Field Sampling Plan for Operable Unit 10-08, CFA-54 (6-in. Clay Pipe) Post-Excavation Soil Confirmation

August 2010

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Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

ABSTRACT

This Field Sampling Plan, along with the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Removal Actions*, constitutes the sampling and analysis plan for soil at the Central Facilities Area, Site CFA-54.

Sampling is pursuant to requirements delineated in the Operable Unit 10-08 Remedial Design/Remedial Action Work Plan. Removal and disposal is the remedy selected by the Agencies for CFA-54 soil contamination. At CFA-54, this specifically involves removing mercury-contaminated soil that exceeds cleanup levels and associated debris (e.g., piping) to a nominal depth of 10 ft or basalt, whichever is encountered first.

Confirmation sampling will be used to confirm that cleanup levels identified in the Operable Unit 10-08 Record of Decision are met.

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ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
COC	chain of custody
DQO	data quality objectives
FFA/CO	Federal Facilities Agreement/Consent Order
FSP	field sampling plan
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
NIST	National Institute of Standards and Technology
OU	operable unit
QAPjP	Quality Assurance Project Plan
QA	quality assurance
QC	quality control
RD/RA	remedial design/remedial action
SAM	Sample and Analysis Management
SOW	statement of work
UCL	upper confidence limit
WGS	Waste Generator Services

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1. INTRODUCTION

This Field Sampling Plan (FSP) was prepared for the Environmental Restoration Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.) Remediation Project of the Idaho Cleanup Project (ICP) at the Idaho National Laboratory (INL) Site. Activities described in this FSP support soil confirmation sampling at Central Facilities Area (CFA), Site CFA-54. The contaminant of concern is mercury, and the site consists of an abandoned clay pipe and associated contaminated soil. The pipe led from the former Chemical Engineering Laboratory (in use from 1953 to 1965) to the CFA-04 pond. As discussed in the Operable Unit (OU) 10-08 Remedial Design/Remedial Action (RD/RA) Work Plan (DOE-ID 2010), remedial action at CFA-54 is necessary to reduce potential threats to human health and the environment. The U.S. Department of Energy, the U.S. Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (referred to hereafter as the Agencies) selected removal and disposal as the remedy for contaminated soil at CFA-54. At CFA-54, this specifically involves removal of mercury-contaminated soil that exceeds OU 10-08 cleanup levels and associated debris (e.g., piping) to a nominal depth of 10 ft or basalt, whichever is encountered first.[a] Confirmation sampling will be performed after contaminated soil and piping have been removed.

1.1 Project Objectives

Under the OU 10-08 RD/RA Work Plan, the objective of the confirmation sampling activity is to collect and analyze soil samples for mercury content "…to verify the effectiveness of the selected remedial action and to determine whether additional remedial action is necessary prior to termination of the remedial action…" (DOE-ID 2009a). All analyses will be performed onsite using mercury field analyzer instrumentation. The two instruments planned for use are the Jerome mercury vapor analyzer and the Ohio Lumex mercury analyzer,[b] as discussed in Section 4.

This FSP will support post-remediation sampling to confirm that remediation goals defined by the CERCLA Record of Decision for OU 10-08 (DOE-ID 2009a) have been met to ensure protection of human health and the environment. Table 1 identifies the risk-based remediation goals for CFA-54. The remedy selected for the CFA-54 site will eliminate this threat by removing the contaminated soil with contaminants of concern that exceed remediation goals.

The *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Removal Actions* (QAPjP) (DOE-ID 2009b) governs Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991) project work performed by INL Site employees and subcontractors as well as employees of other companies or U.S. Department of Energy laboratories. Sampling plan components required by the QAPjP (DOE-ID 2009b) have been incorporated, as applicable, into this FSP.

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a. Details of soil excavation and pipe removal are described in detail in the OU 10-08 RD/RA Work Plan (DOE-ID 2010), including detailed excavation and restoration drawings, estimated quantities of soil to excavate, excavation profile, and waste management.

b. PRODUCT DISCLAIMER—References to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, do not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government, any agency thereof, or any company affiliated with ICP.

Table 1. Cleanup levels for CFA-54 (DOE-ID 2009a).

Site	Contaminant of Concern	Cleanup Level (mg/kg)	
		Human Health	Ecological
CFA-54	Mercury	9.4	8.4[a]

a. Shaded number denotes the cleanup level for the given contaminant (i.e., the lower and more protective goal).

1.2 Site Description

The INL Site encompasses 890 mi^2 and is located approximately 34 mi west of Idaho Falls, in southeastern Idaho (see Figure 1). The U.S. Atomic Energy Commission, now the U.S. Department of Energy, established the Nuclear Reactor Testing Station, now the INL Site, in 1949, as a site for building and testing nuclear facilities. At present, the INL Site supports the engineering and operations efforts of U.S. Department of Energy and other federal agencies in areas of nuclear safety research, reactor development, reactor operations and training, nuclear defense materials production, waste management and technology development, energy technology, and conservation programs.

