U.S. Department of Energy

Oakland Operations Office, Oakland, California

SAMPLING AND ANALYSIS PLAN FOR LIMITED REMOVAL ACTIVITIES AT THE DOMESTIC SEPTIC SYSTEMS ONE AND FIVE LEACHFIELD

at the

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH (LEHR)
UNIVERSITY OF CALIFORNIA AT DAVIS, CALIFORNIA

Prepared for:

United States Department of Energy
Oakland Operations Office
1301 Clay Street
Oakland, California 95612-5208

Prepared by:

Weiss Associates
5801 Christie Avenue, Suite 600
Emeryville, CA 94608-1827

August 17, 1999
Rev. 0

DOE Oakland Operations Contract DE-AC03-96SF20686

Weiss Associates
Environmental Science, Engineering and Management

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Approvals Page

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FIGURES

TABLE

ACRONYMS

bgs	below ground surface
DSS 1/5	Domestic Septic System Nos. One and Five
GEL	General Engineering Laboratories, Inc.
ID	Identification
LEHR	Laboratory for Energy-Related Health Research
mg/kg	milligrams per kilogram
pCi/g	picoCuries per gram
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
Ra-226	radium-226
SOP	Standard Operating Procedure
Sr-90	strontium-90
SVOC	semi-volatile organic compound
UC Davis	University of California at Davis
USCS	Unified Soil Classification System

1. INTRODUCTION

This sampling and analysis plan presents the approach and procedures for the investigation of subsurface soil in the Domestic Septic System Nos. One and Five (DSS 1/5) leachfield at the Laboratory for Energy-Related Health Research (LEHR), University of California at Davis (UC Davis) (Figure 1-1). This sampling and analysis plan includes descriptions and rationale for the planned investigation activities, detailed procedures for all fieldwork, quality assurance/quality control (QA/QC), and data management.

It is proposed that six subsurface structures, including the surface casing of five drywells and one distribution box, as well as the associated piping be removed from the DSS 1/5 leachfield (Figure 1-1). The excavation will be to a depth of six feet below ground surface (bgs) or the bottom of the deepest structure. These structures, as well as the piping, are to be stored in the former Co-60 field and covered in plastic sheeting.

The two most southern drywells will be further excavated to determine the total depth of each structure. Excavation depth will be determined by the reach of the excavator and is expected to be 20 ft bgs. Soil and cobbles removed from these drywells will be placed in B-25 containers and stored in the Western Dog Pens. Following removal of the structures, the excavation will be surveyed, lined with a geotextile fabric, and backfilled and compacted.

