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Environment, Safety, Health Directorate

Waste and Environmental Services

Technical Procedure

Collection of Soil and Vegetation Samples for the Environmental Surveillance Program

Document Owner/Subject Matter Expert:

Name:	Organization:	Signature:	Date:
Phil Fresquez	ENV-ES	*Signature on file*	9/9/2015
Name:	Organization:	Signature:	Date:
Shannon Gaukler	ENV-ES	*Signature on file*	9/9/2015

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Name:	Organization:	Signature:	Date:
Linda Salazar	OIO-DO	*Signature on file*	9/30/2015

Approval Signatures:

Quality Assurance Reviewer:	Organization:	Signature:	Date:
Doris Quintana	QPA-IQ	*Signature on file*	9/30/2015
Responsible Line Manager:	Organization:	Signature:	Date:
Pat Gallagher	ENV-ES	*Signature on file for*	9/9/2015

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REVISION HISTORY

Document Number and Revision *[Include revision number, beginning with Revision 0]*	**Effective Date** *[Document Control Coordinator inserts effective date]*	**Description of Changes** *[List specific changes made since the previous revision]*
WES-GS-TP-XX-XXXX, Rev. 0	10/04/96	New Document.
1		Reformatted in accordance with LIR 300-00-01, Safe Work Practices.
2	04/01	Added new Section 9.0, Training.
3	04/02	Change in directorate.
4	04/03	Team name change to Environmental Surveillance.
5.	5/04	Updated and reformatted document to conform with MAQ procedures.
6	05/31/05	Quick change revision to convert HCP to HR, remove chain-of-custody form, and refer to new chain-of-custody procedure.
7	10/16/07	Renumbered, reformatted to ERSS, and added vegetation sampling steps.
SOP-5132, R0	1/30/08	Renumbered and reformatted to WES.
ENV-ES-TP-003, R0	9/30/2015	Renumbered and reformatted to ENV Division. Added new document owner and subject matter expert, added steps for organic chemicals soil sampling, updated directions and location coordinates. Supersedes SOP-5132.

Table of Contents

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to describe the process for collection of soil and native vegetation (both overstory and understory) samples as part of the Soil, Foodstuffs and Biota Monitoring Program mandated by U.S. Department of Energy (DOE) Order 436.1 and 458.1 and reported in the Annual Surveillance Environmental Report (ASER) as mandated by DOE O 231.1. This procedure is applicable to personnel within the Los Alamos National Laboratory (Laboratory or LANL) Environmental Protection (ENV) Division.

2.0 BACKGROUND AND PRECUATIONS

2.1 Background

Within this procedure, soil for radionuclide collections is defined as material from the 0- to 2-in. depth and for organic chemical collections is defined as material from the 0- to 6-in. depth.

Composite soil samples are composed of the five (5) subsamples collected from an area. A grab sample is one sample from an area. Overstory vegetation samples are defined as trees and shrubs. Understory vegetation is defined as grasses and forbs.

2.2 Precautions

Individuals are required to be trained in the following before performing this procedure:

- First aid
- Cardiopulmonary Resuscitation (CPR)
- General Field Safety for All Employees

A minimum of two (2) people is required to go out in the field. Do not perform work under conditions you consider unsafe. Before beginning work described in this procedure, review safety needs and requirements, identify hazards, and develop hazard-mitigation measures.

3.0 EQUIPMENT AND TOOLS

- Stainless steel soil ring (10-cm diameter), top, and ring-spatula
- Teflon scoop
- Vegetation cutting shears
- Tape measure
- Permanent marker for labeling
- Soap/water solution (for washing ring)
- Water (for rinsing)
- Paper towels
- Chain-of-custody forms

- Tape
- 3-lb hammer
- One 500-mL poly bottle (for rad and metals)
- Two 500-mL amber glass bottle (for organics)
- Ice chest with blue ice
- Ziplock bags (1- and 2-gal. size)
- Personal protective equipment (e.g., safety glasses, safety/field shoes, rubber gloves, Kevlar gloves, sunscreen, and hat)

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Preparatory Activities

Sampler or Field Team Leader (FTL)