The CFA-54 site is located within CFA, in the south-central part of the INL Site (see Figure 1). The CFA-54 site consists of an abandoned 6-in.-diameter vitreous clay pipe that extends from CFA-674 southward approximately 354 ft. The pipe lies approximately 4.5 to 6 ft below ground surface, on average, with bell and spigot joints and is composed of 2- to 3-ft long segments. Figure 2 illustrates the pipe location and profiles of the ground surface, pipe, and basalt depth, as determined from past sampling activities. From approximately 1953 to 1965, the CFA-54 pipe received liquid waste generated from calcine development work and other chemical engineering activities performed in CFA-674. The liquid waste was then discharged to a pond, later identified in the FFA/CO (DOE-ID 1991) as the CFA-04 pond.

Evaluation of the CFA-04 pond was performed under the *Work Plan for Waste Area Groups 6 and 10 Operable Unit 10-04 Comprehensive Remedial Investigation/Feasibility Study* (DOE-ID 1999). Excavation of contaminated soil in the CFA-04 pond was recommended, and the remedial action was conducted in 2003. The vitreous clay pipe was recognized and associated with the CFA-04 pond but was not officially added to the FFA/CO description. Consequently, CFA-04 pond remedial actions did not include the pipe area. However, the opening of the pipe was unearthed during CFA-04 pond remedial activities. Sludge samples were collected from the bottom of the pipe, and soil samples were collected from directly below the pipe opening. These samples and previously collected data confirmed mercury concentrations at levels of concern.

The CFA-54 pipeline was identified as a new FFA/CO site in 2004. Subsequently, multiple CFA-54 sampling events were undertaken, and these are summarized in the *Operable Unit 10-08 Sitewide Groundwater and Miscellaneous Sites Remedial Investigation/Baseline Risk Assessment* (Cahn et al. 2008). The risk assessment concluded that only mercury was at levels of concern for both human and ecological receptors.