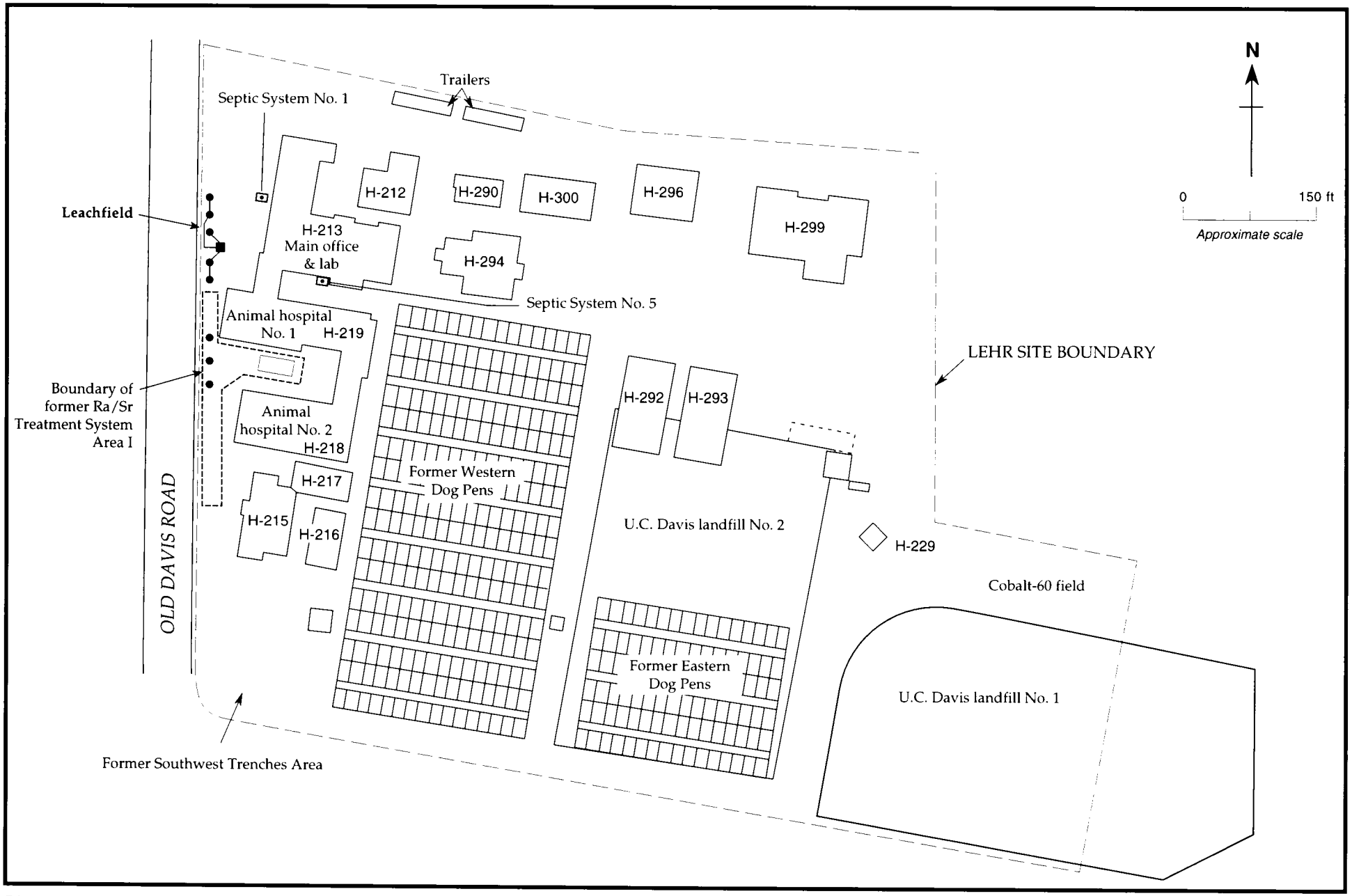


Figure 1-1. Approximate Location of the Domestic Septic Systems 1 & 5 Leachfield

Weiss Associates

2. SAMPLING AND ANALYSIS PLAN

This section describes the sampling and analysis plan to be used during the limited removal activities at the DSS 1/5 leachfield. All work will be conducted in accordance with the Quality Assurance Project Plan (QAPP; Weiss Associates, 1998a), and the appropriate Standard Operating Procedures (SOPs; Weiss Associates, 1998b).

Soil sample collection will be conducted in accordance with SOP 3.1, Surface and Shallow Subsurface Soil Sampling, and SOP 15.1, Lithologic Logging. Sample chain-of-custody records will be prepared in accordance with SOP 1.1, Chain of Custody. Sample handling, packaging, and shipping will be conducted in accordance with SOP 2.1, Sample Handling, Packaging and Shipping. Samples will be collected from appropriate locations as described below.

