



# U.S. Department of Energy

Oakland Operations Office, Oakland, California

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## SAMPLING AND ANALYSIS PLAN ADDENDUM IMPORTED FILL MATERIAL

at the

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH  
UNIVERSITY OF CALIFORNIA, DAVIS

*Prepared for:*

**United States Department of Energy**  
Oakland Operations Office  
1301 Clay Street  
Oakland, California 94612-5208

*Prepared by:*

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

March 21, 2002

Rev. 0

DOE Oakland Operations Contract DE-AC03-96SF20686

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Attachment 1. Chain-of-Custody Record

## ACRONYMS AND ABBREVIATIONS

cu yd	cubic yard(s)
DSS	Domestic Septic System
LEHR	Laboratory for Energy-Related Health Research
SOP	Standard Operating Procedure

## 1. SAMPLING AND ANALYSIS PLAN

This sampling and analysis plan is an addendum to the *Draft Domestic Septic System 3 and 6 Removal Actions Work Plan for the Laboratory for Energy-Related Health Research* (WA, 2002b). The objective of the planned sampling and analysis is to assess the suitability of fill material for use as excavation backfill during the Domestic Septic System (DSS) removal action. To determine the suitability/acceptability of an off-site source of fill material, representative samples will be collected and tested for specific chemical and radiochemical parameters as described below. The physical parameters for this fill material have been determined from previous testing for site use during 2001 field activities (WA, 2002a).

### 1.1 Sampling Plan

Approximately 300 cubic yards (cu yd) of soil will be required for backfilling a portion of the DSS 3 and 6 excavation areas. An off-site source of clean soil located 25 miles northwest of the Laboratory for Energy-Related Health Research (LEHR or the Site) in Esparto, California has been identified. The material is currently stored in a stockpile (Figure 1).

Based on the dimensions of the stockpile in the field, a grid has been overlain onto the section. From this grid, locations have been randomly selected (Figure 1) using a random number generator. Two four-point composite samples (one primary sample and one field duplicate sample) will be collected from the soil source (one sample point per 75 cu yd). Samples will be collected according to LEHR Standard Operating Procedures (SOP) 3.1, Surface and Shallow Subsurface Soil Sampling.

Samples will be composited in the field. Sample volumes, containers and analytical parameters are summarized in Tables 1. Chain-of-custody records will be prepared according to 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. The chain-of-custody record that will be used is shown in Attachment 1.

Following sampling, the sampling locations will be marked using flagging. The flagging will remain on the stockpile until the analyses have been reviewed and the suitability of the material determined.

## 1.2 Analysis Plan

The required laboratory analytical methods for the imported fill soil samples are summarized in Table 1. The samples will be analyzed for radionuclides, metals, volatile and semi-volatile organic compounds, pesticides/polychlorinated biphenyls, nitrate and hexavalent chromium as specified in Section 2.5.2 of the Work Plan (WA, 2002b). The analytical results will be compared to background concentrations, risk-based action standards developed for the Site, and residential preliminary remediation goals to determine whether the imported fill can be utilized on site as backfill material.

## 1.3 References

Weiss Associates (WA), 2002a, *Draft Western Dog Pens Area Removal Action Confirmation Report for the Laboratory for Energy-Related Health Research*, University of California, Davis, Rev. C, February.

WA, 2002b, *Draft Domestic Septic System 3 and 6 Removal Actions Work Plan for the Laboratory for Energy-Related Health Research*, University of California, Davis, Rev. C, March.

