsibilities and Levels of Authority**

SMO personnel are responsible for adherence to requirements in this QAPP that are applicable to their specific task(s). Each individual has an obligation to identify and act towards resolving conditions adverse to quality.

#### **SMO Operations Manager / Program Leader**

- Acts as liaison to DOE and National Nuclear Security Administration/Sandia Field Office (NNSA) regarding sample management program issues.
- Provides programmatic guidance leading to the development of this QAPP.
- Develops and maintains the *SNL/NM Contract Statement of Work (SOW) for Analytical Laboratories* that meets customer requirements.
- Responsible for the operations and activities conducted within the SMO.
- Works with the customer to develop technical criteria for analytical services and data usability and selecting analytical methods to meet customer DQO requirements.
- Develops, refines, and integrates processes and tools used to keep SNL in compliance with applicable regulations.
- Provides technical review of proposals/SOW(s), oversees ongoing performance following contract award(s), and manages external validation contracts.
- Develops and implements initiatives to ensure that adequate data quality is maintained. These initiatives include, but are not limited to, internal quality documents, laboratory guidance documents, laboratory auditing, and general oversight functions.
- Point of Contact (POC) for assessment activities within their scope of authority
- Is a member of the Compliance and Requirements Management (CRM) Group. Provides independent QA support to the Radiation Protection Sample Diagnostics (RPSD) laboratory as well as supports the overall development and implementation of quality processes that will ensure data quality and data integrity within the analytical services program.
- Participates in the review of investigations of unexpected or anomalous data and the establishment of corrective actions.
- Interfaces with management and regulatory compliance personnel to proactively ensure that data products meet or exceed programmatic requirements.
- Supervises and guides personnel who implement day-to-day SMO functions which includes the Sample Packaging Facility (SPF).
- Prepares and provides presentations at required program meetings and technical conferences.

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- Retrieves, organizes, and delivers environmental data and other information as required to support site investigations, regulatory compliance reporting, and period reports to external customers and agencies.
  - Develops, reviews, and approves program documents, plans, and operating procedures as required.
  - Works with the Analytical Services Program Leader and RPSD Operations manager with setting cost, schedule, and performance goals for analytical laboratory support.
  - Notifies management of activities that could adversely affect Environment, Safety and Health (ES&H) or Department objectives.
  - Participates in customer and sponsor program meetings as required.
  - Provides oversight of Information Technology projects in support of the program and Department objectives.

### **CRM Staff**

- Develops and maintains the SMO QAPP.
- Reviews updates to regulatory methods, SNL corporate requirements, and DOE guidance documents, such as the DOE/Department of Defense (DoD) Consolidated Quality Systems Manual (QSM), and implements changes as necessary to remain current and to assure efficient program development.
- Provides guidance and expertise in the areas of QA/quality control (QC) relating to operations of the SMO.
- Interfaces with the Records Management Coordinator for maintenance of project documentation, and resolving record management concerns for storage and maintenance of sampling and analysis records.
- Facilitates implementation of QA requirements for the SMO.
- Assists in developing and reviewing SMO procedures.
- Reviews non-conformances and initiates corrective actions.
- Reviews updates to analytical methods, SNL corporate requirements, and DOE guidance documents, such as the DOE/DoD Consolidated QSM, and implements changes necessary to remain current and to assure efficient program development.
- Assists SMO management to determine needs and priorities for assessments.
- POC for Assurance Information System (AIS) and tracks items as needed; maintains SMO assessment and oversight database.
- Interfaces with AIS Assessment Subject Matter Experts to address questions and issues on assessments.
- Develop and manage metrics to track program performance. Provide a summary of QA metrics to Program Leader for the SMO metrics report.

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- Ensure that QA assessments of the data validation contractor and laboratories are conducted on a systematic basis.

### **SMO Project Coordinator**

- Manages contractor laboratory services, including procurement, acting as the Sandia Delegated Representative, reviewing routine performance assessments, and conducting general laboratory oversight.
- Provides technical review of proposals/statement of work(s), and oversees ongoing performance following contract award(s), and manages external validation contracts.
- Works with the customer to develop technical criteria for analytical services and data usability and selecting analytical methods to meet customer DQO requirements.
- Acts as a POC between Customer/Project Leaders and the analytical laboratories.
- Schedules projects with contract laboratories.
- Creates, or reviews and approves project bottle orders to obtain appropriate sample containers from a vendor or analytical laboratory.
- Notifies analytical laboratories of any QA, environmental, safety, health, and sample matrix requirements regarding sample handling, preparation, and analysis.
- Resolves problems, issues, non-conformances, and errors for projects with regard to analytical data.
- Performs contract verification review (CVR) to ensure appropriate QC analyses have been performed in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*.
- Performs QC of data entered into the SMO database.
- Performs electronic data QC and transfer.
- Processes and follows-up on any data package corrections, both hardcopy and electronic.
- Provides technical guidance and information, as required.
- Reviews, verifies, and processes proformas and invoices from contractors.
- Updates procedures.

### **SMO Staff**

- Provides financial management support to the SMO by partnering with the center financial analyst and Program/Project Leaders.
- Tracks project/task expenditures.
- Ensures compliance with the *SMO Data Management Plan*, Administrative Operating Procedure (AOP) 95-44.