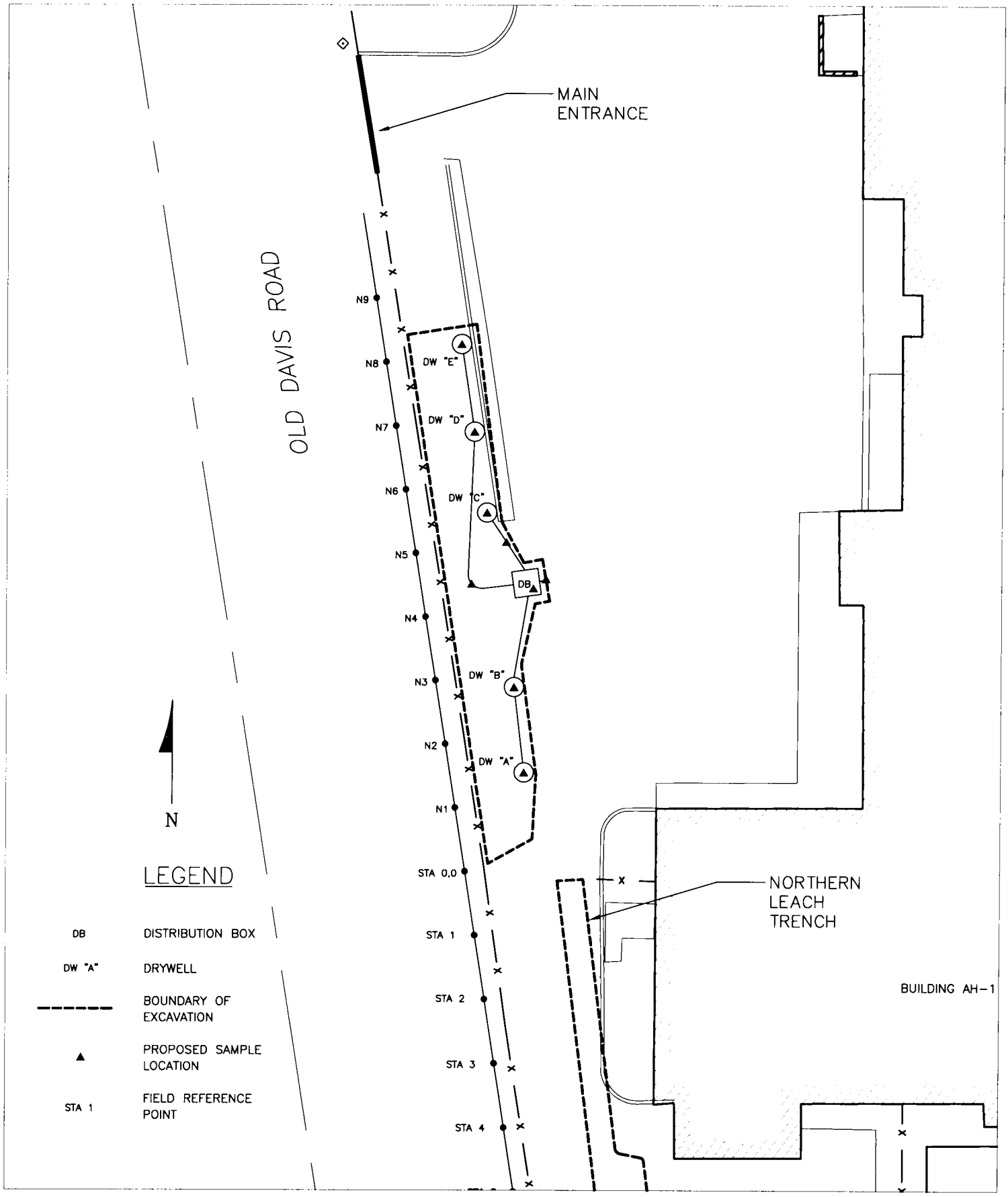
2.1 Sampling Approach

One sample will be collected from the soil 3 ft beneath each of the 5 concrete drywell manways and immediately adjacent to the cobble fill. In addition, one sample will be collected from the soil immediately beneath the distribution box and each of the pipe joints, as appropriate. Figure 2-1 presents the sample locations within the leachfield. These sample locations best represent the areas of potential contamination. A total of nine soil samples will be collected from these structures.

Following excavation of the two most southern drywells ("A" and "B"), one soil sample will also be collected from the bottom of each drywell. Soil samples will be collected only if the bottom of the drywell has been reached.

