5. HEALTH AND SAFETY REQUIREMENTS

A health and safety plan is not required for this project. Instead, per the requirements of INEEL MCP-3562, a hazard screening checklist was completed for this characterization activity to identify all hazards associated with this project. Hazards identified on the checklist, along with corresponding mitigation requirements are documented on a JSA per MCP-3450, “Developing and Using JSAs.” In completing the JSA, technical input and approval is obtained by assigned ESH&QA personnel. The JSA identifies all potential hazards associated with this project.
6. REFERENCES


DOE-ID, 2001, Comprehensive Remedial Investigation Feasibility Study (RI/FS) for Waste Area Group 6 and WAG 10, Operable Unit 10-04, DOE/ID-10807, Rev. 0, August 2001.


DOE-ID, 2002b, Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites, DOE/ID-10587, Rev. 7, September 2002.


Appendix A

Sampling and Analysis Plan Tables
### Sampling and Analysis Plan Table for Chemical and Ecological Analysis

**DRAFT**

<table>
<thead>
<tr>
<th>Sample Activity</th>
<th>Sample Type</th>
<th>Sample Matrix</th>
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**Note:**
- The sampling activity listed in this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters), will appear on field guidance forms and sample labels.
- The following analytical results were obtained:
  - **AT1:** Analysis Suite A1
    - **AT11:** Gypsum Test
    - **AT12:** Inorganic Test
    - **AT13:** Radioactivity, Suite 1
    - **AT14:** Radon Test
    - **AT15:** FF Test
    - **AT16:** Total Metals (TML)
    - **AT17:** 
    - **AT18:** 
    - **AT19:** 
    - **AT20:** 
  - **AT3:** Analysis Suite A2
    - **AT31:** 
    - **AT32:** 
    - **AT33:** 
    - **AT34:** 
    - **AT35:** 
    - **AT36:** 
    - **AT37:** 
    - **AT38:** 
    - **AT39:** 
    - **AT40:** 
  - **AT4:** Analysis Suite A3
    - **AT41:** 
    - **AT42:** 
    - **AT43:** 
    - **AT44:** 
    - **AT45:** 
    - **AT46:** 
    - **AT47:** 
    - **AT48:** 
    - **AT49:** 
    - **AT50:** 

**Comment:**
- **Gypsum Test** by ASTM approved test E435-37
- FF Test by ASTM standard test D-556-24 Sensing Growth Test
- Gypsum Test by ASTM approved test E435-37
- Total Metals (TML) shall include copper, lead, zinc, cadmium, arsenic, barium, and mercury.
# Sampling and Analysis Plan Table for Chemical and Radionuclide Analyses

## DRAFT

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### Notes:
- The sampling activity displayed in this table represents the first six characters of the sample identification number. The complete sample identification number (16 characters) will appear on field guidance forms and sample labels.

#### Analysis Types:
- AT1: Aquatic Toxicity Test
- AT2: Nitrates (NO3)
- AT3: Radiocesium, Suite 1
- AT4: Alkalinity, Suite 1
- AT5: Total Metals (TMA)
- AT6: Trace Metals (TMA)
- AT7: Arsenic (As)
- AT8: Lead (Pb)
- AT9: Analysis of Fission Products
- AT10: Analysis of Fission Products

#### Comments:
- The TMA for gamma rays shall include standardized up to 1000 mCi.
- Lead (Pb) shall include arsenic, lanthanum, strontium, lead, mercury, and by.
- SNV/AM method (SN109.3).
### Sampling Plan Table

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</table>

**Analysis Suites:**

- **AT1:** Analyze suite 1
- **AT2:** Analyze suite 2
- **AT3:** Analyze suite 3
- **AT4:** Analyze suite 4
- **AT5:** Analyze suite 5
- **AT6:** Analyze suite 6
- **AT7:** Analyze suite 7
- **AT8:** Analyze suite 8
- **AT9:** Analyze suite 9
- **AT10:** Analyze suite 10

**Continences:**

- **AT11:** Analyze suite 11
- **AT12:** Analyze suite 12

**Comments:**

- For Human Trace Testing: ASTM standard E167-87
- First Gross Test: ASTM standard E186-94 Smoking Workers' Test
- The TLD gamma spectrometer is certified to ASTM E49
- Materials: TLD, 240-260 mg, 7.6 x 7.6 mm, 0.6 cm thick
- 2-amino-4-toluene, 4-amino-2,6-diiodobenzoic acid
- 100% accuracy of detection, minimum detection, maximum sample size 1 cm x 1 cm

**Analytical Methods:**

- **AT1:** Analyze suite 1
- **AT2:** Analyze suite 2
- **AT3:** Analyze suite 3
- **AT4:** Analyze suite 4
- **AT5:** Analyze suite 5
- **AT6:** Analyze suite 6
- **AT7:** Analyze suite 7
- **AT8:** Analyze suite 8
- **AT9:** Analyze suite 9
- **AT10:** Analyze suite 10

**Contact:**

- Sandia National Laboratories
- 8000 Sandia Road, MS 5020, Albuquerque, NM 87115
- Phone: 505-284-1000

**Project Manager:**

- HAMPTON, T. J., SANDIA NATIONAL LABORATORIES
- Project Contact: MCGUIRE, T. W.
| Sampling Activity | Sample Type | Sample Matrix | Cat Type | Cat Method | Planned Date | Area       | Type of Location | Location         | Depth (F) | AT1 | AT2 | AT3 | AT4 | AT5 | AT6 | AT7 | AT8 | AT9 | AT10 | AT11 | AT12 | AT13 | AT14 | AT15 | AT16 | AT17 | AT18 | AT19 | AT20 | AT21 | AT22 |
|-------------------|-------------|---------------|---------|-----------|-------------|------------|----------------|------------------|-----------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ECMB1             | REG         | SOIL         | DUF     | COMP      | 05/01/03    | INSEL      | SOIL           | REFERENCE AREA   | TBD       | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB2             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INSEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB3             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INHEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB4             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INHEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB5             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INHEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB6             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INNEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB7             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INCEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB8             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INCEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB9             | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INCEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ECMB10            | REG         | SOIL         | GRUB    | COMP      | 05/01/03    | INCEL      | SOIL           | REFERENCE AREA   | TBD       | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

