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Mr. James W. Todd
Assistant Manager for Engineering
U. S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
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Dear Mr. Todd:

Subject: ***Submittal of Updated Reference Documents Cited in the Chemical Waste Landfill (CWL) Post-Closure Care Permit (PCCP) for Sandia National Laboratories/New Mexico (SNL/NM), Environmental Protection Agency Identification Number NM5890110518***

Updated Sandia National Laboratories reference documents cited in the CWL PCCP are being provided to the Department of Energy for submittal to the New Mexico Environment Department (NMED). This submittal is required by Attachment 2 of the CWL PCCP.

This submittal is comprised of four field operating procedures used by SNL/NM personnel to perform groundwater monitoring activities at the CWL. The updated reference documents are:

FOP 05-01	Groundwater Monitoring Well Sampling and Field Analytical Measurements
FOP 05-02	Groundwater Monitoring Equipment Field Check for Water Quality Measurements
FOP 05-03	Groundwater Monitoring Equipment Decontamination
FOP 05-04	Groundwater Monitoring Waste Management

I have signed the certification to be sent to the NMED as the Operator at SNL/NM. If you agree, please sign the certification as the Owner. If you have any questions regarding the enclosed document, please contact Sidney Gutierrez, Director, at (505) 284-0431/smgutie@sandia.gov, Francis Nimick, Senior Manager, at (505) 284-2577/fbnimic@sandia.gov, or Pam Puissant, Manager, at (505) 844-3185/ pmpuiss@sandia.gov.

Sincerely,

Michael W. Hazen
Vice President

Enclosures:
1. Enclosure A – Updated Reference Documents Cited in the Chemical Waste Landfill Post-Closure Care Permit for Sandia National Laboratories/New Mexico, February 2015
2. Submittal of Updated Reference Documents Cited in the Chemical Waste Landfill Post-Closure Care Permit, Certification Statement

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Submittal of Updated Reference Documents Cited in the Chemical Waste Landfill Post-Closure Care Permit

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

Date signed

James W. Todd, Assistant Manager
U.S. Department of Energy
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Sandia Field Office (SFO)
Owner

Date signed

SANDIA NATIONAL LABORATORIES
STEWARDSHIP AND ANALYTICAL SERVICES (4142)

GROUNDWATER MONITORING WELL SAMPLING AND FIELD ANALYTICAL MEASUREMENTS

FIELD OPERATING PROCEDURE

FOP 05-01
Revision 5

Author: _____ **Date:** _____
Tim Jackson, Subject Matter Expert

Approved: _____ **Date:** _____
Michael Skelly, Project Leader

Approved: _____ **Date:** _____
Don Schofield, Field Support Operations Project Leader

Approved: _____ **Date:** _____
Pamela Puissant, Department 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: _____

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LIST OF FORMS

Revision History

Revision	Effective Date	Summary of Changes
1	10/10/2005	New document
2	8/16/2007	Formatting changes. Updated section 2, Roles and Responsibilities; section 3, Training Qualifications; section 9, References.
3	11/12/2009	Formatting changes. Added work planning and control information to section 4.0, Health & Safety. Updated section 3, Training Qualifications; section 9, References.
4	1/24/2012	Formatting changes. Revision history changed from 2 years to 3 years. Removal of some forms (attachments) and replaced with hyperlinks to where the forms can be found. Updated section 3, Training Qualifications; section 9, References.
5		Author change. Updated sections 1, 3, and 4.

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ACRONYMS & ABBREVIATIONS

AOP	administrative operating procedure
ARCOC	analysis request and chain of custody
DI	deionized
DO	dissolved oxygen
FOP	field operating procedure
gal/ft^3	gallon(s)/cubic foot
ft	foot/feet
in	inch(es)
LOP	laboratory operating procedure
mL	milliliter(s)
min	minutes(s)
OJT	on-the-job training
ORP	oxidation/reduction potential
pH	potential for hydrogen
PHS	primary hazard screening
PLA	plan
SAP	sampling and analysis plan
SC	specific conductance
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories, New Mexico
THA	task hazard analysis
TOC	total organic carbon
VOC	volatile organic compound

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1.0 PURPOSE, SCOPE, AND OWNERSHIP

Purpose This field operating procedure (FOP) provides instruction on collecting a groundwater sample from a monitoring well that is representative of in situ groundwater conditions and is suitable for laboratory analysis. The sample must be conducted per regulatory requirements and established agency guidance to provide legally defensible analytical data for regulatory compliance.

Scope The scope of this procedure is limited to well purging, field analytical measurements, and the collection of samples from monitoring wells as part of Sandia National Laboratories, New Mexico (SNL/NM) groundwater monitoring activities.

Ownership The Long-Term Stewardship Department is responsible for development, approval, distribution, revision, and control of this document.

2.0 ROLES AND RESPONSIBILITIES

The **project leader** is responsible for the following:

- Reviewing and recommending approval of this procedure.
- Providing overall coordination and management of the project.
- Providing a sampling and analysis plan (SAP) that meets prescribed regulatory or programmatic requirements.
- Reviewing completed field forms and data pertaining to the sampling activities.
- Reporting all information as may be required by regulations or directives.

The **project coordinator** is responsible for the following:

- Generating a mini-SAP from the SAP. The mini-SAP is a field friendly version of the SAP. It details sampling activities for the field support operations project leader and field technicians. It summarizes sampling procedures, analytical parameters, field measured parameters, purge requirements, and waste management tasks. It also identifies monitoring well characteristics that may extend the sampling period (e.g., low yield wells, well construction issues, etc.).
- Coordinating sampling activities with the SNL/NM lead investigators, regulators, Kirtland Air Force Base and their environmental contractors, Sample Management Office (SMO), and field technicians.
- Providing the field support operations project leader with a copy of the mini-SAP.
- Coordinating sampling procedure variances with the project leader and the field support operations project leader.
- Reviewing completed field forms and data pertaining to the sampling activities.

- Ensuring that all data quality requirements are performed.
- Providing the project leader with a summary of field activities and sampling results.
- Reporting all information as may be required by regulations or directives.
- Submitting completed field forms to the Customer Funded Record Center and entry of relevant data to the Environmental Data Management System (EDMS) database.
- Managing, coordinating, and disposing of purge water and other waste generated from field operations in compliance with SNL/NM Corporate Policy ESH100 Environment Safety & Health, and FOP 05-04, *Groundwater Waste Management Plan.*
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field support operations project leader** is responsible for the following:

- Ensuring that safety and quality assurance procedures are followed.
- Supervising the field technicians.
- Reviewing training requirements for field technicians.
- Providing for the on-the-job training (OJT) of new field technicians.
- Assigning field technicians (qualified by training and experience) to conduct the activities described in this procedure.
- Ensuring the materials and equipment necessary to perform the work are available.
- Maintenance of the training matrix for all field personnel.
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field technician** is responsible for the following:

- Completing all necessary and required training as specified by the field support operations project leader.
- Maintaining and decontaminating equipment.
- Field checking instruments according to the manufacturer's instructions and this procedure.
- Purging the well in preparation for sample collection.
- Collecting and recording field measurements as required by this procedure and the mini-SAP.
- Collecting, preserving, and storing samples as specified in the mini-SAP and in accordance with administrative operating plan (AOP) AOP 95-16, *Sample Management and Custody*.
- Delivering samples to SMO packaging and shipping facility within the required holding times.
- Managing purge water and other generated waste.
- Securing wells.
- Informing the field support operations project leader of wells requiring maintenance or breach of well security.
- Completing and reviewing field documentation forms.

- Providing recommendations for revisions to this procedure (if necessary).

3.0 TRAINING QUALIFICATIONS

Personnel conducting field activities shall complete the following:

- Read applicable sections of SNL/NM Corporate Policy ESH100 Environment Safety & Health.
- Read primary hazard screening (PHS) SNL05A01241, *Groundwater Monitoring Activities*.
- OJT for new field personnel performing groundwater sampling activities. Document training by completing On-the-Job Training form (EP 2009-OJT).
- Read and sign AOP 95-16, *Sample Management and Custody*.
- Read and sign FOP 03-02, *Groundwater Level Data Acquisition and Management*.
- Read and sign laboratory operating procedure (LOP) LOP 94-03, *Sample Handling, Packaging and Shipping*.
- Read and sign FOP 05-02, *Groundwater Monitoring Equipment Field Check*.
- Read and sign FOP 05-03, *Groundwater Sampling Equipment Decontamination*.
- Read and sign FOP 05-04, *Groundwater Waste Management Plan.*
- Read and sign Plan (PLA) PLA 05-09, *Groundwater Monitoring Health & Safety Plan*.
- Complete training courses listed in Table 3.1.
- Field personnel shall sign the Authorized Users List (EP 2009-AUL) to affirm they have read and understand this document, and agree to operate within the stated constraints.

