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Sampling and Analysis Instruction for the 120-F-1 Glass Dump Site

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ACRONYMS AND ABBREVIATIONS

Ag	silver
Am	americium
As	arsenic
Ba	barium
BHI	Bechtel Hanford, Inc.
Cd	cadmium
Co	cobalt
COPC	contaminants of potential concern
Cr	chromium
Cs	cesium
dpm	disintegration per minute
ERC	Environmental Restoration Contractor
Eu	europium
Hg	mercury
Pb	lead
PCB	polychlorinated biphenyl
Pu	plutonium
QC	quality control
SAI	sampling and analysis instruction
Se	selenium
Sr	strontium
TCLP	toxic characteristic leaching procedure
TOC	total organic carbon
U	uranium

Metric Conversion Chart

The following conversion chart is provided to the reader as a tool to aid in conversion.

Into Metric Units			Out of Metric Units		
<i>If You Know</i>	<i>Multiply By</i>	<i>To Get</i>	<i>If You Know</i>	<i>Multiply By</i>	<i>To Get</i>
Length			Length		
inches	25.4	Millimeters	millimeters	0.039	inches
inches	2.54	Centimeters	centimeters	0.394	inches
feet	0.305	Meters	meters	3.281	feet
yards	0.914	Meters	meters	1.094	yards
miles	1.609	Kilometers	kilometers	0.621	miles
Area			Area		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.0836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			Mass (weight)		
Ounces	28.35	grams	grams	0.035	ounces
Pounds	0.454	kilograms	kilograms	2.205	pounds
Ton	0.907	Metric ton	metric ton	1.102	ton
Volume			Volume		
teaspoons	5	Milliliters	milliliters	0.033	fluid ounces
tablespoons	15	Milliliters			
fluid ounces	30	Milliliters			
cups	0.24	Liters			
pints	0.47	Liters	liters	2.1	pints
quarts	0.95	Liters	liters	1.057	quarts
gallons	3.8	Liters	liters	0.264	gallons
cubic feet	0.028	cubic meters	cubic meters	35.315	cubic feet
cubic yards	0.765	Cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	Multiply by 9/5, then add 32	Fahrenheit
Radioactivity			Radioactivity		
curies	3.7×10^{10}	Becquerel	becquerel	2.7×10^{-11}	curies

1.0 INTRODUCTION

This sampling and analysis instruction (SAI) has been prepared to clearly define the sampling and analysis activities to be performed to develop the basis for surveillance and maintenance (S&M) of the 120-F-1 Glass Dumpsite. The purpose of this investigation is to augment historical information and obtain data to establish a technical basis for S&M at the site.

1.1 BACKGROUND

The Glass Dumpsite is an inactive trench that runs east to west. The site is covered with approximately 0.61 m (2 ft) of fluorescent tubes; incandescent light bulbs; instrument vacuum tubes; and small AAA, C, D cell batteries. The site also contains an assortment of chemical bottles, both large and small. The potential source of these chemical bottles is 108-F Laboratory. The site is located 275 m south of 128-F-1, 100-F burning pit and 650 m south-southeast of Building 105-F. Earth from the excavation has been mounded at the west end of the trench. The trench is approximately 10.67 m (35 ft) long, 2.44 m (8 ft) wide, and 1.22 m (4 ft) deep. No back filling appears to have occurred.

1.2 PREVIOUS INVESTIGATIONS

There were no previous investigations identified. Although it has been purported that a radiation survey was performed several years ago, no results are available. Concurrent with the preparation of this report, radiation surveys were conducted and have identified no detectable radiation. However, this radiation survey did not provide enough information to remove radiation protection requirements for field activity. Industrial hygiene technicians performed a background detection survey for total organic vapors, mercury vapors, and explosive gases. Mercury vapors were detected higher than background levels near the openings of broken fluorescent light tubes. No vapors were detected near the breathing zone.

1.3 CONTAMINANTS OF POTENTIAL CONCERN

The site is situated in the 100-F Area and the 108-F Laboratory is a potential source of the contents of the site. Therefore, the following list of contaminants of potential concern (COPC) will be utilized based on 108-F potential contaminants.