The table above displays the sampling activity conducted as of the date shown. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

**Notes:**
- **AT1:** Analysis Task #1
- **AT2:** Analysis Task #2
- **AT3:** Analysis Task #3
- **AT4:** Analysis Task #4
- **AT5:** Analysis Task #5
- **AT6:** Analysis Task #6
- **AT7:** Analysis Task #7
- **AT8:** Analysis Task #8
- **AT9:** Analysis Task #9
- **AT10:** Analysis Task #10
- **AT11:** Analysis Task #11
- **AT12:** Analysis Task #12
- **AT13:** Analysis Task #13
- **AT14:** Analysis Task #14
- **AT15:** Analysis Task #15
- **AT16:** Analysis Task #16
- **AT17:** Analysis Task #17
- **AT18:** Analysis Task #18
- **AT19:** Analysis Task #19
- **AT20:** Analysis Task #20
- **AT21:** Analysis Task #21
- **AT22:** Analysis Task #22

**Analysis Sources:**
- Aquatic Life: Field, Laboratory, Monitoring Program
- Ambient: Field, Laboratory, Monitoring Program

**Corrections:**
- Water Quality: Field, Laboratory, Monitoring Program
- Wet Chemistry: Field, Laboratory, Monitoring Program
- Sediment: Field, Laboratory, Monitoring Program
- Geographic: Field, Laboratory, Monitoring Program

**Environmental:** Field, Laboratory, Monitoring Program

**Quality Assurance/Quality Control:** Field, Laboratory, Monitoring Program
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The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guide forms and sample labels.

Analysis Suites:
- Analysis Suite A: "Monitoring Dunes, Hydrological units, Colloidal Exchange Capacity"
- Analysis Suite B: "Soil and Groundwater, Arsenic, Cadmium"
### Sampling and Analysis Plan Table for Chemical and Physical Analysis

**DRAFT**

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<th>Sample ID</th>
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</table>

The sampling activity displayed on this table represents the first six characters of the sample identification number (eight characters will appear on field guidance forms and sample labels). The complete sample identification number (eight characters) will appear on field guidance forms and sample labels.

**Compliance:**
- Field Quality Control (FQC) by ASTM standard D1402-85

**Analysis:**
- Organic Carbon (OC)
- Amine Compound (AM)
- Residual Nitrate (RN)
- Total Nitrate (TN)
- Total Metals (TAl)
- Total Metals (TAl)
- pH

**Analysis Site:**
- Analytical Methods: American Society for Testing and Materials (ASTM)
- Analytical Methods: American Public Health Association (APHA)

**Sample Transport:**
- Sample Transport: All samples shall be transported in airtight, refrigerated containers.

**Sample Preservation:**
- Sample Preservation: Samples shall be preserved with 0.5% nitric acid.

**Sample Storage:**
- Sample Storage: Samples shall be stored at 4°C until analysis.

**Sample Analysis:**
- Sample Analysis: Samples shall be analyzed within 48 hours of collection.
### Sampling and Analysis Plan Table for Chemical and Toxicological Analysis

#### Plan Table Number: I 50 C9M 3000

**SAP Number**

**Date:** 01/29/2013  
**Project:** LONG-TERM ECOLOGICAL MONITORING FY-00

**Project Manager:** HANLEY, T. LAVANDOR, R. L.

**SMO Contact:** MCGRATH, T. W.

### Table of Sampling and Analysis

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Sample Location</th>
<th>Sample Location Details</th>
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#### Details

- **Sample Description**
  - **Sampling Activity:**
  - **Sample Type:** REG
  - **Sample Matrix:** SOIL
  - **Chemical Type:** GRAB
  - **Chemical Type:** COMP

- **Sampling Dates:**
  - **Method:** INNELL
  - **Location:** SURFACE SOIL
  - **TIE:** TRA
  - **Depth (m):** 1

- **AT1** & **AT2**
  - **AT1:** 1
  - **AT2:** 1

- **Comment:**
  - **Note:** The complete sample identification number (12 characters) will appear on field collection forms and sample labels.

#### Analysis Details

- **Analysis Type (AT) and Quantity Prepared**
  - **AT1:** 1
  - **AT2:** 1

#### Analysis Details (continued)

- **Comment:**
  - **Note:** The TAL for gamma spec will include standard at plus X 46.
  - **Comment:** The full analysis includes: TIE, ROX, HAT, 24-equivalents, 25-equivalents, 2-analyte, 4-analyte, 74-equivalents.

#### Analysis Details (continued)

- **Total Metals (TML):**
  - **Comment:** The full analysis includes: TIE, ROX, HAT, 24-equivalents, 25-equivalents, 2-analyte, 4-analyte, 74-equivalents.

---

**Analysis Code:**

- **A-10**
  - **Comment:**
    - **Note:** The full analysis includes: TIE, ROX, HAT, 24-equivalents, 25-equivalents, 2-analyte, 4-analyte, 74-equivalents.
## Sampling and Analysis Plan Table for Geochemical and Radiological Analysis

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### Enter Analytes Types (AT) and Quantity Requested

| AT1 | AT2 | AT3 | AT4 | AT5 | AT6 | AT7 | AT8 | AT9 | AT10 | AT11 | AT12 | AT13 | AT14 | AT15 | AT16 | AT17 | AT18 | AT19 | AT20 | AT21 | AT22 | AT23 | AT24 | AT25 | AT26 | AT27 | AT28 | AT29 | AT30 | AT31 | AT32 | AT33 | AT34 | AT35 | AT36 | AT37 | AT38 | AT39 | AT40 | AT41 | AT42 | AT43 | AT44 | AT45 | AT46 | AT47 | AT48 | AT49 | AT50 | AT51 | AT52 | AT53 | AT54 | AT55 | AT56 | AT57 | AT58 | AT59 | AT60 | AT61 | AT62 | AT63 | AT64 | AT65 | AT66 | AT67 | AT68 | AT69 | AT70 | AT71 | AT72 | AT73 | AT74 | AT75 | AT76 | AT77 | AT78 | AT79 | AT80 | AT81 | AT82 | AT83 | AT84 | AT85 | AT86 | AT87 | AT88 | AT89 | AT90 | AT91 | AT92 | AT93 | AT94 | AT95 | AT96 | AT97 | AT98 | AT99 | AT100| AT101|

### Notes

- **SAP Number:** LTG (CM 2003)
- **Plan Table Revision:** 0.3
- **Project:** LONG-TERM ECOCLOGICAL MONITORING FY-03
- **Project Manager:** HENRY, T. J. & Gowan, D. L.
- **SIO Coordinator:** DOUGLAS, T. W.
## Sampling and Analysis Plan Table for Chemical and Radiological Analysis

**Plan Table Number:** LTF5-ECM 0500  
**SAP Number:**  
**Date:** 1/07/2002  
**Project:** LONG-TERM ECOLGICAL MONIT0RING FY 03  
**Project Manager:** RANDY T. J. HAMM, R. L.  
**SMC Contact:** MOORE, T. W.