Table 3.1. Training Course List

Course Code	Course Title
CHM100/103	Chemical Safety Training/Site-Specific Chemical Training
ENV100	OSHA Health & Safety Basic Training - General Worker (40 HR)
ENV103	OSHA Health & Safety Training Refresher (8 HR)
ENV112	Hazardous Waste & Environmental Management Training
ENV216	RCRA - Less Than 90-Day Area Accumulation Area for Owners & Emergency Coordinators
ENV316	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers
ENV416	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers - Site-Specific
ESH100	ES&H Awareness
FKL153	Forklift Operator and Hands-On Training
MCH200	Hand and Power Tool Safety
MED102	Standard First Aid
MED104	Heartsaver CPR
OTS101	Occupational Thermal Stress
PKX050	Site Specific Packaging and Transportation of Hazardous Materials Training
PKX100	Basic Hazardous Material Transportation Training
PPE106	Personal Protective Equipment Training
PRS150	Pressure Safety Orientation
PRS250	Advanced Pressure Safety
RAD230	Radiological Worker II Training

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

4.0 HEALTH AND SAFETY

A task hazard analysis (THA) has been performed on the activities described in this FOP as well as a hazard assessment survey performed by a SNL/NM industrial hygienist. They are detailed in the PLA 05-09, *Groundwater Sampling Health and Safety Plan*. The THA was performed in conjunction with PHS SNL05A01241, *Groundwater Monitoring Activities*.

An Activity Level Work Evaluation Form (EP 2009-ALW) was completed and approved by the department manager as required by AOP 09-10, *Work Planning and Control and documented in the groundwater program safety case (ALW 13-01)*.

A field technician or the field support operations project leader shall conduct a tailgate safety meeting and fill out a Tailgate Safety Meeting Form prior to the start of groundwater sampling activities as described in PLA 05-09, *Groundwater Sampling Health and Safety Plan*.

In the event that work is stopped due to:

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

the field technicians shall immediately notify the field support operations project leader, the project coordinator, the project leader, and the department manager. The field technicians shall seek the assistance of the field support operations project leader for the mitigation of the hazard and the completion of a Work Resumption Authorization Form (EP 2009-WRA) as required by AOP 09-10, *Work Planning and Control*. The department manager shall 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 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 to Technical Work Document (TWD) Form (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, and posted on the 4100 Controlled Documents website.

5.0 DEFINITIONS

analysis request and chain of custody (ARCOC) – Method for documenting the history and possession of a sample from the time of its collection, through its analysis and data reporting, to its final disposition.
decontamination – A process used to clean equipment.

dedicated sampling equipment – Sampling equipment that is installed for use in only one monitoring well to prevent potential cross-contamination between wells.

duplicate (or split) sample – A sample which is split into subsamples contemporaneous in time and space.

equipment blank – A sample collected from chemically pure water (reagent-grade deionized [DI] water) that is passed through an item of field sampling equipment and returned to the laboratory for analysis. It is used to determine the effectiveness of equipment decontamination process. This may also be referred to as a decontamination rinsate blank.

field blank – Chemically pure water (reagent-grade DI water) that is subjected to all aspects of sample collection, field processing, preservation, transportation, and laboratory handling as an environmental sample.

groundwater – Water beneath the land surface contained in interconnected pores or secondary openings in the saturated zone that is under hydrostatic pressure. The water that enters wells and issues from springs.

headspace – The empty volume in a sample container between the water level and the cap.

mini-SAP – A detailed document describing the location of wells to be sampled; the frequency of sampling; the analysis to be performed; purge volumes, sample containers, sample preservatives, and sample holding times; and the analytical methods to be utilized. The plan references procedures used to collect, handle, and analyze groundwater samples. It includes all quality control measures that will be implemented to ensure that all activities meet any prescribed regulatory or programmatic requirements.

monitoring well – A well that is constructed for the purpose of extracting groundwater for physical, chemical, or biological testing, or for measuring water levels.

preservation – Storage conditions or addition of a reagent that will minimize the change in concentration of a constituent of interest until analysis can be performed.

purge – The process of removing stagnant water from a well prior to sampling.

Sample Management Office (SMO) – A SNL/NM organization responsible for coordinating with analytical laboratories to have groundwater samples analyzed. SMO receives sample bottles from the laboratory and is responsible for shipping samples.

saturated casing volume – The volume of water contained in one length of the saturated screen casing plus the volume of water contained in the borehole annulus surrounding the outside of the screen casing interval.

static water level – The elevation of the top of a column of water in a monitoring well that is at equilibrium.

trip blank – Laboratory prepared samples of chemically pure water (reagent-grade DI water) used to assess volatile organic compound contamination of the sample container, laboratory preparation water, or contamination resulting from handling procedures. Trip blanks are prepared in the same type of bottle used for an environmental sample and is kept with the set of sample bottles both before and after sample collection.
volatile organic compounds (VOCs) – Liquids or solid organic compounds that exhibit a tendency to pass into the vapor state.

6.0 EQUIPMENT AND MATERIALS

Two pumping methods are used to collect groundwater samples. Each method uses an inert gas (nitrogen) to operate the pump. No aeration of the sample occurs because the sample is isolated from the driving gas. The pump methods are:

1. A piston pump (Bennett model 1800 or equivalent) is used to purge water from the well casing.

2. A pneumatic bladder pump is used for low-flow technique that uses a pneumatic bladder sampling pump. Only the discharge line from the pump must be purged.

The following list includes equipment and materials necessary to collect a sample, document its collection, and request the laboratory analyses. Not all of the equipment may be required for each sampling event. The list depends on the methods used for purging and sampling, and the potential presence of contaminants in groundwater at the site. Details are specified in the mini-SAP.

Consumables

- DI water.
- Decontamination supplies listed in FOP 05-03 (detergents, DI water, reagent grade nitric acid, buckets, brushes, etc.). Additional decontamination requirements and supplies may be specified in the mini-SAP.
- Small and large zip-lock and bubble wrap bags.
- Insulated ice chest (coolers), blue ice or ice.
- Duct tape.
- Paper wipes.
- Wash bottles.
- Sample containers with the required reagents for field preservation of samples. They are identified in the mini-SAP and are provided by SMO and/or the laboratory. (Note:

Visually inspect preservatives for discoloration or degradation prior to use to ensure reagent quality.).
- Seals (custody seal tape).
- Indelible black ink pens.
- Personal protective equipment. Reference PLA 05-09, *Groundwater Sampling Health and Safety Plan*.

Documentation Forms

- Groundwater Sample Collection Field Equipment Check Log,
- Field Measurement Log for Groundwater Sample Collection
- Examples of Sample Label and Sample Identification Numbers (Attachment A).
- Analysis request and chain of custody (ARCOC).

Other Equipment

- Portable Bennett piston pump system or equivalent.
- Compressed nitrogen gas cylinders with associated regulators, calibrated pressure relief valves and high pressure air lines, as necessary, to operate portable Bennett piston pump system or equivalent.
- Water level indicator.
- Empty 55-gallon close head poly drums for purge water/decontamination fluids.
- 0.45 micron membrane filter for filtering the dissolved metals.
- Equipment for groundwater field parameters (pH, specific conductivity [SC], temperature, dissolved oxygen [DO], turbidity, oxidation/reduction potential [ORP]; calibration standards) as specified in FOP 05-02.
- Equipment for field analysis water chemistry such as a digital titrator and colorimeter.

Additional Items

- Calculator.
- Location map of monitoring wells to be sampled.
- Well construction details of monitoring wells to be sampled (depth from top of casing, casing diameters, screen length and depths).
- Key to well lock(s) and for gate access to site (if applicable).
- Equipment manuals.
- Tool box.
- 2-way radio.

7.0 PROCEDURE

7.1 Preparation

The field technician must complete the following prior to field operations:

1. Review the mini-SAP with the project coordinator and schedule the sampling dates.

2. Obtain the required information listed below:

    a. Location of wells.
    b. Depth of wells.
    c. Diameter of well casings and other well construction data.
    d. Method to be used to purge wells.
    e. Methods used to sample wells.
    f. Analytical parameters including number of equipment blanks, duplicate samples, trip blanks.
3. Coordinate site access with the appropriate organization.

4. Obtain the sample containers from SMO. Sample containers must be prepared with the appropriate preservatives by the laboratory or SMO prior to sampling.

5. Make provisions for proper storage and disposal of purge water, decontamination fluids, and other wastes generated during purging and sampling activities.

6. Obtain sample identification numbers from the SMO or field support operations project leader and prepare sample labels. Affix labels to sample bottles.

7. Complete as much as possible of the following forms prior to field operations:

    a. Groundwater Sample Collection Field Equipment Check Log,
    b. Field Measurement Log for Groundwater Sample Collection,
    c. ARCOC,

8. Load and secure the equipment and supplies in the sampling vehicle.

7.2 Documentation

Document all sampling activities by completing the appropriate forms. Use a dark indelible ink pen. Make any necessary corrections by drawing a single line through the incorrect entry, initial and date it, and place the correct entry adjacent to the incorrect entry.

The documentation forms are briefly discussed below:

Field Measurement Log for Groundwater Sample Collection **.** This form is used to record the following:

- Water level depth
- Purge volumes
- Purge field parameters
- Instrument calibration
- Sample collection
- Well condition
- Weather condition

Sample Label, (Attachment A). An adhesive-backed waterproof label is affixed to each sample container before sample collection. Complete the following entries on the label with a black waterproof ink pen:

- Sample ID #
- Sample Type
- Analysis
- Location
- Date
- Time
- Preservative
- Collector

See AOP 95-16 for more information on the sample label.

Sample Identification Number (Sample # / Sample ID), (Attachment A). A sample consists of groundwater collected at a specific location and time. A unique sample number and sample identification is assigned to each sample collected. The sample number is placed in the appropriate space of the Sample Label, and the ARCOC record.

An example of a Sample # is **001234-001** where the

- **001234** – References a unique sample identification number. This number is obtained by going to the SMO Home page and clicking the "Control Numbers" tab.
- **-001** – A fraction that references an analysis. For example -001 for a VOC analysis, -017 for a major cations analysis, and -027 for a cyanide analysis.

