

SOIL SAMPLING

Purpose This Meteorology and Air Quality Group (MAQ) procedure describes the process for collecting soil as part of the Soil Monitoring Program, as mandated by DOE Order 450.1.

Scope This procedure applies to the individual(s) assigned to collect soil samples as part of the Soil Monitoring Program in MAQ.

In this procedure This procedure addresses the following major topics:

Topic	See Page
General Information About This Procedure	2
Who Requires Training to This Procedure?	2
Worker Safety	4
Sample Collection	5
Chain-of-Custody for Samples	8
Records Resulting from This Procedure	9

Hazard Control Plan The hazard evaluation associated with this work is documented in Attachment 1: Initial risk = **low**. Residual risk = **low**. Work permits required: none. First authorization review date is one year from group leader signature below; subsequent authorizations are on file in group office.

Signatures

Prepared by: _____ Phil Fresquez, Environmental Surveillance Team Leader	Date: <u>5/12/04</u>
Approved by: _____ Terry Morgan, QA Officer	Date: <u>5/12/04</u>
Work authorized by: _____ Jean Dewart, MAQ Group Leader	Date: <u>5/14/04</u>

05/24/04

CONTROLLED DOCUMENT

This copy is uncontrolled if no red stamp is present on printed copies. Users are responsible for ensuring they work to the latest approved revision.

General information about this procedure

Attachments This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Hazard Control Plan	2
2	Environmental Surveillance Team Chain-of-Custody Record	1
3	Soil Sampling Equipment and Diagram	3
4	Directions to Soil and Vegetation Sampling Sites	3

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	10/4/96	New document.
1	3/99	Reformatted in accordance with LIR300-00-01, Safe Work Practices.
2	4/01	Added new Section 9.0, Training.
3	4/02	Change in directorate.
4	4/03	Team name change to Environmental Surveillance.
5	5/12/04	Updated and reformatted document to conform with MAQ procedures.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- MAQ personnel assigned to collect soil samples

Training method

The training method for this procedure is **on-the-job** training by a previously-trained individual and is documented in accordance with the procedure for training (MAQ-024).

Annual retraining is required and will be by self-study (“reading”) training.

Prerequisites

In addition to training to this procedure, the following training is also required prior to performing this procedure:

- First Aid
- Cardiopulmonary Resuscitation (CPR)
- MAQ-Field, “General Field Safety for All Employees”

General information, continued

**Definitions
specific to this
procedure**

Soil: Surface soil includes material from the 5-cm (0- to 2-in.) depth.

Composite sample: Samples composed of the five sub-samples taken from an area.

References

The following documents are referenced in this procedure:

- MAQ-024, "Personnel Training"
 - MAQ-026, "Deficiency Reporting and Correcting"
 - MAQ-Field, "General Field Safety for All Employees"
-

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Worker safety

**Precautions
and
limitations**

This document establishes the basic requirements for collecting soil samples. Work performed under this procedure by LANL personnel will occur only after required training to applicable documents has been completed and documented.

**Safe work
practices
requirements**

Project Personnel - A minimum of two people is required to go out in the field.

Personal Protective Equipment - For soil sampling, the following personal protective equipment must be worn: safety glasses, safety/field shoes, rubber gloves, and a hat.

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.

Collecting soil samples

Sample locations

One composite sample should be collected from each of the following locations (see Attachment 4 for directions to sites):

On-site Stations—Stations on Laboratory property

- TA-16 (S-Site)
- TA-21 (DP-Site)
- Near TA-33
- TA-50
- TA-51
- West of TA-53
- East of TA-53
- East of TA-54
- Potrillo Drive/TA-36
- Near Test Well DT-9
- R-Site Road East
- Twomile Mesa

Perimeter Stations—Stations within 4 km (2.5 mi) of the Laboratory boundary (usually located downwind from major potential contaminant sources).

- Otowi
- Near TA-8 (GT-Site)
- Near TA-49 (BNP)
- East of airport
- West of airport
- North Mesa
- Sportsman's Club
- Tsankawi/PM-1
- White Rock (East)
- San Ildefonso

Regional Stations—Stations located within the five counties surrounding Los Alamos County at a distance of up to 80 km (50 mi).