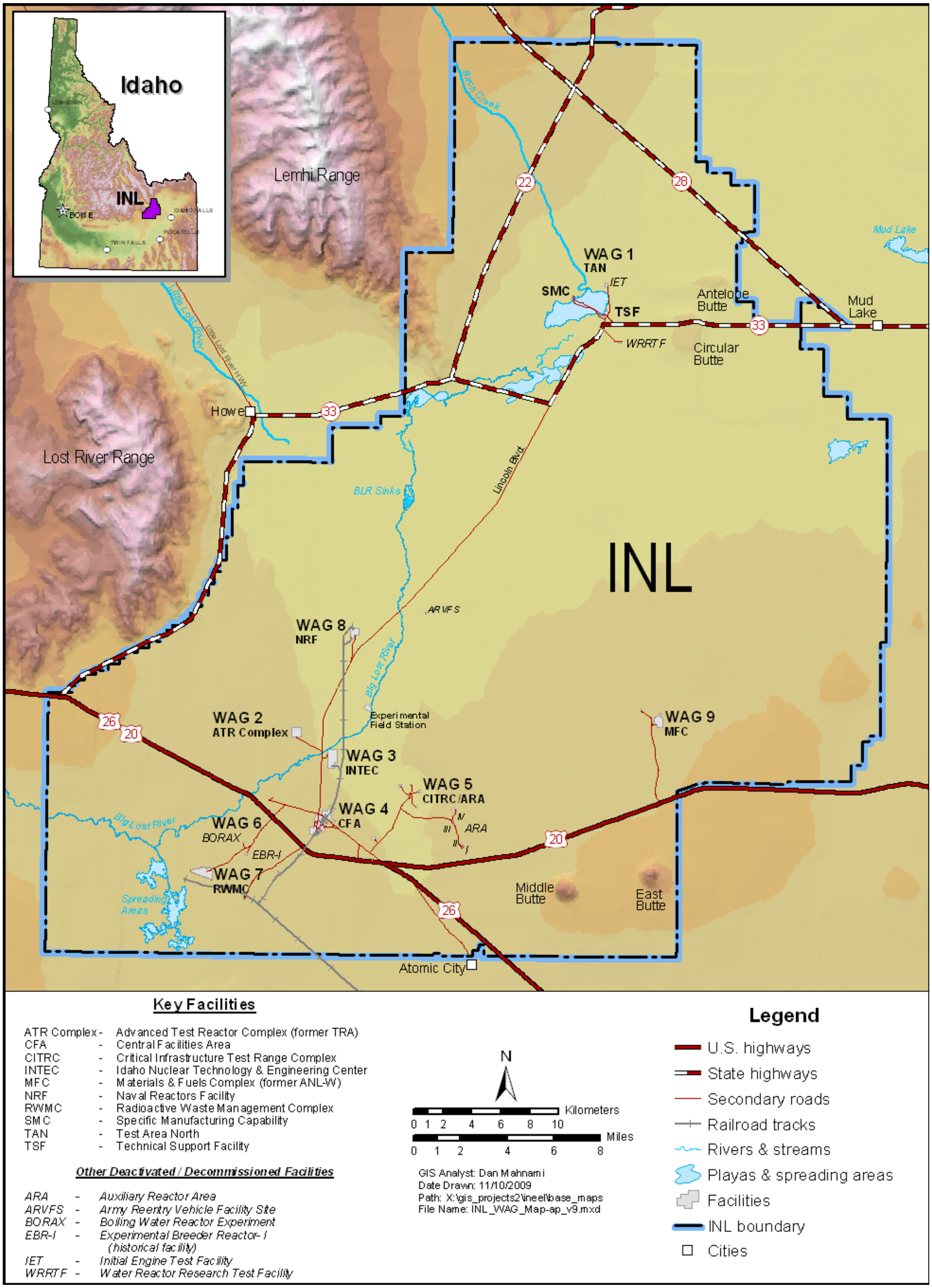

Figure 1. Map of the Idaho National Laboratory Site showing major facility areas and waste area groups.

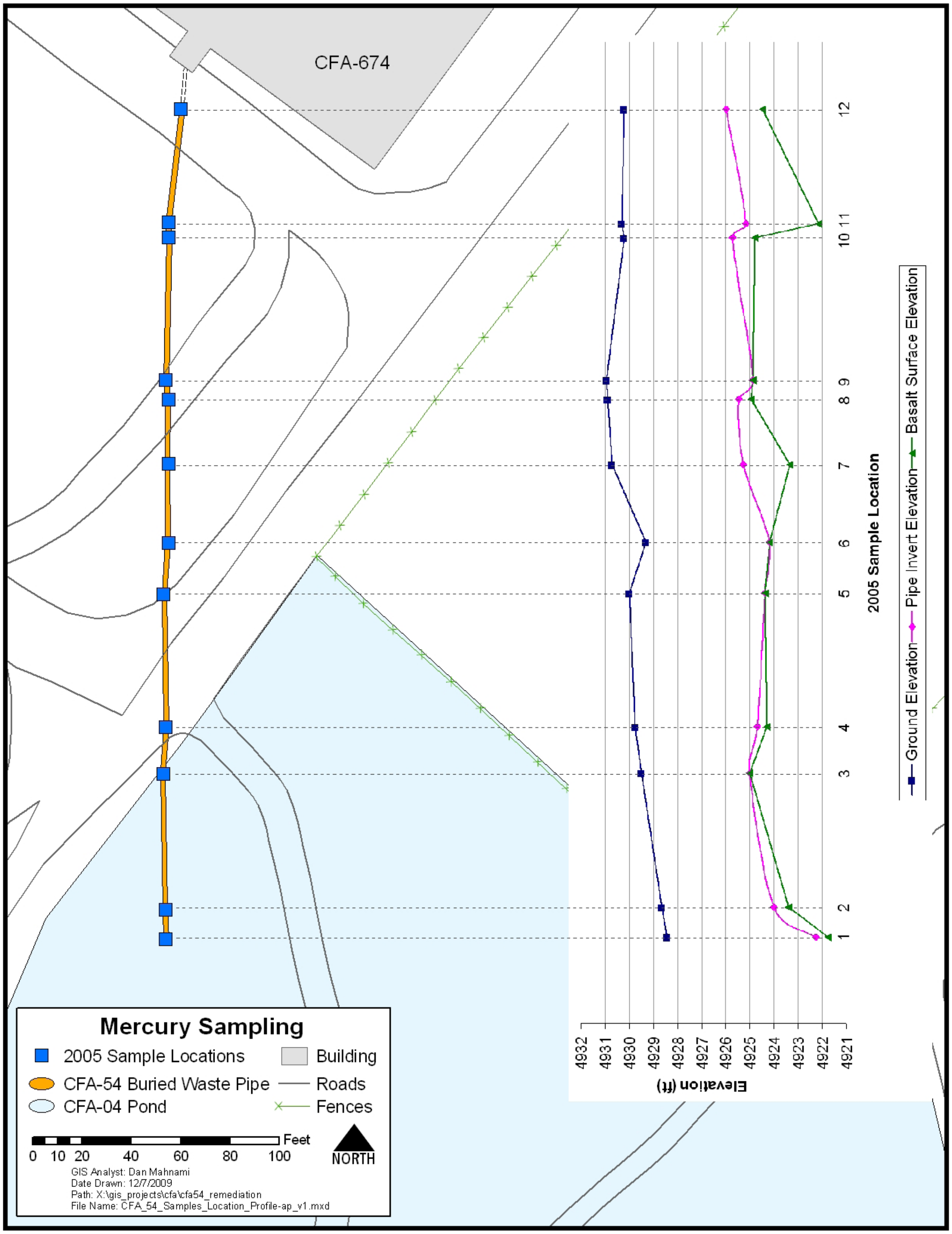

Figure 2. Location of CFA-54 and profiles of ground surface, buried pipe, and basalt.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