1. Determine which locations will be sampled from Attachment 1, Directions to Soil and Vegetation Sampling Sites.

4.2 Soil Sample Steps for Radionuclides, Metals and Organic Chemical Samples

Sampler or FTL

Soil Composite Samples for Radionuclides and Metal Analysis

1. Locate the center of the sampling area, brush away debris such as pine needles, and place a clean 10-cm- (4-in.-) diameter stainless-steel ring on the surface.
2. Cover the ring with the stainless-steel top.
3. Drive the stainless-steel ring 5 cm (2.0 in.) deep into the ground, using a 3-lb. hammer at the center and corners of a square area, 10 m (33 ft.) per side, for a total of 5 samples.
4. Remove soil next to the soil ring-sampler after driving the ring-sampler at a point.
5. Slip the spatula underneath the ring, and lift the sample.
6. Place each of the five (5) subsamples into a 1-gal. Ziplock bag.
7. Mix the subsamples thoroughly in the Ziplock bag to form a composite sample.
8. Pour the composite into a 500-mL poly bottle (for radionuclide and the other inorganic chemical (e.g., metal/target analyte list) analysis.
9. Seal each bottle with chain-of-custody tape.
10. Label the bottle with the sampling location, date, time, and sampler's initials.
11. Place each bottle into a 1-gal. Ziplock bag, and then place in the ice chest.
12. Complete a chain-of-custody form with the appropriate sampling information.

13. Wash the stainless-steel ring, spatula, and top with the soap/water solution, rinse with water, and dry with paper towels.
14. Store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (i.e., normally within 2 working days).
15. Maintain proper chain-of-custody of the samples.

Soil Grab Samples for Organic analysis

1. Locate the center of the sampling area, and collect a soil sample at the 0- to 6- inch depth with a Teflon scoop.
2. Place the sample into the two 500-mL amber glass jar (for organic chemical analysis).
3. Seal each bottle with chain-of-custody tape.
4. Label the bottle with the sampling location, date, time, and sampler's initials.
5. Place each bottle into a 1-gal. Ziplock bag, and then place in the ice chest.
6. Complete a chain-of-custody form with the appropriate sampling information.
7. Store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (i.e., normally within 2 working days).
8. Maintain proper chain-of-custody of the samples.

4.3 Vegetation Sampling

Sampler or FTL

1. Collect understory or overstory samples in the same general location that soil samples are collected. Understory and overstory samples are rotated per sampling session (i.e., one year understory the next year overstory, etc.).
2. Collect understory or overstory samples by first shaking the vegetation to remove any dust or dirt.
3. Cut the grasses/forbs near the surface of the soil for understory samples, and place approximately three (3) pounds into a 2-gal. Ziplock bag.
4. Avoid dirt.
5. Collect tree-shoot-tips measuring from 4 to 6 in., for overstory samples, at chest height, and place approximately three (3) pounds into a 2-gal. Ziplock bag.
6. Seal each bag with chain-of-custody tape.
7. Label each bag with the sample location, date and time collected, and sampler's initials.
8. Place each bag into a larger Ziplock bag (i.e., double bag), and then place in the ice chest.
9. Complete a chain-of-custody form with the appropriate sampling information.

10. Wash the shears with a soap/water solution, rinse with water, and dry with paper towels.
11. Store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (i.e., normally within 2 working days).
12. Maintain proper chain-of-custody on the samples.

4.4 Maintaining Custody of Samples

Sampler or FTL

1. Document chain-of-custody for all samples used to demonstrate compliance.
2. Verify the possession and handling of samples are traceable at all times.

   Note: A sample is considered in custody if it is one of the following:

   - In one's physical possession
   - In one's view after being in one's physical possession
   - In one's physical possession and then locked up so no one can tamper with it or
   - Kept in a secure area where access is restricted to authorized and accountable personnel only
3. If the area cannot be secured, use a custody seal to secure the area or the sample container.

4.5 Transferring Custody of Samples

Sampler or FTL

1. Complete the "relinquished by/received by" and "date" sections of the form whenever samples are transferred into the custody of another person or organization.

   Note: These sections of the form must provide a complete history of custody of the samples from collection to transfer to the analytical laboratory.

4.6 Break in Chain of Custody

Sampler or FTL

1. Document the failure by initiating a deficiency report in accordance with P322-4 Laboratory Performance Feedback and Improvement Process, whenever there is a break in the chain of custody of a sample.
2. Document the occurrence, evaluate the potential impact (if any) on the samples, and propose a fix to prevent recurrence.