- Borrego Mesa
- Rowe Mesa
- Youngsville
- Jemez
- Embudo
- Cochiti

Continued on next page.

Collecting soil samples, continued

Equipment needed Additional specific equipment required for going into the field is given in the operating procedure “General Field Work” (RRES-MAQ-Field). The following equipment is required for soil sampling:

- safety glasses
- rubber gloves
- tape measure
- permanent marker for labeling
- stainless steel soil ring (10-cm diameter), top, and ring-spatula
- 3-lb hammer
- soap/water solution (for washing ring), water (rinsing), paper towels
- 500-mL & 125-mL polyethylene bottles (1 for each composite sample)
- ice chest with blue ice
- zip-lock bags (gallon size) and marker for labeling
- chain-of-custody forms (Attachment 2), tape

Before leaving for the field Check the condition of the vehicle and the fuel level. Identify a Point-of-Contact (providing pertinent information of destination, expected time-in, and how to notify field team). When leaving Los Alamos County, notify the group office to place you on travel status. Ensure that you have a working cell phone and a pager.

Steps for sampling soil Sampling guidelines set by the American Society for Testing and Materials (ASTM) were used to develop the guidelines followed by the Environmental Surveillance Team. At collection times, plan trips to sampling locations and perform the following steps:

Step	Action
1	Locate the center of the sampling area, and place a clean 10-cm- (4-in.-) diameter stainless steel ring on the surface (see Attachment 3). Cover the ring with the stainless steel top.
2	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. After driving the ring-sampler at a point, remove soil next to the soil ring-sampler, slip the spatula underneath the ring, and lift the sample. Place each of the five sub-samples into a 1-gallon zip-lock bag.
3	Thoroughly mix the sub-samples in the zip-lock bag to form a composite sample. Pour the composite into a 125-mL polyethylene bottle (for heavy-metal analysis) and a 500-mL poly bottle (for radionuclide analysis).

Steps continued on next page.

Collecting soil samples, continued

Step	Action
4	Seal each bottle with chain-of-custody tape. Label the bottle with the sample location, date, time, and your initials. Place each bottle into a 1-gallon zip-lock bag and then into ice chest.
5	Complete a chain-of-custody form (Attachment 2) with the appropriate sampling information.
6	Wash ring, spatula, and top with the soap/water solution, rinse with water, and then dry with paper towels.
7	Once at the Lab, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (normally within two working days). Maintain proper chain-of-custody on the samples. See chapter <i>Chain-of-custody for samples</i> .
8	For steps to submit samples see chapter <i>Submitting the Samples</i> in Procedure MAQ-706 "Sample Processing."

Chain-of-custody for samples

Maintaining custody of samples

A sample is physical evidence collected from a facility or the environment. Chain-of-custody must be documented for all samples used to demonstrate compliance. Verify that the possession and handling of samples is traceable at all times. 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 that no one can tamper with it.
- Kept in a secure area where access is restricted to authorized and accountable personnel only.

NOTE: A secured area is an area that is locked, such as a room, cooler, vehicle, or refrigerator. If the area cannot be secured by locking, use a custody seal to secure the area or the sample container.

Transferring custody of samples

Whenever samples are transferred into the custody of another person or organization, complete the "relinquished by/received by" and "date" sections of the form (Attachment 2). These sections of the form must provide a complete history of custody of the samples from collection to transfer to the analytical laboratory.

If chain-of-custody is broken

Whenever there is a break in the chain of custody of a sample, document the failure by initiating a deficiency report in accordance with the procedure for deficiencies (MAQ-026). [The deficiency process will document the occurrence, evaluate the potential impact (if any) on the samples, and propose a fix to prevent recurrence.]

