U.S. Department of Energy

Oakland Operations Office, Oakland, California

SAMPLING AND ANALYSIS PLAN ADDENDUM FOR INVESTIGATION-DERIVED WASTE STORED AT THE FORMER COBALT-60 FIELD

at the

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

Prepared for:

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

Prepared by:

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

March 27, 2000
Rev. 0

DOE Oakland Operations Contract DE-AC03-96SF20686

Weiss Associates
Environmental Science, Engineering and Manageme

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TABLES

ACRONYMS

ALARA	As-Low-As-Reasonably-Achievable
HSP	Health and Safety Procedures
ID	identification
IDW	investigation-derived waste
LEHR	Laboratory for Energy-Related Health Research
LLW	low-level radioactive waste
PID	photoionization detector
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RPP	Radiation Protection Program
SAP	Sampling Analysis Plan
SOP	Standard Operating Procedure
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristics Leaching Procedure
UC Davis	University of California Davis
VOC	volatile organic compound
WPSC	Work Plan for Segregation and Characterization
WTS	LEHR waste tracking system

1. INTRODUCTION

This Sampling and Analysis Plan (SAP) is an addendum to the Work Plan for Segregation and Characterization (WPSC) of Investigation-Derived Wastes Stored at the Former Cobalt-60 Field (WA, 1998a) at the Laboratory for Energy-Related Health Research (LEHR) Site, U.C. Davis, California. It presents the approach and procedures for additional sampling of investigation-derived waste (IDW) stored in the former Cobalt-60 Field at LEHR. This SAP addendum supports and complies with the WPSC, and includes descriptions and rationale for the planned investigation activities, detailed procedures for all fieldwork, waste management, quality assurance/quality control (QA/QC), data management, and health and safety considerations.

1.1 Background

As part of the 1998 segregation and categorization of investigation-derived waste (IDW), 243 soil-bearing drums were organized into 33 discrete sets, based on process knowledge and existing analytical data. Composite samples were collected from each of the 33 sets of drums and were sent to an off-site laboratory for analysis. Based on review of the analytical data the waste material was preliminarily classified as low-level radioactive waste (LLW). Thirty-one of thirty-three samples have radioactive constituents above LEHR background. In addition, a data gap analysis indicated that several samples contain metals above the hazardous waste threshold (i.e., total concentration exceeded 10 times the Soluble Threshold Limit Concentration [STLC] and/or exceeded 20 times the Toxicity Characteristics Leaching Procedure [TCLP]). Therefore, additional sampling for STLC/TCLP analyses is required.

1.2 Objective

The objective of this SAP is to generate additional analytical data to accurately designate 33 groups of IDW drums. The drums are organized by group numbers, as established during the 1998 segregation and characterization activities.

To minimize additional analytical costs and to meet the waste acceptance criteria of the anticipated waste disposal facility, Envirocare of Utah, Inc., only the drum sets with the highest concentrations of chromium, lead, mercury and nickel will be re-sampled for the TCLP and STLC analyses. One duplicate set of samples will be collected. Table 1-1 identifies unique waste tracking system numbers for each drum in the two groups, the sampling requirements, duplicate analysis, and the compositing plan.

Following validation by the project chemist (or designee), analytical results will distributed to the LEHR Waste Management Team and the waste will be designated into appropriate classifications.

Table 1-1. Sampling Requirements for Investigation-Derived Waste Drums, LEHR Site, UC Davis, California

		<----------Analytical Parameters [1] ---------->					
Group No. [2] (Sample ID)	**WTS Number [3]**	**TCLP Chromium**	**TCLP Lead**	**STLC Chromium**	**STLC Lead**	**STLC Mercury**	**STLC Nickel**
6 (SSIDW006) [4]	LEHR0403	X	X	X	X	X	
	LEHR0404	X	X	X	X	X	
	LEHR0405	X	X	X	X	X	
	LEHR0406	X	X	X	X	X	
	LEHR0407	X	X	X	X	X	
19 (SSIDW019)	LEHR0458						X
	LEHR0459						X
	LEHR0460						X
	LEHR0461						X
	LEHR0462						X
	LEHR0463						X
	LEHR0464						X
	LEHR0465						X
	LEHR0466						

Notes:

[1] See Table 2-1 for analytical methods and detection limits.

