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Revision: **0**



Effective Date: 2/26/08

Waste and Environmental Services

Standard Operating Procedure

for **COLLECTION OF SOIL AND VEGETATION SAMPLES
FOR THE ENVIRONMENTAL SURVEILLANCE
PROGRAM**

APPROVAL SIGNATURES:

Subject Matter Expert:	Organization	Signature	Date
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Quality Assurance Specialist:	Organization	Signature	Date
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Responsible Line Manager:	Organization	Signature	Date
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1.0 PURPOSE AND SCOPE

The purpose of this procedure is to describe the process for collection of soil and native vegetation (overstory and understory) samples as part of the Soil and (Nonfoodstuffs Biota) Monitoring Program mandated by DOE Order 450.1. This procedure is applicable to personnel within the Los Alamos National Laboratory (Laboratory or LANL) Waste and Environmental Services (WES) Division.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

Within this procedure, soil is defined as surface soil (i.e., material from the 5-cm (0- to 2-in.) depth. Composite soil samples are composed of the five (5) sub-samples taken from an area. Overstory vegetation samples are defined as trees and understory vegetation is defined as grasses and forbs.

2.2 Precautions

Individuals are required to be trained in the following prior to 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

<ul style="list-style-type: none"> • Stainless steel soil ring (10-cm diameter), top, and ring-spatula; • Vegetation cutting shears • Tape measure; • Permanent marker for labeling; • Soap/water solution (for washing ring); • Water (for rinsing); • Paper towels; • Chain-of-custody forms; 	<ul style="list-style-type: none"> • Tape; • 3 lb. hammer; • 500-mL poly bottle; • Ice chest with blue ice; • Ziplock™ bags (one and two gallon size); • Personal Protective Equipment (e.g., safety glasses, safety/field shoes, rubber gloves, Kevlar gloves, and hat.
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4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Preparatory Activities

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|------------------------------------|----|---|
| Sampler or Field Team Leader (FTL) | 1. | Determine which locations will be sampled from Attachment 1, Directions to Soil and Vegetation Sampling Sites. |
| | 2. | Conduct a hazard review in accordance with Attachment 2, Hazard Review for Soil and Vegetation Sampling. |
| | 3. | Before leaving the field, check the condition of the vehicle and the fuel level. |
| | 4. | Identify a Point-of-Contact to provide pertinent information of destination, expected time-in, and methods of notifying the field team. |
| | 5. | When leaving Los Alamos County, notify the group office to place you on travel status. |
| | 6. | Ensure you have a working cell phone and a pager. |

4.2 Soil Sampling Steps

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|----------------|-----|---|
| Sampler or FTL | 1. | Locate the center of the sampling area, and place a clean 10-cm-diameter (4-in.) diameter stainless steel ring on the surface. |
| | 2. | Cover the ring with the stainless steel top. |
| | 3. | Using a 3-lb. hammer, drive the stainless steel ring 5 cm. (2.0 in.) deep into the ground at the center and corners of a square area, 10-m (33 ft.) per side. |
| | 4. | After driving the ring-sampler at a point, and remove soil next to the soil ring-sampler. |
| | 5. | Slip the spatula underneath the ring, and lift the sample. |
| | 6. | Place each of the five (5) sub-samples into a 1-gallon Ziplock™ bag. |
| | 7. | Thoroughly mix the sub-samples in the Ziplock™ bag to form a composite sample. |
| | 8. | Pour the composite into a 500-mL poly bottle (for radionuclide and other inorganic chemical (e.g., Target Analyte List) analysis. |
| | 9. | Seal each bottle with chain-of-custody tape. |
| | 10. | Label the bottle with the sample location, date, time, and sampler's initials. |
| | 11. | Place each bottle into a 1-gallon Ziplock™ bag, and then into 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. |

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Sampler or FTL (Continued)	14.	Once at the Laboratory, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (i.e., normally within two working days).
	15.	Maintain proper chain-of-custody on the samples.

4.3 Vegetation Sampling

Sampler or FTL	1.	Collect Understory and Overstory samples in the same general location that soil samples are collected.
	2.	Collect Understory and Overstory samples by first shaking the vegetation to remove any dust or dirt.
	3.	For Understory samples, cut the grasses/forbs near the surface of the soil and place approximately three (3) pounds into a 2-gallon Ziplock™ bag.
	4.	Avoid dirt.
	5.	For Overstory samples, at chest height, collect tree-shoot-tips measuring from 4 to 6 inches and place approximately three (3) pounds into a 2-gallon 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 into 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.	Once at the Laboratory, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (i.e., normally within two 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.	<p>Verify the possession and handling of samples is traceable at all times.</p> <p>[NOTE: A sample is considered in custody if it is one of the following:</p> <ul style="list-style-type: none"> • 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 that no one can tamper with it; or • Kept in a secure area where access is restricted to authorized and accountable personnel only. <p>A secured area is an area that is locked (e.g., a room, cooler, vehicle, or refrigerator).]</p>
	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. Whenever samples are transferred into the custody of another person or organization, complete the “relinquished by/received by” and “date” sections of the form.
 [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 Broken Chain-of-Custody

Sampler or FTL 1. Whenever there is a break in the chain-of-custody of a sample, document the failure by initiating a deficiency report in accordance with ISD 322-4, *Issues and Corrective Action Management Process*.