### Table of Contents
- Sampling Activities
- Sample Descriptions
- Sample Location
- Enter Analyte Types (ATs) and Quantity Requested

### Sampling Activities

<table>
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<th>Sampling Activity</th>
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### Sample Descriptions

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### Sample Location

| Sample Location | AT1 | AT2 | AT3 | AT4 | AT5 | AT6 | AT7 | AT8 | AT9 | AT10 | AT11 | AT12 | AT13 | AT14 | AT15 | AT16 | AT17 | AT18 | AT19 | AT20 | AT21 | AT22 | AT23 | AT24 | AT25 | AT26 | AT27 | AT28 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| TRA | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

### Comments
- The sampling activity displayed on this table represents the first two characters of the sample identification number.
- The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

**Analysis Suite**

- Alkalinity
- pH
- Total Hardness (TH)
- Total Dissolved Solids (TDS)
- Total KCl
- Total Na
- Total Calcium
- Total Magnesium
- Total Potassium
- Total Iron
- Total Copper
- Total Zinc
- Total Lead
- Total Mercury
- Total Arsenic
- Total Selenium
- Total Antimony
- Total Manganese

**Radiochemistry**

- Alpha
- Beta
- Gamma
- Neutron
- Muon
- X-ray
- Gamma

**Concentrations**

- ppm
- mg/L
- g/L
- µg/L
- mg/kg
- µg/kg

**Note:** The TEL for gamma spec will include standard test play #40.

- The ALPHA test will be performed by the Gamma Spectrometer using the standard test play #40.
- The TEL for gamma spec will include standard test play #40.

**Additional Notes:**

- Total Metals (TMs) shall include any element that contributes to the overall toxicity of the sample.
- The analysis for Total Metals (TMs) shall be performed using the SW 846 method (6060C).
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The sampling activity displayed on this table represents The full text of the table is not provided. Please refer to the original document for complete details.
### Sampling and Analysis Plan Table for Chemical and Radiological Analysis

**Plan Table Number:** LTE ECM 2033  
**Date:** 01/06/203  
**Project:** LONG-TERM ECOLOGICAL MONITORING FY-93  
**Project Manager:** HANCOX, T.J.; VAHORN, P.L.  
**Page 12 of 14**

**DRAFT**

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The sampling activity described on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) appears on final guidance form and sample request.

**Comments:**

- Eartworm Toxicity Test: ASTM standard E1360
- Toxic Growth Test: ASTM standard E1361

**Data Sets:**

- Analysis Set 1:  
  - E131: Semivolatile Hydrocarbons
  - E132: Non-Hydrocarbon Non-Volatiles
  - E133: Radiological
  - E134: Radiological
  - E135: Radiological
  - E136: Radiological

- Analysis Set 2:  
  - E137: Total Metals (TAL)
  - E138: Total Metals (TAL)

- Analysis Set 3:  
  - E139: Total Metals (TAL)
  - E140: Total Metals (TAL)

- Analysis Set 4:  
  - E141: Total Metals (TAL)
  - E142: Total Metals (TAL)

- Analysis Set 5:  
  - E143: Total Metals (TAL)
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- Analysis Set 6:  
  - E145: Total Metals (TAL)
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- Analysis Set 7:  
  - E147: Total Metals (TAL)
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</table>

**Legend:**
- **Sample:** Sample name and location.
- **Type:** Type of sample (e.g., core, split).
- **Phase:** Phase of excavation.
- **Size:** Size of the sample.
- **Stratigraphy:** Stratigraphic context.
- **Descriptive Notes:** Additional notes on the sample.
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<th>Sampling Activity</th>
<th>Sample Type</th>
<th>Sample Area</th>
<th>Soil Type</th>
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The sampling activity displayed on the table represents the first six characters of the example identification number. The complete sample identification number (10 digits) will appear on field guidance forms and sample labels.

**Analysis Source:**
- Analysis Type: A1
- Analysis Title: Sampling Plan
- Method: Method 3050D - Analytical Methods for Sediments
- Reference: Method D4262 - Sampling Plan

**Sampling Plan:**
- Sampling Activity: planned
- Sample Type: soil
- Sample Area: soil
- Soil Type: soil
- Sampling Method: soil
- Planned Date: 09/20/10
- Area: soil
- Type of Location: soil
- Location: ORDINANCE AREA
- Depth (ft): 110

**Analytical Methods:**
- Method D4262 - Sampling Plan
Appendix B

Sample Collection Procedures
Appendix B

Sample Collection Procedures

B1. OVERVIEW

Sampling for LTEM occurs as presented in the LTEM Plan (DOE-ID 2002b). Efforts are directed at sampling to determine levels of contamination in the selected media and to detect possible effects. Levels of contamination in soil, deer mice, and plants are determined to validate the OU 10-04 ERA assumption of no migration of contamination off the AOCs and to establish a baseline. Effects data are evaluated for soil fauna, plants, mammals, and avian receptors at the AOCs. This appendix presents the sampling procedures used to collect analytical and effects samples at each AOC.

1. Perform field plot selection for each of the three areas by randomly selecting ten plots in the site location grids (i.e., TRA, Ordnance Area #1, and reference area) designated for FY 2003 sampling.

