Appendix A

Soil Sampling and Analysis Plan

City of Eureka, Utah Zoning Ordinance Chapter 13

Regulations and Permitting Procedures for Excavations and Development in the Eureka Mills Superfund Site

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LIST OF ACRONYMS

C	Composite
COC	Chain of Custody
cy	Cubic yard
EPA	Environmental Protection Agency
G	Grab
ID	Identification
mg/kg	Milligram/Kilogram
PPM	Parts per Million
QA	Quality Assurance
QC	Quality Control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
ROD	Eureka Mills Superfund Site Record of Decision
SAP	Sampling and Analysis Plan
S	Soil Matrix
SF	Square Feet
SI	Site Inspection
Site	Eureka Mills Superfund Site
SOP	Standard Operating Procedures
SSAP	Soil Sampling and Analysis Plan
TP	Technical Procedure
UDEQ	Utah Department of Environmental Quality
UDOH	Utah Department of Health
µg/kg	Microgram/Kilogram
UDOT	Utah Department of Transportation

1. INTRODUCTION AND OBJECTIVE OF SOIL SAMPLING AND ANALYSIS PLAN

1.1. Introduction

The Environmental Protection Agency (EPA), in partnership with the Utah Department of Environmental Quality (UDEQ), has conducted remedial actions for residential and commercial in Eureka including the excavation and disposal of lead-contaminated soils from residential properties, pursuant to the Eureka Mills Superfund Site Record of Decision (ROD), dated 9/30/2002. To maintain the remedy, the City of Eureka has established Chapter 13 of the Eureka City Zoning Ordinance (Chapter 13) to enact regulations and permitting procedures for excavations and development in the Eureka Mills Superfund Site. The purpose of Chapter 13 is to prevent recontamination of areas where remedial action had been completed and for undeveloped areas.

The ROD identified five metals that are contaminant of concern for the Eureka Mills Superfund Site: lead, arsenic, antimony, mercury and thallium. Because the ROD established lead as the primary contaminant of concern at the Eureka Mills Superfund Site and since antimony, arsenic, mercury and thallium have been found to be co-located with lead at the Eureka Mills Superfund Site, this Soil Sampling and Analysis Plan (SSAP) will require sampling and analysis for lead only.

Chapter 13 allows the use of soil sampling and analysis data to establish the lead content in stockpiles, excavated surfaces and development areas within the boundaries of the Eureka Mills Superfund Site. The purpose of this SSAP is to establish requirements and procedures to be used to obtain data on the concentration of lead in soils to be used to answer specific questions that may arise during soil excavations regulated by Chapter 13. As described in Chapter 13, soil samples are not always necessary to meet the requirements of Chapter 13. Requirements and procedures, as well as the intended use of the data, described in this SSAP, may not be modified without approval of the City of Eureka, after consultation with EPA and UDEQ.

Note that this Appendix provides procedures to collect, analyze, and interpret data necessary to meet the requirements of Chapter 13 and does not contain procedures, guidelines, or directions for protecting the health and safety of those engaged in collecting or analyzing the data. The user of the information contained in this Appendix is solely responsible for protecting their safety and health and the safety and health of those they employ to complete activities described in this Appendix.

1.2. Objective of the SSAP

The objective of this SSAP is to ensure reliable analytical chemistry data is collected for the decision-making process. Data collected will be used to evaluate the lead concentration of the soils being investigated. The lead concentrations will then be compared to criteria established in the ROD to make decisions regarding the required construction activities necessary to meet the requirements of Chapter 13.

2. SOIL SAMPLING LOCATIONS

Features that may be soil sampled pursuant to this SSAP and purpose of the soil sampling is defined in Table 2-1.

Table 2-1
Features to be Sampled and Purpose of Soil Sampling and Analysis

Features to be Sampled	Purpose of the Soil Sampling and Analysis
Existing (Pre-construction) Ground Surface	Establishing an estimated lead concentration of the pre-construction surface soils to determine the applicability of Chapter 13 to the proposed excavation activities.
Post-Excavation Ground Surface	Establishing an estimated lead concentration of the post-construction surface soils
Soil Stockpiles	Establishing an estimated lead concentration of soil stockpiles created through excavation activities regulated by Chapter 13.
Imported Backfill	Establishing an estimated lead concentration of soil imported for the upper 18 inches of the final surface.

The following sections describe the types and frequency for soil sampling of the features listed in Table 2-1.