4.7 Emergency Actions to Take in the Event of Control Failure

FTL

1. Perform first aid for cuts, as appropriate.
2. Provide first aid for all injuries, and take the injured person to Occupational Medicine if immediate medical attention is required or to the nearest hospital.

3. Notify the individual's supervisor and group office as soon as possible.

5.0 RECORDS

The FTL submits the following records generated by this procedure to the Principal Investigator:

- Completed chain-of-custody form.

6.0 PROCESS FLOW CHART

Flow chart is to be included at a later date.

7.0 ATTACHMENTS

Attachment 1: *5132-1, Directions to Soil and Vegetation Sampling Sites*
Attachment 2: *5132-2, Hazard Review for Soil and Vegetation sampling*

ATTACHMENT 1 – 5132-1, DIRECTIONS TO SOIL AND VEGETATION SAMPLING SITES
Page 1 of 4

Location	Coordinates		Directions
	N Coordinate	E Coordinate	
Regional Stations			
Northeast of LANL (Dixon)	1892003.697	1754089.580	From Española, go north on the Taos Highway; turn right to Dixon; travel about 6 mi; sample on the left hand side of the road about 100 yd. in.
Northeast of LANL (Ojo Sarco)	1866220.009	1774071.027	From Española, go north on the Taos Highway; turn right to Dixon; travel through Dixon to County Road 69 to Ojo Sarco. Sampling location is anywhere near the cemetery.
Northeast of LANL (Borrego Mesa)	1815716.813	1772954.340	From Pojoaque, go north on 84/285 approximately ¼ mi; turn right onto NM 503, and head east to Cundiyo; continue north and east on NM 503 to Forest Road (FR) 306, turn right, and go 7.0 mi due east. Sample on the south side of the road.
Southeast of LANL (Rowe Mesa)	1619386.109	1812738.616	From Pojoaque, take NM 84/285 to Santa Fe; continue on St. Francis Drive to the Las Vegas, NM, exit for I-25, and head east towards Pecos; take the exit 307 (Rowe); after exiting, turn left at 34; turn right to continue onto 34; park at gate of Forest Road 2190 – Sample site NW of gate.
Northwest of LANL (Youngsville)	1881888.039	1552332.698	Take NM 502 to the Española turnoff (NM 30); head north and take NM 84/285 north to the Abiquiu Dam exit (NM 96); take a left toward Youngsville to FR 100; turn left and go 2.6 mi. Sampling site is on the left (east) side of the road.
Southwest of LANL (Jemez)	1719495.437	1502276.101	Take West Jemez Road/NM 501 south to NM 4; head west to St. Peter's Dome exit; take FR 289 and go 7.5 mi. Sampling point is on the north side of the road.
Otowi	1774367.578	1671456.471	Take NM 502 east to the Otowi Bridge; park 0.1 mi before bridge, and walk 0.5 mi due east. Sampling site is open are next to Los Alamos Canyon wash.
Across TA-08 (GT Site)	1768805.627	1609433.446	From Diamond Drive, turn right onto West Jemez Road, and go 2.7 mi. Sampling site is on the west side of the road across from Technical Area 08 (TA-08).
Across TA-49 (BNP)	1755456.289	1620318.345	Take West Jemez Road to NM 4; go east toward TA-49; go 0.1 mi past the TA-49 turnoff. Sampling site is on the south side of the road.
East of Airport	1774799.482	1637043.212	Traveling east on Trinity Drive, go 2.4 mi past the DP Road turnoff. Sampling site is on the north side of the road 25 yd. due north.
West of Airport	1775792.773	1631874.119	Traveling east on Trinity Drive, go 1.4 mi past the DP Road turnoff. Sampling site is on the south side of the road across the fence line.