**TABLE**

Table 1. Laboratory Analytical Methods for Imported Fill Material

Parameter	Analytical Method	Required Detection Limit (pCi/g for radionuclides, mg/kg for chemicals)	Required Sample Container/Volume
<u>Radionuclides:</u>			P, G / 2x16 oz.
Americium-241	DOE EML HASL 300	0.01	
Carbon-14	EPA EERF C-01	0.1	
Gamma Emitters	DOE EML HASL 300		
Actinium-228	DOE EML HASL 300	0.1	
Bismuth-212	DOE EML HASL 300	0.1	
Bismuth-214	DOE EML HASL 300	0.1	
Cesium-137	DOE EML HASL 300	0.01	
Cobalt-60	DOE EML HASL 300	0.005	
Lead-210	DOE EML HASL 300	0.5	
Lead-212	DOE EML HASL 300	0.1	
Lead-214	DOE EML HASL 300	0.1	
Potassium-40	DOE EML HASL 300	1	
Radium-223	DOE EML HASL 300	2	
Radium-228	DOE EML HASL 300	0.1	
Radium-226 (*)	DOE EML HASL 300	0.1	
Thallium-208	DOE EML HASL 300	0.05	
Thorium-234	DOE EML HASL 300	0.5	
Thorium-228	DOE EML HASL 300	0.1	
Thorium-230	DOE EML HASL 300	0.05	
Thorium-232	DOE EML HASL 300	0.05	
Gross Alpha	EPA Method 900.0	1	
Gross Beta	EPA Method 900.0	1	
Plutonium-241	DOE EML HASL 300	0.5	
Strontium-90	EPA Method 905.0	0.05	
Tritium	EPA Method 906.0	1	
Uranium-233/234	DOE EML HASL 300	0.025	
Uranium-235	DOE EML HASL 300	0.01	
Uranium-238	DOE EML HASL 300	0.025	
<u>Metals:</u>			G / 8 oz.
Antimony	CLP ILM 4.0	0.5	
Arsenic	CLP ILM 4.0	2	
Barium	CLP ILM 4.0	40	
Beryllium	CLP ILM 4.0	1	
Cadmium	CLP ILM 4.0	0.25	
Chromium (total)	CLP ILM 4.0	1	
Cobalt	CLP ILM 4.0	10	
Copper	CLP ILM 4.0	0.25	
Iron	CLP ILM 4.0	20	
Lead	CLP ILM 4.0	0.3	
Manganese	CLP ILM 4.0	3	
Mercury	CLP ILM 4.0	0.1	

Table 1. Laboratory Analytical Methods for Imported Fill Material (continued)

Parameter	Analytical Method	Required Detection Limit (pCi/g for radionuclides, mg/kg for chemicals)	Required Sample Container/Volume
Molybdenum	CLP ILM 4.0	0.1	
Nickel	CLP ILM 4.0	1	
Selenium	CLP ILM 4.0	1	
Silver	CLP ILM 4.0	0.1	
Thallium	CLP ILM 4.0	0.5	
Vanadium	CLP ILM 4.0	1	
Zinc	CLP ILM 4.0	4	
<u>General Chemistry:</u>			G / 8 oz.
Nitrate	EPA Method 300.0	1	
Hexavalent Chromium	EPA Method 3060A/7196	0.05	
<u>Organics:</u>			
Volatile Organic Compounds	CLP OLM 4.2	< 0.25	4 VOA Vials
Semi-Volatile Organic Compounds	CLP OLM 4.2	< 10	G / 8 oz.
Organochlorine Pesticides/PCBs	CLP OLM 4.2	< 0.1 pesticides < 2.0 toxophene and PCBs	

**Abbreviations**

(*)	30-day ingrowth time and 1,000-minute count time required.
CLP	Contract Laboratory Program
EERF	Eastern Environmental Radiation Facility
EML	Environmental Measurements Laboratory
EPA	United States Environmental Protection Agency
G	glass container
HASL	Health and Safety Laboratory
ILM	Inorganic Laboratory Method
mg/kg	milligrams per kilogram
OLM	Organic Laboratory Method
oz.	ounce
P	plastic container
PCBs	Polychlorinated Biphenyls
pCi/g	picoCuries per gram