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- Tracks and maintains sample information and performing QC on Analytical Request Chain of Custody.
  - Receives and processes data packages.
  - Manages data flow and data storage, including both hardcopy paper records from field activities and analytical laboratories, and electronic data relating to sample tracking or analytical results.
  - Reconciles data coordination QA concerns with Customer/Project Leaders, other SMO staff, analytical laboratories, etc.
  - Performs data entry including processing corrections.
  - Provides backup project status reports.
  - Submits records requests to the SNL Customer Funded Records Center (CFRC).
  - May assist in day-to-day operations of the SMO SPF, including the distribution of bottle orders and providing de-ionized water.

#### **SMO Database Administrator**

- Designs, operates, and maintains the SMO database.
- Reviews and implements improvements to system performance and system design, and determines the need for changes to the design.
- Performs system backup and restoration functions.
- Ensures that sufficient quality checks are in place to maintain the integrity of the SMO sample information management and analytical result databases.
- Develops new forms and reports with the Data Administrator and customers.
- Resolves error messages generated by Oracle™.
- Establishes user accounts, passwords, and privileges within Oracle™.
- Submits requests to administrative and support staff to establish new user accounts on the Local Area Network.
- Assists the SMO Operations Manager in developing electronic data deliverable (EDD) specifications for incorporation into the *SNL/NM Contract SOW for Analytical Laboratories*.
- Interfaces with SNL corporate computing regarding computer operations.

#### **SMO Packaging Coordinator**

- Executes day-to-day operations of the SMO SPF, including the distribution of bottle orders and providing de-ionized water.
- Maintains the SPF.
- Logs in and packages samples for shipment to off-site analytical laboratories.

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- 
- Develops and maintains sample packaging procedures and operations in accordance with *Sample Handling, Packaging and Shipping*, Laboratory Operating Procedure (LOP) 94-03.
  - Ensures samples are properly stored and packaged for shipment to the analytical laboratories in accordance with this QAPP, DOE, U.S. Department of Transportation (DOT), and International Air Transportation Administration (IATA) regulations.
  - Ensures that sample custody is properly maintained and documented in accordance with this QAPP and related Operating Procedures (OPs).
  - Interfaces and coordinates with SNL/NM Shipping, Radiation Protection Operations, and other SNL/NM on-site organizations.
  - Maintains facilities for preparation and return of samples.

### **Contract Laboratories**

- Develops and maintains QA programs and procedures that meet the *SNL/NM Contract SOW for Analytical Laboratories*.
- Performs analyses in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*.
- Promptly communicates anomalies or results adverse to quality to the SMO.
- Provides data in accordance with format requirements in the *SNL/NM Contract SOW for Analytical Laboratories*.

### **Laboratory Oversight/Data Validation Contractor**

- Performs laboratory oversight as directed by the SNL/NM SMO.
- Conducts visits to and technical system audits of contractor laboratories to ensure compliance with *SNL/NM Contract SOW for Analytical Laboratories*.
- Performs data validation in accordance with the applicable procedures.
- Communicates non-compliance issues to the SMO Operations Manager / Program Leader and/or SMO Project Coordinator(s).
- Verifies implementation of laboratory corrective action plans.

#### **2.1.6 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

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## **2.2 Criterion 2, Personnel Training and Qualification**

### **2.2.1 Requirements**

SMO personnel shall be trained and qualified to ensure they are capable of performing their assigned work. Training and qualification must be specific to the types of tasks performed. Personnel shall be provided continued training as required to ensure that job proficiency is maintained. Training shall be updated to meet required frequency schedules when specified. Training requirements and qualification shall be documented. Requirements can be found in SNL Corporate Policy System, the SNL corporate Training Education and Development System (TEDS) database, or activity-specific operating procedures.

Training may consist of formal classroom training, on-line web training, or on-the-job training. Training requirements for SMO specific tasks are listed in the activity-specific procedures. All other training requirements are tracked in the TEDS corporate system.

### **2.2.2 Responsibilities**

SMO personnel are responsible for adherence to training requirements stipulated in this QAPP and in applicable sub-tier documents. SMO personnel are required to read all applicable procedures and acknowledge electronically they understand these documents.

SMO management is responsible for committing resources to facilitate the qualification and training processes, for defining qualification and training requirements for personnel applicable to their specific task(s), and for ensuring personnel meet appropriate requirements.

### **2.2.3 Personnel Qualification or Certification**

Specific qualifications or certifications identified in requirement sources such as, but not limited to, DOE, DOT, and IATA orders and regulations, shall be included in the training program. An assessment of the education, experience, and any special physical capabilities that are required for a job shall be completed and the requirements shall be included in personnel criteria for job selection.

### **2.2.4 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.3 Criterion 3, Quality Improvement**

### **2.3.1 Requirements**

Quality improvement requirements are included in all SMO processes. Requirements include establishing and implementing the following:

- Continuous customer feedback and open communication between SMO personnel, customers, and contract laboratories.
- Processes to detect and prevent quality problems.
- Methods that identify, control, and correct data, services, and process that do not meet established requirements.

### **2.3.2 Compliance with Requirements**

Assessments, quality checks, and other performance measures provide the mechanisms to demonstrate that items, services, or processes meet their requirements within the SMO.

SMO is responsible for:

- Assisting in interpretation and clarification of appropriate regulations, orders, policies, and standards.
- Providing guidance on project-specific QA matters (i.e., acceptance criteria and verification of program efficiency and implementation) to ensure quality requirements are met.
- Ensuring that QA deficiencies are properly recognized, documented, and resolved.