ATTACHMENT 1 – 5132-1, DIRECTIONS TO SOIL AND VEGETATION SAMPLING SITES (CONT.)
Page 2 of 4

Location	Coordinates		Directions
	N Coordinate	E Coordinate	
Perimeter Stations			
North Mesa	1780072.446	1630330.015	Travel east on Diamond Drive past the Golf Course; continue east on North Mesa Road; go 0.7 mi. Sampling site is on the south side of the road.
Sportsman's Club	1788136.211	1636493.387	Travel east on Diamond Drive past the Golf Course; take a left on San Ildefonso; go 0.7 mi into Rendija Canyon. Sampling site is on the north side of the road.
Tsankawi/PM-1	1768110.302	1647985.099	From NM 4, take the turnoff east of NM 4/East Jemez Road intersection (Truck Route) on the same side of the road (north); drive up to MP-1 water pumping station. Sampling site is across the fence line on the north side rim.
White Rock (East)	1758301.447	1655116.466	On NM 4, 0.4 mi east of White Rock. Sampling site is on the east side of the road across the fence line.
San Ildefonso	1759643.636	1645948.997	Before leaving, call the San Ildefonso Tribal Office (505-455-2273) before sampling; you must be escorted by a tribal member. From the junction of NM 502 and NM 4, go 2.5 mi on NM 4 to a gate for the Sacred Area on San Ildefonso Indian land. After meeting with the escort, follow the road for 6.5 mi to the sampling site.
TA-11 (K-Site)	1759328.803	1618868.688	*Controlled Access – Permission required Drive through the guard station near the EOC, and check-in at Building 410; turn right on Anchor Ranch Road to K-Site Road; turn right to TA-11; turn left at TA-11; go 0.1 mile – sampling site is on the west side of the road 50 yards due west.
TA-21 (DP-Site)	1774989.218	1631266.389	*Controlled Access – Permission required. Call number on gate to obtain key and radio. Obtained radio from Mike Alexander at TA-64 building 64. On DP Road from TA-21 entrance (old guard station), go 0.3 mi east to gate; use the FM-80-3 key to open the gate; go east for 0.1 mi. Sampling site is on the north side of the road and north of the fenced off area.
Near TA-33	1740806.015	1638487.987	At West Jemez Road/NM 4 intersection, go east on NM 4 toward TA-33. Sampling site is on the north side of the road 0.2 mi before the TA-33 turnoff.
North of TA-50/35 at TA-60	1771036.570	1626741.360	From Diamond Drive, turn east on Eniwetok Drive; follow the road until it turns to a dirt road; go 1.3 mi. Sampling site is on the south side of the road 70 yd. due south.

ATTACHMENT 1 – 5132-1, DIRECTIONS TO SOIL AND VEGETATION SAMPLING SITES (CONT.)
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Location	Coordinates		Directions
	N Coordinate	E Coordinate	
On-Site Stations			
TA-51	1762889.272	1635769.143	Go to TA-51 0.1 mi past the entrance by utility pole 2135. Sampling site is on the north side of the road, 40 yd. due north.
West of TA-53	1772128.788	1631905.263	Go to TA-53; take La Mesita, and go 0.6 mi. (from East Jemez road) Sampling site is on the south side of the road, 50 yd. due south.
East of TA-53	1772045.015	1639095.397	Go to TA-53; take La Mesita, and go 1.9 mi (from East Jemez road) to gate; park on the north side, continue on road by hiking to the meteorological tower sampling site. Sample in that area.
East of TA-54	1757882.733	1645162.755	Before sampling, check-in with the main office at TA-54 to obtain a key for the gate. The gate is located .9 mi northeast (on Pajarito Road) from the intersection of NM 4 and Pajarito Road. Open the gate, and go 0.1 mi. Sampling site is in the east side of the road across the small wash, and on the east site of the wash.
Potrillo Drive at TA-36	1759475.770	1635153.829	From Pajarito Drive at TA-18, turn left onto Potrillo Drive; go 0.9 mi. Sampling site is on the north side of the road.
Near Test Well DT-9 at TA-49	1752337.978	1629594.961	Check in with EM&R located off West Jemez Road at the entrance to TA-15, and get the key for the gate for TA-49; continue traveling south on NM 501; turn left on Frijoles Mesa road, proceed until you come to the stop sign; turn right and go past the training center for 1.4 mi; turn right on the dirt road, and drive 1 mi due east to Well DT-9; drive about 100 ft. past the well. Sampling site is on the south side of the road, about 50 ft. from the road.
R-Site Road East at TA-15	1761923.229	1625863.108	*Controlled Access – Permission required From West Jemez Road, go through the entrance to TA-15 and through the security gate; take Anchor Ranch Road to R-Site Road to TA-15; check-in with the secretary at the main office at Building 484; drive back 0.5 mi. Sampling site is on the south side of the road.

