



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



MAY 20 2016



Mr. John E. Kieling
Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Dr. East, Bldg I
Santa Fe, New Mexico 87505

Subject: Submittal of Updated Reference Documents Cited in the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan for Sandia National Laboratories/New Mexico (SNL/NM), 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 April 22, 2016.

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

- LOP 94-03 Sample Management Office, Sample Handling, Packaging, and Shipping
- SMO 05-03 Sample Management Office, Procedure for Completing the Contract Verification
- FOP 10-07 Field Operating Procedure for Soil Moisture Determination at the Mixed Waste Landfill Utilizing Neutron Logging

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 David Rast of our staff at (505) 845-5349.

Sincerely,

James W. Todd
Assistant Manager for Engineering

3 Enclosures
cc: See Page 2

**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

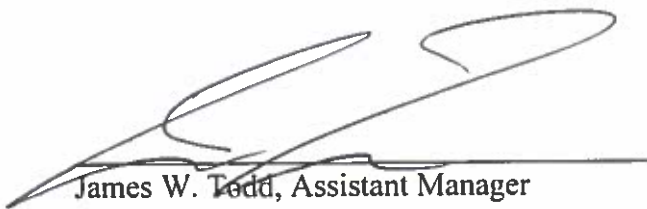
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, 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

2 May 2016

Date Signed



James W. Todd, Assistant Manager
U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
Owner

20 May 2016

Date Signed

Enclosure A

Updated Reference Documents Cited in the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan for Sandia National Laboratories/New Mexico

FOP 10-07 Soil Moisture Determination at the Mixed Waste Landfill Utilizing Neutron Logging
LOP 94-03 Sample Management Office, Sample Handling, Packaging, and Shipping
SMO 05-03 Sample Management Office, Procedure for Completing the Contract Verification

May 2016

Sandia National Laboratories
EPA ID No. NM5890110518

SANDIA NATIONAL LABORATORIES
ANALYTICAL SERVICES DEPARTMENT (4131)

**SOIL MOISTURE DETERMINATION AT THE MIXED
WASTE LANDFILL UTILIZING NEUTRON LOGGING
FIELD OPERATING PROCEDURE**

**FOP 10-07
Revision 2**

Author:  Date: 4/18/2016
Robert Ziock, Author

Reviewer:  Date: 4/18/2016
Mike Mitchell, Project Lead

Reviewer:  Date: 4/18/2016
Donald Schofield, Field Support Operations
Team Lead

Reviewer:  Date: 4/18/2016
Michael Lee, Hazardous Materials Packaging
& Transportation Program Lead

Reviewer:  Date: 4/18/2016
John Walter, Radiological Protection

Approved:  Date: 4/18/2016
Pamela Puissant, Manager

| | |
|---|--|
| 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: 4/22/2016

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LIST OF FORMS

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| EP 2009-ALW | Activity Level Work Evaluation Form |
| EP 2009-AUL | Authorized Users List |
| EP 2009-MCD | Minor Change/Deviation Form for Controlled Documents |
| EP 2009-OJT | On-the-Job Training |
| EP 2009-WRA | Work Resumption Authorization Form |
| LTS 2015-001 | Health & Safety Meeting Form |
| LTS 2015-003 | CPN Probe Sign-Out/Sign-In Form |
| LTS MWL-2012-001 | Mixed Waste Landfill Neutron Logging Data Field Form |

REVISION HISTORY

| Revision | Effective Date | Summary of Changes |
|----------|----------------|---|
| 0 | 2/28/2011 | New Document |
| 1 | 4/22/2013 | Review cycle changed from 2 to 3 years. Updated to reflect the department's current formatting requirements for a FOP. Removed the following attachments: On-the-Job Training, Authorized Users List, and CPN 503 DR Hydroprobe® Moisture gauge Operating Manual. Updates were made to the following appendices: Radiological Hazardous Materials Summary; Neutron Probe (Source) Checklist for Shipping & Receiving; Mixed Waste Landfill Neutron Count Log Form. |
| 2 | 4/22/2016 | Updated department name. Added reviewer, Hazardous Materials Packaging & Transportation Program Lead. Removed field forms from the appendices. Created and hyperlinked forms located on the 4100 Controlled Documents website. Changed references to figure and tables. Added PKX050, PKX100, PKX111 to Table 3-1. To Section 7.1, added transportation requirements. Added Section 7.4, Inspection of Monitoring Equipment and Locations. Removed Section 5.0, Data Quality Objectives and added Section 8.0, Quality Assurance. Added Section 10.0, Records. Updated Appendix D, Neutron Probe (Source) Checklist for Shipping & Receiving. |

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ACRONYMS AND ABBREVIATIONS

| | |
|------------|--|
| ALARA | as low as reasonably achievable |
| cm | centimeter |
| CPN Probe | CPN 503 DR Hydroprobe [®] Moisture Depth Gauge |
| EDMS | Environmental Data Management System |
| EOC | Emergency Operations Center |
| ES&H | Environment, Safety and Health |
| ET Cover | evapotranspirative vegetative soil cover |
| FOP | field operating procedure |
| ft | foot (feet) |
| LTMMMP MWL | Long-Term Maintenance and Monitoring Plan for the Mixed Waste Landfill |
| m | meter |
| mrem/hr | millirem per hour |
| MWL | Mixed Waste Landfill |
| OJT | on-the-job training |
| OSHA | Occupational Safety and Health Administration |
| PHS | primary hazard screening |
| RCT | Radiological Control Technician |
| RPPM | Radiological Protection Procedures Manual |
| SNL/NM | Sandia National Laboratories/New Mexico |
| TWD | technical work document |
| VZ | vadose zone |

1.0 PURPOSE, SCOPE, AND OWNERSHIP

The Mixed Waste Landfill (MWL) is located at Sandia National Laboratories/New Mexico (SNL/NM) Technical Area III. The MWL is a 2.6-acre site that was established in 1959 as a disposal area for low-level radioactive and mixed waste generated by SNL/NM research facilities. The MWL accepted low-level radioactive and minor amounts of mixed waste from March 1959 through December 1988. Approximately 100,000 cubic feet of low-level radioactive and mixed waste containing approximately 6,300 curies (at the time of disposal) of activity were disposed of at the MWL.

1.1 Purpose

The purpose of this Field Operating Procedure (FOP) is to provide guidelines and procedures for use of the CPN503 DR Hydroprobe[®] Moisture Gauge (CPN probe) at the MWL. The CPN probe counts neutrons that will be used to determine soil moisture content beneath the MWL evapotranspirative vegetative soil cover (ET Cover). Neutron counts are correlated to moisture values by use of a correlation formula developed in the *Neutron-Probe Calibration Project at the Infiltration Pilot Site* (SNL/NM August 2001). Monitoring will be performed at the MWL to document levels of soil moisture in the vadose zone. This data will be used to evaluate the effectiveness of the MWL ET Cover as specified in the *Long-Term Maintenance and Monitoring Plan for the Mixed Waste Landfill* (LTMMP MWL) (SNL/NM March 2012).

1.2 Scope

This FOP is applicable to all SNL employees and contractors who perform neutron logging activities at the Technical Area III MWL using a CPN probe. The work does not require a Radiological Work Permit and it will not affect other organizations.

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 moisture monitoring is performed at the MWL 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., 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 ORGANIZATION AND INDIVIDUALS

Responsible Organizations

The Analytical Services Department is responsible for the following:

- Completion and documentation of soil moisture monitoring of the MWL vadose zone as outlined in the LTMMP MWL (SNL/NM March 2012).
- Completion and documentation of inspections for soil moisture monitoring equipment and locations as outlined in the LTMMP MWL (SNL/NM March 2012).
- Performing the work in accordance with the Environment, Safety, and Health (ES&H) Radiological Protection Procedures Manual ([RPPM](#)) which implements the requirements of Corporate Procedure [ESH100.2.RAD.1](#), Implement Radiation Protection Procedures.
- Storing and controlling access and tracking for the CPN probe.

Radiological Protection Department is responsible for providing the following:

- Providing guidance and support to Analytical Services Department operation's involving radiological materials.

Responsible Individuals

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

- Providing programmatic guidance leading to the development of this FOP.
- Performing assessments of MWL operations to ensure compliance to the LTMMP MWL and the ES&H [RPPM](#).
- Reviewing and recommending approval of the procedure.
- Approving an Activity Level Work Evaluation Form ([EP 2009-ALW](#)) for activities described in this FOP as required by program document [PRG 15-01](#), *Work Planning and Control*.

The **Project Lead** (Job Coordinator equivalent in the ES&H [RPPM](#)) for vadose zone monitoring at the MWL is responsible for the following:

- Providing overall coordination and management of the monitoring activities.
- Reviewing and reporting soil moisture data.
- Transmitting soil moisture data to the Long Term Stewardship Database Administrator for inclusion in the Environmental Data Management System (EDMS).
- Reviewing and transmitting documentation forms to the Customer Funded Records Center and the Corrective Action Management Unit Administrative Trailer (Building 6920E).
- Reviewing, revising, and maintaining technical work documents (TWDs).

- Reviewing and recommending approval of this procedure.

The **Field Support Operations Team Lead** (Job Coordinator equivalent in the ES&H [RPPM](#)) is responsible for the following:

- Coordinating with the Project Lead and Field Technicians regarding monitoring activities.
- Supervising the Field Technicians.
- Reviewing training requirements for Field Technicians.
- Assigning qualified Field Technicians to conduct the activities described in this procedure.
- On-the-job training (OJT), as necessary, for new personnel performing field activities. Document training by completing on [OJT Form \(EP 2009-OJT\)](#).
- Providing Field Technicians with necessary equipment to conduct field work.
- Notifying the Project Lead of unusual field conditions, wells requiring maintenance, or breach of well security.
- Reviewing, revising, and maintaining technical work documents.

The **Field Technician** (Radiological Worker equivalent in the ES&H [RPPM](#)) is responsible for the following:

- Completing an [Activity Level Work Evaluation Form \(EP 2009-ALW\)](#) as required by [PRG 15-01](#), *Work Planning and Control*.
- Protection prior to using the CPN probe.
- Performing and documenting inspections of monitoring equipment and locations.
- Operating the CPN probe to obtain soil moisture data.
- Completing and reviewing field documentation forms.
- Transmitting field documentation forms to the Project Lead.
- Informing the Field Support Operations Team Lead of monitoring locations requiring maintenance or if the monitoring location has been compromised (e.g., lock has been removed, damage to protective enclosure or casing).
- Annual calibration of the CPN probe.
- Maintaining the equipment.
- Keeping training current.
- Providing recommendations for revisions to this procedure (if necessary).

The **Radiological Control Technician** (RCT) is responsible for the following:

- Performing monthly radiation surveys of storage area for the CPN probe.
- Performing semi-annual leak surveys of the CPN probe.
- Performing surveys when the CPN probe is sent to manufacturer for calibration and/or maintenance, and when it is returned to SNL/NM.

- Providing radiological protection support to the field activity in accordance with the ES&H [RPPM](#).

The **Database Administrator** is responsible for the following:

- Importing data into EDMS.
- Maintaining the database.
- Identifying, recommending, and implementing improvements to the database.

The **Source Custodian** and **Alternate Source Custodian** responsibilities are detailed in the ES&H RPPM, Chapter 9, Control of Accountable Sealed Radioactive Sources, Source Custodian Section 9.3.3.

The **ES&H Coordinator** is responsible for assisting the staff and management in ES&H performance and compliance.

3.0 TRAINING AND MONITORING QUALIFICATIONS

Personnel conducting field activities shall complete the following:

3.1 Training

- Read [SNL/NM Corporate Policy ESH100 Environment Safety & Health](#).
- Complete required department training and training identified in the primary hazard screening (PHS) results.
- Read PHS [SNL06A00497](#), *Vadose Zone Soil Moisture and Radon Monitoring at the Mixed Waste Landfill*.
- Read applicable sections of the LTMMP MWL (SNL/NM 2012).
- Pre-job briefing required by the ES&H [RPPM](#). (Note: Signing the [Authorized Users List \(EP2009-AUL\)](#) suffices for the pre-job briefing required by the ES&H [RPPM](#).)
- Read *CPN 503 DR Hydroprobe[®] Moisture Gauge Operating Manual*.
- Familiarity with sections in the ES&H [RPPM](#) that pertain to sealed and controlled radioactive sources.
- OJT, as necessary, for new personnel performing existing field activities and/or for new/existing personnel performing NEW field activities. Document training by completing on [OJT Form \(EP 2009-OJT\)](#).
- Complete training courses listed in Table 3-1.
- 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.

3.2 Monitoring

Personnel using the CPN probe are responsible for obtaining and wearing properly coded (neutron radiation) dosimeters during all operations. They are also responsible for returning the dosimeter to their Department Manager on the assigned dates.

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 | Occupational Safety and Health Administration (OSHA) Health & Safety Basic Training - General Worker (40 HR) |
| ENV103 | OSHA Health & Safety Training Refresher (8 HR) |
| ENV112 | Hazardous Waste & Environmental Management Training |
| ESH100 | ES&H Awareness |
| 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 |
| PKX111 | Basic Radioactive Materials Transportation Training |
| PPE106 | Personal Protective Equipment Training |
| RAD210 | Radiological Worker I Training |
| RAD218 | Radioactive Source Control for Source Custodians (note: Only required for source custodian.) |

4.0 HEALTH AND SAFETY

An activity level work evaluation has been performed on the activities described in this FOP and are detailed in safety case ALW 14-06 and associated annual reviews. The evaluation was performed in conjunction with PHS [SNL06A00497](#). The PHS and activity level work evaluation help identify potential hazards that can be expected when performing the work. The potential hazards and their controls are detailed in Table 4-1. 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's Integrated Safety Management System initiative. An exposure assessment survey for field activities was performed by an SNL/NM industrial hygienist. The exposure assessment survey report concluded that the potential for exposure to health hazards has been categorized as well-controlled; therefore acceptable.

In the event that minor changes/deviations in field activities need to be addressed in this FOP or minor updates to the FOP need to be added prior to the official revision/review process, the Field Technician shall discuss the change/deviation with the Field Operations Support Program Lead and submit a Minor Change/Deviation Form for Controlled Documents ([EP 2009-MCD](#)). The form is then reviewed and signed by the Field Operations Support Program Lead and the Department Manager. The "Minor Change/Deviation to Technical Work Document" form and any possible attachments are filed with the original document, posted on the 4100 Controlled Documents website, and copies are kept with the field copy of the FOP.

An Activity Level Work Evaluation Form was completed and approved by the Department Manager as required by [PRG 15-01](#). The hazards and controls to minimize the hazards are listed in Table 4-1.

A health safety and emergency response briefing shall be conducted before the start of field activities. A Health & Safety Meeting Form ([LTS 2015-001](#)) shall be completed at time of aforementioned briefing.