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted **within one year** as records to the records coordinator:

- Chain-of-Custody record

HAZARD CONTROL PLAN

1. The work to be performed is described in this procedure.

“Soil Sampling”

2. Describe potential hazards associated with the work (use continuation page if needed).

Falls/tripping – uneven terrain, carrying awkward objects or equipment
Animal Injuries- (snakes, spiders, mountain lions, etc.)
Weather—Lightning
Handling heavy objects (loading/unloading/transporting/postioning)
Ergonomic injuries (repetitive motion)
Hammering injury (smashed fingers) & flying debris

3. For each hazard, list the likelihood and severity, and the resulting initial risk level (before any work controls are applied, as determined according to LIR300-00-01, section 7.2)

Falls/tripping—occasional/moderate = low
Animal Injuries- (snakes, spiders, mountain lions, etc.)—remote/critical = minimal
Weather—Lightning—remote/catastrophic = low
Handling heavy objects (loading/unloading/transporting/postioning)—improbable/moderate = minimal
Repetitive motion and other ergonomic hazards—remote/negligible = minimal
Hammering injury (smashed fingers) & flying debris—occasional/moderate = low
Ergonomic injuries (repetitive motion)—remote/negligible = low

Overall *initial* risk: Minimal Low Medium High

4. Applicable Laboratory, facility, or activity operational requirements directly related to the work:

None List: Work Permits required? No List:

HAZARD CONTROL PLAN, continued

5. Describe how the hazards listed above will be mitigated (e.g., safety equipment, administrative controls, etc.):

Falls/tripping – Read the "Field Safety for All" document on awareness of trips, slips, and falls.

Animal Injuries – Read the "Field Safety for All" document and use common sense to avoid these types of injuries.

Weather (lightning) -- Read the "Field Safety for All" document and seek shelter when necessary.

Handling heavy objects (loading/unloading/transporting/postioning)--Use proper lifting techniques.

Repetitive motion and other ergonomic hazards—Take a short break every hour.

Hammering injury (smashed fingers) & flying debris—Wear protective clothing: gloves and safety glasses.

6. Knowledge, skills, abilities, and training necessary to safely perform this work (check one or both):



Group-level orientation (per MAQ-032) and training to this procedure.



Other → See training prerequisites on procedure page 3. Any additional describe here:

7. Any wastes and/or residual materials? (check one) None List:

8. Considering the administrative and engineering controls to be used, the *residual* risk level (as determined according to LIR300-00-01, section 7.3.3) is (check one):



Minimal



Low



Medium (requires approval by Division Director)

9. Emergency actions to take in event of control failures or abnormal operation (check one):



None



List:

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

Signature of preparer of this HCP: This HCP was prepared by a knowledgeable individual and reviewed in accordance with requirements in LIR 300-00-01 and LIR 300-00-02.

Preparer(s) signature(s)

Name(s) (print)

/Position

Date

Signature by group leader on procedure title page signifies authorization to perform work for personnel properly trained to this procedure. This authorization will be renewed annually and documented in ESH-17 records.

Controlled copies are considered authorized. Work will be performed to controlled copies only. This plan and procedure will be revised according to MAQ-022 and distributed according to MAQ-030.

MAQ, Meteorology and Air Quality

Environmental Surveillance Team Chain-of-Custody Record

This form is from MAQ-707

Project Contact _____ Contact Phone No. _____ MS _____	Project Name Soils Sampling _____ _____	Account Code _____ Cost Center _____ Program Code _____
--	--	--

Date Collected	Time Collected	Station Name/Number	Number of Samples	Analysis Requested	Remarks