[2] Group No. refers to the original segregation and analysis during the WPSC. Sample ID refers to the original sample identification number associated with the 1998 WPSC. Composite sampling will be accomplished by collecting one soil sample in a 6" brass sleeve from each drum of the group. A total of five sample sleeves will be collected from Group 6 and nine sample sleeves will be collected from Group 19. Only SSIDW006 has lead and mercury concentrations exceeding the 10 times the TCLP/20 times the STLC criteria; the highest concentration of chromium was detected in SSIDW006 at 131 mg/kg; the highest concentration of nickel was detected in SSIDW019 at 219 mg/kg.

[3] The WTS number is a reference to the individual waste package within each group.

[4] An additional five sleeves will be collected from Group 6 and will be submitted to the laboratory as field duplicates. Group 6 was selected as the QA/QC group because it has the most analytical parameters and will provide the most QA/QC data.

Abbreviations:

STLC = Soluble Threshold Limit Concentration
TCLP = Toxicity Characteristics Leaching Procedure
WTS = LEHR Waste Tracking System

2. SAMPLING AND ANALYSIS PLAN

This section describes the SAP to be used during the collection of additional samples from IDW drums stored in the former Cobalt-60 Field. All work will be conducted in accordance with the WPSC, Quality Assurance Project Plan (QAPP; WA, 1998b), and the appropriate Standard Operating Procedures (SOPs; WA, 1998c).

2.1 Sampling Approach

Representative samples of IDW will be collected from each drum of the two groups (see Table 1-1) for off-site laboratory analysis. To characterize the drum contents in a cost-effective manner, samples collected from each drum in the set will be composited into one sample for analysis. The contracted analytical laboratory will perform the sample compositing. A detailed description of the sampling procedure is included in Section 3.1 of this SAP addendum, the WPSC, the QAPP and referenced SOPs. In general, one 2" by 6" brass sample sleeve will be collected from each drum in the two groups (see Table 1-1). One duplicate set of brass sample sleeves will be collected from Group 6 for QA purposes, since Group 6 had the highest results for chromium, lead and mercury and has the greatest number of detected analytical parameters.

2.2 Analytical Plan

Table 2-1, "Analytical Methods for Investigation-Derived Waste Drum Samples," details analytical parameters, methods and detection limits.

Table 2-1. Analytical Methods for Investigation-Derived Waste Drum Samples, LEHR Site, UC Davis, California

Parameter	Analytical Method	Required Detection Limit (mg/L)
STLC Chromium	CCR Title 22 WET and EPA Method 6010	<2.5
TCLP Chromium	EPA 1311 and 6010	<2.5
STLC Lead	CCR Title 22 WET and EPA Method 6010	<2.5
TCLP Lead	EPA 1311 and 6010	<2.5
STLC Mercury	CCR Title 22 WET and EPA Method 6010	<0.1
STLC Nickel	CCR Title 22 WET and EPA Method 6010	<10

Abbreviations:

CCR Title 22 WET	=	California Code of Regulations Title 22 Waste Extraction Test
mg/L	=	Milligrams per Liter
STLC	=	Soluble Threshold Limit Concentration
TCLP	=	Toxicity Characteristics Leaching Procedure
WET	=	Waste Extraction Test

3. SAMPLING AND ANALYSIS PROCEDURES

3.1 Drum Sample Collection

Soil samples will be collected from the drums with a slide-hammer and in accordance with the following SOPs:

- SOP 3.1—Surface and Shallow Subsurface Soil Sampling;
- SOP 1.1—Chain-of-Custody; and
- SOP 2.1—Sample Handling, Packaging and Shipping.

Table 1-1 lists the unique composite sample identification (ID) and required analysis for each group of drums containing IDW from a common waste origin. Each of these IDW drums will be sampled as described below:

1) Samples will be collected using a slide hammer and 2" x 6" sample sleeves. Soil samples will be collected from the middle of each drum. All samples will be stored and shipped in ice-cooled containers.

2) The contract laboratory will be instructed to composite samples from each group (composite number shown on Table 1-1) into one sample for analysis;

3) A total of two composite soil samples and one field duplicate will be collected (see Table 1-1). Composite samples will be analyzed as described in Table 2-1; and,

4) A two-week turnaround time will be requested from the contract laboratory.

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 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 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/field activity daily log. The following will be recorded in the field logbook/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 description using the Unified Soil Classification System;
- Date and time of sample collection;
- Sample locations, ID number and sampling methodology;
- Field observations;
- Results of field measurements; and,
- Results of field calibrations for instruments used.