2.1. Existing Ground Surface

The sampling and analysis described in this Section can be used to determine the applicability of Chapter 13 to excavating activities on a property.

Each property will be divided into zones, with one composite being sampled from each zone. Properties will be divided into zones based on Table 2-2. For properties less than or equal to10 acres in size Table 2-2 lists the number of zones required. For properties greater than 10 acres in size the number of zones required is 46 plus 2 additional zones for each additional acre. As an example, if a property is 15 acres in size, the number of zones required is 56. To determine how many zones are required for a property whose size is not a whole number, the number of acres shall be rounded up. As an example, if a property is 12.2 acres the number of zones required is 52.

Table 2-2
Required Number of Zones

Size of Property	Number of Zones Required	Size of Property	Number of Zones Required
<5000 SF	2	4.51 Acres - 4.75 Acres	25
5000 SF - 10,000 SF	3	4.76 Acres - 5.0 Acres	26
10,001 SF - 15,000 SF	4	5.01 Acres - 5.25 Acres	27
15,001 SF - 20,000 SF	5	5.26 Acres - 5.5 Acres	28
20,001 SF - 25,000 SF	6	5.51 Acres - 5.75 Acres	29
25,001 SF - 30,000 SF	7	5.76 Acres - 6.0 Acres	30
30,001 SF - 35,000 SF	8	6.01 Acres - 6.25 Acres	31
35,001 SF -40,000 SF	9	6.26 Acres - 6.5 Acres	32
40,000 SF - 1.0 Acres	10	6.51 Acres - 6.75 Acres	33
1.01 Acres - 1.25 Acres	11	6.76 Acres - 7.0 Acres	34
1.26 Acres - 1.5 Acres	12	7.01 Acres - 7.25 Acres	35
1.51 Acres - 1.75 Acres	13	7.26 Acres - 7.5 Acres	36
1.76 Acres - 2.0 Acres	14	7.51 Acres - 7.75 Acres	37
2.01 Acres - 2.25 Acres	15	7.76 Acres - 8.0 Acres	38
2.26 Acres - 2.5 Acres	16	8.01 Acres - 8.25 Acres	39
2.51 Acres - 2.75 Acres	17	8.26 Acres - 8.5 Acres	40
2.76 Acres - 3.0 Acres	18	8.51 Acres - 8.75 Acres	41
3.01 Acres - 3.25 Acres	19	7.76 Acres - 9.0 Acres	42
3.26 Acres - 3.5 Acres	20	9.01 Acres - 9.25 Acres	43
3.51 Acres - 3.75 Acres	21	9.26 Acres - 9.5 Acres	44
3.76 Acres - 4.0 Acres	22	9.51 Acres - 9.75 Acres	45
4.01 Acres - 4.25 Acres	23	9.76 Acres - 10.0 Acres	46
4.26 Acres - 4.5 Acres	24	10+ Acres	46+2/acre

A composite will consist of five aliquot sample locations within a zone. The aliquot locations will be determined by sub-dividing the zone into five approximately equal areas, with the aliquot being taken from the center of each. Each aliquot will be collected from the surface (0 – 2").

2.2. Post-Excavation Ground Surface

The sampling and analysis described in this Section can be used to establish the estimated lead concentration of a post-construction ground surface not previously cleaned up by EPA and the State. If the concentration of lead on a post construction ground surface is less than 231 mg/kg, a protective cap, as defined in Chapter 13, is not required.

Each property will be divided into zones, with one composite being sampled from each zone. Properties will be divided into zones as described in Section 2.1.

A composite will consist of five aliquot sample locations within a zone. The aliquot locations will be determined by sub-dividing the zone into five approximately equal areas, with the aliquot being taken from the center of each. The aliquot will be collected from the surface of the excavation (0 – 2").

2.3. Soil Stockpiles

Stockpiles generated during excavations regulated by Chapter 13 may be used as backfill if the material is documented through sampling and analysis to be clean material.

2.3.1. Soil Stockpiles from Properties Remediated by the EPA

On remediated properties, the soil above the marker barrier (approximately 18inches of soil, unless under the drip line of a tree) is considered clean material and should be segregated for use as backfill. This material does not need to be verified as clean through sampling and analysis. Any material excavated below the marker barrier must be either:

- Assumed to contain high lead levels and disposed in the Open Cell Repository
- Placed in stockpiles and sampled as described in Section 2.3.3.