2. Prepare the plots by staking the corners and center, and distributing mammal traps in 3 m (10 ft) intervals on the 100 x 100 m (110 x 110 yd) plot as shown in Figure B-1 and discussed in TPR-145.

3. Obtain necessary paperwork, including safe work permits, scientific/trapping collection permits, and radiological work permits.

4. Obtain all sampling equipment, forms, labels, etc. as required.

5. Perform sampling in the spring and early summer of 2003:

   a. During the first week:

      (1) Perform soil sampling for plant and earthworm bioassays, analytical concentrations, and soil fauna community structure determination with the Berlese Funnel extraction procedure (the sampling procedure is presented in TPR-145).

      (2) Perform plant tissue collection for analysis.
b. During the second week:

(1) Perform sampling of small mammal community structure, presence/absence, diversity/richness, and density/biomass sampling using the trap and release methodology (the sampling procedure is presented in Section B3.1.3)

(2) Perform plant community structure, presence/absence, diversity/richness, and density/biomass sampling (the sampling procedure is presented in Section B3.1.1)

(3) Perform bird community structure, presence/absence, diversity/richness, and density/biomass sampling (the sampling procedure is presented in Section B3.1.2).

c. During the third week:

(1) Perform deer mouse tissue sampling to obtain effects and analytical data

(2) Harvest small mammals for analytical concentration determination (the sampling procedure is presented in TPR-145)

(3) Harvest small mammal samples for organ to body weight measurements, histopathology, and genetic samples (the sampling procedure is presented in Section B3.4).

6. Perform decontamination of sampling equipment, task site, and personnel, as necessary

7. Prepare samples for storage and shipment to the appropriate facilities:

a. Genetic samples will be delivered to the geneticist

b. Histopathology specimens will be shipped to the laboratory

c. Preserved invertebrates will be sent to the laboratory

d. Bioassay soils will be shipped to the laboratory for plant and earthworm toxicity bioassays

e. Soil samples will be shipped to the laboratory for chemical and radiological analysis

f. Plant and small mammal samples will be frozen and shipped to the laboratory for chemical and radiological analysis.

B2. ANALYTICAL SAMPLING PROCEDURES

B2.1 Biota Analytical Samples

Samples of vegetation, mammals, and soil will be collected for analysis of contaminant concentration.
B2.1.1 Vegetation Sampling Procedure for Analytical Sampling

Two types of vegetation, shrubs and grasses, representing the two most common functional plant types at the INEEL will be collected for chemical analysis. A review of dietary information for herbivorous and omnivorous INEEL wildlife species has resulted in consideration of the following individual plant species and/or types:

- Wyoming big sagebrush (*Artemisia tridentata*)
- Crested wheatgrass (*Agropyron cristatum*)

Sagebrush represents the shrub most commonly utilized by the INEEL’s primary consumers, including the pronghorn, sage grouse, black-tailed jackrabbit, Nuttall’s cottontail, and the pygmy rabbit. In addition, sagebrush is an important component in the diets of avian and mammalian omnivores and herbivorous insects. Wheatgrasses are most widely used and are significant components in the diets of jackrabbits, cottontails, birds, and small mammals. If crested wheatgrass is not available or the amount is not sufficient, other wheatgrasses will be substituted.

Terrestrial vegetation samples will be collected during the early part of the growing season in conjunction with small mammal population analysis and tissue collection. Grass and sagebrush will be sampled in late May or June.

A field reconnaissance will be used to assess species presence and abundance within each randomly selected 100 x 100 m (110 x 110 yd) grid. If wheatgrass or sagebrush is unavailable, the nearest grid that contains a sufficient amount of these species will be evaluated. A field reconnaissance of potential reference areas will also be completed to match the reference area with the site areas to the greatest extent possible. Potential reference sampling areas with soil types similar to those onsite that have not been recently burned were identified in Figure 1-3. Final selection of the reference area and sampling grid cells will be based on the presence of suitable species and access.

Each vegetation tissue sample will be a composite of material from at least five individual plants of the same species. Individual plants should be randomly selected within a 20-m (22-yd) radial plot in each corner and center of the 100 x 100 m (110 x 110 yd) grid. Such plants should also located at least 1 to 3 m (1.1 to 3.3 yd) apart, depending on size. Atypical individuals (i.e., resembles less than 5% of the plants for the area) based on size or herbivory should not be included. An approximately equal amount of vegetation should be collected from each individual plant.

Clean disposable gloves should be worn. Plant samples should be clipped with pruning shears or grass shears, as appropriate. Plant material from each of the five radial plots should be combined into one plastic bag to make a composite sample. Sagebrush should be clipped on at least two sides and at two different heights to obtain a representative sample.

A minimum of 60 g of fresh biomass is required for radiological and metal analysis. If munitions analyses are required, an additional 30 g per analyte group is needed. Sample weight should be verified in the field to ensure an adequate quantity has been collected. Plant samples should be placed into a sealable plastic bag that has been placed into another sealable plastic bag. Sharp points on woody vegetation should be bent or broken off within the bag to avoid bag puncture. Bags should be labeled and the field data should be recorded in notebooks or on field data sheets. Samples should be placed in a cooler on ice until it is frozen or shipped to the laboratory. Field data will be recorded.
Grass samples should be collected by clipping above ground level (e.g., 1.3 to 5.1 cm [0.5 to 2 in.]) with grass shears. Clipping should be adjusted, as needed, to minimize sampling dead vegetation from previous years and to maximize sampling green vegetation from the current growing season. All material above the cutting height will be collected. Dead material should be removed from the sample by hand if unavoidably collected. Grass samples will include new growth of leaves, stems, and any inflorescences present on the plants. It is desirable to remove as much dead material as possible; however, this may be impractical and an estimate of the percentage of dead material should be noted.

Shrub samples should be collected using pruning shears. Collected material will include leaf and stem growth from the current season. Shrubs should be clipped at a height between 0.5 to 1.5 m (0.55 to 1.6 yd) on at least two sides. It is common to also collect woody material during this process. Stripping fresh leaves and stems from the woody material may be necessary. In the event that woody material is not removed, the sampler should make an estimate of the remaining amount.