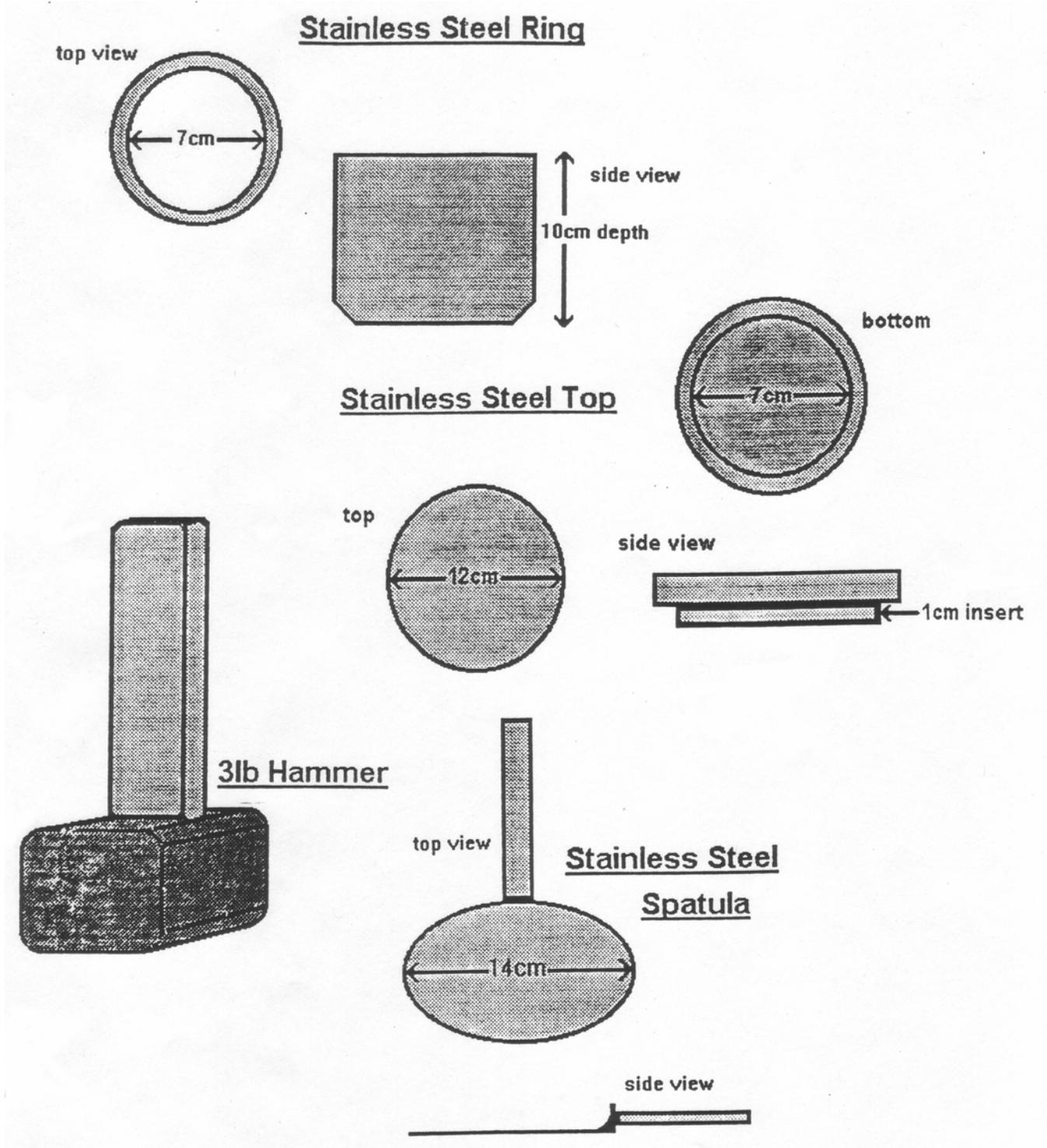
EXAMPLE

Relinquished by (print and sign)	Date	Relinquished by (print and sign)	Date	Relinquished by (print and sign)	Date
	Time		Time		Time
Received by (print and sign)	Date	Received by (print and sign)	Date	Received by (print and sign)	Date
	Time		Time		Time

Samplers (print names and initial)