Radionuclide COPCs:

Am-241	Co-60	Cs-137	Eu-152	Eu-154	Sr-90	U-234
U-235	U-238	Pu-238	Pu-239/240			

Metals:

As	Ba	Cd	Cr	Hg	Pb	Se	Ag
----	----	----	----	----	----	----	----

Others:

PCBs	TOC	Asbestos	Nitrite	Nitrate	Sulfate	Fluoride	Phosphate
Chloride	Cyanide	Sulfide	Caustics				

1.4 PROBLEM DEFINITION

The problem is that there is not enough information to provide a technical basis for S&M. Some information was obtained from the Waste Information Data System and historical site review regarding the debris that was placed in the site. The primary goals of this SAI are to identify surface chemical and radiation hazards that pose an industrial health and safety threat to the field personnel associated with the Glass Dumpsite. The information acquired is not intended for waste designation or site closure purposes.

1.5 DECISIONS TO BE MADE

The following section presents all of the decisions that need to be made to resolve the problem identified in Section 1.4, along with the inputs needed to resolve each decision.

1.5.1 Decision Statements

1. Determine whether the residual white powder in the jar located on the south side of the dumpsite contains hazardous material. If the material is hazardous, this information can be passed on to the Remedial Action group. The consequence of a wrong decision is that the material is hazardous and the Remedial Action group is not notified. This information will be incidental since the Remedial Action group will fully characterize the dumpsite prior to remediation. Final remediation activities will not be planned solely on information obtained from the implementation of this SAI.
2. Determine whether residual radioactive contamination is present at or near the surface from previous uses. If there is radioactive contamination at or near the surface, this information can be passed on to the Remedial Action group. The consequence of a wrong decision is that radioactive contamination is present and the Remedial Action group is not notified. The lack of this information will be incidental since the Remedial Action group will fully characterize the dumpsite prior to remediation. Final remediation activities will not be planned solely on information obtained from the implementation of this SAI.
3. Determine whether residual chemical contamination is present at or near the surface from previous uses. If there is chemical contamination at or near the surface, this information can be passed on to the Remedial Action group. The consequence of a wrong decision is that chemical contamination is present and the Remedial Action group is not notified.

The lack of this information will be incidental since the Remedial Action group will fully characterize the dumpsite prior to remediation. Final remediation activities will not be planned solely on information obtained from the implementation of this SAI.

1.5.2 Required Inputs for Decision Making

Inputs required for Decision 1:

To determine whether the residual white powder in the jar located on the south side of the dumpsite contains hazardous material, it shall be analyzed for COPCs according to the priorities identified in Tables 1 and 2.

Inputs required for Decision 2:

To determine whether radioactive contamination is present at or near the surface from previous uses, a direct survey of as much area as possible and at least 60 technical smear surveys shall be analyzed. This will produce a smearable limit of less than 100 dpm cesium-137 equivalent beta and less than 10 dpm plutonium-239 equivalent alpha.

If no contamination is detected with field instruments, radiological coverage requirements will not be applicable, but will be provided as a courtesy for the remainder of the assessment.

If detectable contamination is found above the 95 percent upper confidence level minimum detectable activity of the instruments, samples from the affected area/item shall be analyzed according to the priorities identified in Table 2.

Inputs required for Decision 3:

To determine whether potential chemical contamination is present at or near the surface from previous uses, the area will be surveyed visually for suspicious conditions (discoloration, etc.). Samples will be taken from suspicious areas discovered in the visual survey, if necessary.

2.0 PROJECT MANAGEMENT

The following section identifies the individuals or organizations participating in the project and discusses specific roles and responsibilities of the individuals/organizations. This section also discusses the quality objectives for measurement data, and discusses the special training requirements for the staff performing the work.

2.1 PROJECT/TASK ORGANIZATION

The task shall be managed through the Surveillance/Maintenance and Transition Project (see Figure 1 for organizational chart) and has been assigned to the Inactive Facilities Surveillance and Maintenance/Radiation Area Remedial Action Task Lead. The Environmental Restoration Contractor (ERC) Field Support Group shall provide assistance in site preparation, assist in collecting samples, and overall supervision of the field activity. The Sample and Data Management Group arrange for analytical services. The ERC Safety and Health Group shall provide radiological control, industrial safety and health support as required, while the ERC Assessment and Environmental Compliance Group shall ensure that environmental activities are performed in a responsible manner.