#### **2.3.2.1. Detection and Prevention Process**

Detection and prevention processes used for quality improvement shall include:

- Periodic review and update of the *SNL/NM Contract SOW for Analytical Laboratories* and other SMO documents.
- Feedback from staff, and internal and external customers to identify potential problems and to initiate corrective actions.
- Tracking of all quality issues from each aspect of the sample life cycle to monitor for trends.
- Frequent project meetings to review QA information and data analyzed to identify areas needing improvement.
- Management assessments as discussed in Section 2.9.
- Internal assessments as discussed in Section 3.4.

### **2.3.2.2. Identification, Control, and Correction of Problems**

Several types of documents and procedures shall be used for identifying, controlling, and correcting problems for quality improvement. These documents include:

- Corporate Corrective Action Procedures CG100.6.1, Manage Risks and CG100.6.6, Determine and Take Action
- *DOE NNSA Model SOW for Analytical Laboratories*
- *SNL/NM Contract SOW for Analytical Laboratories*
- Contract Laboratory QA Plans (LQAPs)
- *Procedure for Completing the Contract Verification*, SMO-05-03
- *Data Validation Procedure for Chemical and Radiochemical Data for the Sample Management Office*, AOP 00-03
- Other AOPs, Sampling and Analysis Plans (SAP), and Health and Safety Plans.

### **2.3.3 Review and Analysis of Information to Generate Improvements**

Quality problems and other quality-related information, both positive and negative, from various internal and external sources, should be reviewed and analyzed by the CRM Group to identify improvement opportunities in the quality management system, processes, items, products, or services. Implemented improvements will be reviewed annually during the management assessment (see Section 2.9) to ensure their continuing suitability and effectiveness.

### **2.3.4 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.4 Criterion 4, Documents and Records**

### **2.4.1 Requirements**

The SMO shall maintain documents and records to demonstrate QA/QC activities and to provide support for possible evidential proceedings. The configuration of documents should be managed in accordance with AOP 09-11 Radiation Protection, Waste Management, and ES&H Administrative Operating Procedure, Document Control or a similar program process. Records that provide documentary evidence of quality shall be specified, prepared and maintained in accordance with SNL/NM record-keeping procedures. SMO analytical data packages shall be transferred to the customer as well as to the CFRC for cataloging and storage in accordance with SNL Corporate Policy, IM100, Information Management & Cyber Security, DOE requirements, and the document control requirements of International Organization for Standardization (ISO) 9001 and ISO 14001.

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### **2.4.2 Compliance with Requirements**

Documents and records shall be reviewed to assure conformance with general corporate or organizational policies. The *SNL/NM Contract SOW for Analytical Laboratories* should be reviewed and updated as needed. This QAPP and applicable data review procedures shall be reviewed and updated to reflect significant changes every three years or as needed. Other relevant documents should be reviewed and updated as needed.

### **2.4.3 Documents and Records for Interfacing Organizations**

Documents and records of interfacing organizations may include those imposed on the SMO, such as those described in the *Radiological Protection Procedures Manual (RPPM)* (MN471016) or those specified in the *SNL/NM Contract SOW for Analytical Laboratories*.

### **2.4.4 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.5 Criterion 5, Work Processes**

### **2.5.1 Requirements**

SMO management and customers shall agree upon SMO work scope and processes. SMO processes are well-defined for those activities whose failure can lead to undesirable consequences. Work is documented in lower tier documents and procedures (Section 4.0). Suspect/Counterfeit control requirements do not apply to SMO processes. Also, SMO processes do not require QA review of Safety Software. Additional information can be found in Section 3.0 Part B of this QAPP.

### **2.5.2 Compliance with Requirements**

OPs and desk instructions shall be used for routine work. Controlled copies of OPs and desk instructions shall be readily available to all personnel. Work activities shall be documented and records maintained. Administrative controls shall be implemented as a part of these processes to ensure that the likelihood of failure of the activities is appropriately small. Additional information can be found in Section 3.0 Part B of this QAPP.

### **2.5.3 Work Processes for Interfacing Organizations**

The work process procedures performed by interfacing organizations are governed by the following documents:

- RPPM
- ES&H Center Procedures
- Procurement documents
- Environmental Permits
- *SNL/NM Contract SOW for Analytical Laboratories.*

### **2.5.4 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.6 Criterion 6, Design**

### **2.6.1 Requirements**

SMO processes do not include design tasks and are not subjected to these requirements.

### **2.6.2 Compliance with Requirements**

SMO processes do not include design tasks and are not subjected to these requirements.

### **2.6.3 Design for Interfacing Organizations**

Formal design activities are typically done as contracted activities. Design work, including changes, must incorporate applicable requirements and design bases.

### **2.6.4 Supporting Documents**

SMO processes do not include design tasks and are not subjected to these requirements.

## **2.7 Criterion 7, Procurement**

### **2.7.1 Requirements**

The SMO follows SNL corporate QA policies and procedures provided by the Sandia Purchasing Organization. Procurement documents shall include QA requirements. SMO laboratory and data validation contracts are designated “Quality Significant” according to SCM100.2.11, *Acquire*

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*Quality Significant Items.* Contracts for major or stand-alone activities may either include a program specific to the contracted activity or may rely on the contractor's own QA program. If separate QA programs are used, they must be reviewed and approved by the SMO and must include the appropriate grading for the activity. If the contracting documents do not specify a QA program to be followed, the SMO QA program is required.

### **2.7.2 Compliance with Requirements**

The SNL Procurement Center follows applicable Procurement Instructions and relevant SNL corporate policies and procedures for procuring property, materials, and services. These policies cover the following areas:

- Procurement documents,
- Supplier qualification,
- Supplier monitoring,
- Nonconformance and corrective action,
- Inspection, and
- Product documentation.