PLN-2128, "Environmental Restoration Project Health and Safety Plan," provides descriptions of most of the project personnel. Descriptions of personnel associated with this FSP, as well as those not included in PLN-2128, are provided in Sections 2.1 through 2.4. Table 2 lists key personnel, assignments, and contact information. A logbook entry will be made to show the name of the individual performing the function. These responsibilities may change throughout the sampling effort.

Table 2. Proposed personnel and job assignments.

Assignment	Name	Phone
Work project manager	Howard Forsythe	208-533-3563
Technical lead	Dean Shanklin	208-533-3542
Field team leaders	Dean Shanklin/Danny Smith	208-533-3542/208-520-4623
Health and safety officer	Nathan Wegener	208-533-0663
Samplers	TBD	TBD
Waste Generator Services waste technical specialist	Jason Orme	208-520-6400
Sample and Analysis Management representative	Donna Kirchner	208-533-3482
Environmental lead	Brent Burton	208-533-0153
Quality Assurance representative	Brian Chesnovar	208-520-1301
Environmental Restoration Project facility manager	David Diaz	208-533-3714

TBD to be determined

2.1 Technical Lead

The technical lead is responsible for field activities and for all personnel, including craft personnel, assigned to work at the project location. The technical lead acts as the interface between operations and project personnel and works to ensure that the sampling team achieves project objectives in a safe and efficient manner. The technical lead coordinates all document preparation, field and laboratory activities, data evaluation, risk assessment, dose assessment, and design activities.

2.2 Waste Generator Services Waste Technical Specialist

The INL Site Waste Generator Services (WGS) waste technical specialist ensures that waste disposal complies with approved INL Site waste management procedures. WGS personnel are responsible for helping to solve waste management issues at the task site. In addition, WGS personnel prepare appropriate documentation for waste disposal and make proper notifications, as required. All waste is disposed of using approved INL Site procedures in accordance with PRD-5030, "Environmental Requirements for Facilities, Processes, Materials and Equipment."

If samples require disposal, the WGS project representative is responsible to properly disposition the sample with the assistance of generator personnel. All waste must be characterized, and WGS personnel must pre-approve disposal.

2.3 Sample and Analysis Management Personnel

ICP Sample and Analysis Management (SAM) personnel are responsible for helping to define analyses that will meet project requirements, generating the sampling and analysis plan table and field guidance form, and generating and issuing sample labels.

2.4 Environmental Support

Environmental personnel are assigned to the job site to provide resources and expertise to resolve environmental issues. Personnel assigned to provide this support must be qualified to recognize and evaluate environmental concerns according to his or her expertise and are given the authority to take or direct immediate actions to ensure compliance and protection. In addition, environmental personnel assess and ensure compliance with applicable ICP procedures and documentation, including this FSP.

3. DATA QUALITY OBJECTIVES

The data quality objective (DQO) process developed by the EPA (EPA 2006) helps ensure that the type, quantity, and quality of data used in decision-making are appropriate for the intended application. DQOs for CFA-54 confirmation sampling are summarized in Table 3.

Table 3. Data quality objectives for CFA-54 confirmation sampling.

Item	Description
Problem Statement	The objective of the confirmation sampling activity at CFA-54 is to collect and analyze soil samples for mercury content to verify effectiveness of the selected remedial action (excavation and backfill with clean soil) and to determine whether additional remedial action is necessary before termination of the remedial action.
Decision Statement	**Decision Statement 1:** Determine whether mercury levels at the boundary of the excavation area are below the cleanup goal. **Alternative Action 1:** The 95% UCL on the mean concentration in the soil for mercury is below cleanup levels; remediation activities are complete. **Alternative Action 2:** The 95% UCL on the mean concentration in the soil for mercury is above cleanup levels; remediation activities are not complete.
Inputs to the Decision	• Sampling approach completed as designed • Cleanup levels (8.4 mg/kg) • Remedial action completed as designed • 1997 and 2005 analytical data from soil samples • Analytical data from confirmation samples.
Study Area Boundary	Section 1.2 describes the area to be sampled. The boundary of the excavation, approximately 354 ft long by a minimum of 4 ft wide and down to basalt (or 10 ft), will be sampled. Sampling will be conducted so that samples are temporally and spatially collocated.
Analytical Approach	**Action level:** OU 10-08 ROD (DOE-ID 2009a) cleanup level for CFA-54 is 8.4 mg/kg for mercury. **Theoretical decision rule:** If the 95% UCL of the population mean for mercury is below the respective cleanup levels, then the remedial action is complete, and no further excavation will be required. If the 95% UCL of the population mean for mercury is at or above the respective cleanup levels, then additional soil removal will be required.