Macrophytic aquatic plants should be collected along the margins of the wastewater ponds and the Big Lost River Sinks. One composite sample will be collected at each aquatic sample location. The aboveground portion of each plant should be cut and placed in a labeled heavy-duty plastic bag, then placed in a cooler with ice for transport to the analytical laboratory.

Modifications to these procedures can be made in the field as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets. Soil samples collocated with the plant tissue samples (i.e., from within the center of each 20-m [22-yd] radial plot in each corner and within the center of the 100 × 100 m [110 × 110 yd] grid) will also be collected.

B2.1.2 Mammal Sampling Procedure for Analytical Sampling

One small mammal species, the deer mouse (Peromyscus maniculatus), representing the major links between primary and secondary consumers and higher predators, will be collected for tissue analyses. The deer mouse is a primary prey item for both secondary and tertiary consumers. This species is commonly used to represent several important linkages in the food chain and is the primary choice because it is omnivorous, widespread, and relatively easy to collect.

Collection of animal samples will be in accordance with applicable sections of TPR-145 and in accordance to the following information discussed. Deer mice will be collected for tissue analysis. It will be necessary to collect several deer mice for each analysis to obtain the 60 g of tissue required. Deer mice will be composited to obtain the required tissue amounts. Compositing will not include segregation of small mammals by sex or age, but will be limited to the single species. Small mammal species, other than deer mice, will be weighed, photographed, and have other life history or details recorded in the field logbook and released.

The deer mouse samples will not be washed before homogenization. The intent of this sample preparation is to evaluate what a predator is most likely to consume. By incorporating all unwashed biotic tissue, all available contaminants in each sample will be assessed; however, not all of the analytes are necessarily bioavailable.

The same trapping design (see Section B3.1.3) used to evaluate small mammal population/community data will be used to collect deer mouse tissue samples for analytical assessment. Ten trapping locations or sample plots will be used in the two AOCs (Ordnance Area Group #1 [including the Experimental Field Station, Fire Station II Range Fire Burn Area, and NOAA Grid] and TRA) and the reference area. A 100 × 100 m (110 × 110 yd) grid was placed over each of these areas, and plots were
randomly chosen at each location. Figures 3-1 through 3-3 show the location of all ten sample plots at
each of the three areas. Each sample plot will require a two-week to three-week trapping period and will
consist of one hundred traps placed along ten parallel transect lines (ten traps on each). Each of the
transects will follow a roughly straight line 100 m long. An example of the transect design is shown in
Figure B-1.

Traps will be left open four nights, closed three nights, and then reopened an additional four nights.
Once an animal is trapped, a unique numbered ear tag is attached. The ear tag correlates with the trap
location, genus, species, collector's initials, and date recorded in a field logbook. The animal should be
emptied into a plastic bag. It should be sexed, aged (adult/juvenile), weighed, and identified to its species
if possible. A ruler should be used to measure the head-body length, ear from skull to tip, tail, and right
hind foot to the nearest millimeter. The animal should then be returned for release to the location it was
trapped. All information should be recorded on the data sheet.

Tissues will be collected for chemical and radiological analysis, genetics, and histopathology. On
the last day of the population surveys, at least three deer mice in each grid will be retained as a single
composite sample. Animals to be sacrificed for contaminant analysis will be dispatched in the field by
asphyxiation with carbon dioxide. After dispatch, each carcass will be weighed and placed within another
clean plastic bag. The amount of sample material in the composite sample will be determined by
summing the weights of the individual specimens from each location. Processing should take place as
soon as possible after checking traps to reduce potential degradation of the specimen. Samples will be
placed on ice for transport to the processing center.

Portions of each animal’s liver and kidney will be collected for histopathology. A ventral incision
will be made with a clean scalpel blade. Small sections of the liver and kidney will be removed, weighed
to the nearest 0.01 g, and placed in a 10% buffered Formalin. This solution is potentially carcinogenic and
should be handled with caution that is detailed on the respective material safety data sheets (MSDS). The
jar will be labeled with appropriate sample information (i.e., time, date, and sample identification
number). Small sections of maternal and fetal tissue will be removed from female mice. The carcasses
will be placed in a sealable plastic bag and placed inside another bag with the sample labeled. COC forms
will be filled out.

Tissue samples for residue analysis should be frozen and shipped on blue ice to the laboratory. Dry
ice can cause serious skin burns if handled incorrectly. Gloves should be worn when handling dry ice.

A single voucher specimen will be photographed, but will not be analyzed for contaminants. An
experienced wildlife biologist will examine the voucher specimen to verify genus and species.

B2.2 Soil Analytical Characterization

Soil samples will be collected from the surface 0 to 5 cm (0 to 2 in.) and subsurface 5 to 61 cm
(2 to 24 in.) or bedrock (i.e., limited to two sampling intervals), and will consist of composites from
locations within the sampling plot designs that correspond to plants from which vegetation samples are
collected.

Before sampling, it is important to calculate the total volume of sample material that each
increment sample location will collect to ensure that the volume required for each analysis is available, to
completely fill each sample container. The analysis-specific volumes are specified in Table 4-4. Sampling
locations specified in the Figures 1-3 and 3-1 through 3-3 will be identified and marked using surveying
stakes, lath, or flags. The soil will be evaluated for contamination concentrations.
B2.2.1 Surface Soil Material

Composite surface material samples will be comprised of five increment subsamples collected from each of the corners and center point of a 100-m (110-yd) square. All or a portion of the increment samples are mixed together to create a composite sample representative of average constituent concentrations within the area to be characterized. For a given composite sample, the volume of each increment sample must be the same, and must equal 1/n of the required composite sample volume, where n equals the number of increment samples making up the composite sample.

Surface material samples are collected as follows:

1. At each subsample location, an area approximately 61 cm (24 in.) in diameter is cleared of surface vegetation, nondecomposed plant litter, and debris.

2. A decontaminated stainless steel spoon or hand auger is used to collect surface material to a depth of five centimeters. A stainless steel pick may be used as needed to loosen the soil. To the extent possible, gravel-size or larger particles and debris are eliminated, based on visual observation.

3. The material is described visually and observations are recorded on the soil sample field data sheet.

4. The increment sample is sieved through a No. 10 mesh and the fine fraction placed into a decontaminated stainless steel mixing bowl; then thoroughly mixed.