Table 4-1. Task Hazard Analysis

| Potential Hazard | Hazard Rating | Control |
|--|---------------|---|
| Radiological (see Section 4.1 for additional information) <ul style="list-style-type: none"> • External Radiation • Leaking Source • Contaminated materials or soil | Medium | <ul style="list-style-type: none"> • Personnel must be trained on the radiological hazards associated with the use of the instrument and are required to wear their radiation dosimetry during use. • The instrument (source) must be leak tested semi-annually by SNL Radiation Protection. • Work is performed outside site boundary and an ET Cover has been installed over the former disposal areas (minimum average thickness of 5.37 feet [ft]); therefore personnel will not come into contact with contaminated materials or soil. • Monitoring wells have enclosed steel casing which prevents the monitoring equipment from coming into contact with contaminated materials or soil. |
| Chemical | Low | <ul style="list-style-type: none"> • Work is performed outside site boundary and an ET Cover has been installed over the former disposal areas (minimum average thickness of 5.37 ft); therefore personnel will not come into contact with contaminated materials or soil. • Monitoring wells have enclosed steel casing which prevents the monitoring equipment from coming into contact with contaminated materials or soil. |
| Physical <ul style="list-style-type: none"> • Weather/Heat Stress & Cold Stress • Sunburn • Mechanical hazards (cable winch) • Strains, and lifting hazards • Slips, trips, falls | Low | <ul style="list-style-type: none"> • Monitoring activities are not physically demanding. • First Aid kit is located in sampling vehicle. • Personnel should seek shelter if lightning is observed within 5 miles (25 seconds from time of flash to thunder) or the Emergency Operations Center (EOC) issues a lightning warning (via EOC pager). Workers will be trained on heat & cold stress, and sunburn hazards. Sunscreen will be provided. • Dangling lanyards will not be worn when operating manual cable winch. • Leather work gloves will be worn when handling the cable from the winch. • Proper lifting techniques will be reinforced. • Holes will be filled or covered to eliminate slip, trip hazards. |
| Biological <ul style="list-style-type: none"> • Snakes, Rodents, Insects | Low | <ul style="list-style-type: none"> • Care will be taken to observe that the well casings pose a potential for insects and other animals. • Monitoring well areas will be kept clean and places of refuge for biological hazards minimized. |
| Fire | Low | <ul style="list-style-type: none"> • Fire extinguishers will be located in mobile equipment. |

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4.1 Radiation Hazard

The CPN probe contains a 50.0 millicurie Am241/Be neutron source. Radiation levels provided by the manufacturer are:

30 centimeters (cm): 0.1 millirem per hour (mrem/hr) gamma, 1.8 mrem/hr neutron

Contact: 0.5 mrem/hr gamma, 1.7 mrem/hr neutron

Other: up to 30 mrem/hr neutron on contact if unshielded

Detailed ES&H [RPPM](#) requirements for use and storage of the CPN probe are listed below:

Engineering Controls: The CPN probe is locked in the ERFO2 storage shed when not in use.

Administrative Controls:

- Pre-Job Briefing shall be performed.
- TWDs (FOP and PHS).

Hold Points: None

Void Points: Contamination greater than ES&H [RPPM](#) Attachment 6-1 Radioactive Contamination Limits of 20 disintegrations per minute/100 cm² and radiation levels greater than 5 mrem/hr at 30 cm (gamma + neutron).

Alarming Equipment (or other special equipment): None

RCT Coverage: Intermittent

RCT required surveys:

- Semi-annual leak test (cycle group April and October)
- Monthly routine survey of storage area
- Transportation surveys when shipping CPN probe to manufacturer.
- Job coverage surveys as needed

Source Custodian required inventory: Semi-annual (cycle group April and October)

Radiological Posting:

- Radioactive Materials Area
- Controlled Area

Frisking Requirements: None

TWD (this FOP) Sign-In Requirements: Initial

For more information on the CPN probe see [Radiological Hazardous Materials Summary](#) (Appendix A).

Extreme care shall be taken to ensure safe operation in accordance with this procedure and to keep radiation exposure as low as reasonably achievable (ALARA). If the CPN probe becomes stuck in an access tube or borehole shut down work immediately , proceed as directed in section 4.2 Work Shutdown.

4.2 Work Shutdown

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 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](#)) as required by [PRG 15-01](#), *Work Planning and Control*. The Department Manager shall sign the completed form prior to the restart of work.

In the event that work is stopped due to:

- The CPN probe becoming lodged in an access tube, call Radiation Protection and inform them of the problem. An RCT will be dispatched to the site. Do not attempt to retrieve the probe in any manner that could possibly damage the probe or expose the source.
- The CPN probe sustaining extensive damage, maintain a safe distance from the probe (10 meters [m] or 33 ft). Immediately notify Radiation Protection. An RCT will be dispatched to the site.

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](#)) as required by [PRG 15-01](#), *Work Planning and Control*. The Department Manager shall sign the completed form prior to the restart of work.

5.0 EQUIPMENT AND MATERIALS

5.1 Personal Protective Equipment

Personal protective equipment includes the following:

- safety boots
- safety glasses
- leather gloves (when handling CPN interface cable)

5.2 Neutron Logging Equipment and Materials

The CPN 503DR system consists of the following (see Appendix B for photos):

- CPN probe
- CPN probe shielded control box
- Interface cable (12 ft length used to connect CPN probe to shielded control box for standard count)
- CPN shipping case (made of durable plastic)
- CPN cable reel mounted in vehicle (spooled with 375 ft of CPN interface cable)
- Battery charger

Additional equipment and materials includes the following:

- Logbook
- Pulley fixture to be mounted to the access tube.
- Power source (12 volt DC to AC vehicle power inverter mounted in vehicle)
- Key to unlock padlock on the ERFO2 storage shed (obtain key from the Project Lead)
- Key to unlock padlocks on access tube protective casings (obtain key from Project Lead)

6.0 FIELD PROCEDURES

6.1 CPN Probe Handling Requirements

The CPN probe is stored in the locked the ERFO2 storage shed. It can only be used with the permission of the Source Custodian. The Field Technician must complete the following information on the

Sign-Out/Sign-In Form ([LTS 2015-003](#)) when using the CPN probe:

- Field Technician name
- Reason for using CPN probe
- CPN probe Source ID
- Sign-out date and time
- Sign-in date and time

The probe should always remain in the shielded control box unless in use. When the probe is outside the shielded control box, use the shielding blanket to cover the probe whenever possible. The operator should minimize their time near the probe. A distance of at least a 1-m (3.3-ft) should be maintained. Do not leave the probe unattended, except when it is locked in the ERFO2 storage shed. The door to the ERFO2 storage shed is clearly marked with a magenta and yellow placard labeled “Caution-Radioactive Materials.” The CPN shielded control box and its

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storage case are labeled with the appropriate radioactive material warnings. These labels must be replaced immediately if damaged, obscured, or removed. Contact Radiation Protection to assist in the replacement of signs and/or labels. Personnel not performing the monitoring, but in the immediate area, need to be notified of the radiation hazard. The field technician is only authorized to transport the CPN probe within Technical Area III. Only a government vehicle may be used to transport the CPN probe. The CPN probe shall be stored in the shipping case during transport. The shipping case shall be secured to the floor of the government vehicle during transport.

A leak test survey is performed on the probe by radiation protection personnel semi-annually (cycle group April and October). A source inventory is performed by the Source Custodian semi-annually (cycle group April and October). Both are requirements listed in the ES&H [RPPM](#). A notice should be issued by the Device and Source Registrar indicating when the survey and inventory are due. In addition, a [Source Status Label](#) (Appendix C) is attached to the CPN shielded control box and its storage case stating when the leak test survey and semi-annual inventory were last performed and when they need to be updated.

If the CPN probe needs to be sent to the manufacturer for calibration and/or maintenance, follow the requirements listed in the ES&H [RPPM](#). The [Neutron Probe \(Source\) Checklist for Shipping & Receiving](#) is provided in Appendix D that gives detailed directions for shipping and receiving. Update the [Source Status Label](#) (Appendix C) to “Active” or “Loaned” as necessary.

6.2 Standard Count

Charge the battery in the CPN probe shielded control box prior to use. A standard count will be taken each day the CPN probe is used (see page 21 of *CPN 503 DR Hydroprobe[®] Moisture Gauge Operating Manual*). Take five standard counts if the CPN probe is new, has been repaired, or the probe has not been used for six months. The standard count measurement is taken with the probe in the shielded control box. Always place the probe in the same location when taking standard counts to ensure consistency.

1. Place the CPN probe storage case on a sturdy, level surface (level ground is fine) at least 3 m (10 ft) from a hydrogen source or any large vertical surface, and at least 10 m (33 ft) from any other radioactive source.
2. Place the shielded control box on top of the standard count plate (a plate on top of the probe storage case). Leave the probe in the shielded control box.
3. Connect the CPN interface cable (10-ft length) between the probe and the shielded control box.
4. Press the “CLEAR” key to display “READY.”
5. Press the “STD” key to get into the standard count menu. This will display the current standard count.
6. Press the “STEP” key. This will display the previous standard count.
7. Press the “STEP” key. This will display the current Chi squared (χ^2) value.
8. Press the “STEP” key. This will display “New Standard?”

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9. Press "Enter."
10. Step back to a safe distance of at least 10 ft.

The shielded control box will beep after pressing "ENTER." This indicates it has begun counting to determine a new standard count. The counting will continue for approximately 4 minutes. The shielded control box will beep three times when the standard count is completed and then display the new standard count value.

11. Press the "ENTER" key. This will save the new standard count value and display the "READY" prompt.

The new standard count is acceptable if the new χ^2 value is between 0.75 and 1.25. To display the new standard count and new χ^2 value repeat steps 5 through 7. Record the new standard count and the new χ^2 value on the Mixed Waste Landfill Neutron Logging Data Field Form (LTS MWL-2012-001) if χ^2 is within the acceptable range. If the new χ^2 is not between 0.75 and 1.75, begin with step 4 again. Otherwise continue with step 12. (Refer to the discussion on statistics and other standard count information contained in the CPN 503 DR Hydroprobe[®] Moisture Gauge Operating Manual).

12. Press the "STEP" key. This will display "New Standard?"
13. Press "CLEAR."
14. This will display the "READY" prompt.

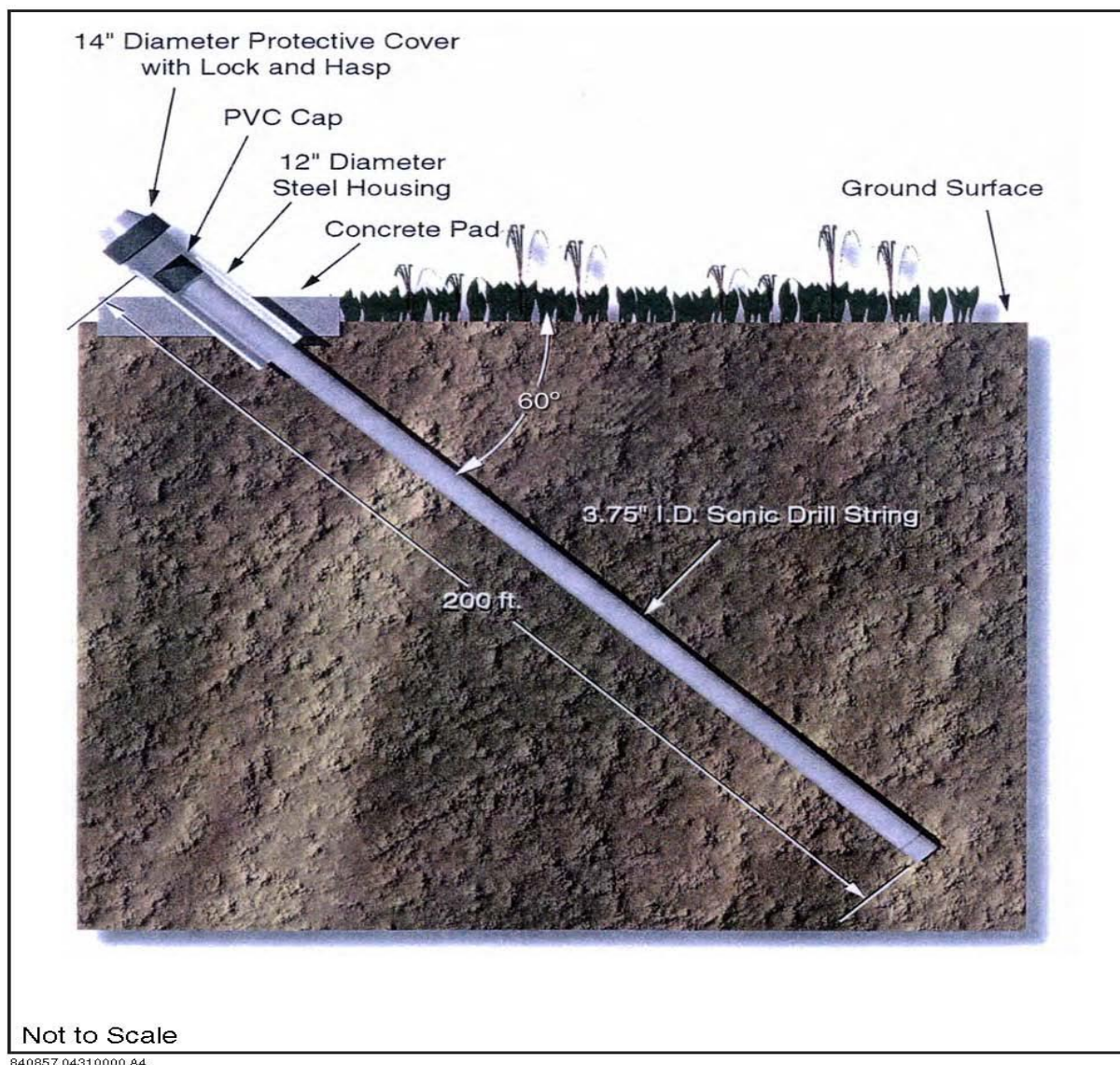
After taking the standard count verify that the sampling time is set for 30 seconds. Press the "TIME" key. If the display shows "30," press "ENTER" and the probe is ready for field measurements. If the display shows something other than "30," use the "STEP" key to scroll through the time choices until "30" is displayed. Press "ENTER," and the probe is ready for field measurements.

6.3 Neutron Logging of Access Tubes

The soil-moisture monitoring system is comprised of three access tubes drilled on a 30-degree angle from vertical to a depth of 200 linear feet and a vertical depth of 173 feet below ground surface. The access tubes are identified as vadose zone (VZ)-1, VZ-2, and VZ-3. Each access tube is cased with 4.5-inch diameter steel casing. The access tubes are open to the soil in the bottom (no end cap). Figure 7-1 presents a schematic of an access tube. To log neutron counts:

1. Take the standard count (refer to Section 6.2).
2. Position the CPN cable reel in line with the access tube casing.
3. Open lock and remove casing cap.
4. Attach unistrut pulley fixture to top side of casing.
5. Attach the CPN cable to probe while probe still in shielded control box.

Figure 6-1. Soil Moisture Monitoring Access Tube



6. Place shielded control box directly next to access tube casing.
7. Remove the probe from the shielded control box. Thread the probe through the unistrut pulley assembly and into the access tube casing.
8. Slowly lower the CPN probe into the access tube until the bottom of the CPN probe is even with the ground level. Set the cable reel footage counter to zero.
9. Place shielded control box next to CPN cable reel and attach cable coming from cable reel hub to the shielded control box.
10. Reel out the CPN probe to the first monitoring depth.
11. Press the "COUNT" button on the shielded control box. A neutron count value will be displayed after 30 seconds.