ATTACHMENT 1 – 5132-1, DIRECTIONS TO SOIL AND VEGETATION SAMPLING SITES (CONT.)
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Location	Coordinates		Directions
	N Coordinate	E Coordinate	
On-Site Stations			
Two-Mile Mesa at TA-06	1769494.453	1615386.422	*Controlled Access – Permission required. From West Jemez Road, go through the entrance to TA-15 and through the security gate; take Anchor Ranch Road to TA-22, and check-in with the secretary at the main office; take the road on the south side of the main office building; go to Two-Mile Road; take a right; drive to the meteorological tower by TA-40. Sampling site is on the east side of the road past the gate and near the meteorological tower.
TA-73/SR 502 (Most Westerly)	1775884.850	1630804.120	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 approximately 170 yards east of the Los Alamos Fire Department Station #6.Note: the 5 locations sampled at TA-73 stretch evenly from ~ yards east of the Fire Department station and ~ yards west of the parking lot at the trail head of Canyon Rim trail.
TA-73/SR 502 (West)	1775570.790	1632199.910	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 475 yards east of the above site.
TA-73/SR 502 (Middle)	1775418.920	1633062.840	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 290 yards east of the above site.
TA-73/SR 502 (East)	1775282.650	1634054.160	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 335 yards east of the above site.
TA-73/SR 502 (Most Easterly)	1774557.860	1636562.160	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 870 yards east of the above site. This is the most eastern site which is approximately ~ 155 yards west of the parking lot of the Canyon Rim trailhead.

ATTACHMENT 2 – 5132-2, HAZARD REVIEW FOR SOIL AND VEGETATION SAMPLING
Page 1 of 1

Work Tasks/Steps	**Hazards, Concerns, and Potential Accidents; Likelihood/Severity**	**Controls, Preventive Measures** (e.g., safety equipment, administrative controls, etc.)	**Hazard Level** (from IMP 300-00-00, Hazard Grading Matrix)
Collect soil and vegetation samples according to steps for soil and vegetation sample collection in Section 4.2 and 4.3 of this procedure.	Hammering injury (smashed fingers) and flying debris from use of ring and hammer Cutting injury from shears Ergonomic injuries (repetitive motion) Occasional/moderate = low	Wear the minimum Personal protective equipment, as described above. Cut away from fingers and body. Use Kevlar gloves. Always lock blades when not in use and carry away from body. Take a short break every hour.	Low
Same as above.	Handling heavy objects (loading, unloading, transporting, and positioning) Occasional/moderate = low	Use proper lifting techniques.	Low

Los Alamos NATIONAL LABORATORY EST. 1943

Environment, Safety and Health

Electronic Public Reading Room - Posting of Controlled Procedures

Operations Integration Office Management Approval:

Print Name	Signature	Date
Ellena Martinez	Ellena Martinez	3/4/16

Derivative Classifier:

☐ OUO ☐ UCNI ☒ Unclassified ☐ Classified

Print Name	Signature	Date
Larry W. Maassen	Larry Maassen	3/4/16

List of Controlled Documents:

Procedure No.	Title/Description
Air Monitoring (ENV)	
ENV-ES-TPP-003	Technical Project Plan for the Neighborhood Environmental Watch Network (NEWNET)
ENV-ES-TPP-007	Technical Project Plan for the Direct Penetrating Radiation Monitoring Network (DPRNET)
Data Validation (ADESH)	
OIO-TP-5161	Routine Validation of Volatile Organic Compound Analytical Data
OIO-TP-5162	Routine Validation of Semivolatile Organic Compound Analytical Data
OIO-TP-5163	Routine Validation of Organochlorine Pesticide and Polychlorinated Biphenyl Analytical Data
OIO-TP-5165	Routine Validation of Metals Analytical Data
General Field Work	
OIO-TP-222	Shipping/Receiving of Environmental Samples by the Sample Management Office (SMO)
OIO-QP-219	Sample Control and Field Documentation
Soil, Foodstuffs, and Biota Sampling (ENV)	
ENV-ES-TPP-002	Technical Project Plan for Biota Dose Assessment
ENV-ES-TP-003	Collection of Soil and Vegetation Samples for the Environmental Surveillance Program
ENV-ES-TP-004	Produce Sampling
ENV-ES-TP-007	Game Animal Sampling
ENV-ES-TP-006	Sampling Soil and Vegetation at Facility Sites
SOP-5247	Collection of Benthic Macroinvertebrates in the Rio Grande
ENV-ES-TP-008	Collection of Crawfish in the Rio Grande
Well Drilling, Construction, Development, Maintenance, and Abandonment	
ENV-RCRA-QP-010	Land Application of Groundwater