3.2.3 Sample Numbers

A unique alphanumeric identification number will be assigned to each sample collected, using the following format:

aabbbccc

Where,

aa = Type of sample and matrix
- SS - soil sample
- WS - water sample

bbb = Three-letter acronym designating the sample area at the site
- IDW - Investigation-Derived Waste

ccc = Chronological sample number (e.g., 001, 002, 003)

Based on the 1998 sampling for segregation and characterization, the next sample in the sequence will be SSIDW037.

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. WASTE MANAGEMENT

Excess solid waste and decontamination liquids generated as the result of sampling will be returned to the drum from which they originated. All activities will be conducted in accordance with the LEHR Waste Management Plan (WA, 1999a).

4.1 Decontamination Solutions

Decontamination solutions will consist of water with alconox detergent used to clean the sample collection tools. When possible, preliminary decontamination will be conducted so that the sediment and rinseate generated by cleaning the sampling equipment will be minimal and will be discharged into the void-space within the drums from which the respective soil sample was collected.

4.2 Waste Tracking System

Waste tracking sheets will be updated with sample information and will be submitted to the Field Waste Coordinator for review. Following review, the waste tracking sheets will be submitted to the LEHR Waste Tracking System Coordinator for incorporation into the LEHR Waste Tracking System database.

5. QUALITY ASSURANCE AND DATA MANAGEMENT

The quality assurance requirements applicable to this SAP Addendum are detailed in the QAPP for the environmental restoration activities at the LEHR site (WA, 1998b). This plan is based upon the requirements of DOE Order 414.1A *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.

The samples collected will be analyzed by General Engineering Laboratories, Inc. 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.

6. HEALTH AND SAFETY CONSIDERATIONS

Health and safety considerations for the activities detailed within this SAP Addendum are addressed in the WPSC (WA, 1998a) and the following documents:

- Project Health and Safety Plan (WA, 1998d);
- Health and Safety Procedures (WA, 1998e);
- Standard Operating Procedures (WA, 1998c);
- Contingency Plan and General Emergency Response Procedures (WA, 1998f);
- As-Low-As-Reasonably-Achievable (ALARA) Program (WA, 1999b); and the
- Radiation Protection Program (WA, 1999c).

All sampling activities will be conducted as prescribed in the WPSC with the exception of Volatile Organic Compound (VOC) monitoring. Laboratory analytical data indicate that no VOCs and only trace quantities of semi-volatile organic compounds were detected in the 33 groups. In addition, field photoionization detector (PID) data collected during the sampling and segregation in 1998 detected no VOCs. Therefore, PID monitoring will not be required during conduct of this task.

The LEHR Health and Safety Officer or qualified designee will provide perimeter support, monitor atmospheric conditions and determine if heat stress monitoring is appropriate as specified in project monitoring guidelines. This activity is expected to be conducted during the spring, therefore the need for heat stress monitoring is unlikely.

7. REFERENCES

Weiss Associates (WA), 1998a, Work Plan for Segregation and Characterization of Investigation-Derived Wastes Stored at the Former Cobalt-60 Field, Laboratory for Energy-related Health Research (LEHR), University of California at Davis, California, September.

WA, 1998b, Quality Assurance Project Plan for Environmental Restoration/Waste Management, LEHR, University of California at Davis (UC Davis), California, February.

WA, 1998c, Final Standard Operating Procedures, LEHR, UC Davis, California, March.

WA, 1998d, Project Health and Safety Plan for Environmental Restoration/Waste Management, LEHR, UC Davis, California, November.

WA, 1998e, Final Health and Safety Procedures, LEHR, UC Davis, California, Weiss Associates, January.

WA, 1998f, Contingency Plan and General Emergency Response Procedures for Energy-Related Health Research, UC Davis, California, November.

WA, 1999a, Draft Final Waste Management Plan for Removal Actions in the Southwest Trenches, Ra/Sr Treatment Systems, and Domestic Septic Systems Areas, Rev. F, LEHR, UC Davis, California, June.

WA, 1999b, Final As Low As Reasonably Achievable Program Management, Rev. 3, LEHR, UC Davis, California, July.

WA, 1999c, Final Radiological Protection Program, Rev. 3, LEHR, UC Davis.