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12. Record neutron count value on Mixed Waste Landfill Neutron Logging Data Field Form (LTS MWL-2012-001).
13. Continue to move the probe to each predetermined location in the access tube to collect neutron counts.

When all sample data have been collected:

14. Disconnect cable from shielded control box.
15. Place shielded control box directly next to access tube casing.
16. Remove probe from access tube casing and immediately place into shielded control box.
17. Disconnect cable from probe.
18. Close and lock the casing cap.

Repeat this procedure for the remaining access tubes. Appendix B provides photos of the equipment setup.

6.4 Inspection of Monitoring Equipment and Locations

Inspection of the monitoring equipment and locations shall be performed at time of the monitoring event as described in the LTMMP MWL (SNL/NM March 2012).

7.0 WASTE MANAGEMENT

No waste is generated from neutron logging activities.

8.0 QUALITY ASSURANCE

Quality assurance objectives for soil moisture determination at the MWL are specified in the MWL LTMMP (SNL/NM March 2012), Appendix E, Section 3.0 – Data Quality Objectives.

9.0 DATA MANAGEMENT

9.1 Data Collection Locations and Frequency

Neutron logging data is collected from three locations (VZ-1, VZ-2, and VZ-3). There are sixty monitoring points (depths) for each of the VZ locations. See the Mixed Waste Landfill Neutron Logging Data Field Form (LTS MWL-2012-001) for monitoring depths. The frequency at which the data is collected is specified in the LTMMP MWL.

9.2 Data Submittal Process

The steps of the data flow process and the personnel associated with each step are defined below.

Field Technician

1. As the neutron count data is collected and recorded on the Mixed Waste Landfill Neutron Logging Data Field Form (LTS MWL-2012-001) it is compared to the previous monitoring result values to see if there are any anomalies.
2. Anomalies are noted and the Mixed Waste Landfill Neutron Logging Data Field Form (LTS MWL-2012-001) is submitted to the Project Lead.

Project Lead

1. The Project Lead enters the neutron count data into a Microsoft® Excel spreadsheet that uses a previously determined correlation equation to convert neutron counts to soil moisture content (percent water content by volume).
2. Neutron count and soil moisture data are submitted to the Database Administrator after review by the Project Lead.

Database Administrator

The Database Administrator imports the data received from the Project Lead into EDMS.

10.0 RECORDS

Field documentation data records shall be processed according to MWL LTMMP, Section 4.8 – Records Keeping and Reporting, and Appendix C, Section 4.3 – Records Management and Reporting.

11.0 REFERENCES

InstroTek, Inc. (formerly CPN Company). CPN 503 DR Hydroprobe[®] Moisture Gauge Operating Manual, 4057 Port Chicago Hwy STE 100, Concord, California.
<http://instrotek.com/>

Sandia National Laboratories, [Corporate Policy ESH100 Environment Safety & Health](#) (current version), Sandia National Laboratories, New Mexico.

Sandia National Laboratories, “Neutron-Probe Calibration Project, Infiltration Pilot Site, Mixed Waste Landfill,” Sandia National Laboratories, Albuquerque, New Mexico (2001).

Sandia National Laboratories, “Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill,” Sandia National Laboratories, Albuquerque, New Mexico (2012).

Sandia National Laboratories, “Work Planning and Control,” [PRG 15-01](#) (current version), Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, MN471016, [Radiological Protection Procedures Manual](#) (current version), Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories Primary Hazard Screening, [SNL06A00497](#) (current version), “Vadose Zone Monitoring at the Mixed Waste Landfill.” Sandia National Laboratories, Albuquerque, New Mexico.

APPENDIX A

Radiological Hazardous Material Summary

RADIOLOGICAL HAZARDOUS MATERIALS SUMMARY

General Information

Type of device: – Neutron Moisture Probe
Manufacturer: – CPN International, Inc.
Model Number: – CPN 503DR
Serial Number: – #H30039459 (primary instrument), #H300605758 (backup instrument)
Operating parameters: – 6.5 mA Average
1.85 gigabecquerel (50 millicurie) Americium-241:Beryllium
Type of radiation: – Gamma, Neutron
Sandia Device and Source Registrar ID#: – RS02625 (primary instrument), RS00661 (backup instrument)
Location of device: – TA-III, ERFO2 storage shed

The manufacturer's encapsulation of the source is a double sealed capsule CPN-131.
The manufacturer's shielding of the source is provided by silicon-base paraffin.

Source Custodian: Robert Ziock, Dept. 4142, 845-0485
Alternate Custodian: none

Radiation Levels (provided by manufacturer)

30 cm: 0.1 mrem/hr gamma, 1.8 mrem/hr neutron
Contact: 0.5 mrem/hr gamma, 1.7 mrem/hr neutron
Other: up to 30 mrem/hr neutron on contact if unshielded

Dosimetry

A TLD with a neutron code of 20 is required for personnel operating the CPN probe.

Training and Technical Work Documents

Operators of the CPN probe shall complete the following training:

- 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.
- OJT as necessary, for new personnel performing field activities. Document training by completing on OJT Form ([EP 2009-OJT](#)).
- Read *CPN 503 DR Hydroprobe® Moisture Gauge Operating Manual*.
- OSHA 40-hr Hazardous Waste Operations Training.
- OSHA 8-hr Hazardous Waste Operations Training Refresher

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RADIOLOGICAL HAZARDOUS MATERIALS SUMMARY (continued)

- Read PHS [SNL06A00497](#), *Vadose Zone Monitoring at the Mixed Waste Landfill*.
- RAD210 Radiological Worker 1.
- Familiarity with sections in the ES&H [RPPM](#) that pertain to sealed and controlled radioactive sources.

ALARA protocol will be performed by the field personnel when using this instrument.

Postings

Postings at storage location include: “Controlled Area” and “Radioactive Materials”

Users of the instrument will be responsible for administrative controls while the probe is in use or transport.

Surveys & Inventory

A leak survey shall be performed on the CPN probe semi-annually (cycle group April and October) by an RCT.

A leak test survey shall also be performed on the CPN probe prior to transportation by the Packaging and Transportation group from the ERFO2 storage shed. This will occur only when the CPN probe is sent to the manufacturer for calibration/maintenance. Upon return to the ERFO2 storage shed, an additional leak test survey must be performed.

Note: Anytime the CPN probe is shipped to the manufacturer, the status of the source must be change from “**Active**” to “**Loaned**” status prior to movement from the ERFO2 storage shed. This is done via the “Device and Radioactive Source Tracking System” website at: <https://webprod2.sandia.gov/dvs/>. Upon return from the manufacturer and prior to use of the CPN probe by a Field Technician, the status of the source must be changed back to “**Active**” status.

Monthly routine surveys of the ERFO2 storage shed are performed by an RCT.

Inventory of the CPN probe is performed semi-annually (cycle group April and October) by the Source Custodian.

RADIOLOGICAL HAZARDOUS MATERIALS SUMMARY: (concluded)

Transport

- Only within TA-III by authorized field personnel. Any other transportation will be done by the Packaging and Transportation group.
- Instrument will be transported in the manufacturer's hard shell suitcase. The suitcase will be secured in the vehicle using tie-downs.
- A "Caution Radioactive Material" label must be affixed to the outside of the suitcase.
- If the CPN probe is used in the field for more than five days (without daily storage in the ERFO2 storage shed) or is transferred off-site, update the source location in the Radiation Protection Source Database.

Operational As Low As Reasonably Achievable (ALARA) Screen

The Operational ALARA Screen shall be performed by evaluating the following conditions. If any of the conditions apply to the radiological work an Operational ALARA Review shall be performed. [10 Code of Federal Regulations 835.1003(b)]

- Will the highest individual dose of >100 mrem total effective dose be expected to complete the work? No.
- Will the collective dose of >500 person-mrem total effective dose be expected to complete the work? No.
- Will airborne radioactivity in the accessible work area be expected to routinely meet or exceed the criteria for an airborne radioactivity area? No airborne radioactivity.
- Will removable contamination in the accessible work area be expected to routinely meet or exceed the criteria for a high contamination area? No removable contamination.
- Will hot particles be expected in the accessible work area? No hot particles.
- Will general area dose rates in the accessible work area be expected to routinely meet or exceed the criteria for a high or very high radiation area? No.
- Are dose rates of >50 µrem/hr expected in occupied areas for a period >1 week? No.

An Operational ALARA Review is not required based on the answers to the above questions.

APPENDIX B

Photographs of Equipment Setup

CPN probe/shielded control box and instrument case (probe contained in shielding)



CPN probe/shielded control box and instrument case (probe removed from shielding)



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Cable reel used to lower CPN probe into the VZ access tubes



Equipment setup at a VZ monitoring location



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APPENDIX C

Source Status Label

Source Status Label

Example:

Source ID #: RS00661

Status: ACTIVE

Leak Test last performed: 4/11/05

Leak Test due by: 10/11/05

Semi-Annual Inventory Performed: 4/27/05

Semi-Annual Inventory due by: 10/27/05

Replace with "LOANED" status tag if the unit is sent in for calibration/maintenance. Upon return, immediately have a leak test survey performed to upgrade the status to "ACTIVE" and indicate status on a new tag. Notify Device & Source Registrar of any status or storage changes: 844-3415

APPENDIX D

Neutron Probe (Source) Checklist for Shipping & Receiving

Neutron Probe (Source) Checklist for Shipping & Receiving
(To be completed by Source Custodian only)

Indicate Source Registrar ID # of neutron probe instrument to be shipped to manufacturer for calibration and/or repairs:

☐ RS00661 ☐ RS02625

Current status of the source indicated on instrument and instrument storage case label. (It should indicate that the source is "Active")

☐ Active ☐ Loaned

Notify a Radiological Control Technician (RCT) that the instrument will be sent offsite (to the manufacturer) for calibration and/or repairs and request a "Movement" and "Shipping" survey.

- ☐ RCT notified.
- ☐ RCT performed "Movement" and "Shipping" survey.
- ☐ RCT informed shipper of the "Movement" and "Shipping".

Request a change of status from "**Active**" source to "**Loaned**" status prior to movement from the ERFO2 storage shed. This is done by completing a Radioactive Source Change Form ([SF 2001-RS](#)) and providing it to the administrator of the [Device and Radioactive Source Tracking System](#) (DARTS) at devsrc@sandia.gov.

- ☐ Sent completed [SF 2001-RS](#) to DARTS administrator at devsrc@sandia.gov.
- ☐ Printed all e-mails to and from the DARTS administrator. Keep with instrument's records.
- ☐ Replace tag on the instrument and the instrument storage case indicating the status has been changed from "**Active**" to "**Loaned**."
- ☐ Removed nickel-cadmium batteries from instrument prior to shipping.

Complete shipping documentation (SHIPPER form) located at the following web address:

<http://cfo.sandia.gov/logistics/Shipping/Page1WSF.htm>

Neutron Probe (Source) Checklist for Shipping & Receiving (continued)

Attach all relevant documents electronically to the SHIPPER form as instructed. This includes:

- ☐ The “Information of Hazardous Material Shipments” form (provided on the SHIPPER website). Indicate on appropriate line the material to be shipped is CLASS 7-RADIOACTIVE MATERIALS.
- ☐ The “Movement” and “Shipping” survey that was performed by the RCT.
- ☐ The most recent “SPECIAL FORM” provided by the manufacturer (see SPECIAL FORM attached to this checklist).
- ☐ Copy of letter from the National Nuclear Security Administration Sandia Site Office to SNL Radiation Protection “Exemption of Department of Energy and its Prime Contractors from Nuclear Regulatory Commission Licensing Requirements” (see letter attached to this checklist).
- ☐ Copy of U.S. Department of Transportation (Pipeline and Hazardous Materials Safety Administration) International Certificate of Competent Authority Special Form Radioactive Materials Certificate USA/0632/S-96 (see certificate attached to this checklist).
- ☐ Copy of Radioactive Material License Number 1100-07 (see license attached to this checklist).
- ☐ A statement in the form of an e-mail from a Nuclear Criticality Safety Engineer (NCSE) that certifies the material remains below the DeMinimis requirements (see e-mail attached to this checklist).
- ☐ Print a hardcopy of all the forms and keep with instrument’s records.
- ☐ Submit the SHIPPER form and all attachments.

A Customer Service Request (CSR) Form must be completed after the Shipper is submitted. The CSR Form can be accessed at: <https://arsprod.sandia.gov/Logistics/LogisticsNM.jsp>

- ☐ CSR Form completed and submitted.
- ☐ Instrument was picked up by shippers for delivery to the manufacturer. Source Custodian signed shipping form indicating instrument pickup.

The following will be completed upon return of the instrument to Sandia National Laboratories:

- ☐ The Source Custodian was notified that the instrument has been returned from the manufacturer and a delivery to the Source Custodian is arranged.
- ☐ Source Custodian signed for instrument and returned it to the ERFO2 storage shed.

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Neutron Probe (Source) Checklist for Shipping & Receiving (concluded)

- ☐ Shipping papers were filed with the instrument's records.

Upon return from the manufacturer and prior to use of the CPN probe by a Field Technician, the status of the source must be changed back to "**Active**" status by completing another [SF 2001-RS](#) form and providing it to the DARTS administrator.

- ☐ Source Custodian immediately notifies the "Device Source Registrar" via e-mail that the instrument has been returned from the manufacturer to regular storage location at TA-III, ERFO2 storage shed.
- ☐ Source Custodian schedules leak test with an RCT.
Date leak test performed.
- ☐ Source Custodian e-mails "Device Source Registrar" a copy of the leak test results and request a "**Change of Status**" from "**Loaned**" source to "**Active**" if the leak test indicates that the source is intact.
- ☐ Print a hardcopy of all e-mails to and from the "Device and Source Registrar" and keep with instrument's records.
- ☐ Replace tag on the instrument and the instrument storage case indicating the status has been changed from "**Loan**" to "**Active**."

SPECIAL FORM

49CFR 173.476 Approval of special form radioactive materials.

(a) Each offeror of special form Class 7 (radioactive) materials shall maintain on file for at least one year after the latest shipment, and provide to the Associate Administrator on request, a complete safety analysis, including documentation of any tests, demonstrating that the special form material meets the requirements of Paragraph 173.469. An IAEA Certificate of Competent Authority issued for the special form material may be used to satisfy this requirement.

49CFR 173.469 Tests for special form radioactive materials

- | | |
|---------------------|--|
| (1) Impact Test | Free fall of capsule from a height of 9 meters onto a granite block of smooth surface. No shattering or breaking observed. |
| (2) Percussion Test | Capsule placed on a 1/4" sheet of lead on concrete. Steel rod 25 mm in diameter by 330 mm long was dropped from a height of one meter. No shattering or breaking observed. |
| (3) Bending Test | Not applicable due to small length. |
| (4) Heat Test | Capsule heated to 800°C (1472°F) with a torch. Maintained for 10 minutes and allowed to air cool. Discoloration, but no melting or dispersement observed. |


Leakage test performed after each test. No activity in excess of .005 microcuries (185 Bq) observed.