An example of a Sample Identification # is **MWL-MW1** where the

- **MWL** – References the monitor well location.
- **MW1** – References the monitor well number.

See AOP 95-16 for more information on the Sample Identification Number.

***Analysis Request and Chain-of-Custody Record* (ARCOC).** An original ARCOC record must accompany all samples from the field to the laboratory. The ARCOC provides a legal record of the sample from collection to disposal. The ARCOC also specifies the sample analysis. Instructions for completing the ARCOC are provided on the back of the form. ARCOC numbers are obtained at the SMO Home page and clicking the "Control Numbers" tab.

See AOP 95-16 for more information on the ARCOC.

7.3 Decontamination

Decontaminate all equipment used to sample groundwater prior to placement in a well. Follow the directions listed in FOP 05-03 for decontaminating equipment.

7.4 Static Water Level Measurements

Water level information is used to calculate the volume of water in a well casing and the minimum amount required for purging. The static water level is measured in each well prior to purging or obtaining a sample. Static water level measurements are taken to the nearest 0.01 foot using a water level indicator. Measurements are referenced to a surveyed mark of known elevation at the top the well casing. See FOP 03-02 for collecting a static water level measurement. (Note: Because the static water level measurement is used to calculate a purge volume it is not necessary to follow every step of FOP 03-02. Use it only as general guidance for obtaining a static water level measurement.)

7.5 Well Evacuation (Purging)

Purging a well removes stagnant water so that a representative sample of the groundwater can be obtained. Purging requirements are affected by one or more of the following and are detailed in the mini-SAP:

- Permit requirements
- The pump and sample method used (conventional vs. low-flow)
- Well construction
- Well recharge rate
- Equipment limitations

Purge the well at a rate that creates minimal disturbance to the groundwater flow regime. This ensures the most representative sample of the groundwater. Monitor the water level during the purging process to help indicate minimal disturbance. Purge the well until the volume specified in the mini-SAP is met and until groundwater field parameters stabilize. See section 7.6 for more information on measuring groundwater field parameters. Instructions for purging using the two different pump methods are listed in the next two sections.

7.5.1 Portable Non-Dedicated Piston Pump System

Install the pump according to its operating manual and criteria specified in the mini-SAP. The pump intake should be set at or near the bottom of a well's screened interval. Nitrogen gas is used to operate the pump. The flow rate is controlled by varying the gas pressure on the pump. A minimum of one saturated casing volume (unless otherwise specified in the mini-SAP) needs to be purged when using a portable non-dedicated piston pump system. A saturated casing volume is defined as the volume of one length of the saturated screen (*V1*) plus the borehole annulus surrounding the outside of the well screen interval (*V3*). The following formulas are used to calculate a saturated casing volume:

$V1 = R1^2 \times \pi \times (H2 - H1) \times 7.48$ gallon/cubic feet (gal/ft^3)
$V2 = R2^2 \times \pi \times (H2 - H1) \times 7.48$ gal/ft^3
$V3 = (V2 - V1) \times 0.30$

Minimum purge volume or saturated casing volume = $V3 + V1$

where:

$\pi = 3.14$
R1 = radius of the well casing feet (ft) = [diameter of well casing inch (in) x 1(ft)/12 (in)] / 2
R2 = radius of borehole (ft) = [diameter of borehole (in) x 1 (ft)/12 (in)] / 2
V1 = volume of submerged screen length casing interval
V2 = volume of submerged screen length annulus
V3 = submerged annulus volume
H1 = depth to water in screen (ft) not to exceed length of screen
H2 = well depth (ft)
H2 - *H1* = static water height (ft) in well screen
0.30 = filter pack porosity

Begin purging the well after the minimum purge volume has been determined. If possible, purge the well at a flow rate equal to the recharge rate of the well. A pumping rate that is equal to the recharge rate will keep the water level in the well constant. Otherwise, turn down the flow rate to the lowest level possible and still maintain flow at the surface. Record groundwater field parameters at a minimum of every 5 gallons. Groundwater field parameters must stabilize before

samples are collected. See Section 7.6 for more information on collecting groundwater field parameter data.

If the well goes dry during the purging process, allow the water in the well to recover to 80 percent of the static water level. If the recovery time exceeds 2 hours, collect the samples as soon as there is a sufficient volume.

7.5.2 Dedicated Low-Flow (Minimal Drawdown) Technique

The pump and its tubing were installed previously and are dedicated to the well. Nitrogen gas is used to operate the pump. The flow rate is controlled by varying the gas pressure on the pump. The flow rate is set to less than or equal to the recharge rate of the well.

A minimum of two tubing water volumes (unless otherwise specified in the mini-SAP) need to be purged when using the Dedicated Low-Flow technique. Calculate tubing water volumes using the following formula.

one tubing water volume = $\pi r^2 h$ * 28310 milliliter (mL)/ft^3

where:

π = 3.14
r = radius of the sample tubing (ft) = [diameter of sample tubing (in) x 1(ft)/12 (in)] / 2
h = tubing length (ft)

The following formulas are provided on the "Field Measurement Log For Groundwater Collection" to calculate the volume of water in one tubing length.

Tubing Diameter

1/4" outer diameter, 0.17" inner diameter: 4.5 mL/ft X ____ (length of tubing in ft) = ____ mL
3/8" outer diameter, 0.25" inner diameter: 9.6 mL/ft X ____ (length of tubing in ft) = ____ mL

Set the purge rate to less than or equal to the recharge rate of the well. A purge rate of < 1000 mL/minute (min) is desired. Monitor the water level periodically and adjust the purge rate to minimize drawdown in the well to less than 0.1 meters. It is especially important to minimize disturbance to the water in the well when measuring the water level. Record groundwater field parameters a minimum of four readings per tubing volume. Samples are collected after a minimum of two tubing water volumes are purged and the groundwater field parameters are stable. See Section 7.6 for more information on collecting groundwater field parameter data. (Note: Wait a minimum of 24 hours before sampling with a newly installed dedicated low-flow pump.)

7.6 Measuring Groundwater Field Parameter Data

Connect the flow-through cell to the pump tubing. The flow-through cell houses the probes used to measure most of the groundwater field parameters (pH, SC, temperature, ORP, DO). Water pumped from the well flows through the cell and contacts the probes. Turbidity is measured with a portable turbidimeter.

Groundwater field parameters are identified in the mini-SAP. All instruments and their corresponding probes are function checked prior to recording groundwater field parameters. Function check the instruments in accordance with FOP 05-02.

The samples are collected (see Section 7.8) after the well or tubing is properly purged and the groundwater field parameters are stable. The following stability criteria apply (if no others are listed in the mini-SAP):

Four consecutive measurements of:

- +/- 0.1 standard units for pH.
- +/- 1.0 degrees Celsius for temperature.
- +/- 5 percent for SC.
- +/- 10 percent or ≤ 5 nephelometric turbidity units for turbidity.

Additional field parameters may include ORP and DO, as required in the mini-SAP.
Field measurements are recorded on the Field Measurement Log for Groundwater Sample Collection.

7.7 Field Analysis

Samples may be collected for field analysis such as alkalinity, hexavalent chromium, nitrate, and ferrous iron. The field analyses will be specified in the mini-SAP. Digital titrators and colorimeters are used to perform the field analyses. Follow the manufacturer's procedures when performing the analyses. Document the results on the Field Measurement Log for Groundwater Collection or specific field analysis forms if applicable.

7.8 Sample Collection

Sample wells in the order specified in the mini-SAP. If an order is not specified, sample wells in the order from least contaminated to most contaminated. This will minimize the potential for cross-contaminating wells. If the potential for groundwater contamination has not been established at the site, sample wells from the up gradient direction toward the down gradient direction.

After the purging criteria have been met and groundwater field parameters are stable, collect the samples specified in the mini-SAP. Collect samples in the order of decreasing volatilization sensitivity, as applicable:

Most Volatile:	1. Volatile organic compounds 2. Total organic halogens 3. Total organic carbon (TOC) 4. Base-neutral and acid extractable organic compounds
Least Volatile:	5. Total metals 6. Dissolved metals 7. Phenols 8. Cyanide 9. Sulfate and chloride 10. Turbidity (for laboratory analysis) 11. Nitrate and ammonia 12. Radionuclides 13. Bacteria

7.8.1 Collection of Volatile Organic Analysis Fraction

Collect the VOC samples at a slow discharge rate to minimize volatilization. VOC sample containers should be filled at a rate not exceeding 100 mL/min. The sampling system may be modified in order to split the flow of water, such that the flow can be reduce to a rate of 100 ml/min or less.

Fill the sample vial completely. Pour the last few drops into the vial so that surface tension forms a convex meniscus on the water surface in the vial. Cap the bottle securely. Slight overflow will result in the elimination of air space in the bottle. Turn the bottle over and tap it gently to check for bubbles. If bubbles are present, repeat the procedure using a new sample container.

7.8.2 Filtration for Dissolved Metals and Major Cation Fractions

Sample fractions for dissolved metals and major cations (potassium, calcium, sodium, magnesium) require filtration to remove suspended solids. Use a disposable 0.45- micron in-line filter. Place over the discharge outlet. A minimum of over 500 mL should be drawn through the filter before sampling. Please note, filtration of samples is not limited to dissolved metals and cations. Consult the mini-SAP as to when filtration is required.