2.2 Analytical Plan

Each soil sample collected from the locations described in Section 2.1 will be analyzed for the full suite of COCs. Table 2-1 presents the complete list of analytical parameters and methods. A duplicate sample will be collected at one location for QA purposes.



WEISS ASSOCIATES

SCALE: 1" = 20'	
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LEHR
DOMESTIC SEPTIC SYSTEM
NO. 1 & 5 LEACHFIELD

PROPOSED SAMPLE LOCATIONS

FIGURE
2-1

Table 2-1. Containers and Holding Times for Laboratory Analytical Methods Planned for Domestic Septic Systems One and Five Leachfield

Parameter	Analytical Method	Holding Time
Radionuclides (2 x 16-oz P/G):		
Americium-241	Lab SOP	6 months
Carbon-14	Lab SOP	6 months
Gamma Emitters	EPA Method 901.1	6 months
Actinium-228		
Bismuth-212		
Bismuth-214		
Cesium-137		
Cobalt-60		
Lead-210		
Lead-212		
Lead-214		
Potassium-40		
Radium-223		
Radium-228		
Radium-226*		
Thallium-208, 234		
Thorium-228, 230, 232	Lab SOP	6 months
Gross Alpha	EPA Method 9310	6 months
Gross Beta	EPA Method 9310	6 months
Plutonium-241	Lab SOP	6 months
Strontium-90	EPA Method 905.0	6 months
Tritium	EPA Method 906.0	6 months
Uranium-233/234, 235, 238	Lab SOP	6 months
Metals/Other Inorganics (1 x 8-oz G):		
Antimony	CLP SOW ILM 02.1	6 months
Arsenic	CLP SOW ILM 02.1	6 months
Barium	CLP SOW ILM 02.1	6 months
Beryllium	CLP SOW ILM 02.1	6 months
Cadmium	CLP SOW ILM 02.1	6 months
Chromium (total)	CLP SOW ILM 02.1	6 months
Chromium (+6)	EPA Method 7196	30 days
Cobalt	CLP SOW ILM 02.1	6 months
Copper	CLP SOW ILM 02.1	6 months
Iron	CLP SOW ILM 02.1	6 months
Lead	CLP SOW ILM 02.1	6 months
Manganese	CLP SOW ILM 02.1	6 months
Mercury	CLP SOW ILM 02.1	28 days
Molybdenum	CLP SOW ILM 02.1	6 months
Nickel	CLP SOW ILM 02.1	6 months
Selenium	CLP SOW ILM 02.1	6 months

Table 2-1. Containers and Holding Times for Laboratory Analytical Methods Planned for Domestic Septic Systems One and Five Leachfield (continued)

Parameter	Analytical Method	Holding Time
Silver	CLP SOW ILM 02.1	6 months
Thallium	CLP SOW ILM 02.1	6 months
Vandium	CLP SOW ILM 02.1	6 months
Zinc	CLP SOW ILM 02.1	6 months
General Chemistry		
Nitrate	EPA Method 300.0	48 hours
Nitrogen (TKN)	EPA Method 351.2	28 days
TOC	EPA Method 415.1	28 days
Ammonia	EPA Method 350.1	28 days
Organics:		
Volatile Organic Compounds	CLP SOW OLM 03.0	14 days
Semi-Volatile Organic Compounds	CLP SOW OLM 03.0	14 days to extraction, 40 days to analysis of extracts
Organochlorine Pesticides (and PCBs)	CLP SOW OLM 03.0	14 days to extraction, 40 days to analysis of extracts

Abbreviations:
CLP SOW = Contract Laboratory Program Statement of Work
OLM 03.0 = Organic Laboratory Method 03.0
ILM 02.1 = Inorganic Laboratory Method 02.1.
P = Plastic container
G = Glass container
g = grams
oz = ounces
* = 30-day ingrowth-time and 1000-minute count-time

3. SAMPLING AND ANALYSIS PROCEDURES

3.1 Soil Sample Collection

All soil samples will be collected with a hand auger in accordance with SOP 3.1.