**FIGURE**

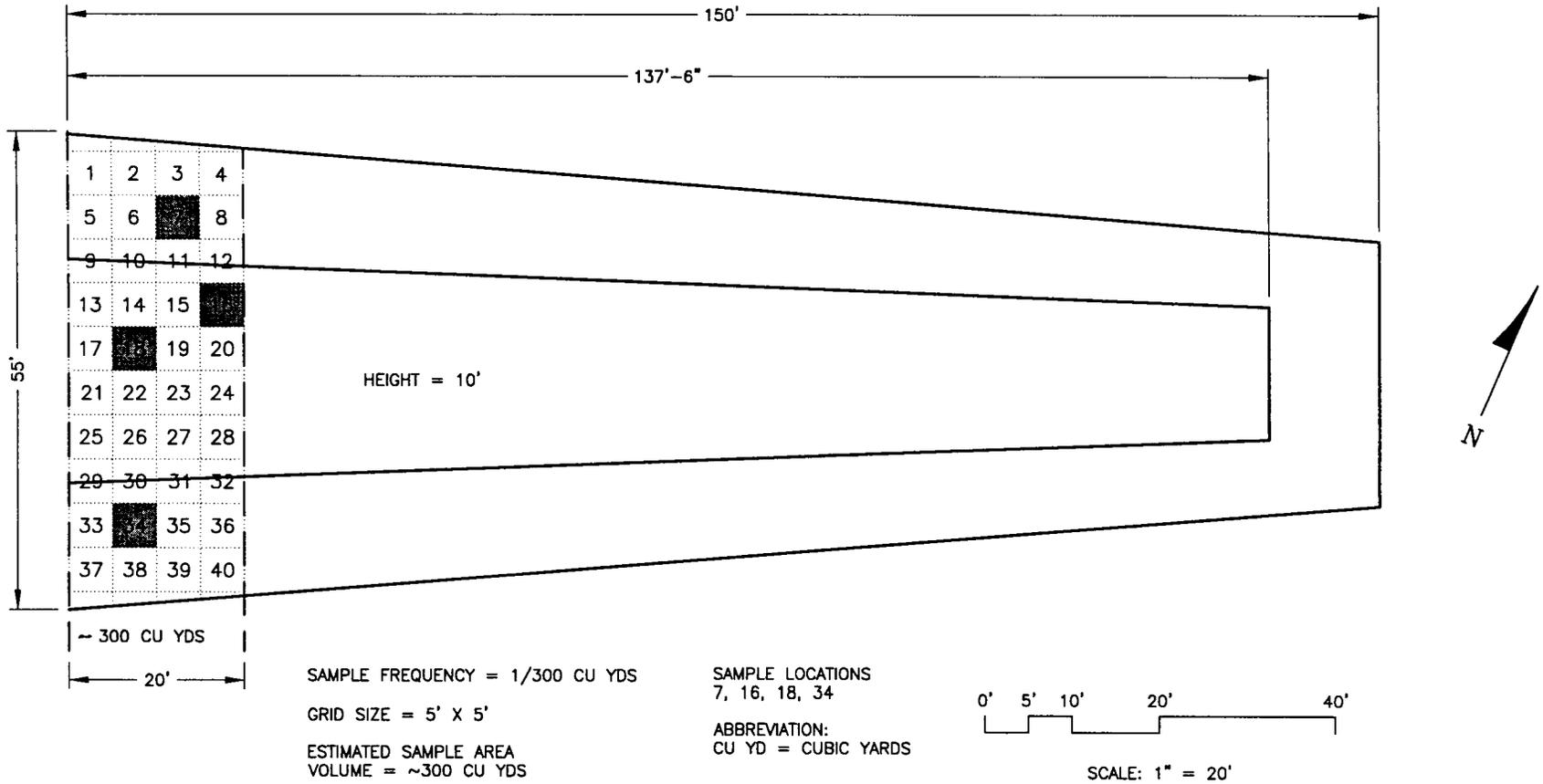


Figure 1. Stockpile Grid With Composite Sample Locations

## **ATTACHMENT 1**

### **CHAIN-OF-CUSTODY RECORD**