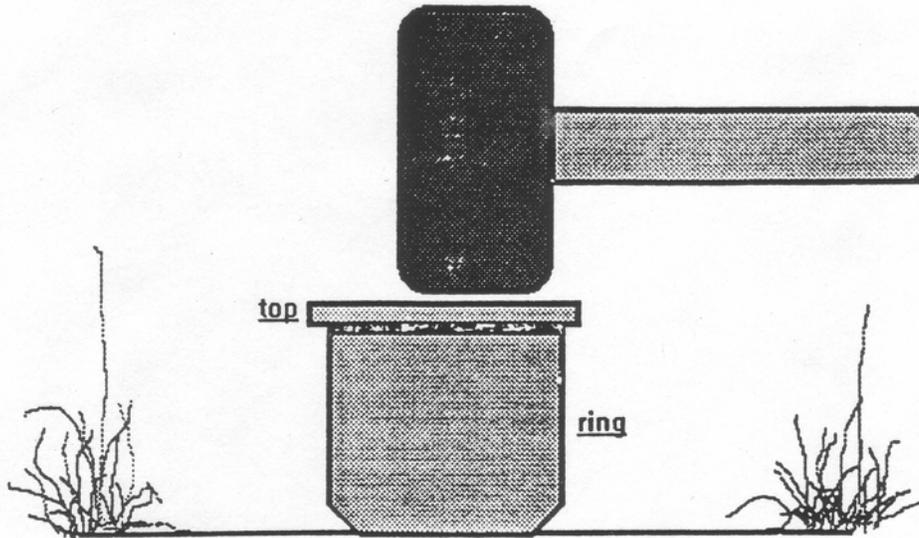
Comments

SOIL SAMPLING EQUIPMENT AND DIAGRAM

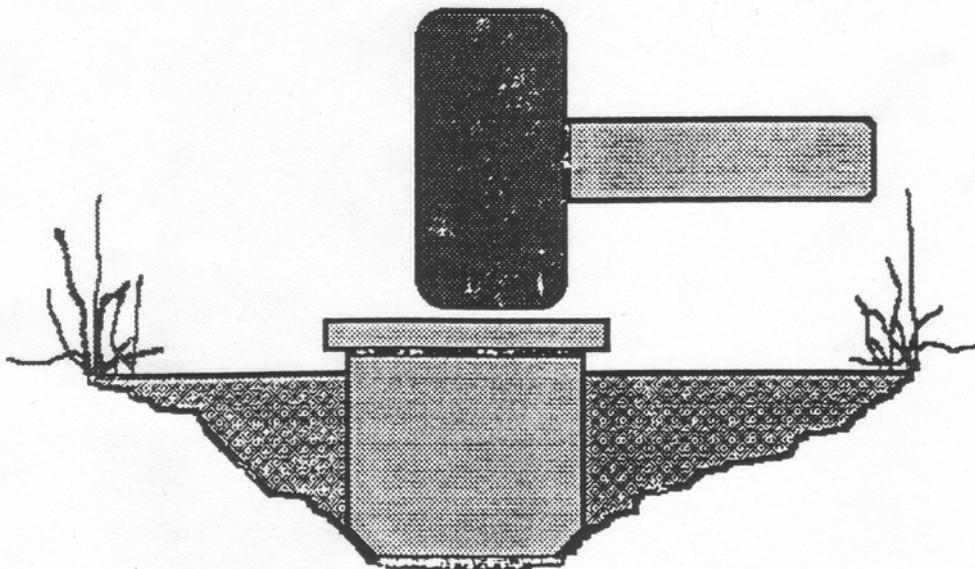


SOIL SAMPLING EQUIPMENT AND DIAGRAM, CONTINUED

Step 1. place ring on soil and start hammering

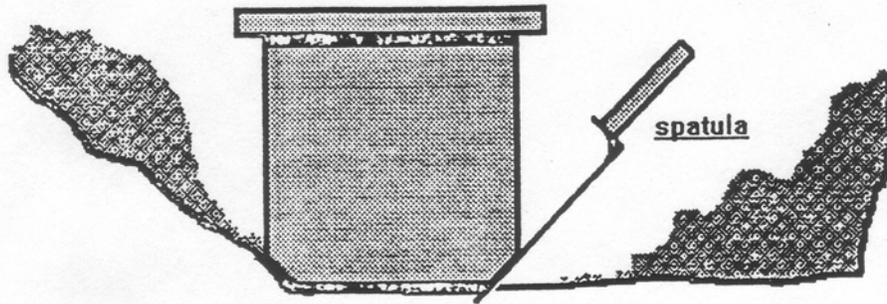


Step 2. hammer ring into soil

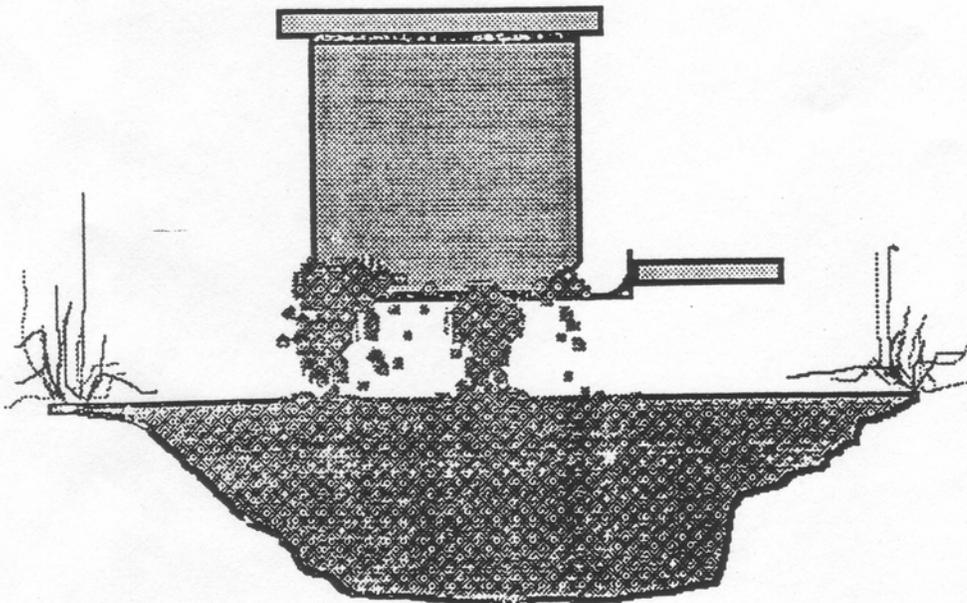


SOIL SAMPLING EQUIPMENT AND DIAGRAM, CONTINUED

Step 3. remove soil from surrounding of ring with spatula



Step 4. remove ring from soil with spatula and place soil into a sampling bag



DIRECTIONS TO SOIL AND VEGETATION SAMPLING SITES

<i>LOCATION</i>	<i>COORDINATES</i> <i>N Coord. E Coord.</i>		<i>DIRECTIONS</i>
Regional Stations			
Northeast of LANL (Borrego Mesa)			From Pojoaque, go north on 84/285 approximately 1/2 mile then 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 road.
Southeast of LANL (Rowe Mesa)			From Pojoaque, take 84/285 to Santa Fe; continue on St. Francis Dr. to the Las Vegas exit for I-25 and head east to Pecos. Take the Rowe turn off; turn right and follow road until it becomes a dirt road (FR 35). Continue to the top of Rowe Mesa and turn right on FR 326. Go .1 mile—sample site is on the north side of the road.
West of LANL (Youngsville)			Take SR 502 to the Española turnoff (SR 30), head north then take 84/285 north to the Abiquiu Dam exit (SR 96), take a left toward Youngsville to FR 100 then turn left and go 3 miles—sampling site is on the north side of the road.