5. For composite samples, Steps 1 through 4 are repeated at each increment sample location that composite sample adding each successive increment sample to the mixing bowl.

6. The sample material is thoroughly mixed in the stainless steel bowl using a decontaminated stainless steel spoon. To homogenize, the sample is divided into four quarters and mixed, then the four quarters are combined and the entire sample mixed. The mixture is placed into the appropriate laboratory-supplied sample containers.

7. The containers are labeled and handled as required. Soil subsample location descriptions and collection information will be documented in the logbook per MCP-1194.

B2.2.2 Subsurface Soil Material

Subsurface material samples are collected as composite samples. Before sampling, it is important to calculate the total volume of collected sample material at each increment sample location to ensure the volume required for each analysis is available to completely fill each sample container. The analysis-specific volumes are specified in Table 4-4. Specified sampling locations will be identified and marked using surveying stakes, lath, or flags.

Composite surface material samples will be comprised of five increment subsamples collected from each of the corners and center point of a 100-m (110-yd) square. All, or a portion of, the increment samples are mixed together to create a composite sample representative of average constituent concentrations within the area to be characterized. For a given composite sample, the volume of each increment sample must be the same, and must equal 1/n of the required composite sample volume, where n equals the number of increment samples making up the composite sample.
Subsurface material samples are collected as follows:

1. At each sample location, an area approximately 61 cm (24 in.) in diameter is cleared of surface vegetation (nondecomposed plant litter) and debris.

2. A decontaminated stainless steel spoon or hand auger is used to collect subsurface material from a depth of 5 to 61 cm (5 to 24 in.) below ground surface (decontaminated per TPR-6575). A stainless steel pick may be used as needed to loosen the soil. To the extent possible, gravel-size or larger particles and debris are eliminated based on visual observation.

3. The material is visually described and observations recorded on the soil sample field data sheet.

4. The increment sample is sieved through a No. 10 mesh and the fine fraction placed into a decontaminated stainless steel mixing bowl; then thoroughly mixed.

5. For composite samples, Steps 1 through 4 are repeated at each increment sample location for that composite sample, adding each successive increment sample to the mixing bowl.

6. The sample material is thoroughly mixed in the stainless steel bowl using a decontaminated stainless steel spoon. To homogenize, the sample is divided into four quarters and each quarter is mixed, then the four quarters are combined and the entire sample is mixed. The mixture is placed into the appropriate laboratory-supplied sample containers.

7. The containers are labeled and handled as required. Soil subsample location descriptions and collection information will be documented in the logbook per MCP-1194.

The center of the sample grid location will be surveyed using a GPS unit.

**B2.3 Soil Nutrient and Physical Characterization**

Soil samples for soil nutrient and physical characterization will be collected at the same time and same locations as soil samples for contaminant analysis. Each composite sample will be collected as follows:

- Soil sampling sites will be collocated with chemical and radiological soil samples.

- Following collection of the chemical analysis samples (described above), appropriate amounts of homogenized soil will be placed into the shipping containers for analysis. Approximately 500 g will be placed into a sealable plastic bag for soil nutrient and physical characterization.

- The containers will be labeled and handled as specified by the FSP.

 Modifications to these procedures may be made in the field, as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.
B3. EFFECTS SAMPLING

B3.1 Population/Community Data

Ecological systems such as populations or communities are usually quite large and complex. These systems must be described and quantified to compare them with one another or assess changes in them. Several ecological variables can be measured, such as density, frequency, coverage, and biomass, to describe populations and communities. These measurements are used to characterize aspects of populations and communities such as presence/absence, population density, population distribution, species diversity, and productivity (biomass).

B3.1.1 Vegetation

A number of sampling technique designs are available for sampling plant populations and communities such as a census, quadrant, transects, and line-intercept. The two types of vegetation surveys that will be used to characterize the plant populations during the 2003 sampling events at Ordnance Group #1, TRA, and the reference area are the Daubenmire method and the line-intercept method. Both methods are suitable for estimating the cover for small shrubs, rhizomatous grasses, and bunchgrasses.

**B3.1.1.1 Daubenmire Method.** The Daubenmire method begins with the establishment of transect lines 30.5 m (100 ft) in length, randomly placed at each location. If possible, transects will be established at least 100 m (300 ft) from ecotones, roads, and other anthropogenic influences. GPS positions will be recorded and logged for the start and end points on each transect. Each transect line will have ten quadrat locations (or sample plots) spaced 3 m (10 ft) apart. A 1 x 3 m (1.1 x 3.3 yd) quadrat will be used to estimate percent ground cover. As the quadrat frame is placed along the tape at the specified intervals, the canopy coverage of each plant species is estimated. In addition the data is recorded by quadrat, by species, and by cover class. Canopy coverage estimates can be made for both perennial and annual plant species.

1. The quadrat frame is observed directly from above and the cover class for all individuals of a plant species in the quadrat is estimated as a unit. All other kinds of plants are ignored as each plant species is considered separately.

2. A line drawn about the leaf tips of the undisturbed canopies (ignoring inflorescence) is imagined and these polygonal images are projected onto the ground. This projection is considered "canopy coverage." The classes the canopy coverage of the species falls into can be determined (see Table B-1).

3. Canopies extending over the quadrat are estimated even if the plants are not rooted in the quadrat.

4. The data are collected during a period of maximum growth for key species.

5. For tiny annuals, it is helpful to estimate the number of individuals that would be required to fill 5% of the frame. A quick estimate of individuals in each frame will then provide an estimate as to whether the aggregate coverage falls in Class I or II, etc.

6. Overlapping canopy cover is included in the cover estimates by species; therefore, total cover may exceed 100%. Total cover may not reflect actual ground cover.
Table B-1. Plant cover classes.

<table>
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<th>Coverage Class</th>
<th>Range of Coverage (%)</th>
<th>Midpoint of Range (%)</th>
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<td>1</td>
<td>0 to 5</td>
<td>2.5</td>
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<td>26 to 50</td>
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</tr>
<tr>
<td>6</td>
<td>95 to 100</td>
<td>97.5</td>
</tr>
</tbody>
</table>

While using this method, it is important to keep track of the growth, form of each species so that comparisons of grass vs. forb vs. shrub can be made. Also, if it is present, an estimation of the cover of bare ground and rocks will provide additional characterization data. While conducting this survey, it is important to remember to record total cover for each quadrat because this may differ from the sum of the cover values for individual species (due to plant canopy overlap). The surveyor should have a cover category for each quadrat among all identifiable species, mosses (if any), bare ground, rocks, and total cover.