Table 3. (continued).

Item	Description
Performance or Acceptance Criteria	The objective of this sample-collection event is simple and straightforward. The developed sampling design is not statistical; therefore, the analyses prescribed in this step are not applicable. The event will adhere to specific QA/QC procedures to ensure proper design, implementation, and analysis.
Optimize the Sampling Design	The remedial decision will be based on the mean concentration of the contaminant of concern. A 95% ULC of the population mean is used to determine whether the cleanup level has been attained. EPA guidance states that "…data sets with 20 to 30 samples provide fairly consistent estimates of the mean…" (EPA 1992). Because all contaminated materials (i.e., soil and piping) are expected to be removed during excavation above basalt, a random sampling approach—where all soils are presumed to have equal chances of being (or not being) contaminated, combined with biased samples (for worst case data)—is a defensible approach for confirmation sampling.

EPA U.S. Environmental Protection Agency
OU operable unit
QA quality assurance
QC quality control
ROD record of decision
UCL upper confidence limit

4. SAMPLE LOCATIONS, COLLECTION, ANALYSIS, AND DATA MANAGEMENT

4.1 Sample Collection

Results of confirmation sampling will be used to confirm that cleanup levels are met, based on the 95% upper confidence limit (UCL) on the mean. Confirmation sampling will be performed after the area has been excavated, as described in the OU 10-08 RD/RA Work Plan (DOE-ID 2010).

4.1.1 Sample Locations

Selected sample locations—post-excavation—are thought to best reflect the population, both spatially and vertically. A biased-random approach is employed. As shown in Figure 2, basalt is expected to be encountered along the entire length of the excavation. Therefore, soil samples are expected to be collected above basalt at all points. A stratified sampling approach will be deployed by dividing the excavation into seven 50-ft segments. The planned excavation is 354 ft long, divided by 50 ft, resulting in seven 50-ft segments, with the remaining 4 ft added to the final (i.e., southern) segment, which contains the pipe discharge. Nine primary samples will be collected from each segment—three each from the west side, center, and east side. West- and east-side sample locations will be randomly placed at the base of the excavation. The center sample location will be randomly placed and biased toward the existence of soil above the basalt. In addition, three quality assurance (QA) and quality control (QC) duplicate samples will be generated at randomly selected primary sampling locations. And finally, up to four biased samples will be collected, at locations selected by the field lead, from areas showing signs of potential contamination (e.g., staining or discoloration). This approach will result in the collection of 67 samples (i.e., 63 primary and four biased samples) plus up to seven duplicate samples (see Table 4). At a minimum, samples will be collected from each 50-ft segment upon completion of excavation of that specific segment.

Table 4. Distribution of planned samples per excavation segment.

Segment Number	Distance from Building CPP-674 (ft)	Number of Samples to Collect			
		West Side	**Center**	**East Side**	**Total**
1	0–50	3	3	3	9
2	50–100	3	3	3	9
3	100–150	3	3	3	9
4	150–200	3	3	3	9
5	200–250	3	3	3	9
6	250–300	3	3	3	9
7	300–354	3	3	3	9
Varies	Duplicate QA/QC samples[a]				7
Varies	4 biased samples				4
				Total	**74**

a. Duplicate samples will be collected at the rate of 1 in 20 per day or 1 during each sampling day, whichever is greater (up to 7 duplicate samples total).

QA quality assurance
QC quality control

After excavation, the border area and trench should be free of contamination. A hybrid or combination random or biased approach for confirmation sampling is defensible under these circumstances. The QAPjP recognizes that there are cases where a nonstatistical approach or nonrepresentative samples must be taken to meet project DQOs. For unexcavated soil remaining at CFA-54, collection of considerably more than the EPA-recommended minimum number of samples (i.e., 20 to 30) will result in a data set that can be used to calculate a 95% UCL, on the mean, for comparison to the cleanup level.

4.1.2 Presampling Meeting

Before sampling, project personnel will meet to ensure that sampling can be performed in a safe and compliant manner that will result in usable data. Project personnel also will ensure that all necessary equipment and documentation are present and that all personnel understand the project scope, objectives, hazards, and hazard controls. The corresponding health and safety plan (PLN-2128) and other facility manager-authorized work control documents will be reviewed to ensure that all hazards have been identified and mitigated, accordingly.