South of LANL (Jemez)	1719495.437	1502276.101	Take West Jemez Rd./SR 501 south to SR 4; head west to St. Peters Dome exit then take FR 289 and go 7.5 miles—sampling point is on the north side of road.
Perimeter Stations			
Otowi	1777182.637	1668721.670	Take SR 502 east to the Otowi Bridge, park .1 mile before bridge and, walk .5 mile due west—sampling site in open area next to LA Canyon wash.
TA-8 (GT Site)	1768805.627	1609433.446	From Diamond Dr., turn right on West Jemez Rd. and go 2.7 miles—sampling site is on the west side of road.
Near TA-49 (BNP)	1755456.289	1620318.345	Take West Jemez Rd. to SR 4 and go east toward TA-49. Go .1 mile past the TA-49 turnoff—sampling site is on the south side of road.
East Airport	1774799.482	1637043.212	Traveling east on Trinity Dr., go 2.4 miles past the DP Road turnoff—sampling site is on the north side of the road, 25 yd due north.
West Airport	1775792.773	1631874.119	Traveling east on Trinity Dr., go 1.4 miles past the DP Road turnoff—sampling site is on the south side of road across the fence line.
North Mesa	1780072.446	1630330.015	Travel east on Diamond past the Golf Course and continue east on No. Mesa Road; go .7 miles—sampling site is on south side of road.