Once the surveys are complete, the species cover can be estimated by multiplying the number of times a class is recorded by the midpoint of that cover class, adding the results for each class, and calculating an average by dividing by the total number of quadrats sampled. Data are usually collected from many quadrats located along a transect, so that the transect is the sample unit. Therefore, data must be collected from several transects to determine the sample’s precision for statistical analysis of cover data.

This method recognizes the difficulty in accurately assigning an exact percent cover value to each quadrat, since even the ability of highly experienced workers are unlikely to visually estimate closer than about 5% cover. Assigning broad cover classes provides an equally accurate result as long as the data follows a normal distribution around the midpoint within each class. The narrower upper and lower classes of the Daubenmire scale protect against skewed data in extremely sparse or dense vegetation.

Ranking data into broad classes is also a relatively rapid procedure, since observers are not required to spend as much time contemplating quadrat cover to the nearest percent. In fact, rapid evaluation of each quadrat is the key to success with this approach, since a large sample is less sensitive to the occasional incorrect ranking.

**B3.1.1.2 Line-Intercept Method.** The second method, line-intercept, uses a measuring tape (or marked string) stretched between two stakes or points (a transect line). The tape is pulled taunt and is anchored at both ends. The intercept distance is recorded for each plant/species that intercepts the line. Shrub cover is determined by tallying the measurements at which the line passes over or under the edges of individual plants (USFWS 1981). Surveyors move along the line and project the plant canopies vertically to the tape. The surveyors also record the length of the line segment intercepted by the plant and the type of plant involved. The vertical projection extends from the ground to infinity. As a result, it should be ensured that shrub cover intercepting above and below the line is recorded. Generally, small gaps between shrub foliage/branches (user defined) are ignored and included in shrub intercept measurements.

If different plant species overlap, each is measured separately; however, cover projections are not doubled (this is done to document shrub species diversity). If desired, shrub intercept can be recorded within different height strata (i.e., low, medium, tall, etc.).
Cover is calculated by adding all intercept distances and expressing this total as a proportion of tape length. Each transect is regarded as one sample unit, so multiple transects must be measured to estimate sample variance and conduct statistical analyses of cover data. For example, 10 ft of cover/100 ft × (100) = 10% shrub cover (Figure B-2). Percent cover for the entire transect is determined by adding the percent cover of each 100 ft sample unit, then dividing the sum by the transect length (i.e., 120 ft of cover/1000 × [100] = 12% cover).

\[ C = \sum I \times \frac{1}{L} \]

\[ C = \text{Cover of Shrubs} \]
\[ \sum I = \text{Sum of Shrub Intercepts} \]

Figure B-2. Shrub cover intercept example.

The line-intercept method is easy to learn, simple to use, and provides an accurate estimate of cover. In fact, line-intercept sampling is often used as the standard comparison when testing other methods to determine cover. Its primary drawback is that sampling can be time consuming, particularly in dense vegetation or when intercept distances are difficult to define because of many gaps or irregular edges within the canopy. Therefore, the line-intercept technique is best suited for vegetation characterized by discrete plants, such as bunchgrasses or compact shrubs.

B3.1.2 Birds

The Breeding Bird Survey is a roadside survey of avifauna designed to monitor abundance and distribution of birds in the United States and southern Canada. Routes have been established and used at the INEEL (Belthoff and Ellsworth 1999). The methodology used in this FSP will be adapted to the sampling presented in Belthoff and Ellsworth (1999). Additional evaluation of bird population/community data will be incorporated as a selected study in an area of known contamination.

B3.1.3 Mammals

Small mammals will be evaluated by using live trapping methods. The ten sample plots established for biota and soil analytical sampling will be used to assess the small mammal population/community data in the two AOCs (Ordnance Area Group #1 [including the Experimental Field Station, Fire Station II
Range Fire Burn Area, and NOAA Grid] and TRA) and the reference area. Figures 1-3 and 3-1 through 3-3 show the location of all sample plots at all three areas. Each sample plot will require a two to three-week trapping period, and will consist of one hundred traps placed along ten transect lines (ten traps on each) in a line grid formation. Each of the transects will approximately follow a 100 m long straight line. An example of the transect design is shown in Figure B-1.

Traps will be left open four nights, closed three nights, and then reopened an additional four nights. There will be 800 nights of trapping within each 100 m sample plot during the 2003 trapping season. Statistical evaluation of the initial data may be used to alter this design.

Once an animal is trapped, a unique numbered ear tag is attached. The ear tag correlates with the trap location, genus, species, collector’s initials, and date recorded in a field logbook. The animal should be emptied into a plastic bag. It should be sexed, aged (adult/juvenile), weighed, and identified to its species if possible. A ruler should be used to measure the head-body length, ear from skull to tip, tail, and right hind foot to the nearest millimeter (mm). The animal should then be released to the original location from where it was trapped. All information should be recorded on the data sheet.

The mark-and-recapture method will be used in estimating population densities. This method involves several steps:

1. Trapping and marking some individuals of a population
2. Releasing the known number of marked individuals back into the population from which they were captured
3. Trapping some individuals of the population after the marked individuals have had a chance to redistribute themselves into the population
4. Estimating the total population size by a series of computations that are based on the ratio of marked to unmarked individuals in the recapture attempt.

Generally speaking, if the population is large, the marked individuals will become diluted within it and only a few would be expected to appear in the second sample. If assumptions about the sampling and animals’ distribution are correct, then the proportion of marked individuals in the second sample is the same as the entire population.