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. For all injuries, provide first aid and see that the injured person is taken to Occupational medicine (only if immediate medical attention is not required) or to the nearest hospital.

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

4.8 Records

FTL 1. Submit the following records generated by this procedure to the Records Processing Facility:

- Completed Chain of Custody form.

5.0 PROCESS FLOW CHART

Flow chart is to be included at a later date.

6.0 ATTACHMENTS

Attachment 1 5132-1 Directions to Soil and Vegetation Sampling Sites (5 pages)

Attachment 2 5132-2 Hazard Review for Soil and Vegetation sampling (1 page)

7.0 REVISION HISTORY

Author: Phil Fresquez

Revision No. [Enter current revision number, beginning with Rev.0]	Effective Date [DCC inserts effective date for revision]	Description of Changes [List specific changes made since the previous revision]	Type of Change [Technical (T) or Editorial (E)]
0	10/04/96	New Document	T

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Revision No. <i>[Enter current revision number, beginning with Rev.0]</i>	Effective Date <i>[DCC inserts effective date for revision]</i>	Description of Changes <i>[List specific changes made since the previous revision]</i>	Type of Change <i>[Technical (T) or Editorial (E)]</i>
1	03/99	Reformatted in accordance with LIR 300-00-01, Safe Work Practices	E
2	04/01	Added new Section 9.0, Training	T
3	04/02	Change in Directorate	E
4	04/03	Team name change to Environmental Surveillance	E
5	05/12/04	Updated and reformatted document to conform with MAQ procedures	E
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	E
0	10/16/07	Renumbered, reformatted to ERSS, and added vegetation sampling steps.	T and E
0	1/30/08	Renumbered and reformatted to WES.	E

[Using a CRYPTOCard, click here to record "self-study" training to this procedure.](#)

If you do not possess a CRYPTOCard or encounter problems, contact the ERSS training specialist.

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ATTACHMENT 1: DIRECTIONS TO SOIL AND VEGETATION SAMPLING SITES	
5132-1 <p style="text-align: center;">Directions to Soil and Vegetation Sampling Sites</p>	Records Use only 

Location	Coordinates		Directions
	N Coordinate	E Coordinate	
Regional Stations			
Northeast of LANL (Dixon)	1893077.952	1754296.644	From Espanola, go north on the Taos Highway; turn right to Dixon; travel about six miles; sample on the left hand side of the road about 100 yards in.
Northeast of LANL (Ojo Sarco)	1866902.623	1774787.958	From Espanola, go north on the Taos Highway; turn right to Dixon; travel through Dixon to County Road 69 to Ojo Sarco. Sample location is anywhere near the church.
Northeast of LANL (Borrogo Mesa)	1815716.813	1772954.340	From Pojoaque, go north on 84/285 approximately ½ mile; turn right onto State Road (SR) 503, and head east to Cundiyo; continue north and east on SR 503 to Forest Road (FR) 306 turn right and go 6 miles due east – sample on the south side of the road.
Southeast of LANL (Rowe Mesa)	1619386.109	1812738.616	From Pojoaque, take 84/285 to Santa Fe; continue on St. Francis Drive to the Las Vegas, NM exit for I-25, and head east to Pecos; take the towne turn off; turn right and follow the road until it becomes a dirt road (FR 35); continue to the top of Rowe Mesa and turn right on FR 326; go 0.1 mile – sample site is on the north side of the road.