3.2 Sample Documentation

The usability of the data obtained during this investigation will depend on its quality. A number of factors relate to data quality. Sample collection methods are as important to consider as the methods used for sample analysis. Following proper procedures for both sample collection and analysis reduces sampling and analytical error. To ensure sample integrity, samples will be handled using complete Chain-of-Custody documentation and preserved using proper sample preservation techniques, holding times, and proper shipment methods. Obtaining valid and comparable data also requires adequate QA/QC procedures and documentation.

The components of the sample documentation and custody system will include the following:

- Chain-of-Custody Form,
- Field Logbook/Field Activity Daily Log,
- Sample Numbers,
- Sample Labels; and,
- Custody Seals.

3.2.1 Chain-of-Custody

Chain-of-Custody forms will be completed by the sample team members to track sample custody as well as to specify the requested analyses. Chain-of-Custody forms will be completed in accordance with the requirements of SOP 1.1.

3.2.2 Field Logbook/Field Activity Daily Log

Descriptions and observations made during field and sampling activities will be documented in the field logbook and field activity daily log. The following will be recorded in the field logbook and field activity daily log:

- Project name and number;
- Location of site;
- Purpose of sampling;
- Description of field activities;
- Names of sampling personnel;
- Date and time of entries;
- Sample medium description using the Unified Soil Classification System (USCS);
- Date and time of sample collection;
- Sample locations, Identification (ID) number and methodology;
- Field observations;
- Results of field measurements; and,
- Results of field calibrations for instruments used.

3.2.3 Sample Numbers

The sample matrix will be identified by "SS" for soil sample. Since these samples will be collected from the DSS Area, they will be identified by the nomenclature "ST" per the Draft Final Work Plan for Removal Actions at the Southwest Trenches, Radium/Strontium Treatment System Area, and Domestic Septic System Areas, Rev. F, 1999. Samples will be numbered sequentially. Therefore, the first soil sample collected will be identified as SSSTC001.

3.2.4 Sample Labels

Sample labels will be attached to individual sample containers and will contain the following information:

- Project number;
- Sample ID number;
- Date and time collected;
- Initials of sampler; and,
- Requested analyses.

3.2.5 Custody Seals

Custody seals will be used to detect tampering and will be placed over the lid of the shipping container and annotated with the following information:

- Date and time; and,
- Initials of sampler.

4. LAND SURVEY

Following the completion of the removal and sampling activities at the DSS 1/5 leachfield, a land survey will be performed to establish California State Coordinates for each sample collection point. This survey will locate each point horizontally and vertically and to the nearest 1.0 ft and 0.1 ft, respectively. A State of California-licensed land surveyor will perform all surveying.

5. QUALITY ASSURANCE AND DATA MANAGEMENT

The quality assurance requirements applicable to the removal action at the DSS 1/5 leachfield are detailed in the QAPP for the environmental restoration activities at the LEHR site (Weiss, 1998b). This plan is based upon the requirements of DOE Order 5700.6c *Quality Assurance* and EPA QAMS-005/80 *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* as they are applicable to the scope of work. Additional task-specific quality assurance requirements are detailed in the SOPs.

The samples collected for this investigation will be analyzed by General Engineering Laboratories, Inc. (GEL) in Charleston, South Carolina. Laboratory reports (hard copies and electronic files) will be forwarded from the laboratories to the Weiss Associates Data Validation Chemist. These results will be validated and transferred to the project database by the Weiss Associates Database Manager in accordance with procedures described in the QAPP (Weiss Associates, 1998a).

6. REFERENCES

Final Quality Assurance Project Plan (QAPP) for the Laboratory for Energy-Related Health Research, University of California at Davis, California, Weiss Associates, 1998a.

Standard Operating Procedures (SOPs) for the Environmental Restoration/Waste Management, Laboratory for Energy-Related Health Research, University of California at Davis, California, Weiss Associates, 1998b.