Like all estimation procedures, a number of assumptions must be met to validly use this method:

- The two samples taken from the population must be random samples (i.e., all individuals in the population have an equal and independent chance of being captured during the time of sampling).
- There is no change in the ratio of marked to unmarked animals, meaning that from initial capture to recapture there must be no significant addition of unmarked animals to the population through births or immigration.
- The population losses from mortality and emigration must remove the same proportion of marked and unmarked individuals.
- The marking of individuals does not affect their mortality.
- Individuals do not lose marks.
The Peterson-Lincoln Index, the simplest method for determining the population size, will be used. The total population may be estimated as follows:

- Assume the total estimated population size contains N individuals
- Sample M individuals from this population, mark these animals, and return them to the population
- Sample a second set of n individuals from the population; this sample contains recaptured animals (i.e., individuals captured and marked in the first sampling)
- Estimate the population size, N, by the equation:

\[ N = \frac{Mn}{R} \]  

(1)

Equation 1 may overestimate the population size (i.e., it is biased) when samples are relatively small. \( N_c \) is a nearly unbiased estimate of population size if the number of recaptured animals, \( R \), is at least eight. This bias can be reduced by computing:

\[ N_c = \frac{(M + 1)(n + 1) - 1}{R - 1} \]  

(2)

The approximate variance, \( s^2 \), of this estimate is:

\[ s^2 = \frac{(M - 1)(n + 1)(M - R)(n - R)}{(R + 1)^2(R + 2)} \]  

(3)

With the standard deviation, \( s \), 95% and 99% confidence limits on the population estimate are given by:

\[ N(\text{or } N_C) + 1.96(s)(95\% \text{ confidence limits}) \]  

(4)

and

\[ N(\text{or } N_C) + 2.58(s)(99\% \text{ confidence limits}) \]  

(5)

### B3.1.4 Reptiles

Collection of small mammals will provide an indication of possible exposure of reptiles to contamination in the soil. Population information will be collected for these receptors that is consistent with the direction in the OU 10-04 ROD. Collection will occur during future field seasons under the LTEM Plan and will use university experts in the design of the project.

### B3.2 Earthworm and Plant Bioassay Soil Samples

Bioassay soil samples will be collected at the same time and same locations as soil samples. Each composite sample will be collected as follows:

- Soil sampling sites will be collocated with chemical and radiological soil samples.
Following the collection of the chemical analysis samples (described above), appropriate amounts of homogenized soil will be placed into the shipping containers for the bioassays.

Containers will be labeled with the date, location, and other appropriate information and shipped on ice to the bioassay laboratory for processing.

Modifications to these procedures may be made in the field as appropriate based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

### B3.3 Soil Invertebrate Community Survey Soil Samples

Soil samples for soil on invertebrate community structure will be collected at the same time and same locations as soil samples for analysis. Each composite sample will be collected as follows:

1. Soil sampling sites will be collocated with the chemical and radiological soil samples.

2. Following collection of the samples for chemical analysis, appropriate amounts of homogenized soil will be placed into shipping containers for the Berlese Funnel extraction. Approximately 500 g of soil will be placed into a sealable plastic bag for Berlese Funnel extraction to conduct soil fauna community analysis.

3. Large invertebrates will be removed from the soil sample.

4. The soil sample is placed in a funnel under a 40-watt light bulb. The lamp above the soil creates a warm, dry, and well illuminated condition at the top of the funnel, encouraging cool-, shade-, and moisture-loving invertebrates to move down the funnel into a collecting bottle containing a preservative (i.e., 80% ethanol).

5. The Berlese Funnel technique gives a biased sample of soil fauna because it captures species that are mobile and do not desiccate easily. Therefore, the Burlese Funnel it may miss many insect larvae and other soft-bodied invertebrates.

6. The containers will be handled and labeled with the date, sample location, and other information as appropriate.

Modifications to these procedures may be made in the field as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

### B3.4 Histopathology and Body and Organ Weight

Small mammal tissues will be collected for chemical and radiological analysis, genetics, and histopathology. On the last day of small mammal population surveys (see Section B3.1.3), at least three deer mice in each sampling plot will be retained as a single composite sample. Deer mice will be taken to the laboratory and humanely killed. Immediately before processing, live animals should be killed by cervical dislocation or asphyxiation with carbon dioxide gas. Animals should be removed from traps one at a time, so that specimens are not misidentified. Processing should take place after trap checks as soon as possible to reduce potential degradation of the specimen. The deer mice will be weighed to the nearest 0.1 g.
A ventral incision will be made with a clean scalpel blade. Small sections of liver and kidney will be removed for histopathology and weighed to the nearest 0.01 g, then placed in 10% buffered Formalin. This solution is potentially carcinogenic and should be handled with caution as detailed on the MSDS. The jar will be labeled with appropriate sample information (time, date, sample identification number, and ear tag number).

Small sections of maternal and fetal tissue will be removed from female mice for genetics analysis. The three carcasses forming the single composite sample will be placed in a sealable plastic bag, placed inside another bag, and then labeled for contaminant analysis. COC forms will be filled out.

The removal of the kidney and liver may reduce apparent concentrations slightly. Estimate loss in concentration are as follows:

\[
\text{mg/kg WB} \times \frac{\text{kg WB}}{\text{kg WB}} + \text{mg/kg L} \times \frac{\text{kg L}}{\text{kg L}} + \text{mg/kg k} \times \frac{\text{kg k}}{\text{kg k}}
\]

\[
\text{mg/kg WB} = \text{concentration in whole body}
\]

\[
\text{mg/kg L} = \text{concentration in liver (estimated)}
\]

\[
\text{mg/kg k} = \text{concentration in kidney (estimated)}
\]

A bioaccumulation factor from the literature will be used to estimate the fraction lost to histopathology. Although the bioaccumulation factor introduces uncertainty into the assessment, the liver and kidney tend to concentrate metals and may exhibit cellular changes for evaluation of effects from exposure. If effects are determined to be present, a selected study will be performed to further characterize this problem or the sampling approach will be modified appropriately.

**B4. AQUATIC ECOSYSTEM CHARACTERIZATION**

Aquatic ecosystem sampling will be performed across the INEEL at AOCs during future sampling seasons as discussed in the LTEM Plan (INEEL 2003). This approach will allow optimization of sampling efforts and should reduce analysis costs.

**B4.1 Sediment and Surface Water Analytical Sampling**

Sediment and surface water samples will be obtained from the reference area and from the waste ponds at TRA and will be used to predict health effects and exposure in selected collocated species and swallows.