4.1.3 Confirmation Sampling and Analysis

Confirmation sampling and analysis will be performed on the soil surface at the bottom of the excavation, following remediation, to demonstrate that mercury concentrations are below cleanup levels.

Surveyors or project personnel will mark the sample locations before sample collection. A description of each sample location will be documented, including soil type, orientation within the excavation, and coordinates, to include elevation (i.e., depth).

Table 5 provides a general summary of the samples to be collected at CFA-54 (e.g., analyte, sample depth, media, type, sample container, preservation, and hold time) plus the total number of samples to be collected. A sampling and analysis table will be generated for this activity, before sample collection, that will contain project-standardized sample descriptions, locations, and analytes for which to sample to assist in sample collection and data entry into the ICP Environmental Data Warehouse (ICP 2010).

Table 5. General summary of samples to be collected at CFA-54.

Analysis Type	Sample Depth	Sample Media	Sample Type	Container and Headspace	Preservation	Hold Time (days)	Number of Samples
Total mercury	Excavated surface	Soil	Grab	Plastic soil pucks with minimal headspace	Cool to 4°C	28	67[a]
Total mercury	Excavated surface	Soil	dup	Plastic soil pucks with minimal headspace	Cool to 4°C	28	7[a]

a. Sixty-three primary samples, with up to seven duplicate samples and four biased samples.

Real-time screening for mercury contamination at CFA-54 will be performed using field mercury analyzers capable of analyzing mercury contamination in soil. Two field instruments have real-time mercury analysis capabilities in air and soil. The Jerome mercury vapor analyzer and the Ohio Lumex mercury analyzer can detect part–per-billion levels of mercury in air and soil. These instruments (or their equivalent) will be used for both real-time screening and confirmation analysis of the soil following site excavations. Excavation details are described in the OU 10-08 RD/RA Work Plan.

4.1.4 Sample Documentation and Management

The sample team lead will be responsible for controlling and maintaining all field documents and records and for verifying that all documents submitted to the ICP SAM group are maintained in good condition. All entries will be made in indelible black ink. Errors will be corrected by drawing a single line through the error and entering the correct information. All corrections will be initialed and dated.

Any deviations will be brought to the attention of project management. Any changes to the number of samples, the expected approach, or the analytical or quality control requirements will be noted in the project-specific log notes. Incidental changes that occur throughout the planning process may be documented in the sample log notes and do not require a Document Revision Form (http://icp-edms.inel.gov/docs/drf_menu.html), unless one or more of the following occur:

- Change in scope
- Increased hazards not already accounted for in supplemental work control
- Redefined population
- Significantly changed strategy.

A field Document Revision Form can be initiated, as needed, for unexpected conditions encountered in the field.

4.1.4.1 Field Logbooks. Sampling logbooks will be maintained in accordance with company sampling procedures. Field logbooks will be used to record information necessary to interpret the analytical data. All field logbooks will be controlled and managed according to company procedures. The QAPjP discusses use of a field team leader, calibration, and shipping logbooks. Some sample programs use only a sample logbook. In such cases, all pertinent information will be recorded in the sample logbook, and no other logbooks will be necessary.

4.1.4.2 Sample Logbook. A sample logbook will be used to record all pertinent sampling information, such as:

- Physical description of each sampling location
- Quality control samples
- Shipping information (if not applicable, samples will be relinquished to project personnel for analysis)
- Team activities
- Problems encountered
- Visitor names
- List of site contacts
- Any corrective actions taken as a result of field audits.

This logbook will be signed and dated at the end of each day's sampling activities.

4.1.5 Sampling Equipment, Calibration, and Setup

Sampling equipment, documentation, and any other supplies that will be used for sampling are identified in ICP standard procedures. Before sampling, new or decontaminated equipment will be obtained to support sampling activities. The following equipment and supplies will be used for sampling, as needed:

- Hand tools (e.g., disposable spades, spoons, or scoops)
- Aluminum pans, or equivalent
- Personal protective equipment designated in work control documents authorized by facility management, or as identified by the project safety representative
- Stakes or flags to mark sampling locations
- Chain-of-custody (COC) forms
- Sample logbook
- Wipes or absorbent towels
- Sample container and labels
- Authorized work control documents to direct fieldwork (i.e., sampling procedure or technical procedure and job safety analysis as an operations-related task or work order)
- Container for staging samples, or ice if samples are not immediately transferred to an analyst
- Adhesive tape
- Individual sample bags and waste bags

- Aluminum foil
- Pens and markers
- Custody seals.

If applicable, Industrial Hygiene personnel will be responsible for measuring and evaluating any chemical hazards. Any monitoring equipment used will be calibrated, as required, in accordance with ICP procedures. Any monitoring required by Safety personnel will be documented in sample log notes, if applicable, or performed by Safety personnel supporting this work activity.