Figure 1. Organizational Chart

2.2 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The required detection limits and precision and accuracy requirements for each of the analyses to be performed are summarized in Tables 1 and 2. The tables are in sample analysis priority order.

Table 1. Table Summarizing Data Quality Requirements for Solid Media.

Media	Analytical Method	Analytical Parameter	Regulatory Limit	Detection Limit ¹ pCi/g or mg/kg	Precision	Accuracy
Solids	Microscopy	Asbestos	N/A	1%	+/- 30%	+/- 30%
Solids	Electrode/paper	Caustics	N/A	0.1 0.1	+/- 30%	+/- 30%
Solids	Ion Chrom. - EPA300.0	Nitrate	N/A	0.1 5	+/- 30%	+/- 30%
Solids	Ion Chrom. - EPA300.0	Nitrite	N/A	0.1 5	+/- 30%	+/- 30%
Solids	Ion Chrom. - EPA300.0	Sulfate	N/A	2 10	+/- 30%	+/- 30%
Solids	Ion Chrom. - EPA300.0	Fluoride	N/A	0.2 1	+/- 30%	+/- 30%
Solids	Ion Chrom. - EPA300.0	Phosphate	N/A	2 10	+/- 30%	+/- 30%
Solids	Ion Chrom. - EPA300.0	Chloride	N/A	2 10	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Arsenic	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Barium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Cadmium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Chromium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Lead	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Selenium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Silver	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW846 – 1311/6010	Mercury	N/A	Extract ² >>>	+/- 30%	+/- 30%
Solids	SW-846 – 9010/9012	Cynaide	N/A	.5 3	+/- 30%	+/- 30%
Solids	Sw-846 – 9030	Sulfide	N/A	4 10	+/- 30%	+/- 30%
Solids	GC/MS SW-846 - 8270	Semi-Volatile Organics	N/A	0.5 0.5	+/- 30%	+/- 30%
Solids	GC/MS SW-846 - 8260	Volatile Organics	N/A	.002 .002	+/- 30%	+/- 30%
Solids	GC SW-846 - 8080	PCBs (if soils)	N/A	0.05 10	+/- 30%	+/- 30%
Solids	Gamma Energy Analysis	Co-60	N/A	0.1 1	+/- 3σ	+/- 3σ
Solids	Gamma Energy Analysis	Cs-137	N/A	0.1 1	+/- 3σ	+/- 3σ
Solids	Gamma Energy Analysis	Eu-152	N/A	0.1 1	+/- 3σ	+/- 3σ
Solids	Gamma Energy Analysis	Eu-154	N/A	0.1 1	+/- 3σ	+/- 3σ
Solids	Proportional Counting	Gross Alpha	N/A	10 25	+/- 30%	+/- 30%
Solids	Proportional Counting	Gross Beta	N/A	15 30	+/- 30%	+/- 30%
Solids	Beta Counting	Sr-90	N/A	1 5	+/- 30%	+/- 30%
Solids	Alpha Energy Analysis	Pu-238, Pu-239/240	N/A	1 20	+/- 30%	+/- 30%
Solids	Alpha Energy Analysis	Am-241	N/A	1 20	+/- 30%	+/- 30%
Solids	Alpha Energy Analysis	U-234, U-235, U-238	N/A	1 20	+/- 30%	+/- 30%

¹First value is for "Full Protocol"; second value is for Rapid Turn around or Reduced Volume analysis. Full Protocol detection limits require larger volume shown. Detection limits are based on optimal conditions. Sample specific matrix effects or interference may raise the values shown

²TCLP values are reported as liquid extract concentrations for solid samples and bulk liquid concentrations for liquid samples.

Table 2. Table Summarizing Data Quality Requirements for Liquid Media.