7.8.3 Equipment Blanks, Field Blanks, and Duplicate (Split) Samples

Collect any equipment blanks, field blanks, duplicate, or split samples as specified in the mini-SAP.

When collecting duplicate or split samples, it is important to take them in a consecutive order. That is, take all the VOC samples, then all the TOC samples, then all the metals, etc. Do not pull one complete set of samples and then pull another complete set. The groundwater chemistry may change during sampling and that could affect the consistency of the sample results.

7.8.4 Sample Handling and Documentation

Mark sample labels with the date and time of collection. Seal the sample containers with custody seal tape so they cannot be opened without breaking the tape. Place the sample containers inside sealable plastic bags. Immediately place samples requiring preservation into a sample cooler with ice or blue ice. Complete an ARCOC and transport the samples to SMO (see Section 7.11) when all field activities at the well location are completed.

7.9 Waste Disposal

Containerize, label, and process all wastes generated during purging, sampling, and decontamination activities in accordance with FOP 05-04.

7.10 Well Condition and Security

Remove all non-dedicated sampling equipment from the well and secure the equipment for transport. Place the casing cap on the well. Secure and lock the outer protective casing cap. Clean up the sampling site. Note on the Field Measurement Log for Groundwater Sample Collection any problems with the well (such as missing or damaged hasps, locks, concrete pads, protective posts, obstruction inside the well casings, well access, etc.). Immediately inform the field support operations project leader of the problem.

7.11 Sample Shipment

SMO personnel verify with the field technician that the sample labels and the ARCOC are filled out correctly before they take custody of the samples from the field technician. SMO is responsible for shipping the samples to the designated analytical laboratory within the required holding times. For further information on sample handling refer to AOP 95-16.

7.12 Quality Assurance

FOP 05-02 is used as the quality assurance mechanism for operations described in this procedure.

8.0 RECORDS

A record of purging and sample collection activities is required. Forms that provide the required documentation are listed below:

- Field Measurement Log for Groundwater Sample Collection
- Examples of Sample Label and Sample Identification Numbers (Attachment A).
- ARCOC.
- Groundwater Sample Collection Field Equipment Check Log

The completed documentation is reviewed by the field support operations project leader. SMO will review sample labels and the ARCOC upon delivery of samples to the facility. All of the original documentation with the exception of the ARCOC and sample labels are provided to the project coordinator for review before submittal to the project leader. The project leader reviews, approves, and returns the documentation to the project coordinator for transmittal to the Customer Funded Record Center.

9.0 REFERENCES

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Nielsen, David M., and Gillian L. Yeates, 1985, "A Comparison of Sampling Mechanisms Available for Small-Diameter Groundwater Monitoring Wells," Groundwater Monitoring Review, Spring 1985, 83-99.

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

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

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

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

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

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

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

Sandia National Laboratories, Long-Term Stewardship, PLA 05-09, *Groundwater Monitoring Health and Safety Plan* (latest edition), SNL/NM.

ATTACHMENT A

EXAMPLES OF SAMPLE LABEL AND SAMPLE IDENTIFICATION NUMBERS

EXAMPLES OF SAMPLE LABEL AND SAMPLE IDENTIFICATION NUMBERS

Sandia National Laboratories **Environmental Programs** Sample ID.# _____ TYPE _____ANALYSIS_____ LOCATION _____ DATE _____TIME _____ PRESERVATIVES _____ COLLECTOR _____ SF2000-EPL(4-94)	SNL/NM 018562 SNL/NM 018563 SNL/NM 018564 SNL/NM 018565 SNL/NM 018566 SNL/NM 018567 SNL/NM 018568

SANDIA NATIONAL LABORATORIES
STEWARDSHIP AND ANALYTICAL SERVICES (4142)

GROUNDWATER MONITORING EQUIPMENT FIELD CHECK FOR WATER QUALITY MEASUREMENTS

FIELD OPERATING PROCEDURE

FOP 05-02
Revision 5

Author: _____ **Date:** _____
Tim Jackson, Subject Matter Expert

Approved: _____ **Date:** _____
Michael Skelly, Project Leader

Approved: _____ **Date:** _____
Don Schofield, Field Support Operations Project Leader

Approved: _____ **Date:** _____
Pamela Puissant, Department 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: _____

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

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EP 2009-ALW – Environmental Planning – Activity Level Work Evaluation Form
EP 2009-AUL – Environmental Planning – Authorized Users List
EP 2009-OJT – Environmental Planning – On-the-Job Training
EP 2009-WRA – Environmental Planning – Work Resumption Authorization Form
LTS GW-2012-002 – Groundwater Sample Collection Field Equipment Check Log
LTS GW-2012-006 – Tailgate Safety Meeting Form

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Revision History

Revision	Effective Date	Summary of Changes
1	10/10/2005	New document
2	8/16/2007	Formatting changes. Updated section 2, Roles and Responsibilities; section 3, Training Qualifications; section 9, References.
3	11/12/2009	Formatting changes. Added work planning and control information to section 4.0, Health & Safety. Updated section 3, Training Qualifications; section 9, References.
4	1/24/2012	Formatting changes. Revision history changed from 2 years to 3 years. Removal of some forms (attachments) and replaced with hyperlinks to where the forms can be found. Updated section 3, Training Qualifications; section 9, References.
5		Author change. Updates to all sections.

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ACRONYMS & ABBREVIATIONS

AOP	administrative operating procedure
°C	degrees Celsius
DO	dissolved oxygen
ES&H	Environmental, Safety & Health
FOP	field operating procedure
LTS	Long-Term Stewardship
mV	millivolt
NTU	nephelometric turbidity units
ORP	oxidation/reduction potential
pH	potential of hydrogen
PHS	primary hazard screening
PLA	plan
SAP	sampling and analysis plan
SC	specific conductivity
SNL/NM	Sandia National Laboratories, New Mexico
THA	task hazard analysis

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1.0 PURPOSE, SCOPE, AND OWNERSHIP

Purpose This field operating procedure (FOP) provides guidance on operating instruments used to measure groundwater field parameters during groundwater sampling of monitoring wells. Analytical parameters may include potential of hydrogen (pH), specific conductivity (SC), temperature, oxidation/reduction potential (ORP), turbidity, and dissolved oxygen (DO) content. The procedure also provides information on function checks and calibrations of instruments that act as the quality assurance mechanism for FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements*.

Scope This procedure applies to groundwater field parameters measured during groundwater sampling activities conducted at Sandia National Laboratories, New Mexico (SNL/NM).

Ownership The Long-Term Stewardship Department is responsible for development, approval, and revision of this document.

2.0 ROLES AND RESPONSIBILITIES

The **project leader** is responsible for the following:

- Reviewing and recommending approval of this procedure.
- Providing overall coordination and management of the project.
- Providing a sampling and analysis plan (SAP) that meets prescribed regulatory or programmatic requirements.
- Reviewing completed field forms and data pertaining to the sampling activities.
- Reporting all information as may be required by regulations or directives.

The **project coordinator** is responsible for the following:

- Generating a mini-SAP from the SAP. The mini-SAP is a field friendly version of the SAP. It details sampling activities for the field support operations project leader and field technicians. It summarizes sampling procedures, analytical parameters, field measured parameters, purge requirements, and waste management tasks. It also identifies monitoring well characteristics that may extend the sampling period (e.g., low yield wells, well construction issues, etc.).
- Coordinating sampling activities with the SNL/NM lead investigators, regulators, Kirtland Air Force Base and their environmental contractors, Sample Management Office (SMO), and field technicians.

- Providing the field support operations project leader with a copy of the mini-SAP.
- Coordinating sampling procedure variances with the project leader and the field support operations project leader.

- Reviewing completed field forms and data pertaining to the sampling activities.
- Ensuring that all data quality requirements are performed.
- Providing the project leader with a summary of field activities and sampling results.
- Reporting all information as may be required by regulations or directives.
- Submitting completed field forms to the Customer Funded Record Center and entry of relevant data to the Environmental Data Management System database.
- Managing, coordinating, and disposing of purge water and other waste generated from field operations in compliance with SNL/NM Corporate Policy ESH100 Environment Safety & Health, and FOP 05-04, *Groundwater Waste Management Plan.*
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field support operations project leader** is responsible for the following:

- Ensuring that safety and quality assurance procedures are followed.
- Supervising the field technicians.
- Reviewing training requirements for field technicians.
- Providing for on-the-job training of new field technicians.
- Assigning field technicians (qualified by training and experience) to conduct the activities described in this procedure.
- Ensuring the materials and equipment necessary to perform the work are available.
- Maintenance of the training matrix for all field personnel.
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field technician** is responsible for the following:

- Completing all necessary and required training as specified by the field support operations project leader.
- Maintaining and decontaminating equipment.
- Field checking instruments according to the manufacturer's instructions and this procedure.
- Completing and reviewing field documentation forms.
- Providing recommendations for revisions to this procedure (if necessary).