4.1.6 Sample Designation and Labeling

Waterproof adhesive labels must be generated by the SAM representative and must display pertinent information (e.g., unique sample identifier, project name, sample location, and analysis type). The SAM representative will draft a sampling table, numbers, and labels that correlate directly to this sampling activity. Labels will be completed and placed on the containers in the field before collecting the sample. Sample team members will provide information necessary for label completion. Such information may include sample date, time, and the sampler's initials.

4.1.7 Chain of Custody

COC procedures will begin immediately after the first sample has been collected. At the time of sample collection, the sampling team will initiate a COC form for each sample. All samples will remain in the custody of a sampling team member until custody is transferred to the analytical laboratory sample custodian. Upon receipt at the laboratory, the sample custodian will review the sample labels and the COC form to ensure completeness and accuracy. If discrepancies are noted during this review, then immediate corrective action will be sought, and the sampling team member(s) will relinquish custody, as directed on the COC. Pending successful corrective action, the laboratory sample custodian will sign and date the COC form, signifying acceptance of delivery and custody of the samples. The COC will be performed in accordance with approved company procedures.

4.1.8 Sample Collection Procedures

Samples will be collected in accordance with company-approved procedures developed under QAPjP requirements. Specific procedures will be identified in the field logbooks.

4.1.9 Equipment Decontamination Procedures

Disposable equipment will be used to collect soil samples. Equipment decontamination will not be required.

4.1.10 Sample Transport

Because low levels of U-238 have been detected at CFA-54, QAPjP field radiological screening requirements will apply. Once sampling is complete, samples will be prepared for shipment, and applicable shipping papers will be completed. Samples will be packaged, and packages will be provided to the Packaging and Transportation shipper for transport, in accordance with MCP-9228, "Managing Nonhazardous Samples." Company-approved work control documents to direct sampling activities will be generated to supplement this FSP.

4.2 Sample Analysis

Sample analyses will be performed using a field mercury analyzer instrument, which will be operated by project personnel. Following the sample analysis practice established for the OU 3-13, Group 3, Other Surface Soils (Phase II) Project (DOE-ID 2009c, Section 7 and Appendix O), samples (200 mg or less) will be transferred to pre-weighed quartz "spoons," weighed again, and placed in an Ohio Lumex Mercury Analyzer for analysis. Sample weights will be determined by difference measurement and recorded in the laboratory logbook. Before sample analyses, the Lumex will be warmed up for no less than 1/2 hour for instrument stability. The instrument will be calibrated in accordance with the manufacturer's instructions before analyzing each sample set, using National Institute of Standards and Technology (NIST) standards. The instrument calibration curve will be established using a NIST soil standard (SRM-2710a, "Montana I Soil") (NIST 2010a) with 32.6 mg/kg mercury; whereafter, a blank standard and a second NIST soil standard (SRM-2711a, "Montana II soil") (NIST 2010b) with 6.25 mg/kg mercury will be analyzed. Then the soil samples will be analyzed.

Under ideal conditions, the Ohio Lumex instrument is capable of measurements in the low-to-sub-part-per-billion range. To facilitate rapid sample turnaround, the limit of analysis will not be sought after. Rather, the instrument will be calibrated to yield its highest accuracy results in the 10- to 50-ppm Hg range, which will provide for a minimum detection limit of 0.8 ppm Hg (DOE-ID 2009c). In accordance with the QAPjP, the basic requirement is that the required detection limit for the method be one-tenth, or less, than that of the regulatory value (the cleanup level). A minimum detection limit of 0.8 ppm is less than one-tenth the CFA-54 cleanup level of 8.4 mg/kg; therefore, this minimum detection limit will satisfy the project detection limits.

Various additional techniques will be used to ensure quality subsequent to analyzing the samples. A mixture of field duplicates, laboratory duplicates, matrix spikes, matrix spike duplicates, blanks, and NIST soil standards will be analyzed immediately after a set of sample analyses.

4.2.1 Analytical Methods

To ensure that data of acceptable quality are obtained from the confirmation sampling activity, standard EPA laboratory methods or technically appropriate methods for analytical determinations will be used to obtain sample data (see Table 6).

Table 6. Field real-time instrumentation and detection limit for mercury.

Analytical Method	Detection limit
EPA SW-846, Method 7473[a]	0.8 mg/kg

a. Method 7473, "Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry" (EPA 2007b).

4.2.2 Instrument and Calibration Procedures

4.2.2.1 Mercury Vapor Analyzers—Inside the Jerome mercury vapor analyzer is the Jerome gold film sensor, which is inherently stable and does not require frequent calibration. The Jerome instrument is factory calibrated using laboratory equipment containing NIST traceable permeation tubes. Depending on the frequency of use, it is recommended that the interval of calibration be every 12 months. The Lumex Mercury Analyzer is calibrated using NIST standards to establish a calibration curve, depending on the expected level of mercury contamination in the soil.

