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REDOX Paint Sampling and Analysis Instruction

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Environmental Restoration

Submitted by: Bechtel Hanford, Inc.

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REDOX Paint Sampling and Analysis Instruction

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ACRONYMS

BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COC	contaminant of concern
COPC	contaminant of potential concern
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Document*
HSRCM	*Hanford Site Radiological Control Manual*
PCB	polychlorinated biphenyl
QA	quality assurance
QC	quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
SAI	sampling and analysis instruction

1.0 INTRODUCTION

This sampling and analysis instruction (SAI) describes the sampling and analysis activities to be performed to obtain waste characterization information for an exterior door removed from the 202-S Building (also referred to as the Reduction/Oxidation [REDOX] Plant). In addition, the data may be used to support future waste disposition of painted materials at the 202-S Facility.

This section provides background information about the door, a list of contaminants of concern (COCs) for the materials that will require sampling and analysis, and decisions that will be made based on the analytical results.

1.1 BACKGROUND

On March 7, 2001, an exterior door was removed from a 202-S Facility airlock. This door was removed by the 233-S Decommissioning Project as part of a decontamination control activity because grout that had been applied to the floor had rendered the door unusable. A new door was installed to allow the airlock and emergency exit from the 202-S Facility north sample to remain operational. Because the door was part of an airlock, the potential exists for radiological contamination to be present on both sides of the door.

After removal, the door was declared to be waste material and is being managed as *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) waste by the 233-S Project. The door is painted green on both sides and was later repainted blue on the exterior side. The door weighs 62.6 kg (138 lb) and has an asbestos core for the purposes of fire-proofing. In compliance with U.S. Department of Energy, Federal, and state environmental requirements, the painted surfaces of the door must be sampled and analyzed to determine proper disposal methods.

1.2 CONTAMINANTS OF POTENTIAL CONCERN

Table 1 contains a list of the COCs for the paint on the REDOX door. This list was generated by identifying all credible contaminants of potential concern (COPCs) based on historical process operations and waste designation requirements.

Table 1. Contaminants of Potential Concern.

Media	COPCs (Specific)
Paint on exterior surface of door	Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, VOCs, SVOCs, pesticides, PCBs, plutonium, Am-241, Sr-90, Cs-137, Co-60, Eu-152, Eu-154, Eu-155

PCB = polychlorinated biphenyl
SVOC = semi-volatile organic compound
VOC = volatile organic compound

1.3 RATIONALE FOR CONTAMINANT OF POTENTIAL CONCERN EXCLUSIONS

Table 2 identifies the COPCs that were removed from the list if they were not regulated, posed no risk, or if process knowledge confirmed that the materials would not be present.

Table 2. Excluded Contaminants of Potential Concern.

Media	COPCs Excluded	Rationale for Exclusion
Paint on exterior surface of door	VOCs	The paint is old and dried. The VOCs potentially present in unused paint would have polymerized or evaporated since application.
	SVOCs	The paint is old and dried. The SVOCs potentially present in unused paint would have polymerized or evaporated since application.
	Pesticides	While paints on wood surfaces may include pesticides, the waste is a metal door. Metal surfaces are not expected to be painted with pesticide-treated paints.
	Radionuclides	Plutonium, americium-241, and strontium levels can be determined using GEA data and the facility profile, which will meet waste acceptance criteria.

1.4 CONTAMINANTS OF CONCERN

Table 3 identifies the final list of COCs for the identified media.

Table 3. Contaminants of Concern.

Media	Known or Suspected Source of Contamination	Type of Contamination (General)	COCs (Specific)
Paint on exterior surface of door	Older paint potentially contains heavy metals	Heavy metals	Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
	Older paint potentially contains PCBs	PCBs	PCBs
	Radiological COCs should be assessed to facilitate offsite disposal or treatment	Radiological	Gross alpha, gross beta, GEA

1.5 PROBLEM DEFINITION

Insufficient information is available concerning exterior paint (i.e., door primer, original green, and a later overcoat of blue paint) used at the 202-S Facility to accurately designate the material for waste disposal. To provide waste disposition, sampling and analysis is necessary to determine if *Resource Conservation and Recovery Act of 1976* metals, polychlorinated biphenyls (PCBs), and radionuclides are present.