3.0 TRAINING QUALIFICATIONS

Personnel conducting field activities shall complete the following:

- Read applicable sections of SNL/NM Corporate Policy ESH100 Environment Safety & Health.
- Read primary hazard screening (PHS) SNL05A01241, *Groundwater Monitoring Activities*.
- OJT for new field personnel performing field checks of water quality measurement equipment. Document training by completing On-the-Job Training form (EP 2009-OJT).
- Read and sign FOP 03-02, *Groundwater Level Data Acquisition and Management*.
- Read and sign FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements*.
- Read and sign FOP 05-03, *Groundwater Sampling Equipment Decontamination*.
- Read and sign FOP 05-04, *Groundwater Waste Management Plan*.
- Read and sign plan (PLA) PLA 05-09, *Groundwater Monitoring Health & Safety Plan*.
- Complete training courses listed in Table 3.1.
- Field personnel shall sign the Authorized Users List (EP 2009-AUL) to affirm they have read and understand this document, and agree to operate within the stated constraints.

Table 3.1. Training Course List

Course Code	Course Title
CHM100/103	Chemical Safety Training/Site-Specific Chemical Training
ENV100	OSHA Health & Safety Basic Training - General Worker (40 HR)
ENV103	OSHA Health & Safety Training Refresher (8 HR)
ENV112	Hazardous Waste & Environmental Management Training
ENV216	RCRA - Less Than 90-Day Area Accumulation Area for Owners & Emergency Coordinators
ENV316	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers
ENV416	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers - Site-Specific
ESH100	ES&H Awareness
FKL153	Forklift Operator and Hands-On Training
MCH200	Hand and Power Tool Safety
MED102	Standard First Aid
MED104	Heartsaver CPR
OTS101	Occupational Thermal Stress
PKX050	Site Specific Packaging and Transportation of Hazardous Materials Training
PKX100	Basic Hazardous Material Transportation Training
PPE106	Personal Protective Equipment Training
PRS150	Pressure Safety Orientation
PRS250	Advanced Pressure Safety
RAD230	Radiological Worker II Training

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

4.0 HEALTH AND SAFETY

A task hazard analysis (THA) has been performed on the activities described in this FOP as well as a hazard assessment survey performed by a SNL/NM industrial hygienist. They are detailed in the PLA 05-09, *Groundwater Monitoring Health & Safety Plan*. The THA was performed in conjunction with PHS SNL05A01241, *Groundwater Monitoring Activities*.

An Activity Level Work Evaluation Form (EP 2009-ALW) was completed and approved by the department manager as required by administrative operating plan (AOP) AOP 09-10, *Work Planning and Control and documented in the groundwater program safety case ALW 13-01.*

A field technician or the field support operations project leader shall conduct a tailgate safety meeting and fill out a Tailgate Safety Meeting Form prior to the start of groundwater sampling activities as described in PLA 05-09, *Groundwater Monitoring Health & Safety Plan.*

In the event that work is stopped due to:

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

the field technicians shall immediately notify the field support operations project leader, the project leader, the project coordinator, and the department manager. The field technicians shall seek the assistance of the field support operations project leader for the mitigation of the hazard and the completion of a Work Resumption Authorization Form (EP 2009-WRA) as required by AOP 09-10, *Work Planning and Control*. The department manager shall 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 FOP or Revisions 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 to Technical Work Document Form (EP 2009-MCD). The form is reviewed and signed by the Field Operations Support Program Lead and Department Manager. The "Minor Change/Deviation to Technical Work Document" form and any possible attachments are filed with the original document, and posted on the 4100 Controlled Documents website.

5.0 DEFINITIONS

dissolved oxygen (DO) content − The DO content of the water in milligrams per liter (mg/L) or percentage of oxygen saturation of the water at the indicated temperature.

specific conductivity (SC) − The ability of a cubic centimeter of water to conduct electricity. It varies directly with the amount of ionic substances in the water and is measured in micro-mhos per centimeter (µmhos/cm) at 25ºC. SC is an indirect measure of total dissolved solids in dilute solutions.
potential of hydrogen (pH) − The inverse log of the hydrogen ion concentration of a solution. A measure of the intensity for the basic or acidic condition of a solution. Range is from 0 to 14 with 1 being the most acidic. A neutral solution is at a pH of 7. Greater than 7 is considered basic.

oxidation/reduction potential (ORP) − The electric potential (usually measured in millivolts [mV]) required for the transfer of an electron from one molecule or element (the oxidant) to another molecule or element (the reductant). Used as a qualitative measure of the oxidation state of the molecules or compounds in solution.

temperature (°C) − The temperature of the water in degrees Celsius (°C).

turbidity (nephelo-metric) − The cloudiness in water due to suspended and colloidal organic and inorganic material. Water turbidity is measured in nephelometric turbidity units (NTUs).

6.0 EQUIPMENT AND MATERIALS

The following instruments are used to measure groundwater parameters:

- YSI Model EXO Handheld Display with YSI EXO1 Sonde and flow-through cell to measure °C, pH, SC, DO, and ORP.
- HACH 2100Q Turbidity Meter.

Equivalent instruments may be substituted. Follow manufacturer's instructions for calibration and operation.

The following list includes field documentation forms, equipment and materials necessary to calibrate/check field analytical equipment, and/or to measure the parameters.

Documentation Forms:

- Groundwater Sample Collection Field Equipment Check Log

Calibration Standard Solutions − Calibration standard solutions must be factory supplied and have expiration dates and/or lot number on the container.

- pH solutions.

- electrical conductivity solutions: measured in micromhos/centimeter (µmhos/cm) at 25°C reference solution.
- standard for oxidation/reduction potential: measured in mV @ 25° C.
- Gelex® or equivalent turbidity standards: ≤10, 20, 100, and 800 NTU.

Additional Items:

- manufacturer's instructions/operator/manuals
- deionized water (DI)
- material safety data sheets

7.0 PROCEDURES

7.1 Equipment Calibration and Function Check

Review the mini-SAP to determine the groundwater field parameters to be measured and the corresponding instruments needed.

Calibrate or perform a function check on the instruments prior to measuring groundwater field parameters. Complete the Groundwater Sample Collection Field Equipment Check Log. Note the condition and quality of calibration standards. Make sure they have not exceeded their expiration date. Replace if necessary.

7.1.1 EXO Sonde and Handheld Display

The EXO sensors (except temperature) require periodic calibration, and procedures follow the same basic steps with slight variation. The following is a set of instructions for calibrating an EXO1 Sonde using a EXO Handheld Display. All calibrations should be conducted in a temperature controlled space. For additional information reference the manufacturer's manuals.

1) Turn unit on by pressing the green power button.
2) Go to the Calibrate menu.
3) Select the sensor and parameter to calibrate.
4) In the next menu, select a 1-, 2-, or 3-point calibration (depending on sensor type).
5) Click the Start Calibration button:
    - Initial data reported will be unstable and then move to stable readings.
    - Click graph data button to compare pre-calibration and post calibration values.
    - Once readings are stable, click Apply to accept calibration point.
6) Repeat the process for each sensor and calibration point.
7) Click Complete when all points have been calibrated.

No calibration is required for the temperature.

If a calibration error appears, then repeat the calibration procedure. Reference the manufacturer's manual for additional calibration procedures or if errors continue to occur during the calibration process. It may be necessary to replace a probe that cannot be calibrated.

7.1.2 HACH 2100Q Turbidimeter

The HACH 2100Q Turbidimeter should be calibrated every 3 months using StablCal Stabilized Formazin Standards followed by assigning values to Gelex® Secondary Turbidity Standards. Refer to the "Instrument and Procedure Manual" to perform this operation.

Once a value has been assigned to the Gelex® Secondary Turbidity Standards they can be used to perform a daily function check on the instrument prior to groundwater sampling activities. The following is a set of instructions to perform a function check prior to groundwater sampling activities:

1) Wipe the Gelex® Secondary Turbidity Standard cells (≤10, 20, 100, and 800 NTU) with a soft, lint-free cloth.
2) Apply a thin film of silicone oil and wipe with a soft cloth to obtain an even film over the entire surface of the cell.
3) Press: "**I/O**". The instrument will turn on. Place the instrument on a flat, sturdy surface.
4) Insert the Gelex® Secondary Turbidity Standard cell in the instrument cell compartment so the diamond or orientation mark aligns with the raised orientation mark in front of the cell compartment. Close the lid.
5) Select manual or automatic range selection by pressing the "**RANGE**" key. The display will show "**AUTO RNG**" when the instrument is in automatic range selection.
6) Select signal averaging mode by pressing the "**SIGNAL AVERAGE**" key. The display will show "**SIG AV**" when the instrument is using signal averaging. Use signal average mode.
7) Press: "**READ**". The display will show "**----NTU**", then the turbidity in NTU. Record the value after the lamp symbol turns off.

If the reading is not within 5% of the previously established value, recalibrate the instrument with StablCal Stabilized Formazin Primary Standards as indicated in the "Instrument and Procedure Manual".

To obtain a turbidity value on a groundwater sample, fill an empty cell, wipe with a soft lint-free cloth, and repeat steps 2 through 7.

7.2 Equipment Maintenance

Store the equipment and perform routine maintenance as required by the manufacturer's instructions.

8.0 RECORDS

The completed documentation is reviewed by the field technician and project coordinator before it is provided to the project leader. The project leader reviews, approves, and transmits the documentation to the Customer Funded Records Center.

9.0 REFERENCES

HACH Company, CAT. NO. 46500-88, Portable Turbidimeter, Model 2100P, Instrument and Procedure Manual.

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

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

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

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

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

Sandia National Laboratories, Long-Term Stewardship, PHS SNL05A01241, *Groundwater Monitoring Activities* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, PLA 05-09, *Groundwater Monitoring Health and Safety Plan* (latest edition), SNL/NM.