SMO procurements also adhere to these processes and the required grading requirements.

The SMO, in conjunction with SNL/NM Purchasing, manages analytical and data validation services contracts in support of other programs. SMO develops the SOW for analytical services based on customer requirements, generates requests for proposals, and develops scoring criteria with SNL/NM Purchasing. The SMO reviews and scores laboratory qualifications and coordinates pre-award assessments, as required. The SMO makes laboratory selection based on best value for both technical and price criteria with concurrence of SNL/NM Purchasing. After contracts are placed, SMO monitors laboratory performance through periodic assessments, performance evaluations, and ongoing data review. The SMO is responsible for cost accounting and financial management for all contracted services provided to the other programs through the SMO.

The *SNL/NM Contract SOW for Analytical Laboratories* contains details and requirements for analytical services provided to SNL/NM by contract laboratories.

### **2.7.3 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.8 Criterion 8, Inspection and Acceptance Testing**

### **2.8.1 Requirements**

Inspection and testing of specified items, services, and processes shall be conducted using established acceptance and performance criteria aligned with contractual and customer requirements.

Acceptance requirements for analytical data are discussed in Part B, Section 3.5, Data Validation and Usability.

### **2.8.2 Compliance with Requirements**

The SMO receives sampling kits (sample bottles and coolers) from the contract laboratories per the requirements described in the *SNL/NM Contract SOW for Analytical Laboratories*. The sampling kits are requested using a bottle order. Sampling kits are inspected on receipt by the SMO staff using the criteria described on the original bottle order. Containers and analytical data shall be inspected as outlined in Part B, Section 3.3.8 and Section 3.5.

All equipment used by the SMO shall be properly maintained and inspected prior to use. Equipment requiring calibration will be calibrated in accordance with the manufacturer's instructions against known standards that are traceable to a national standard such as National Institute of Standard and Technology, if available. Malfunctioning equipment shall be clearly identified as being out of service and shall not be returned to service until it is demonstrated that the equipment is functioning properly in accordance with the manufacturer's instructions.

The SMO will monitor contract laboratory services in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*.

### **2.8.3 Inspection and Acceptance Testing by or for Interfacing Organizations**

Laboratory instrument and equipment testing, inspection, and maintenance are addressed in Part B, Section 3.3. The SMO shall verify the adequacy of contractor inspection and testing procedures during the assessment process.

### **2.8.4 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.9 Criterion 9, Management Assessment**

### **2.9.1 Requirements**

SMO staff, as well as management personnel from programs using SMO services, shall assess SMO processes. Problems that hinder the SMO from achieving its objectives shall be identified and documented. Management assessment shall include appropriate conclusions and suggest corrective actions if applicable. Management assessments shall be conducted in accordance with CG100.6, Ensure Quality Outcomes, CG100.6.19, Conduct Management Review and Manage Issues.

### **2.9.2 Compliance with Requirements**

SMO staff and appropriate management personnel are responsible for management assessments and the documentation of results. The SMO shall provide assessment information to management personnel from programs using SMO services with appropriate conclusions and corrective actions as needed in compliance with corporate requirements.

### **2.9.3 Supporting Documents**

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **2.10 Criterion 10, Independent Assessment**

### **2.10.1 Requirements**

The SMO shall promote the independent assessment process by assigning appropriate personnel to assist in any independent assessment and shall track and correct any non-conformances identified during this process in compliance with CG100.6, Ensure Quality Outcomes CG100.6.3, Determine, Plan and Perform Assessments, and the SNL/NM Contract SOW for Analytical Laboratories.

### **2.10.2 Compliance with Requirements**

The determination of SMO processes to be examined is to be made by the requesting management. Independent assessments of processes shall be performed in accordance with a process defined by the applicable management program in compliance with CG100.6, Ensure Quality Outcomes. Independent assessments shall be planned and conducted to measure item and service quality, to measure the adequacy of work performance, and to promote improvement. The group performing independent assessments shall have sufficient authority and freedom from

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the line to carry out its responsibilities. The group shall also have access to the appropriate SMO management and staff.

### ***2.10.3 Assessments Performed by External Organizations***

Independent assessments may be performed periodically by a variety of independent groups outside of SMO. These assessments may be a part of other program's QA to assess operations and work processes.

### ***2.10.4 Supporting Documents***

Supporting documents are listed in Section 4.0. These are normative documents or may demonstrate compliance with QA requirements.

## **3.0 PART B: DATA REQUIREMENTS**

### **3.1 Data Acquisition**

The SMO has the primary responsibility of ensuring that the quality of the data generated for sampling programs meet data quality requirements necessary to demonstrate compliance with DOE requirements and local, state, and federal environmental regulations. This QAPP addresses applicable elements from EPA QA/R-5 as they apply to the SMO and contract laboratories.

### **3.2 Project Management**

Project management and applicable information from EPA QA/R-5 is addressed in Section 2.0 of this QAPP.

### **3.3 Data Generation and Acquisition**

#### ***3.3.1 Sampling Process Design***

The DQO process provides a means of defining the appropriate quality of the data required to support environmental projects. Other programs define DQOs and ensure that they are met. The SMO is responsible for incorporating necessary and applicable requirements into the *SNL/NM Contract SOW for Analytical Laboratories* so that the other program's DQOs are met.

#### ***3.3.2 Sampling Method Requirements***

After DQOs are developed for a particular activity, appropriate sampling strategies must be established. The SMO provides guidance to customers on sampling strategies.