Media	Analytical Method	Analytical Parameter	Regulatory Limit	Detection Limit ¹ pCi/L or ug/L	Precision	Accuracy
Liquid	Microscopy	Asbestos	N/A	1%	+/- 30%	+/- 30%
Liquid	Electrode/paper	Caustics	N/A	0.1 0.1	+/- 30%	+/- 30%
Liquid	Ion Chrom. - EPA300.0	Nitrate	N/A	0.1 5	+/- 30%	+/- 30%
Liquid	Ion Chrom. - EPA300.0	Nitrite	N/A	0.1 5	+/- 30%	+/- 30%
Liquid	Ion Chrom. - EPA300.0	Sulfate	N/A	2 10	+/- 30%	+/- 30%
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Liquid	SW846 - 1311/6010	Barium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Liquid	SW846 - 1311/6010	Cadmium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Liquid	SW846 - 1311/6010	Chromium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Liquid	SW846 - 1311/6010	Lead	N/A	Extract ² >>>	+/- 30%	+/- 30%
Liquid	SW846 - 1311/6010	Selenium	N/A	Extract ² >>>	+/- 30%	+/- 30%
Liquid	SW846 - 1311/6010	Silver	N/A	Extract ² >>>	+/- 30%	+/- 30%
Liquid	SW846 - 1311/6010	Mercury	N/A	Extract ² >>>	+/- 30%	+/- 30%
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Liquid	Alpha Energy Analysis	Pu-238, Pu-239/240	N/A	1 20	+/- 30%	+/- 30%
Liquid	Alpha Energy Analysis	Am-241	N/A	1 20	+/- 30%	+/- 30%
Liquid	Alpha Energy Analysis	U-234, U-235, U-238	N/A	1 20	+/- 30%	+/- 30%

¹First value is for "Full Protocol"; second value is for Rapid Turn around or Reduced Volume analysis. Full Protocol detection limits require larger volume shown. Detection limits are based on optimal conditions. Sample specific matrix effects or interference may raise the values shown.

²TCLP values are reported as liquid extract concentrations for solid samples and bulk liquid concentrations for liquid samples.

2.2.1 Field Instruments Detection Methods and Limits

The radiation detection methods and limits will be in accordance with the ERC procedures. The instruments used shall be capable of detecting down to 3000 dpm/100 cm² total activity while scanning at four inches per second, 1000 dpm/smear beta and can detect 100 dpm/100 cm² alpha on a static count.

The instruments used in detecting total organic vapors shall have 1 part per million above background as a minimum detectable signal. The instruments used in detecting mercury vapor shall have 0.003mg/m³ above background. The instruments used in detecting explosive gases shall have capability to detect 1 percent lower explosive limit (15 to 21 percent oxygen environment).

2.3 SPECIAL TRAINING REQUIREMENTS

Training or certification requirements needed by personnel are described in BHI-HR-02, *ERC Training Procedures*, and BHI-QA-03, *ERC Quality Assurance*, Plan Numbers 5.1, Field Sampling Quality Assurance Program Plan,” and 5.2, “Onsite Measurements Quality Assurance Program Plan.” Decontamination and Decommissioning workers, Radiological Control Technicians, Samplers, and other field personnel shall have completed before starting work any other training as defined by the work package including a current physical.

3.0 MEASUREMENT/DATA ACQUISITION

The following section presents the sampling process design, along with the requirements for sampling methods, sample handling, custody, preservation, containers, and holding times. This section also addresses the requirements for field and laboratory quality control (QC), instrument calibration and maintenance, and field documentation.

3.1 SAMPLING PROCESS DESIGN

The Analytical Field Services organization needs to collect samples at the 120-F-1 Glass Dumpsite. Based on field observations, there is very little sample media present at the site. Follow all protocols identified in the procedures. Collect the container of powder/solid on the south edge of the site for sample analysis. Exercising professional judgement, use an extension devise and slightly move surface items and containers. Collect any potential sample media for sample analysis. Detailed field documentation is absolutely necessary for this activity and will be recorded in the Analytical Field Services Sample log.

3.2 SAMPLING METHODS REQUIREMENTS

The procedures to be implemented in the field should be consistent with those outlined in BHI-EE-01, *Environmental Investigation Procedures*, including the following:

<i>Procedure #</i>	<i>Procedure Title</i>	<i>Revision #</i>
1.5	Field Logbooks	2
2.0	Sample Event Coordination	1
2.1	Sampling Documentation Processing	1
2.2	Data Package Receipt and Control	1
2.7	Sample Disposition Record	1
3.0	Chain of Custody	2
3.1	Sample Packaging and Shipping	1
4.0	REVISION ORDER	A
	Soil and Sediment Sampling	2
4.2	Sample Storage and Shipping Facility	2
4.4	Container Sampling	0

3.3 SAMPLE HANDLING, SHIPPING, AND CUSTODY REQUIREMENTS

All sample handling, shipping, and custody should be performed in accordance with BHI-EE-01 procedures identified in Section 3.2 above.