EXO User Manual, Advance Water Quality Monitoring Platform

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SANDIA NATIONAL LABORATORIES
STEWARDSHIP AND ANALYTICAL SERVICES (4142)

GROUNDWATER MONITORING EQUIPMENT DECONTAMINATION

FIELD OPERATING PROCEDURE

FOP 05-03
Revision 5

Author: _____ **Date:** _____
Tim Jackson, Subject Matter Expert

Approved: _____ **Date:** _____
Michael Skelly, Project Leader

Approved: _____ **Date:** _____
Don Schofield, Field Support Operations Project Leader

Approved: _____ **Date:** _____
Pamela Puissant, Department 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: _____

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EP 2009-AUL – Environmental Planning – Authorized Users List
EP 2009-OJT – Environmental Planning – On-the-Job Training
EP 2009-WRA – Environmental Planning – Work Resumption Authorization Form
LTS GW-2012-004 – Groundwater Monitoring Waste Generation Log
LTS GW-2012-006 – Tailgate Safety Meeting Form
LTS GW-2012-003 – Portable Pump and Tubing / Water Level Indicator Decontamination Log Form

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Revision History

Revision	Effective Date	Summary of Changes
1	10/10/2005	New document
2	8/16/2007	Formatting changes. Updated section 2, Roles and Responsibilities; section 3, Training Qualifications; section 8, References.
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5	1/23/2015	Author change. Updated sections 2, 3, 4, and 6.

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ACRONYMS & ABBREVIATIONS

AOP	administrative operating plan
CHPD	closed head polyethylene drum
DI	deionized
FOP	field operating procedure
HNO_3	nitric acid
L	liter
LTS	Long-Term Stewardship
ml	milliliter
OJT	on-the-job training
PHS	primary hazard screening
PLA	plan
PPE	personal protective equipment
SAP	sampling and analysis plan
SNL/NM	Sandia National Laboratories, New Mexico
THA	task hazard analysis

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1.0 PURPOSE, SCOPE AND OWNERSHIP

Purpose This field operating procedure (FOP) provides instruction for decontaminating groundwater sampling equipment.

Scope This procedure applies to all groundwater sampling equipment used during groundwater sampling activities conducted at Sandia National Laboratories/New Mexico (SNL/NM).

Ownership The Long-Term Stewardship Department is responsible for development, approval, distribution, revision, and control of this document.

2.0 ROLES AND RESPONSIBILITIES

The **project leader** is responsible for the following:

- Reviewing and recommending approval of this procedure.
- Providing overall coordination and management of the project.
- Providing a sampling and analysis plan (SAP) that meets prescribed regulatory or programmatic requirements.
- Reviewing completed field forms and data pertaining to the sampling activities.
- Reporting all information as may be required by regulations or directives.

The **project coordinator** is responsible for the following:

- Generating a mini-SAP from the SAP. The mini-SAP is a field friendly version of the SAP. It details sampling activities for the field support operations project leader and field technicians. It summarizes sampling procedures, analytical parameters, field measured parameters, purge requirements, and waste management tasks. It also identifies monitoring well characteristics that may extend the sampling period (e.g., low yield wells, well construction issues, etc.).
- Coordinating sampling activities with the SNL/NM lead investigators, regulators, Kirtland Air Force Base and their environmental contractors, Sample Management Office, and field technicians.
- Providing the field support operations project leader with a copy of the mini-SAP.
- Coordinating sampling procedure variances with the project leader and the field support operations project leader.
- Reviewing completed field forms and data pertaining to the sampling activities.
- Ensuring that all data quality requirements are performed.
- Providing the project leader with a summary of field activities and sampling results.

- Reporting all information as may be required by regulations or directives.
- Submitting completed field forms to the Customer Funded Record Center and entry of relevant data to the Environmental Data Management System database.
- Managing, coordinating, and disposing of purge water and other waste generated from field operations in compliance with SNL/NM Corporate Policy ESH100 Environment Safety & Health, and FOP 05-04, *Groundwater Waste Management Plan.*
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field support operations project leader** is responsible for the following:

- Ensuring that safety and quality assurance procedures are followed.
- Supervising the field technicians.
- Reviewing training requirements for field technicians.
- Providing for the on-the-job training (OJT) of new field technicians.
- Assigning field technicians (qualified by training and experience) to conduct the activities described in this procedure.
- Ensuring the materials and equipment necessary to perform the work are available.
- Maintenance of the training matrix for all field personnel.
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field technicians** are responsible for the following:

- Completing all necessary and required training as specified by the field support operations project leader.
- Maintaining and decontaminating equipment.
- Completing and reviewing field documentation forms.
- Providing recommendations for revisions to this procedure (if necessary).

3.0 TRAINING QUALIFICATIONS

Personnel conducting equipment decontamination shall complete the following:

- Read applicable sections of SNL/NM Corporate Policy ESH100 Environment Safety & Health.
- Read primary hazard screening (PHS) SNL05A01241, *Groundwater Monitoring Activities*.
- OJT for new field personnel performing field checks of water quality measurement equipment. Document training by completing On-the-Job Training form (EP 2009-OJT).
- Read and sign FOP 03-02, *Groundwater Level Data Acquisition and Management*.
- Read and sign FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements*.

- Read and sign FOP 05-02, *Groundwater Monitoring Equipment Field Check for Water Quality Measurements.*
- Read and sign FOP 05-04, *Groundwater Waste Management Plan*.
- Read and sign FOP 09-05, *Conducting Slug Test Using Data Logger & Pressure Transducer* (only necessary if conducting slug test).
- Read and sign plan (PLA) PLA 05-09, *Groundwater Monitoring Health & Safety Plan*.
- Complete training courses listed in Table 1.
- Field personnel shall sign the Authorized Users List (EP 2009-AUL) to affirm they have read and understand this document, and agree to operate within the stated constraints.

Table 3.1. Training Course List

Course Code	Course Title
CHM100/103	Chemical Safety Training/Site-Specific Chemical Training
ENV100	OSHA Health & Safety Basic Training - General Worker (40 HR)
ENV103	OSHA Health & Safety Training Refresher (8 HR)
ENV112	Hazardous Waste & Environmental Management Training
ENV216	RCRA - Less Than 90-Day Area Accumulation Area for Owners & Emergency Coordinators
ENV316	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers
ENV416	RCRA - Less Than 90-Day Area Accumulation Area for Waste Workers - Site-Specific
ESH100	ES&H Awareness
FKL153	Forklift Operator and Hands-On Training
MCH200	Hand and Power Tool Safety
MED102	Standard First Aid
MED104	Heartsaver CPR
OTS101	Occupational Thermal Stress
PKX050	Site Specific Packaging and Transportation of Hazardous Materials Training
PKX100	Basic Hazardous Material Transportation Training
PPE106	Personal Protective Equipment Training
PRS150	Pressure Safety Orientation
PRS250	Advanced Pressure Safety
RAD230	Radiological Worker II Training

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

4.0 HEALTH AND SAFETY

A task hazard analysis (THA) has been performed on the activities described in this FOP as well as a hazard assessment survey performed by a SNL/NM industrial hygienist. They are detailed in the PLA 05-09, *Groundwater Monitoring Health & Safety Plan*. The THA was performed in conjunction with PHS SNL05A01241, *Groundwater Monitoring Activities*.
An Activity Level Work Evaluation Form (EP 2009-ALW) was completed and approved by the department manager as required by administrative operating plan (AOP) AOP 09-10, *Work Planning and Control and documented in the groundwater program safety case (ALW 13-01)*.

A field technician or the field support operations project leader shall conduct a tailgate safety meeting and fill out a Tailgate Safety Meeting Form prior to the start of groundwater sampling activities as described in PLA 05-09, *Groundwater Monitoring Health & Safety Plan.*

In the event that work is stopped due to:

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

the field technicians shall immediately notify the field support operations project leader, the project leader, the project coordinator, and the department manager. The field technicians shall seek the assistance of the field support operations project leader for the mitigation of the hazard and the completion of a Work Resumption Authorization Form (EP 2009-WRA) as required by AOP 09-10, *Work Planning and Control*. The department manager shall 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 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 to Technical Work Document (TWD) Form (EP 2009-MCD). The form is 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, and posted on the 4100 Controlled Documents website.

5.0 EQUIPMENT AND MATERIALS

The following list includes equipment and materials necessary for decontaminating groundwater sampling equipment:

- 55-gallon closed head polyethylene drum (CHPD)
- deionized (DI) water
- hand-held squirt bottles containing DI water
- non-phosphate laboratory detergent (e.g., Liqui-Nox®)
- hand-held squirt bottles containing non-phosphate laboratory detergent and tap water
- bottle brushes
- paper wipes
- plastic containers/buckets with lids
- personal protective equipment (PPE) − nitrile or latex gloves, chemical safety goggles, safety boots
- plastic garbage bags and waste storage containers
- Decontamination Log Form
- Groundwater Monitoring Waste Generation Log
- reagent grade nitric acid (HNO_3)

6.0 PROCEDURES

6.1 Equipment Decontamination

Wear the PPE specified in the PLA 05-09, *Groundwater Monitoring Health & Safety Plan*, when decontaminating equipment. The following is a list of groundwater monitoring equipment that needs to be decontaminated after each use and a set of instructions for performing the decontamination process:

- **static water level indicator**

  1) Wipe the last three feet of cable and probe with a paper wipe wetted with a 0.1% (1 milliliter/liter [1 ml/L]) Liqui-Nox®/DI or distilled water solution.
  2) Wipe the last three feet of cable and probe with a paper wipe wetted with deionized or distilled water.
  3) Wipe the last three feet of cable and probe with a clean, dry paper wipe.