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Sampling plans are the responsibility of other programs and would address the types of samples, locations and frequency, matrices, and measurement parameters, and DQOs. Further discussion of sampling method requirements is presented in customer field operating procedures and activity-specific SAPs.

### **3.3.3 Sample Handling and Custody Requirements**

The SMO shall have procedures that address the sample handling and custody requirements that apply to SMO-specific tasks or activities. These procedures will be readily available to all SMO personnel handling samples. The SMO shall ensure staff is trained in and follow the sample handling and custody requirements.

Each analytical laboratory participating in the analysis of SNL/NM SMO customer samples shall have LOPs that address activities related to sample custody (such as receiving, storing, and disposing of samples and maintaining the chain-of-custody records). The LOPs will be readily available to all appropriate laboratory personnel.

The analytical laboratories are solely responsible for lawful disposal of samples after the sample storage requirement is fulfilled. Detailed sample handling and custody requirements are discussed in the current revisions of the *Sample Management and Custody* procedure, AOP 95-16, and *SNL/NM Contract SOW for Analytical Laboratories*.

### **3.3.4 Analytical Methods**

Analytical, extraction, and other preparation methods are selected and specified in accordance with the DQOs and are identified in the *SNL/NM Contract SOW for Analytical Laboratories*. A general requirement is that industry-standard methods, such as EPA SW-846 (Third Edition), EPA 600 series methods, Occupational Safety and Health Administration (OSHA) methods, American Society for Testing and Materials (ASTM) methods, and Standard Methods of the American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF) are used where possible. Laboratory specific applicable standard methods are used when appropriate or SNL/NM approved, laboratory specific methods may be substituted. New methods may be developed when required. All analytical methods must be pre-approved by the SNL/NM SMO, documented in a laboratory-approved LOP, and performed as specified in a controlled laboratory setting. Analytical results (organic, inorganic, radiochemical, and miscellaneous analytes) and non-analytical data shall be reported in the units consistent with the specified method.

The SMO shall verify that the analytical laboratories follow the *SNL/NM Contract SOW for Analytical Laboratories* as it pertains to Standard Methods. The standard methods requirements

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are discussed in the *SNL/NM Contract SOW for Analytical Laboratories*, EPA SW-846 and other EPA documents, OSHA, ASTM, and APHA documents.

All analytical laboratories will maintain controlled copies of approved LOPs for each analytical method or general procedure in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*.

### **3.3.5 Quality Control**

Laboratory analytical activities shall be subjected to QC checks using QC samples. QC sample requirements are specified in the *SNL/NM Contract SOW for Analytical Laboratories*, LQAPs, LOPs, and in the published test method.

### **3.3.6 Instrument/Equipment Testing, Inspection, and Maintenance**

Each analytical laboratory shall have procedures that address activities related to instrument/equipment testing, inspection, and maintenance. Laboratory equipment shall be inspected, tested, and maintained in accordance with LOPs, LQAPs, and the *SNL/NM Contract SOW for Analytical Laboratories*.

Analytical laboratory preventive maintenance activities shall be documented, and the records maintained in accordance with LOPs, LQAPs, and the *SNL/NM Contract SOW for Analytical Laboratories*.

### **3.3.7 Instrument/Equipment Calibration and Frequency**

Each laboratory shall have procedures that address instrument/equipment calibration and frequency requirements. Instruments shall be calibrated in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*, LOPs, LQAPs, and applicable analytical test method.

### **3.3.8 Inspection/Acceptance of Supplies and Consumables**

The SMO shall ensure staff is trained in sampling kit (sample containers and cooler) requirements. SMO shall inspect sampling kits to determine that they are undamaged, match the project-specific bottle order, and meet any other specific written requirements associated with AOP 95-16 and the *SNL/NM Contract SOW for Analytical Laboratories*. Any errors or damage to shipping containers will be addressed in accordance with AOP 95-16, the *SNL/NM Contract SOW for Analytical Laboratories*, and procurement policies.

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### **3.3.9 Non-direct Measurement**

Data and information gathered from sources outside the SMO or gathered from any source that was not collected under an approved QA program appropriate to that used for SMO shall not be approved for SMO use. Indirect measurement data reported by contract laboratories, as a result of data produced through direct measurements, shall be reviewed and designated usable from the laboratory if all other QC associated with the direct measurement data are acceptable.

### **3.3.10 Data Management**

The SMO tracks sample data generated from field, shipping, analysis, data review, and validation activities. SMO data management functions include tracking sample shipments to the analytical laboratories, tracking supporting and analytical data returned from the analytical laboratories, and cost accounting associated with sample analysis and data validation. The SMO receives and tracks both hardcopy data and EDD files from the analytical laboratories. The EDD file is checked for accuracy and compared to hardcopy data in accordance with SMO *Procedure for Electronic Data Deliverable (EDD) Processing*, SMO-05-04 and the *SNL/NM Contract SOW for Analytical Laboratories*. When data is manually entered, the hardcopy data is used and verified.

The SMO shall verify that the laboratories follow the *SNL/NM Contract SOW for Analytical Laboratories* as it pertains to data management. The analytical laboratory certifies the laboratory-generated data in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*, EPA SW-846, or other applicable standard methods. A summary report that includes analytical and QC results is prepared and approved by the analytical laboratory. Data packages shall conform to contract or procedural requirements. Data may also be validated by independent review as described in Part B, Section 3.5.