2.3.2. Soil Stockpiles from Properties Not Remediated by the EPA

On unremediated properties, any material excavated must be:

- Assumed to contain high lead levels and disposed in the Open Cell Repository
- Placed in stockpiles and sampled as described in Section 2.3.3.

2.3.3. Sampling Requirements for Stockpiles

One five-point composite sample and one discrete sample per every 100 cubic yards of homogeneous material are required for excavated stockpiles of soils. If the material is not homogeneous, additional discrete (grab) samples shall be collected from each type of material.

2.4. Imported Backfill

If, at the City's discretion they require, materials provided from suppliers shall be certified as uncontaminated by the supplier or sampled and analyzed. A minimum of one composite sample for each type of material imported to the property is required. If more than 1,000 cubic yards of a material is to be delivered to the Site, one sample per 1,000 is required.

3. SOIL SAMPLING AND ANALYSIS REQUIREMENTS

3.1. Sampling Methods

Soil sampling will be conducted in accordance with the following Standard Operating Procedures (SOPs) (see Attachment B):

- ERT SOP 2006 Sampling Equipment Decontamination
- ERT SOP 2012 Soil Sampling
- HDR Technical Procedure No. TP-8-001 Project Custody Documentation
- HDR Technical Procedure No. TP-13-001 Packing, Shipping and Labeling

3.2. Discrete/Composite Sampling Requirements

Soil samples will be collected using a disposable plastic scoop. If the soil cannot be sampled with the plastic scoop, a hand-coring device, a decontaminated shovel, pick, or chipping bar will be employed. If other than disposable equipment is used for sample collection, the equipment shall be decontaminated before each sample is collected. Refer to Attachment B for decontamination procedures.

3.2.1. Discreet Samples

Discreet or "grab" samples are samples collected from one location. Each soil sample will be placed in a labeled glass sampling jar or poly bag as required by the laboratory which is doing the analysis. Typically, at least 8 ounces of soil will need to be collected.

3.2.2. Composite Samples

Composite samples are samples collected from compositing of five grab samples (aliquots) collected at the approximate center and corners of the area to be sampled or five aliquots which represent approximately the same volume of material to be sampled. Each aliquots will be placed in a sealed poly bag, and the sample will be homogenized.

3.3. Analytical Requirements

Samples collected pursuant to this Appendix must be analyzed by a laboratory certified by the National Environmental Laboratory Accreditation Program for the analysis of soil samples in accordance with the Environmental Protection Agency's publication *Test Methods for Evaluating Solid Waste* (SW-846) and certified for the specific test methods listed in Table 3-1. There are numerous laboratories in the Wasatch Front which meet these requirements

Table 3-1 Soil Sample Volumes, Containers, And Preservation				
Parameter	**Analytical Method**	**Number – Sample Volume and Container Type**	**Preservation***	**Holding Time****
Lead	EPA 6010/7470	1-8 oz Wide-Mouth Glass Jar or poly bags (as required by the laboratory)	4°C	6 months

* Sample preservation will be performed by the sampler immediately after sample collection.

** Holding times begin from the time of sample collection in the field.

4. FIELD OPERATIONS DOCUMENTATION

4.1. Field Documentation

Documentation that will be generated will include, but not be limited to, the following activities:

- Sample collection activities
- Laboratory-specific records of custody, analysis, and reports

All field data will be recorded in permanently bound notebooks. The following includes a list of the forms and/or checklists that will be completed for this sampling task:

- Completing Field Logbook Checklist (one per day)
- Documenting Sample Number and Completing Sample Labels Checklist (one per shipment)
- Custody Seals Checklist (one per shipment)
- Chain-of-Custody Forms Checklist (one per shipment)
- Packing Shipping Container Checklist (one per shipment)
- Shipping and Reporting Samples Checklist (one per shipment)

4.2. Field Logbook and/or Sample Field Sheets

Each field sampling event will be documented in a field logbook with the following information recorded: sampler(s) name, date, time of sampling event, sample location, matrix, test to be performed, SOPs utilized, sample identification (ID) assigned to the samples, and weather.

4.3. Photographic Records

Digital photographs shall be taken to document the location and conditions under which samples were taken. The digital files will have the following information included in their file name: Sample ID, date, and location.