- **portable non-dedicated piston pump system**
  Complete the following after the pump and its tubing have been removed from the well:

  1) Remove Sonde from the flow-through cell and rinse the probes (potential for hydrogen, specific conductance, dissolved oxygen, temperature, oxidation/reduction potential) with DI or distilled water.
  2) Seal the opening on the flow-through cell with the cap.
  3) Make sure all of the tubing used in purging and sampling remains connected to the pump and is included in the decontamination process (including the flow-through cell).

4) Pump the following solutions through the tubing in the order listed below: Collect solution discharge in a 55-gallon CHPD.
   - 5 gallons of DI or distilled water mixed with 20 ml Liqui-Nox®.
   - 5 gallons of DI or distilled water.
   - 5 gallons of DI or distilled water mixed with 20 ml reagent grade HNO_3.
   - 3 times 5 gallons of DI or distilled water for a total of 15 gallons
5) Rinse outside of pump tubing with DI or distilled water.
6) Complete Decontamination Log form
7) Complete a Groundwater Monitoring Waste Generation Log form

- **Dedicated Low-Flow Pump System**
  The pump and tubing are dedicated to the well and are not removed for decontamination. However, the tubing that is connected from the well to the flow-through cell is decontaminated. Complete steps 1 through 4 and steps 6 through 7 listed above.

- **Pressure Transducer and Cable**

  1) Wipe the cable (portion immersed in the water) and pressure transducer with a paper wipe wetted with a 0.1% (1ml/L) Liqui-Nox® /deionized or distilled water solution.
  2) Wipe the cable (portion immersed in the water) and pressure transducer with a paper wipe wetted with deionized or distilled water.
  3) Wipe the cable (portion immersed in the water) and pressure transducer with a clean, dry paper wipe.

- **Borehole Camera System**

  1) Wipe the cable (portion immersed in the water) and pressure transducer with a paper wipe wetted with a 0.1% (1ml/L) Liqui-Nox® /deionized or distilled water solution.
  2) Wipe the cable (portion immersed in the water) and pressure transducer with a paper wipe wetted with deionized or distilled water.
  3) Wipe the cable (portion immersed in the water) and pressure transducer with a clean, dry paper wipe.

6.2 Decontamination Waste

Handle all decontamination waste according to FOP 05-04, *Groundwater Waste Management Plan*.

7.0 RECORDS

The completed documentation is reviewed by the field support operations project leader and project coordinator before it is provided to the project leader. The project leader reviews and approves the documentation for transmittal to the Customer Funded Record Center by the project coordinator.

8.0 REFERENCES

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

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

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

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

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

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

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

Sandia National Laboratories, Long-Term Stewardship, PHS SNL05A01241, *Groundwater Monitoring Activities* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, PLA 05-09, *Groundwater Monitoring Health and Safety Plan* (latest edition), SNL/NM.

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SANDIA NATIONAL LABORATORIES
STEWARDSHIP AND ANALYTICAL SERVICES (4142)

GROUNDWATER MONITORING WASTE MANAGEMENT

FIELD OPERATING PROCEDURE

FOP 05-04
Revision 5

Author: _____ **Date:** _____
Tim Jackson, Subject Matter Expert

Approved: _____ **Date:** _____
Michael Skelly, Project Leader

Approved: _____ **Date:** _____
Don Schofield, Field Support Operations Project Leader

Approved: _____ **Date:** _____
Pamela Puissant, Department 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: _____

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

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LIST OF FORMS

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EP 2009-AUL – Environmental Planning – Authorized Users List
EP 2009-OJT – Environmental Planning – On-the-Job Training
EP 2009-WRA – Environmental Planning – Work Resumption Authorization Form
SA2001-MWA – Less Than 90-Day Hazardous or Mixed Waste Accumulation Unit Inspection Form
LTS GW-2012-005 – Work Request Form
LTS GW-2012-004 - Groundwater Monitoring Waste Generation Log

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Revision History

Revision	Effective Date	Summary of Changes
1	10/10/2005	New document
2	8/16/2007	Formatting changes. Updated section 3, Roles and Responsibilities; section 4, Training Qualifications; section 7, References.
3	11/12/2009	Formatting changes. Added work planning and control information to section 5, Health and Safety. Updated section 4, Training Qualifications; section 7, References.
4	01/24/2012	Formatting changes. Revision history changed from 2 years to 3 years. Removal of some forms (attachments) and replaced with hyperlinks to where the forms can be found. Updated section 4, Training Qualifications; section 7, References.
5		Author change and updates to all sections.

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ACRONYMS & ABBREVIATIONS

AOP	administrative operating plan
CHPD	closed-head poly drum
decon	decontamination
FOP	field operating procedure
HWMF	Hazardous Waste Management Facility
LTS	Long-Term Stewardship
OJT	on-the-job training
PHS	primary hazard screening
PLA	plan
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RMWDR	radioactive or mixed waste disposal request
RMWMF	Radioactive and Mixed Waste Management Facility
SAP	sampling and analysis plan
SNL/NM	Sandia National Laboratories, New Mexico
THA	task hazard analysis
WDDR	waste description and disposal request

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1.0 PURPOSE, SCOPE, AND OWNERSHIP

Purpose This field operating procedure (FOP) provides instruction on managing waste generated during groundwater sampling activities. Waste is managed in compliance with Sandia National Laboratories, New Mexico (SNL/NM) Corporate Policy ESH100 Environment Safety & Health.

Scope The scope of this procedure is limited to management of waste generated during groundwater monitoring activities at SNL/NM sites, and include well purge waste water, equipment decontamination (decon) waste water, personnel protective equipment (PPE) waste (nitrile or latex gloves), plastic, and paper wipes. All other waste generated during groundwater monitoring activities will be managed in accordance with Corporate Policy ESH100 Environment Safety & Health.

Ownership The Long-Term Stewardship (LTS) Department is responsible for development, approval, distribution, revision, and control of this document.

2.0 BACKGROUND

Sandia conducts two types of groundwater surveillance monitoring at SNL/NM: (1) on a site-wide basis as part of the SNL/NM LTS Program's Groundwater Monitoring Program Groundwater Surveillance Task and (2) as site-specific groundwater monitoring at LTS/Environmental Restoration Operations sites with ongoing groundwater investigations. Separate requirements and site-specific monitoring plans will be developed and detailed upon regulatory approval of corrective measure evaluation, post-closure care provisions, long-term monitoring and maintenance plans, and other regulatory procedures.

Based upon historical results, groundwater sampling of monitoring wells is not expected to produce waste or contaminated materials requiring special handling or regulated disposal.

3.0 ROLES AND RESPONSIBILITIES

The **project leader** is responsible for the following:

- Reviewing and recommending approval of this procedure.
- Providing overall coordination and management of the project.
- Providing a sampling and analysis plan (SAP) that meets prescribed regulatory or programmatic requirements.
- Reviewing completed field forms and data pertaining to the waste management activities.
- Reporting all information as may be required by regulations or directives.

The **project coordinator** is responsible for the following:

- Generating a mini-SAP from the SAP. The mini-SAP is a field-friendly version of the SAP. It details sampling activities for the field support operations project leader and field technicians. It summarizes sampling procedures, analytical parameters, field measured parameters, purge requirements, and waste management tasks. It also identifies monitoring well characteristics that may extend the sampling period (e.g., low-yield wells, well construction issues, etc.).
- If needed, preparing a waste management plan for each sampling event.
- Providing the field support operations project leader with a copy of the mini-SAP.
- Coordinating waste management activities with the project leader and the field support operations project leader.
- Reviewing completed field forms and data pertaining to the sampling activities.
- Ensuring that all data quality requirements are performed.
- Reviewing all analytical data used for waste characterization.
- Obtaining waste determination from the environmental protection representative (non-hazardous, hazardous, and radioactive).
- Managing, coordinating, and disposing of purge water and other waste generated from field operations.
- Obtaining discharge permits for purge and decon water from the Waste Water Discharge project leader.
- Submitting disposal request to the appropriate department (Hazardous Waste Management Facility [HWMF], Radioactive and Mixed Waste Management Facility [RMWMF], Waste Water, and Solid Waste).
- Coordinating with the field support operations project leader for disposal and discharges (Work Request Form).
- Tracking and documenting each waste activity.
- Performing and documenting weekly inspections of Building 9925 Resource Conservation and Recovery Act (RCRA) Less Than 90-Day Waste Accumulation Area.
- Performing and documenting weekly inventory of all waste stored at Building 9925 waste accumulation areas.
- Performing monthly inspection of emergency equipment.
- Maintaining documentation for waste disposal activities.
- Submitting completed field forms to the Customer Funded Record Center and entry of relevant data to the Environmental Data Management System database.
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field support operations project leader** is responsible for the following:

- Ensuring that safety and quality assurance procedures are followed.
- Supervising the field technicians.

- Verifying field technicians' compliance with RCRA waste accumulation area training requirements.
- Providing for on-the-job training (OJT) of new field technicians.
- Assigning field technicians (qualified by training and experience) to conduct the activities described in this procedure.
- Ensuring the materials and equipment necessary to perform the work are available.
- Maintenance of the training matrix for all field personnel.
- Owner/manager/emergency coordinator of building 9925 RCRA Less Than 90-Day Waste Accumulation Area.
- Reviewing and providing recommendations for revisions to this procedure (if necessary).