The radioactive material encapsulated in CPN International, Inc. stainless steel sealed source capsule, identified as model number **CPN-131**, has been tested for and is in compliance with the requirements for special radioactive material. IAEA Certificates of Competent Authority have been issued as follows:

| <u>CPN GAUGES</u> | <u>ACTIVITY & NUCLIDE</u> | <u>IAEA NO.</u> |
|---------------------|---------------------------------------|------------------------------|
| MC-1,2,3 & 501/DR | 10 mCi Cs-137 and 50 mCi Am-241/Be | USA/0634/S and USA/0627/S |
| 503/DR, MCM-2, MC-M | 50 mCi Am-241/Be | USA/0627/S |
| MC-S-24 | 10 mCi Cs-137 and 50 mCi Am-241/Be | USA/0634/S and USA/0627/S |
| AC-2/R | 100 mCi Am-241/Be | USA/0627/S |



CPN International, Inc.
2830 Howe Road
Martinez, CA 94553
Phone: (925) 228-9770
Fax: (925) 228-3181


Douglas Carter
Radiation Safety Officer

September 8, 2003

A:RSO.spclform.doc



National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400



NOV 28 2007

Mr. Brad Elkins
Manager Radiation Protection
Sandia National Laboratories, Org. 10328
P.O. Box 5800, MS-1103
Albuquerque, New Mexico 87185

Subject: Exemption of Department of Energy (DOE) and its Prime Contractors from Nuclear
Regulatory Commission (NRC) Licensing Requirements

Dear Mr. Elkins:

The Atomic Energy Act of 1954, as amended, exempts the DOE and its prime contractors from the NRC licensing requirements. Accordingly, 10 CFR 30.11, 30.41, 40.14, 40.51, 70.11 and 70.42 provide for the lawful receipt by DOE and its prime contractors of by-product, source, and/or special nuclear material from an NRC licensee consistent with the applicable DOE-approved 10 CFR 835 Radiation Protection Plan. Sandia Corporation, which manages and operates Sandia National Laboratories under a prime contract with the DOE, is therefore authorized to receive all present and future shipments of such material. Please note that this memorandum addresses materials only and does not address or authorize the receipt of wastes containing by-product, source, and/or special nuclear material.

If you have any questions regarding this memorandum, please contact Donald Brady of my staff at (505) 845-6164.

Sincerely,

Daniel Pellegri
Assistant Manager
Environment, Safety, Health & Quality Assurance

Enclosure

cc:

A. Blumberg, SNL/NM, Org. 11100, MS-0141



U.S. Department
of Transportation

Pipeline and
Hazardous Materials
Safety Administration

IAEA CERTIFICATE OF COMPETENT AUTHORITY
SPECIAL FORM RADIOACTIVE MATERIALS
CERTIFICATE USA/0632/S-96, REVISION 5

East Building, PHH-23
1200 New Jersey Avenue SE
Washington, D.C. 20580

This certifies that the sources described have been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency¹ and the United States of America² for the transport of radioactive material.

1. Source Identification - QSA Global, Inc. Model Nos. AX1, X.1, and X.1/2 (All models manufactured on or after May 17, 1977).
2. Source Description - Cylindrical double encapsulations made of stainless steel and tungsten inert gas or laser seal welded. Approximate outer dimensions of all models are 7.9 mm (0.31 in.) in diameter and 10.15 mm (0.4 in.) in length. Construction shall be in accordance with attached AEA Technology QSA, Inc. Drawing No. RBA10880, Rev. E.
3. Radioactive Contents - No more than either 3.7 GBq (100.0 mCi) of Americium-241 or 13.0 GBq (351.0 mCi) of Californium-252. The Am-241 is in oxide form and mixed with beryllium powder and pressed into a solid pellet. The Cf-252 is in the form of a metal wire or an oxide solid ceramic.
4. Quality Assurance - Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations¹ shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.
5. Expiration Date - This certificate expires on March 31, 2013.

¹ "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

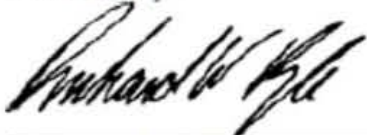
² Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

(- 2 -)

CERTIFICATE USA/0632/S-96, REVISION 5

This certificate is issued in accordance with paragraph 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the February 29, 2008 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:



Robert A. Richard
Deputy Associate Administrator for Hazardous Materials Safety

Mar 13 2008
(DATE)

Revision 5 - Issued to extend the expiration date.

From: Schwers, Norman F
Sent: Thursday, October 28, 2010 3:38 PM
To: Ziock, Robert
Cc: Colborg, Shawn P; Spangler, Richie
Subject: FW: De Minimis quantity

Robert,

Based on our conversation, you would like to ship this same item /material to the manufacturer for calibration.

Based on the material type and quantity remaining the same as the previous analysis, the material remains below the DeMinimis requirements.

No NCS controls are required for this material.

I have included Shawn and Richie on this email since I assume that it will pass through 957.

Please pass this along to any of the shipping and packaging personnel or transportation personnel that may need this review.

If you have any questions about this review, please contact me.

Norm Schwers
NCSE
nfschwe@sandia.gov
845-3346

From: Schwers, Norman F
Sent: Tuesday, January 27, 2009 10:39 AM
To: Ziock, Robert; Archibeque, Edward A; Garcia, Andy J; Kidd, Carter R; Gabaldon, Glen G
Subject: De Minimis quantity

Robert,

I just received your call for the Am-241 shipment.

According to your call, the material is 1.85GBq (1.85E9 Bq) and the SNL De Minimus limit is 1.27E12 Bq.

This is less than the de Minimis quantity and can be stored in 957c with no Nuclear Criticality Safety controls required.

I am not sure who you will be working with in transportation or at 957c, so I included a few of the personnel that I know.

If you have any questions, just let me know.

Thanks

Norm Schwers
845-3346

SANDIA NATIONAL LABORATORIES
ANALYTICAL SERVICES DEPARTMENT

**SAMPLE MANAGEMENT OFFICE
SAMPLE HANDLING, PACKAGING AND SHIPPING
LABORATORY OPERATING PROCEDURE**

**LOP 94-03
Revision 7**

Author: Don Watenpaugh Date: 4/13/16
Don Watenpaugh,
SMO Packaging Facility Lead Coordinator

Reviewer: Doug Perry Date: 4/13/16
Doug Perry,
SMO Packaging Facility Coordinator

Reviewer: Michael Wesley Lee Date: 4/15/16
Michael Wesley Lee,
Hazardous Material Packaging and Transportation Program Lead

Reviewer: Matt Kaspar Date: 4/18/2016
Matt Kaspar,
Health Physicist

Reviewer: Corey Robert White Date: 4-13-16
Corey Robert White,
SMO Operations Manager

Approved: Sonoya Shanks Date: 4/18/16
Sonoya Shanks,
SMO Program Leader

| | |
|--|---|
| 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: 4/22/16

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REVISION HISTORY

| Revision | Effective Date | Summary of Changes |
|----------|----------------|---|
| 0 | 01/14/1994 | New Document |
| 1 | 05/14/1996 | Administrative Updates |
| 2 | 09/17/1998 | Administrative Updates |
| 3 | 12/16/2003 | Organization ownership change from Sandia ES&H to Environmental Restoration Project |
| 4 | 6/26/2007 | Changed revision cycle from 2 to 3 years. Organization ownership change from Sandia Environmental Restoration Project to Sandia ES&H Organization. |
| 5 | 6/29/2011 | 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. |
| 6 | 11/12/2013 | Programmatic revisions include improvements to ARCO 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, PKX050, and OJT for HWMF Operations coordination were added to training requirements. A buddy system has been mandated for Friday work schedules. The chemicals were removed from use in addition to removing the use of the fume hood. The two Emergency Evacuation routes have been described with additional evacuation information. A requirement to stage first time samples waiting RCT survey in the RMA has been added. Other revisions include updating language to reflect current program elements and requirements. |
| 7 | 4/22/2016 | Change in Sample Packaging Facility Building location and Emergency Procedures. Change in Hours of Operation. Remove ENV112 and PKX112 from Training Qualifications Table 1. Addition of training qualifications and duties for Administrative Support staff Table 3.2. Deletion of buddy system. |

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ACRONYMS AND ABBREVIATIONS

| | |
|----------|---|
| AOP | Administrative Operating Procedure |
| ARCOG | Analysis Request and Chain-of-Custody |
| COC | Chain-of-custody |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| ES&H | Environmental Safety and Health |
| IATA | International Air Transport Association |
| IH | Industrial Hygiene |
| LOP | laboratory operating procedure |
| OJT | On the Job Training |
| PHS | Primary Hazard Screening |
| RCT | Radiation Control Technician |
| RMA | Radioactive Management Area |
| RPDP | Radiation Protection Dosimetry Program |
| RPPM | Radiation Protection Procedures Manual |
| 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 |
| SPF | Sample Packaging Facility |
| TAR | Tone Alert Radio |
| TAT | Turnaround Time |

1.0 PURPOSE, SCOPE, AND OWNERSHIP

The purposes for this Laboratory Operating Procedure (LOP) are the following:

- Maintain sample integrity during the packaging and shipping processes at Sandia National Laboratories/New Mexico (SNL/NM)/ Sample Management Office (SMO).
- Ensure SMO packaging and shipping processes meet regulatory requirements with applicable local, state, federal, and international transportation regulations, U.S. Department of Energy (DOE) regulations and Sandia Environment, Safety and Health (ES&H) policies and procedures.

1.1 Scope

This document applies to all SMO employees and contractors responsible for the packaging and/or shipping of samples via a common carrier at SNL/NM.

1.2 Ownership

The SMO is responsible for the development, approval, distribution, revision and control of this document. Suggestions for improvement to this document should be submitted to the SMO.

2.0 RESPONSIBLE INDIVIDUALS AND ORGANIZATIONS

The following individuals and organizations have the specified responsibilities with regard to samples submitted to the SMO Packaging Facility for packaging and shipping.

Requesting Organization(s): Organizations that require SMO services are responsible for communicating requirements to the SMO at least two weeks prior to sample collection. This allows sufficient time to notify the analytical laboratories and provide sample kits (Bottle Orders) for sampling events. SMO customers, including field personnel, are responsible for providing complete sample documentation, completed Analysis Request and Chain-of-custody ([ARCO](#)) or Sample Analysis Request Form ([SARF](#)) (Attachment A, B and C), and Radiological Survey Forms (Attachment F) as applicable. The SMO customer shall make special arrangements with the SMO in advance for sample delivery to Building 1090 during non-standard hours of operation. In addition, SMO customers must notify the SMO of any special shipping requirements (i.e., late delivery, short hold times, limited quantity, etc.).

SMO Packaging Coordinator: Trained SMO Packaging Coordinators (Section 3.0 Training Qualifications) are responsible for packaging samples for shipping to contract analytical laboratories through the SNL/NM Receiving/Mail & Material Movement Organization (10261) commonly referred to as "Shipping and Receiving". SMO Packaging Coordinators ensure that samples are properly processed, stored, and packaged for shipment to analytical laboratories in accordance with the current *SMO Quality Assurance Project Plan* ([SMO-QAPP](#)), DOE, US

Department of Transportation (DOT), or International Air Transportation Administration (IATA) requirements as applicable. In addition, the Packaging Coordinators shall ensure that sample custody is maintained and documented in accordance with the current [SMO-QAPP](#) and the *Sample Management and Custody Administrative Operating Procedure* ([AOP-95-16](#)).

SMO Staff: The SMO Administrative Support Staff are responsible for assisting the SMO Packaging Coordinator and customers check in sample when the SMO Packaging Coordinator is not available. The SMO Administrative Support Staff must complete training listed in Table 3-2.

Hazardous Material Packaging Consultants: The Logistics Risk Management consultants in the Sandia National Laboratories Shipping and Receiving organization are responsible for oversight and guidance and are the final authority in the shipment of all samples processed at the SMO Packaging Facility as described in Section 7.3 of this document.

Radiological Control Technicians (RCTs): Radiation Protection Program RCTs are responsible for surveying all non-exempt samples prior to shipping. See Section 7.1 for a discussion regarding sample exemption.

3.0 TRAINING QUALIFICATIONS

Requesting Organization: Customers requesting SMO services shall read this procedure and acknowledge electronically that they have read and understood this procedure.

SMO Packaging Coordinator: Training requirements are listed in Table 3-1. Upon completion of required training, the SMO Packaging Coordinator is qualified to process and package samples for shipping through Logistics Risk Management SNL/NM Shipping and Receiving/Mail & Material Movement organizations. Training requirements are in compliance with the Code of Federal Regulations 49 CFR Subpart H, Part 172.700-704. SMO Packaging Coordinators must complete training listed in Table 3-1.

SMO Staff: The SMO Administrative Support Staff are responsible for assisting customers check in sample when the SMO Packaging Coordinator is not available. The SMO Administrative Support Staff must complete the training listed in Table 3-2.

Personnel performing activities in this document shall complete the following:

- Personnel shall sign an Electronic Authorized Users List 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 training identified in Table 3-1 of this document.
- Read current version of PHS SNL972834764, *SMO Packaging Facility Operations*.

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- On-the-job training (OJT), as necessary, for new personnel performing existing activities or new/existing personnel performing new activities. Document training by completing the OJT Form ([EP 2009-OJT](#)).

Table 3-1 – SMO Packaging Coordinator Training Course List

| Course Code | Course Title |
|-------------|--|
| CHM100 | Chemical Safety |
| CHM101 | Chemical Safety Training Update for GHS |
| CHM103 | Site Specific Chemical Safety |
| ESH 100 | ES&H Awareness |
| ESH 200 | Safety Management |
| ENV102 | OSHA Health & Safety Basic Training – Occasional Worker (24 HR) |
| ENV103 | OSHA Health & Safety Training Refresher (8 HR) |
| PKX050 | Site Specific Packaging and Transportation of Hazardous Materials Training |
| PKX100 | Basic Hazardous Material Transportation Training |
| PKX115 | Basic Hazardous Material Driver Training |
| PKX130 | Basic International Air Transportation (IATA) Training |
| PKX111 | Basic Radioactive Materials Transportation Training |
| PKX200 | Advanced Hazardous Material Transportation Training |
| PKX230 | Advanced International Air Transportation (IATA) Training |
| PKX211 | Advanced Radiological Materials Transportation Training |
| PPE106 | Personal Protective Equipment Training |
| RAD102 | General Employee Radiological Training (May be replaced with RAD210, Rad230 or SNL qualified RCT training) |
| RAD210 | Radiological Worker I Training |
| OJT | Sample Packaging Facility Operations |

Table 3-2 - SMO Administrative Support Staff Training Course List

| Course Code | Course Title |
|-------------|--|
| CHM100 | Chemical Safety |
| CHM 101 | Chemical Safety Training Update for GHS |
| CHM103 | Site Specific Chemical Safety |
| ESH 100 | ES&H Awareness |
| PPE106 | Personal Protective Equipment Training |
| RAD102 | General Employee Radiological Training (May be replaced with RAD210, Rad230 or SNL qualified RCT training) |
| OJT | Section 7.0 Sample Receipt LOP 94-03 Rev 7 |

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4.0 HEALTH AND SAFETY

Hazards Identification:

A complete listing of hazards are identified in [PHS 972834764](#), *SMO Packaging Facility Operations* (current version). In addition, Sampling/Field Technicians shall inform SMO Packaging Coordinators and SMO Staff of other known potential hazards associated with samples to be packaged and shipped by SMO. Hazards associated with sample handling and packaging activities include, but are not limited to, the following:

- Chemical hazards
- Radiological hazards
- Physical hazards
- Biological hazards (etiologic agents) are a remote possibility not incident to normal working conditions.