4.4. Sample Numbering System

4.4.1. Sample Identification from Residential Properties

All samples will have a unique sample number assigned. Samples from residential properties will be identified by the two letter street identifier, then the property identification number followed by a sequential number identifying that sample, then a letter indicating the sample type (C for composite samples and G for grab samples), a letter indicating matrix (S for soil), and finally last the depth interval. Attachment A provides the two letter street identifiers for Eureka. Attachment A may need updating if

additional streets are added to the town through development. As an illustration of the sample numbering system, a sample taken from 112 East Main Street that is a fourth primary soil composite sample at a depth of 0-6 inches would be labeled as follows:

EM112-004-CS-06

This label is explained in Table 4-1.

Table 4-1
Sample Identification Number Breakdown - Residential Properties

Street Name	Address #	Sample Number	Sample Type	Matrix	Depth
EM	112	004	C	S	06

All sample labels and tags will be completed using indelible ink. The sample labels will be affixed to the sample bottle and covered with clear tape. These labels will include the following information:

- Initials of the collector
- Date and time of collection
- Place of collection
- Sample ID number
- Analysis required
- Preservative
- Designation of “grab” or “composite” samples

All sample labels and tags will be completed using indelible ink. The sample labels will be affixed to the sample bottle and covered with clear tape. These labels will include the following information:

- Initials of the collector
- Date and time of collection
- Place of collection
- Sample ID number
- Analysis required

- Designation of “grab” or “composite” samples

4.4.2. Sample Labels and/or Tags

The laboratory shall provide label forms and tags.

4.4.3. Sample Custody

The primary objective of these procedures is to create an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis. Procedures to ensure the custody and integrity of the samples begin at the time of sampling and continue through transport, sample receipt, preparation, analysis and storage, data generation and reporting, and sample disposal.

Sample custody is initiated using detailed record keeping by field personnel. Following collection, sample custody for off-site samples will be documented using a Chain of Custody (COC) for the analysis to be completed by the off-site laboratory. These forms will be completed in indelible ink. A copy of the COC form from each group of samples will be provided to the City of Eureka. Information regarding sample custody for samples shipped to the laboratory is presented in Attachment B.

4.5. Documentation Data Management and Retention

Property owner is responsible for the providing copies of all field records generated during sampling events and the test results received from analytical laboratory to the City of Eureka.

5. SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

Samples collected in the field will be transported to the laboratory as expeditiously as possible. When a 4° C requirement for preserving the sample is indicated, the samples will be packed on ice to keep them cool during collection and transportation. All samples being shipped to the analytical laboratory will be packaged and shipped in accordance with Packing, Shipping, and Labeling, presented in Attachment B. .

6. DECISION MAKING CRITERIA

Analytical results from soil samples will be compared to the Threshold Lead Concentrations shown in Table 6-1. Based on this criteria, decision will be made on the applicability of the

Table 6-1
Decision Making Criteria

Features to be Sampled	Threshold Lead Concentrations	Decision Summary
Existing (Pre-construction) Ground Surface	Residential Areas: 231 (mg/kg) Non-Residential Areas: 735 (mg/kg)	If the lead concentration is equal to or above the applicable criteria, the requirements of Chapter 13 apply to the excavation activities completed in the area represented by the sample. If the lead concentration is below the applicable criteria, the requirements of Chapter 13 do not apply to the excavation activities completed in the area represented by the sample. However imported fill, if being used for a protective cap, must meet the criteria for imported fill listed in this table.
Post-Excavation Ground Surface	Residential Areas: 231 (mg/kg) Non-Residential Areas: 735 (mg/kg)	If the lead concentration is equal to or above the applicable criteria, a protective cap, as defined in Chapter 13, must be installed. If the lead concentration is below the applicable criteria, a protective cap is not required by Chapter 13.
Soil Stockpiles	100 (mg/kg)	If the lead concentration is equal to or above 100 (mg/kg), the soil stockpile cannot be used for construction of a protective cap. If the lead concentration is below 100 (mg/kg), the soil stockpile can be used for construction of the protective cap.
Imported Backfill	100 (mg/kg)	If the lead concentration is equal to or above 100 (mg/kg), the imported backfill cannot be used for construction of a protective cap. If the lead concentration is below 100 (mg/kg), the imported backfill can be used for construction of the protective cap.

Attachments

Attachment A -Eureka Two Letter Street Identifiers

Attachment B - Standard Operating Procedures

Attachment B.1 - ERT SOP 2006 Sampling Equipment Decontamination

Attachment B.2 - ERT SOP 2012 Soil Sampling

Attachment B.3 - HDR Technical Procedure No. TP-8-001
Project Custody Documentation

Attachment B.4 – HDR Technical Procedure No. TP-13-001
Packing, Shipping and Labeling