4.2.2.2 Field Instruments—All field instruments will be calibrated in accordance with appropriate procedures and the QAPjP (DOE-ID 2004a).

4.2.3 Laboratory Records

Laboratory records are required to document all activities involved in sample receipt, processing, analysis, and data reporting. Sample management records document sample receipt, handling, storage, and the sample analysis schedule. The records (1) verify that the COC and proper preservation were maintained, (2) reflect any anomalies in the samples, (3) note proper log-in of samples into the laboratory, and (4) address procedures used to prioritize received samples to ensure that holding-time requirements are met.

The laboratory is responsible to maintain documentation demonstrating laboratory proficiency with each method, as prescribed in standard operating procedures. Laboratory documentation will include sample preparation and analysis detail, instrument standardization, detection and reporting limits, and test-specific QC criteria. Any deviation from prescribed methods must be properly recorded. QA/QC reports will include general QC records (e.g., analyst training, instrument calibration, routine monitoring of analytical performance, and calibration verification). Project-specific information (e.g., blanks, spikes, calibration check samples, replicates, and splits performed in accordance with project requirements) may be documented

4.3 Data Management and Document Control

4.3.1 Data Reporting

The field laboratory associated with this project will adhere to the standards, as established by the SAM program, for requirements for analytical data deliverables for laboratories used by ICP.

4.3.2 Data Validation

The project has elected to perform all of the mercury analyses onsite to avoid delays associated with sample analysis turnaround and to increase the quantity of samples analyzed. No independent limitations and validation report will be generated, as is typical for analyses conducted by independent laboratories. An evaluation of the quality of sample data and QC samples will be performed in a manner similar to that conducted for mercury-contaminated soil site CPP-93, as described in Agency-approved document OU 3-13, Group 3, Other Surface Soils (Phase II) Remedial Action Report (DOE-ID 2009c). The evaluation will be performed to verify quality of the data and compliance to the FSP and the company quality program.

4.3.3 Data Quality Assessment

DQOs are covered in Section 3. In addition to meeting DQOs, the project must specify measurements necessary to produce acceptable data for CFA-54. The QA objectives for this project will be met through a combination of field and laboratory checks. Field QC checks will consist of collecting duplicates at the frequencies specified in Table 4. Laboratory checks may consist of initial and continuing calibration samples, laboratory control samples, matrix spikes, and matrix spike duplicates.

Acceptable tolerances are a reference to the statistical evaluation of data measurements. For additional information on acceptable tolerances and target analytical levels, see Chapter 9 of SW-846, *Test Methods for Evaluating Solid Waste* (EPA 2007a).

4.3.4 Prefinal Inspection and Completion Report

Confirmation data and data analysis will be presented in the prefinal inspection report for CFA-54, in accordance with the FFA/CO (DOE-ID 1991).

A remedial action completion report will be prepared that will include this project, in accordance with applicable program requirements. The report will contain a summary of all sample data generated during this sampling effort. Appendixes containing all sample results will be attached. The final report will also describe the sample-collection effort, and a description of the data quality assessment process may also be included. The final report will discuss how the data were used. The DQOs will be reviewed and evaluated to determine whether project objectives have been met.

4.3.5 Document Control

Document control consists of the clear identification of all project-specific documents in an orderly form, secure storage of all project information, and controlled distribution of all project information. Document control ensures that controlled documents of all types related to the project will receive appropriate levels of review, comment, and revision, as necessary. Upon completion of the confirmation sampling activity, all project documentation and information will be transferred to compliant storage, according to project, program, and company requirements. This information may include field logbooks, COC forms, sample coordinates map, data reports, and final technical reports.

5. WASTE MINIMIZATION AND MANAGEMENT

Throughout the sampling activity, emphasis will be placed on waste-reduction methods. Practices to be implemented to support waste minimization include, but are not limited to, the following:

- Restrict materials (especially hazardous materials) to those needed to perform work
- Substitute recyclable or burnable items for disposable items
- Reuse items, when practical
- Segregate of contaminated waste from uncontaminated waste
- Segregate reusable items (e.g., personal protective equipment and tools).

Types of waste generated may include sampling equipment (e.g., wipes, aluminum pans, tools, and personal protective equipment). The WGS project representative, with assistance from the waste generator, will prepare waste determination and disposition forms, material profiles, and container profiles. The planned disposition route for all sample waste will be to the Idaho CERCLA Disposal Facility.

6. HEALTH AND SAFETY REQUIREMENTS

Personnel who sample, transport, and analyze the soil must work under PLN-2128 and project-specific work control that contains hazard identification and mitigation.

7. REFERENCES

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