The **field technicians** are responsible for:

- Completing all necessary and required training as specified by the field support operations project leader.
- Maintaining and decontaminating equipment.
- Managing and disposing of waste as directed by completed Work Request Forms and the field support operations project leader.
- Completing and reviewing field documentation forms.
- Providing recommendations for revisions to this procedure (if necessary).

The **waste water discharge project leader** is responsible for reviewing analytical data results of purge and decon water if requested by the project coordinator.

The **environmental protection representative** is responsible for reviewing analytical data results of purge and decon water if requested by the project coordinator.

The **health physicist** is responsible for reviewing analytical data results of purge and decon water if requested by the project coordinator.

4.0 TRAINING QUALIFICATIONS

Personnel conducting field activities shall complete the following:

- Read applicable sections of SNL/NM Corporate Policy ESH100 Environmental Safety & Health.
- Read primary hazard screening (PHS) SNL05A01241, *Groundwater Monitoring Activities*.
- OJT for new field personnel performing waste management activities. Document training by completing On-the-Job Training form (EP 2009-OJT).
- Read and sign FOP 03-02, *Groundwater Level Data Acquisition and Management*.

- Read and sign FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements*.
- Read and sign FOP 05-02, *Groundwater Monitoring Equipment Field Check*.
- Read and sign FOP 05-03, *Groundwater Sampling Equipment Decontamination*.
- Read and sign FOP 09-05, *Conducting Slug Test Using Data Logger & Pressure Transducer* (only necessary if conducting slug test).
- Read and sign Plan (PLA) PLA 05-09, *Groundwater Monitoring Health & Safety Plan*.
- Complete training courses listed in Table 4.1.
- Field personnel shall sign the Authorized Users List (EP 2009-AUL) to affirm they have read and understand this document, and agree to operate within the stated constraints.

Table 4.1. Training Course List

Course Code	Course Title
CHM100/103	Chemical Safety Training/Site-Specific Chemical Training
ENV100	OSHA Health & Safety Basic Training - General Worker (40 HR)
ENV103	OSHA Health & Safety Training Refresher (8 HR)
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NOTES: CPR = Cardiopulmonary Resuscitation
ES&H = Environment, Safety and Health
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5.0 HEALTH AND SAFETY

A task hazard analysis (THA) has been performed on the activities described in this FOP as well as a hazard assessment survey performed by a SNL/NM industrial hygienist. They are detailed in the PLA 05-09, *Groundwater Monitoring Health & Safety Plan*. The THA was performed in conjunction with PHS SNL05A01241, *Groundwater Monitoring Activities*.

An Activity Level Work Evaluation Form (EP 2009-ALW) was completed and approved by the department manager as required by administrative cooperating plan (AOP) AOP 09-10, *Work Planning and Control and documented in the groundwater program safety case (ALW 13-01)*.

A field technician or the field support operations project leader shall conduct a tailgate safety meeting and fill out a Tailgate Safety Meeting Form prior to the start of groundwater sampling activities as described in PLA 05-09, *Groundwater Monitoring Health & Safety Plan*.

In the event that work is stopped due to:

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

the field technicians shall immediately notify the field support operations project leader, the project leader, the project coordinator, and the department manager. The field technicians shall seek the assistance of the field support operations project leader for the mitigation of the hazard and the completion of a Work Resumption Authorization Form (EP 2009-WRA) as required by AOP 09-10, *Work Planning and Control*. The department manager shall 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 FOP or revisions 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 to Technical Work Document Form (EP 2009-MCD). The form is reviewed and signed by the Field Operations Support Program Lead and Department Manager. The "Minor Change/Deviation to Technical Work Document" form and any possible attachments are filed with the original document, and posted on the 4100 Controlled Documents website.

6.0 DESCRIPTION OF ACTIVITIES

The following is a description of activities for managing waste specific to groundwater monitoring activities and the groundwater monitoring program.

The project coordinator prepares a mini-SAP that provides the field support operations project leader and field technicians with the information necessary for them to perform work and manage waste properly. The project coordinator may include additional sample analytical requirements that are not specified in the mini-SAP but are necessary to properly characterize the waste.

The field support operations project leader and field technicians use the information provided in the mini-SAP to perform the monitoring activities at the designated locations. The waste generated during monitoring activities may include purge water, decon water, PPE, disposable filters, paper wipes, and plastic. The mini-SAP identifies how the waste will be managed.

All purge water and decon water will be collected in separate 55-gallon closed-head poly drums (CHPDs). A label will be placed on each 55-gallon CHPD drum indicating the following:

- Initial Label Type (per Corporate Policy ESH100 Environmental Safety & Health)
- Container Identification # (site-date-sequence)
- Project Name
- Waste Matrix (purge water or decon water)
- Accumulation Start Date
- Waste Owner, Organization, and phone number

All solid waste will be placed in a plastic trash bag and waste receptacle. A label will be placed on the waste container indicating the following:

- Initial Label Type (per Corporate Policy ESH100 Environmental Safety & Health)
- Container Identification # (site-date-sequence)
- Project Name
- Waste Matrix (PPE, paper wipes, plastic)
- Accumulation Start Date
- Waste Owner, Organization, and phone number

The field technicians will complete a Groundwater Monitoring Waste Generation Log as the waste is produced at each sampling location. The Groundwater Monitoring Waste Generation Log will identify:

- Container Identification # (site-date-sequence)
- Project Name
- Initial Label Type (per Corporate Policy ESH100 Environmental Safety & Health)
- Waste Matrix (purge water, decon water, PPE, paper wipes, plastic)
- Container Type/Volume
- Volume of Waste
- Total Container Weight
- Chain of custody (COC) #: Sample#-Fraction

- Accumulation Start & Full Date
- Date Waste is moved to an Accumulation Area
- Accumulation Area Name

The waste drums will be moved to the appropriate storage area at completion of sampling activities. All hazardous waste will be placed in a RCRA Less Than 90-Day Waste Accumulation Area. The waste drums labeled as containing non-hazardous waste will be kept at an area designated for non-hazardous waste.

The field support operations project leader is responsible for managing and processing all hazardous and non- hazardous waste once they are placed into the Building 9925 storage areas. Hazardous waste cannot exceed the 90-day hold time for a RCRA waste accumulation area. SNL/NM requirements and guidance for management of hazardous wastes at less than 90 –day Accumulation Areas are addressed in the Corporate Procedure: ESH100.2.ENV22 Manage Hazardous Waste at SNL/NM. If an alternate 90-day area is used, the field support operations project leader will coordinate with the owner of the alternate site to ensure all regulatory and SNL/NM requirements are met.

All waste generated during groundwater monitoring activities will be managed in accordance with Corporate Policy ESH100 Environment Safety & Health. Contact SNL/NM's Environmental Compliance Coordinators for assistance with compliance of applicable environmental laws and regulations regarding waste management.

1. Disposal methods for waste generated during groundwater monitoring activities include:

   - Discharge wastewater to the sanitary sewer.
   - Disposal through the HWMF.
   - Disposal as regular solid waste.

   Sanitary Sewer Discharge — All wastewater is discharged to the sanitary sewer in accordance with Albuquerque Bernalillo County Water Utility Authority requirements . A sanitary sewer discharge permit will be issued to the project coordinator by the waste water discharge project leader.

   HWMF Disposal — Purge and/or decon water that does not meet sanitary sewer discharge requirements and hazardous solid waste must be disposed through the HWMF.

   If waste must be disposed through the HWMF, then the project coordinator will fill out and submit a HWMF Waste Description and Disposal Request (WDDR) form. A copy of the laboratory analytical results (electronic or hard copy) must also be submitted to the HWMF.

If a permit was issued for discharge (sanitary sewer), then the project coordinator will submit a Work Request Form to the field support operations project leader to perform the discharge. The Work Request Form includes the following information:

- Project Name.
- Discharge Permit #.
- Indicate where the water will be discharged (ground surface or sanitary sewer).
- Number of containers to be emptied.
- Total volume of water to be discharged.
- Container identification numbers.
- Date of Discharge.
- Who completed the discharge.

The field support operations project leader receives the Work Request Form from the project coordinator to discharge the purge and/or decon water. The field support operations project leader schedules a field technician to discharge the purge and/or decon water as indicated in the Work Request Form. The completed Work Request Form is returned to the project coordinator by the field support operations project leader.

2. To dispose of hazardous waste, the project coordinator must fill out a HWMF WDDR form. The form is accessible on-line at:

   http://www-irn.sandia.gov/esh/hwmf_prgrm/wddr.htm

   The HWMF may request a data package on the waste in addition to the WDDR form.

3. To dispose of radioactive or mixed waste, the project coordinator must fill out a RMWMF Radioactive or Mixed Waste Disposal Request (RMWDR) form. The form is accessible on-line at:

   https://info.sandia.gov/esh/esh_center/Radioactive_Waste/RegWaste_dforms.htm

   The RMWMF may request a data package on the waste in addition to the RMWDR form.

7.0 REFERENCES

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

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

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

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

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

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

Sandia National Laboratories, Long-Term Stewardship, PHS SNL05A01241, *Groundwater Monitoring Activities* (latest edition), SNL/NM.

Sandia National Laboratories, Long-Term Stewardship, PLA 05-09, *Groundwater Monitoring Health and Safety Plan* (latest edition), SNL/NM.

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