An activity level work evaluation has been performed on the activities described in this LOP and are detailed in safety case [ALW 14-15](#). The evaluation was performed in conjunction with PHS SNL 972864764. The PHS and activity level work evaluation help identify potential hazards that can be expected when performing the work. 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 Sandia's Integrated Safety Management System initiative.

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 Technician will immediately notify the Program Lead and the Department Manager. SMO personnel should seek the next higher level of authority (Program Lead) to assist with the mitigation of the hazard and the completion of the Work Resumption Authorization Form ([EP 2009-WRA](#)) as required by PRG 15-01, *Work Planning and Control*. The Department Manager must sign the completed form prior to the restart of work.

In the event that minor changes/deviations in field activities need to be addressed in this LOP or minor updates to the LOP need to be added prior to the official revision/review process, the Technician shall discuss the change/deviation with the Operations Support Program Lead and submit a Minor Change/Deviation Form for Controlled Documents ([EP 2009-MCD](#)). The form is then reviewed and signed by the Operations Support Program Lead and the Department Manager. The Minor Change/Deviation Form for Controlled Documents and any possible attachments are filed with the original document, posted on the 4100 Controlled Documents website, and copies are kept with the field copy of the LOP.

5.0 EQUIPMENT AND MATERIALS

The Packaging Facility equipment and materials include but are not limited to the following list.

Equipment

- Eberline E600 Survey Meter with attached SHP380AB (or equivalent) is used by the RCTs in accordance with the Radiation Protection Operating Procedure [RPO-03-31](#) for indication only. Daily instrument source checks are performed in accordance with the Radiation Protection Procedures Manual (RPPM), Chapter 12, Attachment 12-1.
- Work Table Commercial Scale with a capacity of 150 lbs. (68 kg) for weighing shipping containers/coolers.
- Various laboratory refrigerators and freezers for sample storage and temperature preservation, storage of shipping containers/coolers, and Blue Ice™.

Materials

- Re-sealable plastic bags and bubble bags (assorted sizes)
- Insulated plastic ice chests/coolers (preferably without a drain spout)
- Absorbent packing material (i.e., Powersorb™ Universal Sorbent Pads)
- Bubble wrap
- Large plastic bags
- Rubber Bands
- Strapping tape
- Strapping bands
- Crimping supplies
- Custody seal tape
- Shipping Labels: Orientation arrows, “Fragile” and various hazard and handling DOT/IATA approved labels (i.e., “Flammable”, “Corrosive”, etc.)
- Cooling material (frozen) (i.e., Blue Ice™). In the event that cooling material is not readily available, ice may be substituted, provided that the ice is double-bagged, sealed and placed in the cooler with the bag opening facing up.
- Gloves: chemical resistant and disposable gloves made of latex, polyvinyl chloride (PVC), nitrile, etc.
- Safety glasses
- Lab coat or coveralls
- Safety shoes
- Thermoluminescent dosimeter (TLD) for personnel involved in handling radioactive materials and samples which have not been screened by an RCT.

6.0 SMO PACKAGING FACILITY (SPF) HOURS OF OPERATION

SMO Packaging Coordinators are available at the SPF *Monday through Thursday from 7AM to 4:30PM and on Friday, from 7AM to 12 noon.*

If same day packaging and shipping is required, samples must be delivered to the SMO Packaging Facility, Building 1090, *before 11:00AM*. This allows sufficient time for the SMO Packaging Coordinator to complete the packaging process and meet corporate shipping deadlines. If corporate shipping deadlines cannot be met and sample integrity or customer requirements may be compromised, the SMO Packaging Coordinator or authorized representative may deliver samples to the FedEx drop-off located at the Albuquerque International Sunport (3720 Spirit Dr SE). The SMO Packaging Coordinator or authorized representative will deliver the entire consignment to the carrier for transport. **This applies to non-hazardous samples only.**

7.0 SAMPLE RECEIPT AND PACKAGING PROCEDURES

If samples are determined to be hazardous (flammable, corrosive, radioactive, etc.), the customer must document the type of hazard and notify SMO prior to sample submission. The SMO Packaging Coordinator shall follow the procedures outlined in Section 7.2 of this procedure.

7.1 Receiving Non-Hazardous Samples

- A minimum of one chain-of-custody must accompany submitted samples. The SMO Packaging Coordinator or SMO Staff shall be present during the acceptance of samples at the SMO Packaging Facility.
- If the samples are not packaged for shipment immediately and refrigeration is required, the SMO Packaging Coordinator will refrigerate the samples to maintain the temperature at $\leq 6^{\circ}\text{C}$ until shipment to the analytical laboratory.
- Items containing Radioactive Material shall be stored in the area posted "Controlled Area" and "Radioactive Material Area (RMA)".
- Based on process knowledge, Industrial Hygiene (IH) media and samples are shipped as non-regulated. ES&H samples are exempted from the requirements of the RPPM if it is reasonably expected that the exterior of the sample container exhibits contamination levels less than those listed in Attachment 6-1, "Radioactive Contamination Limits" and the Dose rate on contact with the container is less than 0.5 mrem per hour.
- An RCT shall survey all non-exempt samples before they are shipped. Samples that are exempt and *do not* require an RCT survey prior to shipment include non-hazardous ground

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water samples, IH and any other samples with a Clearance – Radiological Process Knowledge Form ([SF 6951-RRF](#)) on file and exempt bioassay samples. Exempt bioassay samples that meet the following definitions and other criteria are qualified for the exemption (Diagnostic Specimen Exemptions: under IATA DGR 2014, Amendment III):

- Specimens are those collected directly from humans or animals, including, but not limited to, excreta, secretions, blood and its components, tissue and tissue fluid, swabs, and body parts being transported for purposes such as research, diagnosis, investigational activities, disease treatment, and prevention.
 - A patient or animal specimen is considered exempt if there is a minimal likelihood that pathogens are present. In determining whether a patient or animal specimen has a minimal likelihood that pathogens are present, an element of professional judgment is required to determine if a substance is exempt. This judgment should be based on known history, symptoms, and individual circumstances of the source, human or animal, and endemic local conditions.
 - Examples of specimens which may be transported under the exemption include the blood or urine tests to monitor cholesterol levels, blood glucose levels, hormone levels, PSA tests, tests required to monitor organ function such as heart, liver, or kidney function for humans or animals with non-infectious diseases, or therapeutic drug monitoring; tests conducted for insurance or employment purposes, biopsies to detect cancer; and antibody detection in humans or animals.
- The SMO SPF shall not ship any samples that have specific activity above that specified by the Nuclear Regulatory Commission (NRC) license of the contract analytical laboratory and/or IATA Section 10. Or, those samples that fail to meet the definition and other criteria under IATA DGR 2014 for Diagnostic Specimen Exemptions.

7.1.1 Sample Check-In

7.1.1.1 Documentation

Ensure that all applicable documentation is correct and present.

NOTE: Nitrile gloves shall be worn when handling all sample containers.

- Ensure that the information on the [ARCOC](#) and/or SARF for the IH program, Radiation Protection Dosimetry Program (RPDP) or the Onsite Laboratory (RPSD) forms are legible. (Attachments A, B, C and D). Illegible request forms will not be accepted.
- Ensure that sample containers are labeled and that all labels are legible and complete. The container labels in Attachment E are required for customers submitting samples on the ARCO. Illegible sample labels will not be accepted.
- If samples are from a radiological controlled area, the Sample Team Member shall have the *Radiological Survey* documentation (Attachment F) and/or the radiological survey number present upon sample delivery to the SMO Packaging Facility.

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- If samples are destined for the RPSD laboratory for analysis (i.e., gamma spec, alpha, beta, etc.), a completed *Onsite Laboratory (RPSD) SARF* from the Sample Team Member shall accompany the samples to the laboratory. (Attachment D).
- The Sample Team Members shall work with the SMO Packaging Coordinator or other SMO staff to ensure that all sample containers and request forms are correct and sample information is cross-referenced and complete.

7.1.1.2 Sample Container Inspection

The SMO has the authority to refuse samples that do not meet the following criteria.

- Sample containers are clean, sealed and intact.
- Each sample container has double containment in a re-sealable plastic bag. Glass containers are placed in sealed plastic bubble bags.
- Verify that no sample containers are leaking or broken.
- All sample container lids or bags are secured with SNL approved custody tape. Glass vials for aqueous samples like groundwater, and IH containers, are exempt from this requirement. The container(s) are placed in a plastic bag and the bag, not the container(s), is secured with the custody tape.
- All sample containers are labeled with a complete and legible label. The sample label in Attachment E is required for all samples submitted on an ARCOG.
- Bioassay sample packaging must consist of the following three components:
 - a leak-proof primary receptacle(s),
 - a leak-proof secondary packaging, and
 - an outer packaging of adequate strength for its capacity, mass and intended use, and with at least one surface having minimum dimensions of 100mm x 100mm.

7.1.1.3 Chain-of-custody Verification

SMO ARCOG

Review the ARCOG to verify that:

- The controlled document ARCOG form is used. This is [SMO 2012-ARCOG \(4-2012\)](#).
- The *ARCOG Number* is present.
- The *Page Numbers* are present and correct.
- The *Project Information* is correct (Dept. No./Mail Stop, Project/Task Manager, Service Order Number). This information can be found in the [Project Management](#) table in the Sample Management Analysis Request Tool ([SMART](#)) application.

- The *Analytical Lab* information is correct (Lab Contact, Lab Destination). External analytical lab information is uploaded from the Electronic Bottle Order and from the Electronic ARCOC. (**Note:** Analytical Lab information is not uploaded for the IH and RPD SARF.) The information can be verified by checking the [Lab Management Table](#) in the [SMART Application](#).
- The analytical laboratory *Contract Number* is correct. Contract numbers are found in the [Lab Management Table](#) in the [SMART Application](#).
- The *Project/Task No. and Customer group* are correct. This information is found in the SMART Application's most recent [Project Management Tables](#) and is uploaded from the Electronic Bottle Order and the Electronic ARCOC.
- The appropriate box in the Radiation Material Area, *RMA*, section is marked. If "Yes" is checked in the *RMA* box, verify that the Rad Survey data is provided and write "*Rad Survey Data Provided*" under *Comments*.
- The appropriate *Sample Disposal* box has been marked.
- The appropriate *Turnaround Time* (TAT) has been indicated. 30 days is a normal TAT. For a *Negotiated TAT*, the Sample Team Member shall indicate the number of days requested for the rush delivery (i.e., 3, 5 etc.). The 3, 7-Day TAT and negotiated TAT prior authorization is completed when the Electronic Bottle Order is submitted.
- The *Special Instructions/ Quality Control (QC) Requirements* section of the ARCOC may be used by the Sample Team Member to indicate special instructions for SMO and/or the analytical laboratory.
- The *Sample Team Members* section has been completed. A signature for each field technician listed is required.
- The sample information on the ARCOC matches the information on the sample labels. All information must be cross-referenced and correct. If there are multiple sample containers assigned to a *Sample No.-Fraction*, verify that the number of sample containers submitted matches those indicated in the *Container-Volume* column (i.e., 3X40 mL will have three 40 mL containers for that sample).
- To relinquish samples go to Section 7.1.1.4.

IH SARF Chain-of-custody

Review the IH SARF Chain-of-custody Report (Attachment B) to verify:

- The *IH Survey ID* is present.
- The *Sample Location* is indicated.
- The *Lab receiving sample* is indicated.
- The *Submitted By and Submission Date* are indicated and correct.
- The *Charge code* (Project/Task number) is correct. This information is found in the most recent [Project Management Table](#) of the SMART Application.
- The *Send Report To* and *Phone* are indicated.

- The *Attention of* line is completed with the name of the person that will receive the final data package. The *Email* line is filled in with this person's e-mail address. Filling in the *Fax* line is optional.
- The *Analysis requested* is completed.
- The *General Comments to lab personnel* are included. Generally, contact information and more specific sample information are indicated in this section.
- The *IH Sample #*, *Col. Date*, *Turn-Around-Time* and *Matrix* are indicated.
- The *Sample Comments* lists an SMO Sample Number-Fraction to correspond to each *IH Sample #*.
- The sample information on the SARF concurs with the samples delivered. All information must be cross-referenced and correct.
- Note that the IH SARF COC is 2 pages. The second page is the signature page for received and relinquished signatures. Verify that the IH Survey ID number is listed on the second page.
- To relinquish samples go to Section 7.1.1.4.

RPDP SARF

Review the RPDP SARF COC to verify that:

- The *RPDP Batch No* is present.
- The *Page Numbers* are *present and correct*.
- The *Customer Name*, *Organization (4121)*, *Phone (845-DOSE/284.5598)*, *email (dosimetry@sandia.gov)* and *program Name (Radiation Protection Dosimetry Program)* are listed.
- The *Analytical Lab* information is correct (Lab Contact, Lab Destination). The analytical laboratory *Contract Number* is correct. Contract numbers are found in the [Lab Management Table](#) in the [SMART Application](#).
- The appropriate TAT has been indicated. Normal (N) TAT is 30 days, Rush (R) TAT is 15 days and Urgent (U) TAT is 7 days.
- *Date Needed By* has been filled.
- The *Special Instructions/QC Requirements* section is completed. This section should include "Biological Sample – Treat with Caution" and an RPDP contact (name and phone).
- The sample information on the RPDP SARF matches the information on the sample labels. All information must be cross-referenced and correct. If there are multiple sample containers assigned to a *Customer Sample ID*, verify that the number of sample containers submitted matches those indicated in the *Qty/Tot Volume Tare Wt* column.
- Assure that the Electronic Data Delivery, *EDD*, box is checked either yes or no.
- To relinquish samples go to Section 7.1.1.4.

7.1.1.4 Relinquishing Samples

Samples are relinquished after the Chain-of-custody document is deemed correct and complete. A Chain-of-custody (on ARCOC) or Submitted by customer (on IH SARF) or person delivering the bioassay samples shall sign and date the appropriate “*Relinquished By*” box.

- The SMO packaging personnel shall sign and date the appropriate “*Received By*” box.
- For the ARCOC, authorized SMO personnel shall sign the “*SMO Authorization*” line.
- The IH SARF is 2 pages. The second page is the signature page for relinquishing and receiving samples. Verify that the IH Survey ID number is indicated on the second page.
- Assure that all pages of the Chain-of-custody are identified with the ARCOC Number, IH Survey ID Number or RPDP Batch Number.
- Provide a copy or send a PDF copy of the ARCOC, IH SARF or RPDP SARF to the customer.
- Enter all pertinent ARCOC, IH SARF or RPDP SARF information in the Sample Management Log (Attachment G).