LOCATION	COORDINATES N Coord. E Coord.		DIRECTIONS
Sportsman's Club	1788136.211	1636493.387	Travel east on Diamond past the Golf Course take a left on San Ildefonso and go .7 mile into Rendija Canyon—sampling site is on the north side of road.
Tsankawi/PM-1	1768110.302	1647985.099	From SR 4, take turnoff just east of SR 4/East Jemez Rd. intersection (truck route) on the same side of the road (north). Drive up to MP-1 water pumping station—sampling site is across fence line on the north side rim.
White Rock (east)	1758301.447	1655116.466	On SR 4, .4 mile east of White Rock, the sampling site is on the east side of road across the fence line.
San Ildefonso			Before leaving, call San Ildefonso Tribal Office (455-2273) prior to sampling—must be escorted by 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 escort, follow the road for 6.5 miles to the sampling site.
On-site Stations			
TA-16 (S-Site)	1759328.803	1618868.688	Go thru the TA-16 guard station and check in at Bldg. 410, turn right on Anchor Ranch Rd. to K-Site Rd., turn right to TA-11, turn left at TA-11, go .2 miles—sampling site is on west side of road 50 yd due west.
TA-21 (DP-Site)	1774989.218	1631266.389	Before leaving, make sure key FM-80-3 is available (Louis Naranjo has key, 5-0831 [office] or 7-3948 [lab]; or Dennis Rupp [7-4435]) On DP Rd., from TA-21 entrance (old guard station) go .3 miles east to gate, use FM-80-3 key to open the gate and go east for .1 mile to sampling site—site is on the north side of the road.
Near TA-33	1740806.015	1638487.987	At West Jemez Rd./SR 4 intersection, go east on SR 4 towards TA-33. Sampling site is on the north site of the road .2 miles before the TA-33 turnoff.
TA-50	1769548.575	1626390.047	From Diamond Dr., turn east on Enwetok Dr., follow road until it turns to a dirt road then go 1.3 miles—sampling site is on the south of the road 70 yd due south.
TA-51	1762889.272	1635769.143	Go to TA-50, .1 mile past the entrance by utility pole 1253—sampling site is on the north side of the road, 40 yd due north.
West of TA-53	1772914.010	1629196.631	Go to TA-53, take La Mesita and go .6 miles—sampling site is on the south side of the road, 50 yd 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 north side and follow road to MET tower sampling site—sample in that area.

LOCATION	COORDINATES <i>N Coord. E Coord.</i>		DIRECTIONS
East of TA-54	1757882.733	1645162.755	Before sampling, check in with main office at TA-54 to acquire a key for the gate. The gate is located .9 miles northeast (on Pajarito Road) from the intersection of SR 4 and Pajarito Road. Open gate and go .1 mile—sampling site is on the east side of road across the small wash, on the east side of the wash.
Potrillo Drive/TA-36	1759475.770	1635153.829	From Pajarito Dr. at TA-18, turn left on Potrillo Dr., go .9 miles—sampling site is on the north side of the road.
Near Test Well DT-9	1752337.978	1629594.961	Check in with EM&R located off West Jemez Rd. at the entrance to TA-15 and get key for gate for TA-49. Continue traveling south on SR 501, turn left on Frijoles Mesa road and proceed until you come to stop sign, turn right and go past the training center for 1.4 miles then turn right on dirt road and drive 1 mile 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	1761923.229	1625863.108	From West Jemez Rd., go through the entrance to TA-15 and through the security gate, take Anchor Ranch Rd. to R-site Road to TA-15, check in with the secretary at the main office at Bldg. 484 then drive back .5 mile—sampling site is on the south side of the road.
Two-Mile Mesa	1769494.453	1615386.422	From West Jemez Rd., go through entrance to TA-15 and through the security gate, take Anchor Ranch to TA-22 and check in with the secretary at the main office, take road on the south of main the main office building, go to Two-Mile Rd, take a right, and drive to MET tower by TA-40. Sampling site is on the east side of the road past the gate, near the MET tower.