3.4 SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES

The sample preservation, container, and holding time requirements for the analyses to be performed are identified in the Sample Authorization Form/Field Sampling Requirements. These items are maintained and verified by the Sample and Data Management Group.

3.5 QUALITY CONTROL REQUIREMENTS

The QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained. When performing this field sampling effort, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity. Based on the volume of sample material that will be present at the site, no field QC samples will be collected. Disposal collection devices will be used whenever possible. Laboratory QC will be conducted on each batch process used.

3.6 INSTRUMENT CALIBRATION AND MAINTENANCE

All field screening and analytical instruments shall be calibrated and maintained in accordance BHI-QA-03, Procedure 5.2. The results from all instrument calibration and maintenance activities shall be recorded in a bound logbook in accordance with procedures outlined in BHI-EE-01, Procedure 1.5, "Field Logbooks." Tags will be attached to all field screening and onsite analytical instruments noting the date when the instrument was last calibrated, along with the calibration expiration date.

3.7 FIELD DOCUMENTATION

Field documentation shall be kept in accordance with BHI-EE-01 including the following procedures, Procedure 1.5, and Procedure 3.0, "Chain of Custody."

4.0 ASSESSMENTS AND RESPONSE ACTIONS

The Compliance and Quality Programs Group may conduct random surveillance and assessments in accordance with BHI-MA-02, *ERC Project Procedures*, Procedure 5.3, "Self-Assessments," to verify compliance with the requirements outlined in this sampling and analysis instruction, project work packages, the Bechtel Hanford, Inc. (BHI) Quality Management Plan, and BHI procedures and regulatory requirements.

Deficiencies identified by one of these assessments shall be reported in accordance with BHI-MA-02, Procedure 5.3. Corrective actions will be taken by the Project Engineer in accordance with DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Documents*, Volume 1, Section 4.0 (DOE 1996) to minimize recurrence.

5.0 DATA VERIFICATION AND VALIDATION REQUIREMENTS

Data verification and validation is performed on analytical data sets primarily to confirm that sampling and chain-of-custody documentation is complete, sample numbers can be tied to the specific sampling location, samples were analyzed within the required holding times, and analyses met the data quality requirements specified in the sampling and analysis instruction. All data verification and validation shall be performed in accordance with BHI-EE-01, Procedure 2.5, "Data Package Validation Process;" WHC-SD-EN-SP-001, *Data Validation Procedure for Radiochemistry Analyses* (WHC 1993a); and WHC-SD-EN-SP-002, *Data Validation Procedure for Chemical Analyses* (WHC 1993b).

6.0 MANAGEMENT OF INVESTIGATION DERIVED WASTE

Investigation-derived waste generated by characterization activities will be managed in accordance with BHI-EE-10, *Waste Management Plan*. Unused samples and associated laboratory waste for the analysis will be disposition in accordance with the laboratory contract and agreements.

7.0 HEALTH AND SAFETY

All field operations will be performed in accordance with BHI health and safety requirements outlined in BHI-SH-01, *Hanford ERC Environmental, Safety, and Health Program*, and the requirements of HSRCM-1, *Hanford Site Radiological Control Manual* (DOE 1995). In addition, a work control package will be prepared in accordance with BHI-MA-02, which will further control site operations. This package will include a site-specific health and safety plan and applicable radiological work permits.

The sampling procedures and associated activities will take into consideration exposure reduction and contamination control techniques which will minimize the radiation exposure to the sampling team as required by BHI-QA-01, *ERC Quality Program*, and BHI-SH-01.

8.0 REFERENCES

BHI-EE-01, *Environmental Investigations Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-EE-10, *Waste Management Plan*, Bechtel Hanford, Inc., Richland, Washington.

BHI-HR-02, *ERC Training Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-MA-02, *ERC Project Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-QA-01, *ERC Quality Program*, Bechtel Hanford, Inc., Richland, Washington.

BHI-QA-03, *ERC Quality Assurance*, Bechtel Hanford, Inc., Richland, Washington.

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