Data shall be managed through the Environmental Data Management System and the Sample Tracking and Analytical Results (STAR) database in accordance with the current revision of the *SMO Data Management Plan*, AOP 95-44, *SMO Procedure for Completing the Contract Verification*, SMO-05-03, *SMO Procedure for Electronic Data Deliverable (EDD) Processing*, SMO-05-04, and in the *SNL/NM SMO Data Validation Procedure for Chemical and Radiochemical Data for the Sample Management Office*, AOP 00-03.

## **3.4 Assessment and Oversight**

Management and QA personnel shall complete assessments of QA related activities done at various levels in the SMO organization. Assessments include but are not limited to surveillance(s), data audit or assessment(s), system audits, limited-scope audits, management review(s), or readiness review(s).

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Management assessments are addressed in Part A, Section 2.9 of this QAPP. For additional details, see CG100.6, *Ensure Quality Outcomes*, and Criterion 3, Section 2.3, requirements in this QAPP.

### **3.4.1 Assessment and Response Actions**

The SMO assessment/surveillance teams shall include personnel with the necessary expertise and knowledge of SMO processes and laboratory operations to address the requirements established in this QAPP, the *SNL/NM Contract SOW for Analytical Laboratories*, and other relevant documents. The SMO Operations Manager / Program Leader is the POC for assessment activities within their scope of authority, or identifies an individual to be the POC for assessment activities. The lead assessor in conjunction with SMO Operations Manager / Program Leader shall be responsible for the selection of assessment/surveillance team members. Assessors shall be independent of any direct responsibility for performance of the activities that they assess. The assessors shall have the authority to stop work based on quality or safety issues. For additional details, see CG100.6.3 and AOP 04-04 *Radiation Protection, Waste Management, and ES&H Administrative Operating Procedure, Assessments*.

Assessments will be regularly executed as part of SMO routine operations. Surveillances and other assessment activities may be conducted at any time as determined by project requirements or in response to conditions perceived as potentially adverse to quality.

Assessment records shall include worksheets, reports, corrective action requests (if necessary), written replies, and a record of completion of corrective actions.

#### **3.4.1.1 Laboratory Performance Assessment**

Laboratory performance assessments determine the accuracy of laboratory measurement systems and include laboratory audits, evaluation of performance samples (MAPEP, etc...), and data package assessments. Performance assessments shall be conducted as off-site data are generated, reduced, and analyzed. All laboratories providing support to the SNL/NM SMO shall be subject to performance assessment requirements as specified in the *SNL/NM Contract SOW for Analytical Laboratories*. Preliminary assessments should be performed as needed.

Laboratories may be subject to data package assessments at the discretion of SMO. This may be conducted during routine systems assessment or performed as a separate assessment. Additional data package assessments may be performed as deemed necessary by the SMO.

Laboratories shall participate in analysis of performance evaluation (PE) samples or assessment samples as required by the SMO, DOE, EPA, and/or the State of New Mexico performance evaluation programs (if required in the future). In addition, laboratories may be subject to the submission of PE samples from the SMO at any time in response to a corrective action, to evaluate the performance of a new method, or other non-routine situations. Analysis results should be compared to predetermined or calculated acceptance limits. Records of performance

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evaluation samples shall be maintained and any problems shall be identified, corrective actions taken and performance re-evaluated prior to analysis of additional applicable samples.

#### **3.4.1.2 Laboratory System Assessment**

System assessments verify the application of the QA system and evaluate the level of compliance with the system. System assessments for SMO cover laboratory activities and final reports. Work areas, activities, activity documentation, and QA/QC procedures and the effectiveness of their implementation shall be evaluated. All analytical laboratories providing support to the SNL/NM SMO shall be subject to system assessment requirements as specified in the SNL/NM *Contract SOW for Analytical Laboratories*.

For a new laboratory, prior to implementation of off-site analytical services contracts, a pre-award assessment of the laboratory(s) may be performed. Laboratory system assessments during the course of a contract may include an on-site visit to the analytical laboratory(s) by SNL/NM representatives or designees.

Technical assessments to verify adherence to requirements as stated in the *SNL/NM Contract SOW for Analytical Laboratories* may be conducted on all laboratories generating data used for regulatory compliance and decision-making purposes.

#### **3.4.1.3 Assessment Documentation**

Assessment results shall be formally documented by personnel and reported by the SMO Operations Manager / Program Leader in accordance with the *SNL/NM Contract SOW for Analytical Laboratories* and relevant project requirements. In the event that the lead assessor is not the SMO Operations Manager / Program Leader, the SMO Operations Manager / Program Leader shall review and approve the assessment report. An assessment report contains any observations, findings, and associated corrective actions. Assessment reports shall be maintained as part of the program files and archived in the SNL CFRC when the contract has ended. Assessment and surveillance reports are considered public documents.

#### **3.4.1.4 Response Actions**

The results of assessments shall be entered into a corrective action system in compliance with CG100.6, *Ensure Quality Outcomes*.

In addition, personnel shall be responsible for identifying and reporting deficiencies and initiating the corrective action process. Documentation of nonconforming items or processes should typically be on a nonconformance record or other forms intended to detail the circumstances of the deviation.

The responsibility for monitoring the quality of analytical systems lies with contract analytical laboratory personnel. All corrective activities resulting from deficiencies occurring at the analytical laboratory shall comply with the LQAP and the *SNL/NM Contract SOW for Analytical*

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*Laboratories.* Additionally, the analytical laboratory shall notify the SMO of the deficiency and, if possible, identify potential causes and corrective action.