7.1.2 Sample Packaging for Environmental or IH Samples

Follow the listed steps when packaging Environmental or IH samples in preparation for shipment.

Note: Nitrile gloves shall be worn when handling all sample containers.

1. Verify that:
 - Each sample container is in a re-sealable plastic bag and that the bag is sealed.
 - Glass containers are placed in a re-sealable bubble bag and the bag is sealed. Glass containers larger than the plastic bags are surrounded with cushioning material (bubble wrap) or placed in a “bubble” sleeve.
2. Place absorbent material (Powersorb™ Universal Sorbent Pads) in the bottom of the cooler and place an appropriately sized waterproof plastic bag on top of the absorbent pad. If the cooler contains water samples, place an additional sorbent pad inside the plastic bag at the bottom of the cooler. Place the protected sample container(s) in the large plastic bag and alternate glass containers with plastic containers or padding. This step does not pertain to IH samples which are packaged and shipped in boxes.
3. Place frozen cooling material (Blue Ice™) in the cooler for samples requiring temperature preservation. Avoid direct contact of the Blue Ice™ with sample containers (Blue Ice™ is often below 0°C). Insulate 40 mL vials with other sample containers or with water filled plastic bottles if necessary. (40 mL vials freeze or break if they are not protected due to the small volume of liquid.) This step does not pertain to IH samples which are packaged and shipped in boxes.

4. Pack the container with cushioning material to minimize the possibility of breakage from dropping or severe shock. Seal the large plastic bag containing samples with duct or plastic tape or a strong rubber band.
5. Weigh each cooler/box and record the weight in the Sample Management Log (Attachment G). The weight of the cooler will also be recorded in the Description on the Line Item section of the Web Shipper (Step #7).
6. Measure the dimensions of the cooler/box and record the total cubic feet on the appropriate line on the address label. The cooler dimensions will also be recorded in the Description on the Line Item section of the Web Shipper (Step #7).
7. Log on to [Web Shipper](#) and follow the on-line instructions to complete the Web Shipper form.
 - A Shipper Number is automatically assigned. All coolers or boxes shipped to the same laboratory may be included on one shipper. Each laboratory location requires a separate shipper. Write the Shipper Number on the associated chain(s) of custody.
 - Assign a cooler or box number (i.e., #1, #2, #3, etc.) for each cooler that is being shipped to the same location.
 - For the Description on the Line Item List enter the cooler/box number, volume and dimensions of the cooler/box, weight, and the corresponding ARCOC number, IH Survey ID or RPDP Batch Number of the samples packed in the cooler. (Example, "Cooler #1; 3.0 Cu. Ft.; 23"X15"X14"; 30lbs.; COC606877") Additional information may be added as necessary.
 - Write the Shipper Number on all Chain(s) of custody or SARF associated with the shipper.
 - Indicate the date expected at destination and reason for expedited shipping. (Example, "Time and Temperature Sensitive Samples for Analysis")
 - In the *Comments* section, Enter: Shipping method and the statement "Please Do Not Re-Pack". (Example, "FED-EX First Overnight. Please Do Not Re-Pack!"). Additional information may be added as necessary.
 - Submit the Shipper. The completed Shipper is approved electronically and is automatically sent to Shipping and Receiving.
 - Print 1 copy of the completed shipper. This copy is taken to Shipping and Receiving with the corresponding cooler(s). After samples are shipped, Shipping and Receiving will send a notification with a completed shipper that includes a tracking number.
8. Scan the Chain(s) of custody with associated documentation pertaining to the ARCOC, IH SARF, or RPDP SARF, and Shipper, and place in the SMO [COCs Packaging](#) folder on the SMO shared drive.
9. Place the original ARCOC or SARF in a re-sealable plastic bag and place it on top of the large sealed plastic bag containing the samples. Close the cooler/box lid.

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10. If the cooler has a drain plug, secure the drain plug in the closed position with packing or duct tape.
11. Secure the cooler lid with packing tape in two locations. Use strapping bands completely around the cooler in two locations. If using a small cooler one location is sufficient. Secure the box lid with packing tape.
12. Mark and label the cooler/box as indicated below:
 - Place the appropriate analytical laboratory pre-printed address label on the cooler/box and ensure that the ARCOG, IH Survey, or RPDP Batch number, Shipper number, weight and volume is recorded on the address label. Secure the address label with transparent tape on coolers.
 - Place orientation arrow labels on two opposing sides of all coolers containing liquids. Put a "Fragile" label on the cooler lid for all coolers with glass containers.
 - Record cooler number (i.e., "1 of 3") on the packing tape located on the cooler lid. Do not write directly on the cooler lid. The packing tape will be removed and the cooler will be re-used. If using a box the box number may be written directly on the box.
13. Transport the cooler/boxes in a Government owned vehicle to Shipping and Receiving Building 957 and present the Web Shipper form to the Service Clerk. Samples delivered to local contract laboratories must be packed securely in either coolers or boxes and transported in a Government owned vehicle. DOT driver training is not required to transport non-hazardous samples but is required for the transportation of hazardous and radioactive samples.
14. Complete all entries in the SMO Packaging Facility Sample Management Log (Attachment G).

7.1.3 Sample Packaging for Bioassay Samples

1. RPDP will deliver bioassay samples for shipment with an RPDP SARF.
2. Inspect the sample containers (Refer to Section 7.1.1.2) to verify that:
 - Sample containers are in a re-sealable plastic bag and that the bag is sealed.
 - Verify that no sample containers are leaking.
 - Verify that sample containers are labeled with a complete and legible label.
3. Follow Steps 1-14 in Section 7.1.2 (Sample Packaging for Environmental or IH Samples) Refrigeration of bioassay samples is not necessary.

7.2 Receiving Hazardous Samples

The following steps must be followed when hazardous samples are received. Refer to [Shipment Planning](#) at Ship an Item (Web Shipper).

- If a sample is determined to be hazardous upon field-testing, via process knowledge and/or during sample survey, SMO personnel shall be notified of the specific hazard prior to sample delivery.
 - If unanticipated radioactive material or removable surface contamination exceeding RPPM Attachment 6-1 limits is determined refer to the **EMERGENCY PROCEDURES** section of this document.
- All samples that are labeled radioactive by an RCT shall be stored in the Radioactive Material Area (a posted refrigerator).
 - General area radiation levels are maintained at a level that does not require posting as a controlled area (<100 mrem per year or about ≤ 0.05 mrem/hr). If total samples present increase the general area dose rate to greater than 0.05 mrem/hr, the Controlled Area boundaries will be extended to reduce radiation exposure to personnel. The SMO support RCT is responsible for all radiation related postings or meter readings.
- Radiological screening shall be conducted on a representative sample fraction at the onsite RPSD laboratory to determine the total isotopic activity.
 - A sample that has a specific activity of 0.002 $\mu\text{Ci/g}$ or less may be packaged and shipped as an environmental sample with a disclaimer (Attachment H).
 - A sample that has a specific activity greater than 0.002 $\mu\text{Ci/g}$ shall be regarded as a radioactive material [IATA Section 6.0.1.3(a)].
- If a sample is determined to be radioactive, it must be within the allowable limits of the contract laboratory NRC license. Copies of NRC licenses documenting allowable radioactive limits are on file at the SMO Packaging Facility or electronically from SMO personnel or on the SMO shared drive in the [NRC Licenses](#) folder. RP needs to perform a transportation survey prior to movement to Shipping/Receiving. The SMO Packaging Facility shall not accept a radioactive sample for packaging if it does not meet the allowable limits of the contract laboratory NRC license. The SMO Packaging Coordinator shall notify the customer when a sample is refused and the customer shall take custody of the sample immediately upon notification. The SMO Packaging Coordinator shall then implement Emergency Procedures.

7.3 Preparing Hazardous Samples

The SMO Packaging Coordinator or SMO Packaging Staff shall take samples deemed hazardous, but not classified as radioactive materials, to Sandia Shipping and Receiving for

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packaging and shipping. The SMO Packaging Coordinator shall reference the section, “*How to Use the Regulations*” in the current edition of the IATA Dangerous Goods Manual when preparing hazardous samples for delivery to Shipping and Receiving (Building 957).

If a sample is determined to be radioactive and within the allowable limits of the contract laboratory license, the SMO Packaging Coordinator and/or Packaging Facility staff will prepare the sample in accordance with IATA Section 10 as it applies to the packaging, marking, labeling, certification and documentation requirements for Class 7 radioactive materials. The SMO Packaging Coordinator shall deliver these limited quantity radioactive material samples to SNL Shipping and Receiving for packaging and shipping. Radioactive samples shall only be delivered to SNL Shipping and Receiving in accordance with Corporate Procedure [SCM100.3.19](#), *Movement of Hazardous Material*.

The steps below provide general guidance when preparing hazardous samples for delivery to Shipping and Receiving.

1. Inform the Hazardous Material Packaging Consultant of the specific hazards and the composition and amount of the specific hazards ([Hazardous Material Packaging, Packaging Engineers](#)).
2. Prepare and complete the required forms:
 - [Web Shipper](#)
 - Information for Hazardous Material Shipments at [Shipment Planning](#)
 - Print two copies of the completed *Web Shipper* and *Hazardous Material Shipments* form. (One copy is for Shipping and Receiving and one is for SMO records.)
 - Attach the completed *Hazardous Material Shipments* form to the *Web Shipper*.
3. Complete the remainder of the *SMO Use Only* section on the ARCO form (Attachment A) with the required information.
4. Deliver the following to Shipping and Receiving, Building 957:
 - Hazardous samples
 - Completed *Web Shipper* and attached *Hazardous Material Shipments* form
5. The Hazardous Material Packaging Consultant shall review the *Web Shipper* and attached *Hazardous Material Shipments* form for completeness and correctness. If errors are found, the package shall be refused for shipment until all corrections are made.

EMERGENCY PROCEDURES

An emergency is defined as an unplanned, significant event or condition that requires time-urgent actions from emergency response resources to ensure the:

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- Health and safety of Members of the Workforce and the public.
- Protection of the environment.
- Security of operations.

Emergency procedures shall be in accordance with established SNL policies and procedures. Refer to [ESH100.3.1, Prepare for and Manage Emergencies](#), and refer to the current version of the [Building 1090 Emergency Action Plan](#). When Tone Alert Radio (TAR) alerts go off the SMO personnel in the SMO Packaging Facility shall follow the procedure outlined in the 1090 Emergency Action Plan when TAR alerts sound.

General post-incident actions by involved personnel are:

- Stop activity.
- Secure the scene to prevent further injury or damage, if it is safe to do so.
- Evacuate if necessary. The SMO facility has two evacuation routes, one to the north and one to the east.
- Do not disturb the scene.
- Notify Department Manager.

Actions required when discovering unanticipated radioactive material or removable surface contamination are listed below.

- Discovery of unanticipated radioactive material will require employees to place work and materials into a safe configuration and exit the building pending a radiological survey and evaluation by SNL Radiation Protection and Facility Management. To mitigate the chance of unanticipated radioactive material, all new samples without process knowledge, are placed in the facility RMA prior to RCT scans.
- Discovery of material with removable surface contamination in excess of RPPM Attachment 6-1 limits for removable surface contamination will require employees to place work and materials into a safe configuration and exit the building pending a radiological survey and evaluation by SNL Radiation Protection and Facility Management.

The following information from [ESH100.3.1, Prepare for and Manage Emergencies](#) provides guidance for both emergency and non-emergency situations.

Table 8. Hazardous Materials Release, Emergency

1. At SNL/NM, call 911 or 844-0911 (cellular).
2. Evacuate and isolate the immediate area. Keep personnel from walking or driving through the affected area. For an outdoor release, stay upwind to avoid fumes.
3. If it is possible to do so safely, determine the chemical and quantity spilled; provide this information to emergency responders.
4. Consult the Material Safety Data Sheets and area ES&H Safety Operating Procedures for information about the released material and provide to emergency responders.

Table 9. Hazardous Materials Release, Non-Emergency

1. For a non-emergency situation, call 311 or 844-6515 or 844-0311 (cellular). To clean up large spills, call the Non-Emergency Hotline (844-6515) for spill response and cleanup.
2. Clean up small spills generated by personnel, as long as you have the correct training and equipment. If you do not feel comfortable doing so, request advice or assistance from the Non-Emergency Hotline (844-6515).
3. Handle all spilled material, absorbents, neutralizers and contaminated PPE as chemical waste. Follow the requirements for containment, labeling, storage, and disposal request specified in ESH100.2.ENV.22, Manage Hazardous Waste at SNL/NM.

Call for Help:

- 911 or 844-0911 (cellular)
- Call 311 or 844-6515 or 844-0311 (cellular), Non-Emergency Phone Numbers, when observing or experiencing an unusual condition that does not appear to constitute an emergency.
- Call the appropriate phone number in (as soon as it is safe to do so) when:
 - An emergency condition is observed or experienced.
 - You are unsure whether you have an emergency or not.

8.0 REFERENCES

International Air Transport Association, Dangerous Good Regulations, 55th edition (updated annually), International Air Transport Association, Montreal, Canada.

Sandia National Laboratories Environment Safety and Health, Corporate Processes and Procedures, <https://my.sandia.gov/authsec/portal/cps/environmentalSafetyHealth>

Sandia National Laboratories 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 Sample Management and Custody Administrative Operating Procedure (AOP-95-16), Current Revision, Sandia National Laboratories/New Mexico, Albuquerque, New Mexico.

Sandia National Laboratories Statement of Work for Analytical Laboratories, Current Revision, Sample Management Office, Sandia National Laboratories/New Mexico (SNL/NM), Albuquerque, New Mexico.