Location	Coordinates		Directions
	N Coordinate	E Coordinate	
Northwest of LANL (Youngsville)	1881888.039	1552332.698	Take SR 502 to the Espanola turnoff (SR 30); head north and take 84/285 north to the Abiquiu Dam exit (SR 96); take a left toward Youngsville to FR 100; turn left and go 3 miles – sampling site is on the north side of the road.
Southwest of LANL (Jemez)	1719495.437	1502276.101	Take West Jemez Road/SR 501 south to SR 4; head west to St. Peters Dome exit; take FR 289 and go 7.5 miles – sampling point is on the north side of the road.
Perimeter Stations			
Quemazon Trail	1782488.290	1616879.220	From Diamond Dr. going north, take a left on Trinity Drive; about ½ mile take a left on Quemazon Trail road. At the end of Quemazon Trail road by water tank #11, sample on the west side about 50 yards out.
Otowi	1777182.637	168721.670	Take SR 502 east to the Otowi Bridge; park 0.1 mile before bridge, and walk .5 mile due east – sampling site is open area next to Los Alamos Canyon wash.
Across TA-8 (GT Site)	1768805.627	1609433.446	From Diamond Drive, turn right onto West Jemez Road, and go 2.7 miles – sampling site is on the west side of the road.
Across TA-49 (BNP)	1755456.289	1620318.345	Take West Jemez Road to SR 4; go east toward TA-49; go 0.1 mile 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 miles past the DP Road turnoff – sampling site is on the north side of the road 25 yards due north.
West of Airport	1775792.773	1631874.119	Traveling east on Trinity Drive, go 1.4 miles past the DP Road turnoff – sampling site is on the south side of the road across the fence line.
North Mesa	1780072.446	1630330.015	Travel east on Diamond Drive past the Golf Course; continue east on North Mesa Road; go 0.7 mile – 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 mile into Rendija Canyon – sampling site is on the north side of the road.

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Location	Coordinates		Directions
	N Coordinate	E Coordinate	
Tsankawi/PM-1	1768110.302	1647985.099	From SR 4, take the turnoff east of SR 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	16551116.466	On SR 4, 0.4 mile 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 (455-2273) prior to sampling – must be escorted by a tribal member. From junction of SR 502 and SR 4, go 2.5 miles on SR 4 to a gate for the Sacred Area on San Ildefonso Indian land. After meeting with the escort, follow the road for 6.5 miles to the sampling site.
On-Site Stations			
TA-16 (S-Site)	1759328.803	1618868.688	Drive through the TA-16 guard station, 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 0.2 mile – sampling site is on the west side of the road 50 yards due west.
TA-21 (DP-Site)	1774989.218	1631266.389	Before leaving, make sure key FM-80-3 is available [Louis Naranjo (5-0831 – office, or 7-3948 – lab) or Dennis Rupp (7-4435) have the key]. On DP Road from TA-21 entrance (old guard station), go 0.3 mile east to gate; use the FM-80-3 key to open the gate; go east for 0.1 mile – sampling site is on the north side of the road.
Near TA-33	1740806.015	1638487.987	At West Jemez Road/SR 4 intersection, go east on SR 4 toward TA-33 – sampling site is on the north side of the road 0.2 mile before the TA-33 turnoff.
North of TA-50/35 at TA-60	1771036.570	1626741.360	From Diamond Drive, turn east on Enwetok Drive; follow the road until it turns to a dirt road; go 1.3 miles – sampling site is on the south side of the road 70 yards due south.
TA-51	1762889.272	1635769.143	Go to TA-51 0.1 mile past the entrance by utility pole 2135 – sampling site is on the north side of the road, 40 yards due north.

Location	Coordinates		Directions
	N Coordinate	E Coordinate	
West of TA-53	1772914.010	1629196.631	Go to TA-53; take La Mesita, and go 0.6 mile – sampling site is on the south side of the road, 50 yards due south.
East of TA-53	1772133.547	1633954.231	Go to TA-53; take La Mesita, and go 2.5 miles to Staging Area; park on the north side, and follow the road 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 acquire a key for the gate. The gate is located .9 mile northeast (on Pajarito Road) from the intersection of SR 4 and Pajarito Road. Open the gate, and go 0.1 mile – 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 mile – 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 SR 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 miles; turn right on the dirt road, and drive 1 mile due east to Well DT-9; drive about 100 feet past the well – sampling site is on the south side of the road, about 50 feet from the road.
R-Site Road East at TA-15	1761923.229	1625863.108	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 mile – sampling site is on the south side of the road.
Two-Mile Mesa at TA-06	1769494.453	1615386.422	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.


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Location	Coordinates		Directions
	N Coordinate	E Coordinate	
TA-73/SR 502 (west)	1775884.850	1630804.120	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 just east of the Los Alamos Fire Department Station #6.
TA-73/SR 502	1775570.790	1632199.910	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 200 yards east of the above site. It is north of the first TA-21 water tower.
TA-73/SR 502	1775418.920	1633062.840	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 200 yards east of the above site. It is north of the second TA-21 water tower.
TA-73/SR 502	1775282.650	1634054.160	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 200 yards east of the above site. It is north of the TSTA facility.
TA-73/SR 502 (East)	1774557.860	1636562.160	Starting on State Road 502 looking east, this site is located approximately 50 yards south on TA-73 about 200 yards east of the above site. This is the most eastern site near the exit to Los Alamos and about 0.20 miles west of East Gate.

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ATTACHMENT 2: HAZARD REVIEW FOR SOIL AND VEGETATION SAMPLING	
5132-2 <p style="text-align: center;">Hazard Review for Soil and Vegetation Sampling</p>	Records Use only 

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 PPE 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