Deficiencies shall be reported and corrective action initiated by the SMO or contracted analytical laboratories if any of the following conditions arise:

- Specific requirements of the analysis method or LOPs are not met,
- Data quality measurements for precision, accuracy, and completeness are not achieved, or
- Lab data review indicates that data are incomplete, that improper calculations were performed, incorrect methodology or technique was employed, or that an instrument malfunction has occurred.

When corrective actions are required, it shall be the responsibility of the analytical laboratory to provide a Corrective Action Report that details planned action to correct the findings and a schedule for completion. The SMO Operations Manager / Program Leader, or designee, shall document that assessment findings are resolved and that the appropriate corrective actions have been implemented in a timely manner. The SMO Operations Manager / Program Leader shall attempt to resolve any disagreements or disputes related to assessment or surveillance findings. Root cause analysis shall be completed to identify the actions necessary to prevent recurrence of the condition whenever the SMO Operations Manager / Program Leader decides that the severity or recurrence of a deficiency indicates it is needed. If a satisfactory resolution cannot be reached, the issue shall be elevated to the next level of contract analytical laboratory management.

See Part A, Sections 2.9 and 2.10 of this QAPP and applicable AOPs for further details on the methods by which deficiencies are identified and corrected.

### **3.4.2 Reports to Management**

Management shall be kept apprised of project status and events impacting quality, through the semi-annual SMO Metrics Report. Open channels of communication shall be fostered among SMO staff, customers, and management at all times. Regularly scheduled SMO staff and management meetings include a discussion of quality activities.

The SMO shall provide reports of results of any QA/QC activities and documentation associated with the handling, shipping, and analysis of samples to the Customer/Project Leaders.

The SMO Operations Manager / Program Leader shall ensure that management and customers are kept informed of, and have access to, results of system and performance assessments and data-package review activities. Any programmatic QA issues identified that adversely affect the quality of data generated shall be reported by CRM Group to management and the SMO Operations Manager / Program Leader.

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### **3.5 Data Validation and Usability**

This section discusses guidelines for assessing data quality. QA protocols are presented for data reduction, verification, validation, and reporting activities performed as part of the SMO function.

See applicable AOPs and activity-specific QAPPs for further details on data validation and usability.

#### ***3.5.1 Data Review, Verification, and Validation***

Procedures for assessing data quality, data reduction, verification, validation, and reporting activities shall comply with applicable requirements described as part of EPA SW-846 and other Standard Methods, LQAP, LOPs, the *SNL/NM Contract SOW for Analytical Laboratories*, and AOPs.

##### **3.5.1.1 Laboratory Data Review**

The analytical laboratory shall complete quality reviews of all data packages as specified in the *SNL/NM Contract SOW for Analytical Laboratories* prior to submitting them to the SMO.

The SMO shall verify that the contract analytical laboratories follow the *SNL/NM Contract SOW for Analytical Laboratories* relative to laboratory data review. See EPA SW-846 and other Standard Methods, LQAP, LOPs, the *SNL/NM Contract SOW for Analytical Laboratories*, and AOPs for further details on laboratory data review and reduction requirements.

##### **3.5.1.2 Laboratory Data Verification and Validation**

The specific criteria to be reviewed in the analytical laboratory data verification and validation process depend on the sample matrix, analytical method, and applicable regulatory requirements. The initial responsibility for monitoring the quality of analytical data lies with the analytical laboratory. The laboratory shall verify that all QC procedures specified for each analytical method are followed and that the results of QC check sample analyses are within the acceptance criteria established for the method. When results are not within control limits, corrective actions shall be taken according to EPA SW-846 and other Standard Methods, the *SNL/NM Contract SOW for Analytical Laboratories*, the LQAP, LOPs, or SMO directive.

The SMO shall verify that the analytical laboratories follow the *SNL/NM Contract SOW for Analytical Laboratories* relative to laboratory data verification and validation. See EPA SW-846 and other Standard Methods, LQAP, LOPs, and the *SNL/NM Contract SOW for Analytical Laboratories* for further details on the laboratory data verification and validation requirements.

SMO personnel are responsible for data verification and editing upon receipt of the data package. A CVR is conducted in accordance with SMO-05-03, *Procedure for Completing the Contract*

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*Verification.* The CVR checks completeness and compliance of the sample custody and laboratory report documentation, examines sample management and custody, and checks technical, QC, and reporting requirements imposed upon the analytical laboratory through the *SNL/NM Contract SOW for Analytical Laboratories*. The CVR checklist provides the SMO with a record of analytical laboratory performance on each data package and allows for SMO tracking of reported deficiencies, correction requests, and problem resolutions. The SMO, using the results from the CVR, monitors the performance of contracted analytical laboratories and, in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*, adjusts payment.

The SMO shall perform a QC check on the EDD and process the file for loading into the analytical results database. This review is performed using SMO-05-04, *Procedure for Electronic Data Deliverable (EDD) Processing*. During the EDD processing, the file is compared to the hardcopy data to ensure accuracy and checked for compliance with the EDD Specification found in the *SNL/NM Contract SOW for Analytical Laboratories*. The SMO documents deficiencies, requests corrections, and resolves EDD problems.

The SMO shall perform data validation if requested to do so by the customer, using AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data*. This AOP provides instructions for the qualification (known as validation) of common laboratory analytical data. This procedure is used to determine the quality and usability of chemical (organic and inorganic) and/or radiochemical analytical data acquired in support of other programs. This procedure generally follows the guidelines and approach presented in the *EPA Contract Laboratory Program (CLP) Functional Guidelines*, and in EPA SW-846 and other standard methods, with modifications made to address analyses requested by the other programs. A data validation report shall be completed by the SMO that includes information regarding the overall quality of the data and the resulting data qualifiers. Data validation qualifiers are then imported into the analytical results database.