Sandia National Laboratories Supply Chain Management Corporate Processes and Procedures, SCM100.3.6, <https://my.sandia.gov/authsec/portal/cps/supplyChainManagement>

ATTACHMENTS

[illegible]

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ATTACHMENT B: Industrial Hygiene (IH) SARF Chain-Of-Custody

SANDIA
SNL NM
SARF Chain of Custody Report

| | | | | | | | | | | | | | | | | | |
|--|---|--------------------------------------|--------------------|----------------------|-----------------|---------------------|------------------------------|---------------|--|-------------------------------------|----------------------------------|--------------------------------------|---|--------------------------------------|---|--|--|
| IH Survey ID: | <u>501013</u> | Lab Log Batch ID: | | Lab receiving sample | | | | | | | | | | | | | |
| Sample location | <u>TA1 897 1300</u> | | | | | | | | | | | | | | | | |
| Submitted By: <u>CASTILLO,R</u> | | Submission Date: _____ | | | | | | | | | | | | | | | |
| Charge code: _____ | | | | | | | | | | | | | | | | | |
| Send Report To: <u>SNL NM</u> | | Attention of: <u>CASTILLOR</u> | | | | | | | | | | | | | | | |
| Address: _____ | | Email: _____ | | | | | | | | | | | | | | | |
| Phone: _____ | | Fax: _____ | | | | | | | | | | | | | | | |
| Analysis requested (please be specific if possible) <u>CADMIUM</u> | | | | | | | | | | | | | | | | | |
| 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 | Turn-Around-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 | | | | | | | | | | | | |
| <table><tr><td>Samples Checked For</td><td>Condition of Sample Received</td><td>Custody Seals</td></tr><tr><td><input type="checkbox"/> Container Integrity</td><td><input type="checkbox"/> Acceptable</td><td><input type="checkbox"/> Present</td></tr><tr><td><input type="checkbox"/> Sample Size</td><td><input type="checkbox"/> Not Acceptable</td><td><input type="checkbox"/> Not Present</td></tr><tr><td><input type="checkbox"/> Sampling Label</td><td></td><td></td></tr></table> | | | | | | Samples Checked For | Condition of Sample Received | Custody Seals | <input type="checkbox"/> Container Integrity | <input type="checkbox"/> Acceptable | <input type="checkbox"/> Present | <input type="checkbox"/> Sample Size | <input type="checkbox"/> Not Acceptable | <input type="checkbox"/> Not Present | <input type="checkbox"/> Sampling Label | | |
| Samples Checked For | Condition of Sample Received | Custody Seals | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Container Integrity | <input type="checkbox"/> Acceptable | <input type="checkbox"/> Present | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Sample Size | <input type="checkbox"/> Not Acceptable | <input type="checkbox"/> Not Present | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Sampling Label | | | | | | | | | | | | | | | | | |

RPDP SARF

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Attachment D: Onsite Laboratory (RPSD) Analysis Request & Chain-Of-Custody
RPSD SARF

RPSD Laboratory Sample Analysis Request Form

| SAMPLE ANALYSIS REQUEST FORM (SARF) | | | | | | | | | | | |
|--|----|---------|------|----------------|-----|------------|--------|---|--------|--------------|-----------------------|
| RPSD LOG NO. | | | | | | | | | | RPSD LOG NO. | |
| ASC TRAC LOG NO. | | | | | | | | | | | |
| Owner: Franco, Manuel Org: 04121 -- MS: 1103 Phone: -- Email: mfranco Project Name: Example SARF Number: 33527 | | | | | | | | | | | |
| Customer Sample ID | ID | Project | Task | Date Collected | TAT | Time Coll. | Sample | # | Survey | Rad | Param. & Method Reqd. |
| (SAMPLE #) | | | | | | | | | | | |
| | | | | | | | | | | | |
| Sample Condition On Receipt: <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal | | | | | | | | | | | |
| Special Instructions: NO OTHER HAZARDS | | | | | | | | | | | |
| 1 Relinquished Date | | | | | | | | | | | |
| 2 Relinquished Date | | | | | | | | | | | |
| 3 Relinquished Date | | | | | | | | | | | |
| 4 Relinquished Date | | | | | | | | | | | |
| 1 Received Date | | | | | | | | | | | |
| 2 Received Date | | | | | | | | | | | |
| 3 Received Date | | | | | | | | | | | |
| 4 Received Date | | | | | | | | | | | |

Page 1 of 1


PROCEDURE NO: RPSD-06-01

ISSUE NO: 14

ATTACHMENT 3
PAGE NO: 1 OF 1

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ATTACHMENT E: Sample Label

| | | |
|---|----------------|-------------------------------------|
|  Sandia National Laboratories | | Volume: Type: Container of |
| *Sample ID: | *COC No: | |
| *Location: | | |
| *Date: | *Time: | |
| *Matrix: | *Preservative: | |
| *Analysis: | | |
| *Collector: | | |

* Required Fields – additional fields may be contained on the form as applicable

ATTACHMENT F: Radiological Survey Form
http://www-irn.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 Counting Data Attached: <input type="checkbox"/> YES <input type="checkbox"/> NO % Eff.: ^(e) _____ Radionuclide: _____ Bkg. $\frac{\text{dpm}^{(a,b)}}{\text{cpm}}$ $\frac{\text{cpm}}{100\text{cm}^2}$ T/R/F ^(c) | | | | ALPHA ACTIVITY Counting Data Attached: <input type="checkbox"/> YES <input type="checkbox"/> NO % Eff.: ^(e) _____ Radionuclide: _____ Bkg. $\frac{\text{dpm}^{(a,b)}}{\text{cpm}}$ $\frac{\text{cpm}}{100\text{cm}^2}$ T/R/F ^(c) | | | | RADIATION SURVEY Background: _____ mrem/hr Radiation Type: <u>Gamma</u> mrem/hr Distance from Source ^(d) | |
| | | cpm | cpm | $\frac{\text{dpm}^{(a,b)}}{100\text{cm}^2}$ | T/R/F ^(c) | cpm | cpm | $\frac{\text{dpm}^{(a,b)}}{100\text{cm}^2}$ | T/R/F ^(c) | mrem/hr | |
| | | | | | | | | | | | |
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| | | | | | | | | | | | |
| ^(a) ND = No detectable activity above background ^(b) If other than 100 cm ² , indicate area or record as 'dpm/probe' or 'dpm/LAW' (large area wipe). ^(c) T/R/F = Total/Removable/Fixed ^(d) OC or CT = On Contact ^(e) %Eff-Removable/Direct | | | | | | | | | | | |
| Remarks: | | | | | | | | | | | |
| | | | | | | Reviewed by: | | | Date: | | |

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ATTACHMENT G: Sample Management Log

| DATE | PROJECT NAME | RELINQUISHED BY | RCVD. BY | PARENT C.O.C. | SHIP DATE | DESTINATI ON LAB | SHIPPER # | WAYBI LL # | <5 Y/N | Q T Y. | W G H T. | COMMENTS |
|------|--------------|--------------------|-------------|------------------|--------------|---------------------|-----------|---------------|--------|--------------|-------------------|----------|
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ATTACHMENT H: Disclaimer

NOTE:

The samples in this cooler are labeled radioactive per Sandia National Laboratory policies and procedures.

However, the samples have been analyzed by gamma spectroscopy and are not radioactive materials per DOT regulations (49 CFR 173.403). Gamma spectroscopy results are enclosed with the chain-of-custody.

Signature: _____

Date: _____

SANDIA NATIONAL LABORATORIES
Sample Management Office

PROCEDURE FOR COMPLETING THE CONTRACT VERIFICATION

SMO-05-03
Revision 06

Author: Wendy Palencia
Wendy Palencia, SMO Project Coordinator

Date: 4/21/16

Review: Mark Lyon
Mark Lyon, SMO Project Coordinator

Date: 4/21/16

Approved: Corey White
Corey White, SMO Operations Manager

Date: 4-21-16

Approved: Sonoya Shanks
Sonoya Shanks, Analytical Services
Program Leader

Date: 4-21-16

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

EFFECTIVE DATE: 4/22/16

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LIST OF FORMS

Contract Verification Review (CVR) Form

Correction Request Form

Document Quality Assurance Checklist

REVISION HISTORY

| Revision | Effective Date | Summary of Changes |
|----------|-------------------|--|
| 1 | June 9, 1999 | New document, first issue |
| 2 | December 2, 2003 | Technical changes |
| 3 | April 30, 2007 | Technical changes |
| 4 | May 11, 2010 | Edited sections due to method changes. Added section to cover the Data Anomaly Report (DAR). Renamed Issue to Revision. |
| 5 | November 12, 2013 | Expanded section on processing the DAR. Added Responsible Individual descriptions, footnote disclaimer, and Acronyms and Abbreviations. Minor sentence and grammar edits. Added yes/no option for closure to Problem Resolution section of CVR form. Removed yes/no "Resolved" boxes on section 1 and 2 of CVR form. |
| 6 | April 22, 2016 | Updated CVR form due to method changes. Add link to electronic CVR form. |

ACRONYMS AND ABBREVIATIONS

| | |
|----------------|---|
| AOP | Administrative Operating Procedure |
| ARCOC | Analysis Request and Chain of Custody |
| brw | Oracle Query Builder File |
| CFRC | Customer Funded Records Center |
| CSV | Comma Separated Values file |
| CVR | Contract Verification Review |
| DAR | Data Anomaly Report |
| EDD | Electronic Data Deliverable |
| EPA | U.S. Environmental Protection Agency |
| HPLC | High Performance Liquid Chromatography |
| ICP | Inductively Coupled Plasma |
| IDL | Instrument Detection Limit |
| L _c | Critical Level |
| LCS | Laboratory Control Sample |
| LCSD | Laboratory Control Sample Duplicate |
| MB | Method Blank |
| MDA | Minimum Detectable Activity |
| MDL | Method Detection Limit |
| mg | Milligram |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| OP | Operating Procedure |
| PCB | Polychlorinated biphenyl |
| ppm | Parts Per Million |
| QAPP | Quality Assurance Project Plan |
| QC | Quality Control |
| SDG | Sample Delivery Group |
| SMO | Sample Management Office |
| SNL/NM | Sandia National Laboratories New Mexico |
| SOW | Statement of Work |
| STAR | Sample Tracking and Analytical Results |
| TAT | Turnaround Time |

1.0 PURPOSE, SCOPE, AND OWNERSHIP

1.1 Purpose

This document provides instructions for performing a contract verification review (CVR) of analytical data packages received by the Sandia National Laboratories/New Mexico (SNL/NM) Sample Management Office (SMO). The CVR checks for completeness and compliance of sample custody and laboratory report documentation. Sample custody documentation is generated during a sampling event. Laboratories performing sample analyses generate analytical reports. The CVR determines that sample custody is, or is not, completely documented and that laboratory analyses and reports comply with contractual requirements.

The CVR examines specific items of sample management, custody, and laboratory reporting. The field sampling team and the analytical laboratory enter the sample management and custody items on the Analysis Request and Chain of Custody (ARCOC) form [SMO 2012-ARCOC](#). After sample receipt at the laboratory, the laboratory completes the ARCOG and returns a copy to the SMO for sample login verification. Additionally, the completed original ARCOG is included in the final laboratory analytical report.

CVR items checked in the laboratory analytical report are technical, quality control (QC), and reporting requirements imposed upon the laboratory through the *SNL/NM Contract Statement of Work (SOW) for Analytical Laboratories*. The laboratory is required to provide specific information in all analytical reports. These data are often in addition to the laboratory's standard operating procedures or requirements in the analytical methods. The CVR provides the SMO with a record of laboratory performance on a report deliverable basis, and allows SMO to compile and track reporting deficiencies, correction requests, and problem resolutions. The SMO monitors the performance of contracted laboratories, in part, using results from the CVR.

1.2 Scope

This procedure applies to all sampling and analysis events coordinated through the SNL/NM SMO and/or utilizing analytical laboratories under contracts administered by the SMO. Any sampling and analysis event, whether for environmental monitoring, site investigation, site restoration, waste characterization, industrial hygiene, bioassay or other purpose, which is tracked by the SMO and for which an SMO contract laboratory generates a data report, will be monitored by the SMO utilizing the CVR. The SMO is responsible for completing the CVR, initiating and tracking any corrective actions based upon the CVR, and documenting corrective action closure.

1.3 Ownership

The SNL/NM SMO is the owner of this operating procedure (OP). The SMO is responsible for maintaining and revising this OP as necessary. Any comments or suggestions for improvement should be forwarded to the SMO.

1.3.1 Program/Project Description

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

2.0 RESPONSIBLE INDIVIDUALS AND ORGANIZATIONS

SMO Operations Manager / Program Leader

- Provides programmatic guidance leading to the development of this OP.
- Develops and maintains the *SNL/NM Contract SOW for Analytical Laboratories* that meets customers' requirements.
- Develops, reviews and approves program documents, plans, and OPs as required.

SMO Project Coordinator

- Acts as a point of contact between Task/Project Leaders and the analytical laboratories.
- Resolves problems, issues, non-conformances, and errors for projects with regard to analytical data.
- Performs 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
- Updates this procedure.

SMO Staff

- 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.
- Submits requests and data packages to the SNL Customer Funded Records Center (CFRC).

SMO Database Administrator

- Designs, operates and maintains the SMO database.
- Establishes user accounts, passwords, and privileges within Oracle™.

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- Submits requests to administrative and support staff to establish new user accounts on the Sandia Restricted Network (SRN).
- Assists the SMO Operations Manager in developing electronic data deliverable (EDD) specifications for incorporation into the SNL/NM Contract SOW for Analytical Laboratories.

3.0 PROCEDURES

3.1 Training Qualifications

SMO personnel shall read this procedure and acknowledge electronically that they have read and understood this procedure.

Prerequisite to completing the CVR, reviewers must be familiar with the appropriate requirement documents and associated procedures. Applicable documents include current revisions of the following:

- *Quality Assurance Project Plan (QAPP) for the SNL/NM SMO*, [SMO QAPP](#),
- The current analytical laboratory contract including the [SNL/NM Contract SOW for Analytical Laboratories](#), and
- Project specific sampling and analysis plans and/or QAPP (or equivalent).

Associated procedures include current revisions of the following:

- *SMO Data Management Plan*, Administrative Operating Procedure [\(AOP\) 95-44](#),
- *Procedure for Electronic Data Deliverable (EDD) Processing*, [SMO-05-04](#),
- *AOP for Sample Management and Custody*, [AOP 95-16](#), and
- *Data Validation Procedure for Chemical and Radiochemical Data SNL/SMO*, [AOP 00-03](#).

3.2 Completing the CVR

The CVR will be completed for analytical data packages delivered to the SMO from the contracted analytical laboratories. The CVR must be completed prior to data validation and transmitting reports and records to the sampling task manager and CFRC. The CVR shall be maintained in the CFRC in accordance with the requirements in section 2.4.1 of the SMO QAPP. A copy of the CVR form can be found on the SNL Controlled Document site under SMO Forms, [SMO-2012-CVR](#). The CVR is completed and electronically signed and date stamped using the CVR tool at https://rails-rn-prod.sandia.gov/esh_smo/cvr/.

Upon receipt of the analytical data package, the SMO will log the Sample Delivery Group (SDG) number and receipt date into the Sample Tracking and Analytical Results (STAR) database, retrieve the current correspondence and documentation files associated with the specific sampling activity, and place the package in queue awaiting CVR.

The CVR is divided into six topical sections, with line entries to be checked as complete or incomplete under each section. The six sections are:

- 1.0 Analysis Request and Chain of Custody Record and Log-In Information
- 2.0 Analytical Laboratory Report
- 3.0 Data Quality Evaluation
- 4.0 Calibration and Validation Documentation
- 5.0 Data Anomaly Report (DAR)
- 6.0 Problem Resolution.

To complete the CVR, gather the analytical data report including the original, signed, returned ARCOC, and the current correspondence and documentation file. Complete the following information.

Header Information

- Project Leader
- Project Name
- Project/Task Number
- ARCOC Number
- Analytical Laboratory Name
- SDG Number

The header information items will be found on the ARCOC and on the analytical laboratory report.

Review the items indicated on each line of the CVR. If the items indicated are complete and correct click “Yes” in the appropriate column. If the items are incomplete or incorrect click “No” and record an explanatory note. The reviewer should resolve any deficiencies with the documentation, if possible, during the review.

3.2.1 Review the ARCOC

Review the ARCOC and laboratory login information and complete the CVR Section 1.0.

Line 1.1 All items on ARCOC complete – data entry clerk initialed and dated

All information prompted for on the ARCOC is necessary for accurate tracking of the samples and documenting sample custody. Verify that all items have been completed and that the sample

custody record is complete and unbroken. Check that the SMO data entry clerk has initialed and dated the ARCOC (on the field copy) indicating when the sample data were entered into the STAR database.