Qualification of data performed under the data validation procedure (AOP 00-03) does not preclude the qualification of data by the analytical laboratories due to unexpected analytical uncertainty, nor does the validation review replace any data usability review for specific project use. For details on site-specific verification/validation requirements, see activity-specific QAPPs and SAPs.

### **3.5.1.3 Data Reporting**

Analytical laboratory-generated data shall be reported on EDD and in hard-copy data reports as requested. All analytical laboratory data report packages for each type of analysis shall contain a case narrative that summarizes the laboratory analysis for the given set of samples. Complete data packages include sample data, QC summaries, and additional supporting data needed to perform data validation. Laboratory reporting requirements and report format shall be in accordance with the *SNL/NM Contract SOW for Analytical Laboratories*.

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The SMO shall verify that the analytical laboratories follow the *SNL/NM Contract SOW for Analytical Laboratories* as it pertains to data reporting. Details on tracking data and entering it into the appropriate databases are presented in the *SMO Data Management Plan, AOP 95-44*, and the *SMO Procedure for Electronic Data Deliverable (EDD) Processing, SMO-05-04*, and other programs, procedures, and documents.

All laboratory analytical reports shall be archived by the SNL CFRC.

### ***3.5.2 Reconciliation with User Requirements***

Customer/Project Leaders shall review and analyze analytical laboratory-generated data prior to use and inclusion in reports. If sample results are unusable, they cannot, by definition, be used in the decision making process. If sample results that are critical to the decision making process are unusable, a determination must be made as to whether or not re-analysis or re-sampling is possible. Sample results that have restricted usability must be used cautiously in the decision making process with their restrictions clearly defined. The SMO shall work closely with analytical contract laboratories and customers to assure that laboratory-generated data meets DQOs and other data needs and that they are sufficient to support any decisions made.

## 4.0 SUPPORTING DOCUMENTS AND REFERENCES

AOP 95-16, *Sample Management and Custody*, current revision.

AOP 95-44, *SMO Data Management Plan*, current revision.

AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data for the Sample Management Office*, current revision.

AOP 04-04, *Radiation Protection, Waste Management, and ES&H Administrative Operating Procedure, Assessments*, current revision.

AOP 09-11, *Radiation Protection (RP), Waste Management (WM), and Environment, Safety, and Health (ES&H) Administrative Operating Procedure, Document Control*, current revision.

CG100.6, *Ensure Quality Outcomes*.

CG100.6.1, *Manage Risks*.

CG100.6.3, *Determine, Plan and Perform Assessments*.

CG100.6.6, *Determine and Take Action*.

CG100.6.19, *Conduct Management Review and Manage Issues*.

ESH100.2.RAD.1, *Implement Radiation Protection Procedures, MN471016, Radiological Protection Procedures Manual*, current revision.

FAC100.1, *Plan Real Property Assets*.

HR100.1, *Acquire Talent*.

HR100.2, *Develop the Workforce*.

IM100, *Information Management & Cyber Security*.

LOP 94-03, *Sample Handling, Packaging and Shipping*, current revision.

SCM100.2.11, *Acquire Quality Significant Items*.

SNL/NM, *Contract Statement of Work for Analytical Laboratories*, current revision.

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SMO-05-03, *Procedure for Completing the Contract Verification*, current revision.

SMO-05-04, *Procedure for Electronic Data Deliverable (EDD) Processing*, current revision.

DOE O 414.1D Admin Chg 1, *Quality Assurance*, 2013.

DOE NNSA, *Model Statement of Work for Analytical Laboratories*, current revision.

EPA QA/R-5, *EPA Requirements for Quality Assurance Project Plans*, 2001 (Reissued 2006).

10 CFR 830 Subpart A, *Nuclear Safety Management, Quality Assurance Requirements*.

ISO 9001, *Quality Management Systems – Requirements*, 2015.

ISO 14001, *Environmental management systems -- Requirements with guidance for use*, 2015.

SNL, *Quality-Significant Procurement Handbook*, current revision.

SNL, Site-wide Personnel Training Plan for Resource Conservation and Recovery Act – Regulated Waste Management Units, Appendix D, General Part B Permit Application, SNL/NM

DOE/DoD Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, current revision.

EPA, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846 (Third Edition), as updated. <http://www.epa.gov/osw/hazard/testmethods/sw846/index.htm>.

EPA 600 series methods.

EPA, *Methods for the Determination of Organic Compounds in Drinking Water*, EPA 600/4-88/039, 1988 (Revised 1991).

EPA, *CLP Functional Guidelines*, current revision.

EPA QA/G-4, *Guidance on Systematic Planning using the Data Quality Objectives Process*, 2006.

APHA, *Standard Methods for the Examination of Water and Wastewater*, current revision.

ASTM, *Annual Book of ASTM Standards*, Volumes 3 and 11.

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OSHA, *OSHA Analytical Methods Manual*, current revision.

United States Department of Energy (DOE), 1997. *EML Procedures Manual*, (HASL-300), 28<sup>th</sup> edition (as updated). United States Department of Energy, Environmental Measurements Laboratory, New York, New York.

United States Environmental Protection Agency (EPA), 1992. *Hazardous Waste Permit for Sandia National Laboratory*, Permit Number NM5890110518 (as updated). United States Environmental Protection Agency, Washington, D.C.

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