Line 1.2 Container type(s) correct for analyses requested

Check that the recorded sample container types are compatible with the sample matrices and analyses requested. Recommended containers are listed in Attachment 5, *SNL/NM Contract SOW for Analytical Laboratories*.

Line 1.3 Sample volume adequate for # and types of analyses requested

Check that the volume or mass of sample provided meets or exceeds the analysis minimum requirement, including sufficient volume/mass required for quality control analyses.

Line 1.4 Preservative correct for analyses requested

Sample preservation, both chemical and thermal, must be consistent with guidance and requirements of the U.S. Environmental Protection Agency (EPA). Correct preservatives are found in Attachment 5, *SNL/NM Contract SOW for Analytical Laboratories*.

Line 1.5 Custody records continuous and complete

Check that a member of the sampling team listed on the ARCOC was first to relinquish the samples. There should be no time gaps in the custody record and all custodians should be identified, from sample collection until receipt at the laboratory. If an express carrier transported samples to the laboratory they should be identified and the shipment waybill number recorded.

Line 1.6 Lab sample number(s) provided and SNL sample number(s) cross referenced and correct

Laboratory sample numbers that uniquely correspond to the SNL/NM assigned sample numbers must be indicated on the returned ARCOC or sample acknowledgement. SNL/NM sample numbers must be correctly cross-referenced to the laboratory sample numbers in the analytical data package.

Line 1.7 Date samples received

The date that samples were received at the laboratory must be indicated on the ARCOC. The date received is noted in the laboratory's acknowledgement of custody.

Line 1.8 Condition upon receipt information provided

The laboratory should make notation as to whether or not the samples were received intact, in good condition, and correctly preserved. Any anomalies should be noted.

3.2.2 Review Analytical Laboratory Report

Review the analytical laboratory report and complete the CVR Section 2.0.

Line 2.1 Data reviewed, signature

Check that there is a transmittal letter or section in the laboratory report case narrative testifying to laboratory management's review and approval for release of the analytical data. The testimonial should bear the signature of an appropriate laboratory manager.

Line 2.2 Method reference number(s) complete and correct

The analytical methods used by the laboratory should be standard, published methods. EPA numbers will typically identify the methods in the report. Check that the analytical methods are referenced and conform to the ARCOG.

Line 2.3 QC analysis and acceptance limits provided (method blank (MB), laboratory control sample (LCS), and Replicate)

Analytical laboratory batch QC sample analysis results and result acceptance limits must be provided in the report. The types of QC samples analyzed will depend on the analytical method and requirements of the *SNL/NM Contract SOW for Analytical Laboratories*. Typically, minimum batch QC might consist of a MB, LCS, and laboratory control sample duplicate (LCSD). Sample replicates should not be performed on field QC samples. Sample replicates are required for most inorganic and radiochemical analyses.

Line 2.4 Matrix spike (MS) /matrix spike duplicate (MSD) data provided

Organic method sample MS analyses are run in duplicate on representative sample matrices, per batch, if adequate sample volume is provided. Check that the laboratory analyzed MS/MSD on the sample(s) and that accuracy and precision data in the sample matrix are reported. Inorganic and radiochemistry methods typically require MS only. MS should not be performed on field QC samples.

Line 2.5 Detection limits provided; e.g., Practical Quantitation Limit (PQL) Method Detection Limit (MDL), Instrument Detection Limit (IDL), Limit of Quantitation (LOQ), Limit of Detection (LOD), Detection Limit (DL), Minimum Detectable Activity (MDA), Minimum Detectable Concentration (MDC), and Critical Level (L_C).

Limits of detection should be provided in the report for each sample analysis. The reported limits of detection should be appropriate to the analysis and in compliance with the *SNL/NM Contract SOW for Analytical Laboratories*.

Line 2.6 QC batch numbers provided

Check that analytical laboratory QC samples are identified by laboratory assigned batch numbers.

Line 2.7 Dilution factors provided

Check that dilution factors are reported for all samples. Most samples will have a dilution factor of “1” indicating that the sample, digestion solution, or extract was analyzed using the optimum preparation weights and volumes described in the analytical method. All liquid samples, solid sample digestions, or extracts that may have required further dilution to be analyzed within the linear working range of the test instrumentation or standards curve must be identified and the dilution factor used must be provided.

Line 2.8 Data reported in appropriate units and using correct significant figures

The number of significant figures to be reported is specified in the *SNL/NM Contract SOW for Analytical Laboratories*. Typically, final analytical results may be reported at three significant figures and limits of detection reported at two significant figures. Check that results are reported in the appropriate units and with the correct number of significant figures. All data for inorganic and metal parameters shall be reported in parts per million (ppm).

Line 2.9 Radiochemistry analysis uncertainty (2-sigma error or 1-sigma error for bioassay) and tracer recovery provided

Confirm that total measurement errors, expressed as plus and minus two standard deviations, i.e., 2-sigma, are reported for all final radiochemistry activity concentration results (Bioassay results are reported as 1-sigma error uncertainty). Confirm the tracer recoveries are reported for alpha spectroscopy, and any other applicable radiochemical method.

Line 2.10 Narrative provided

Check that the analytical report narrative conforms to requirements in the *SNL/NM Contract SOW for Analytical Laboratories*. Generally, the report narrative will describe the contents of the data package, provide an index or list of analyses performed and samples processed, and describe the circumstances leading to laboratory qualification of any analysis result.

Line 2.11 Turnaround time (TAT) met

The analytical report is due at SNL/NM SMO after the elapsed time specified in the *SNL/NM Contract SOW for Analytical Laboratories* and indicated on the ARCOC (typically 30 calendar days from receipt of the samples). Mutually agreed upon expedited TATs may be applicable if documented and so noted on the ARCOC. Verify that the analytical report was received within the required TAT. Analytical data packages not meeting turnaround performance requirements may result in reduced or non-payment for services.

Line 2.12 Holding times met

Sample analysis holding times are counted as days from when the sample was taken until when it was prepared, if applicable, and analyzed. Analysis holding times may be required for valid analysis results or just recommended per industry guidance. Holding times for SNL/NM samples are listed in Attachment 5, *SNL/NM Contract SOW for Analytical Laboratories*. Analytical data not meeting holding times may result in reduced or nonpayment for services.

Line 2.13 Contractual qualifiers provided

The *SNL/NM Contract SOW for Analytical Laboratories* requires the laboratory to assign standard data qualifiers to analytical results not meeting specified criteria. For example, “B” will be assigned when sample analyte contamination was observed above the detection limit and in the associated batch preparation blank sample, and “J” will be assigned to indicate an estimated result less than a limit of quantitation but greater than a method detection limit. Check that the laboratory has appropriately assigned the correct data qualifiers. Qualifiers for SNL/NM samples are listed in Appendix G, *SNL/NM Contract SOW for Analytical Laboratories*.

Line 2.14 All requested result and Tentatively Identified Compounds (TIC) data provided

Confirm that all information requested from the laboratory on the ARCOC, in the *SNL/NM Contract SOW for Analytical Laboratories*, and in project specific correspondence was supplied.

3.2.3 Data Quality Evaluation

Section 3.0 of the CVR, “Data Quality Evaluation,” provides opportunity to evaluate the analytical QC performance measures reported by the laboratory. Sample numbers are recorded to identify sample analysis results associated with nonconforming conditions or poor QC measurement results. Review line items in Section 3.0 highlight those laboratory reporting and technical performance measures checked for completeness in Section 2.0.

Complete the data quality evaluation, Section 3.0 of the CVR.

Line 3.1

Are reporting units appropriate for the matrix and meet SMO contractual specified or project-specific requirements? Inorganics and metals reported as ppm (milligram (mg)/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? IH air results reported as ug/sample? Units consistent between QC samples and sample data?

Note the sample numbers for analytical results not meeting reporting unit conventions or requirements.

Line 3.2 Quantitation limit met for all samples

Note the sample number of analyses associated with elevated quantitation limits. Some analytical laboratories also call the quantitation limit the detection or reporting limit; for radiochemical analyses, the L_C or MDA are the limits reported. Quantitation limits will be elevated when high concentration of an analyte is present. This may only be a cause for concern when the other analytes are not detected in the same analysis.

Line 3.3 Accuracy

Note the sample numbers of analyses associated with nonconforming QC accuracy measurements. Analytical batch LCS analyte percent recoveries must fall within the specified control limits. Sample-specific surrogate compound percent recoveries (organic compound analyses) must be within established control limits. And, if required, MS percent recoveries should also fall within acceptable limits.

Line 3.4 Precision

Note the sample numbers of analyses associated with nonconforming QC precision measurements. Precision measurement values are calculated as relative percent difference between the MS and MSD for organics, sample and sample replicate for inorganics, and paired LCS/LCSD for some other analysis. Precision for radiochemistry is reported as the replicate error ratio.

Line 3.5 Blank data

Note the sample numbers associated with any blank sample in which significant positive results are observed. Contamination observed in a laboratory batch method blank sample, field or trip blank, or equipment rinse blank may indicate inadvertent or cross-sample contamination.

Line 3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"- analyte found in method blank above the MDL for organic and inorganic; "U"- analyte undetected (results below the MDL, IDL or MDA (radiochemical)); "H"- analysis done beyond the method prescribed holding

time; “h”- analysis done beyond the extraction/preparation holding time; “N” - result associated with spike analysis outside control limits.

Qualifier flags are to be assigned to analytical result data in accordance with requirements in the *SNL/NM Contract SOW for Analytical Laboratories*. Verify that laboratory qualifiers are correctly assigned and if not, record the affected sample numbers.

Line 3.7 Narrative addresses planchet flaming for gross alpha/beta

Check that the narrative includes information concerning planchet flaming for gross alpha/beta analysis.

Line 3.8 Narrative included, correct, and complete

Check that information provided by the laboratory in the case narrative is accurate and in agreement with the analysis and QC data presented in the report. If the report narrative is inaccurate, note the sample numbers directly impacted.

Line 3.9 Second column confirmation data provided for methods 8330 (high explosives by HPLC only), 8081 (pesticides), 8082 (PCBs) and 8151 (herbicides).

Check that confirmation results data is provided for detected compounds for high explosives (by HPLC), pesticide/PCB and herbicide analyses.

3.2.4 Calibration and Validation

Review the analytical data report to ensure it includes the required calibration and validation documentation and complete Section 4.0 of the CVR.

Line 4.1 Gas Chromatography (GC)/Mass Spectrometry (MS) (8260, 8270 and TO-15)

Verify the 12- or 24-hour tune check, initial calibration, continuing calibration, internal standard performance data, and instrument run logs are provided.

Line 4.2 Gas Chromatography (GC)/High Performance Liquid Chromatography (HPLC) (8330, 8082, 9070A, and 8010)

Verify the initial calibration, continuing calibration and instrument run logs are provided.

Line 4.3 High Resolution Gas Chromatography (HRGC) /High Resolution Mass Spectrometry (HRMS) (1668 and 8290)

Verify the 12-hour tune check, initial calibration, continuing calibration, internal standard performance data, labeled compound recovery data, Relative Retention Times (RRTs) and ion abundance ratios for samples and standards, and instrument run logs are provided.

Line 4.4 Liquid Chromatography (LC)/ Mass Spectrometry (MS)/MS (6850 and 8330)

Verify the initial calibration, continuing calibration, CRI check standard (contract required detection limit), internal standard performance data and instrument run logs are provided. For perchlorate analysis, verify that chlorine isotope ratios and Interference Check Standard (ICS) data are also provided.

Line 4.5 Inorganics (metals)

Verify the initial calibration, continuing calibration, Inductively Coupled Plasma (ICP) interference check sample data, ICP serial dilution, and instrument run logs are provided.

Line 4.6 Radiochemistry and General Chemistry

Verify the instrument run logs are provided.

Section 5.0 of the CVR, "DAR," evaluates data results to historical monitoring data points to determine outliers and a need for data verification or sample reanalysis. The DAR is generated for monitoring and surveillance data.

3.2.5 Run the DAR

Run the DAR and complete section 5.0 of the CVR.

Line 5.1 DAR completed for monitoring and surveillance data

When applicable, process the DAR according to steps below. The DAR shall be completed for all applicable sample data indicated as sample (SA), not field QC samples.

Update the Historical file

- Open Oracle Query builder
- Log in with user ID, password, "gspr1_new", press "connect", then OK
- Click on "Open Query from File System"
- Press OK
- Open [\\catbert\7500\SMO\STAR\SAR](#) (suspected/data anomaly report) folder
- Select applicable browser file (i.e., SAR_Ambient_Filters.brw)
- Press "Open", then OK
- Execute query

- Maximize window
- Click on the “File” tab
- Select “Export Data”
- Select “Comma-Delimited (CSV)” as format
- Open “Select” window and open [C:\SandiaSAR\SandiaSAR_Ver1p2\](#) applicable CSV file, press “Save”, select “Yes” for “Save As”
- Press OK on export data window, then OK again
- Close file, press No

Run anomaly report

- Open SAR Application
- Press “Select EDD File”
- Go to [\\catbert\7500\SMO\STAR\EDD by COC](#)
- Highlight applicable EDD and press “Open”
- Press “Select Historical Data File” – select the CSV file you just updated under C:\SandiaSAR\SandiaSar_Ver1p2, then press “Open”
- Press “Load Parameters.xls”
- Highlight “parameters.xls”, then press “Open”
- Press “Generate SAR Report” – the report opens in a PDF format
- Right click on the PDF report and go to “Send to Mail Recipient”
- Select “PDF Format”, then press OK
- Send Report to your mailbox and save in a file
- Press “Close Print Preview”
- Press “Generate SAR Workbook” – the report opens in an Excel format
- The Excel Report is automatically saved to your desktop under “SAR_ARCOC#”
- Review the report and note any anomalies on the CVR
- Notify task leader of any anomalies

3.2.6 Complete the CVR

Complete the CVR by noting the review results and correction tracking at the end of the form in Section 6.0 “Problem Resolution.” Note any deficiencies and their resolution on the CVR, or initiate a nonconformance report or correction request. The Correction Request Form can be found on: [Q:\SMO\Correction Request Form.doc](#).

If corrections from the laboratory are required, click YES for “Were deficiencies unresolved” and enter the correction request number in the box on the CVR. Then click the “Reviewed” box and hold the package until corrections are received. Do not close the CVR until the corrected

laboratory report is received. When corrections are received, click the “Yes” button indicating that resolutions are adequate and close the CVR.

4.0 REFERENCES

Sandia National Laboratories, *Administrative Operating Procedure for Sample Management and Custody*, [AOP 95-16](#), current revision, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, *Data Validation Procedure for Chemical and Radiochemical Data*, [AOP 00-03](#), current revision, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, *Procedure for Electronic Data Deliverable (EDD) Processing*, [SMO-05-04](#), current revision, Sandia National Laboratories, Albuquerque, New Mexico.

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

Sandia National Laboratories, *SMO Data Management Plan*, [AOP 95-44](#), current revision, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, [SNL/NM Contract SOW for Analytical Laboratories](#), current revision, Sandia National Laboratories, Albuquerque, New Mexico.