1.6 DECISIONS TO BE MADE

The following subsections present the decisions that need to be made to resolve the problem identified in Section 1.5 and the inputs needed to resolve each decision.

1.6.1 Available Information

Table 4 lists the information that is needed to designate the waste door for disposal and if the needed information is available.

Table 4. Available Information. (2 Pages)

Information Needed	Available Information	Is Information Sufficient
Listed dangerous waste code status	The paint was used on the door, and hence there is no possible "U/P" listing. There is no knowledge of any "K-listed" processes on the Hanford Site. There is no knowledge of "F-listed" waste contacting the door, the use of any solvents on the door, or any other "F-listed" processes occurring in association with the door.	Yes.
Ignitable waste code status	The paint is dried on the door. The paint cannot meet the definition of a flammable liquid. Dried paints are not known to meet the definition of a flammable solid or an oxidizer either.	Yes.
Corrosive waste code status	While special paints may be corrosive, typical paints are not corrosive. This metal door shows no signs of corrosion due to the paint.	Yes.
Reactive waste code status	Paint is not known to be reactive, and the door has been exposed to the environment and handled extensively with no indication of dangerous reactions.	Yes.
Toxicity characteristic waste code status	Some paints are known to contain heavy metals. The paint has dried and any VOCs or SVOCs would have polymerized or evaporated. While often present in paints used on wood surfaces, pesticides are not typically present when for paint used on metal surfaces and, therefore, analysis is not required.	No, analyze for metals.
Toxic dangerous waste code status	Paints are typically non-toxic. The VOCs and SVOCs are the mostly likely constituents to cause a paint to be toxic (these are not present, as discussed above). Other possible toxic constituents are dyes. Some of these include heavy metals, which are being tested for already. There are no tests for other possible toxic compounds in paints, only ions, which are primarily not toxic, except for heavy metals.	Yes.
Persistent dangerous waste code status	Polycyclic aromatic hydrocarbons are not constituents in paints. Halogenated organic compounds are rarely present in paints and only in small concentrations, which are further diluted by the waste matrix of the door. In addition, PCBs are suspected and would show up in the test for halogenated compounds.	Yes.
PCB concentrations	PCBs are known to be present in some paints. Analysis is required to determine its presence.	No; analyze for PCBs.
Information regarding asbestos-containing materials	The door is known to contain asbestos.	Yes.

Table 4. Available Information. (2 Pages)

Information Needed	Available Information	Is Information Sufficient
Radiological data	The door is in a radiological area and is potentially contaminated.	No analysis required.
Information regarding land disposal restricted materials	No additional land disposal restriction issues than those discussed above.	Yes.
Information regarding disposal facility waste acceptance criteria	No known issues regarding facility acceptance criteria.	Yes.

1.6.2 Decision Statements and Action Levels

The scope of this project is to determine appropriate handling, disposal, and/or treatment requirements to dispose the REDOX door. The following decisions need to be made to designate this waste for disposal.

1. Determine if the paint on the door contains residual radiological activity exceeding the criteria in BHI-EE-10, *Waste Management Plan*, Part II, Implementing Procedures, Procedure 8.0, "Release of Nonradioactive Waste," Table 1 and must be controlled as radioactive waste.

2. Determine if the paint on the door is a dangerous waste and must be controlled as a hazardous waste.

Table 5 lists the COCs and action levels identified to characterize and designate the waste materials.

Table 5. Regulatory Action Levels and Basis. (2 Pages)

Media	COCs	Preliminary Action Level	Basis for Setting Action Level
Radionuclides			
Paint	Gross alpha	5 pCi/g	BHI-EE-10, Part II, Procedure 8.0
	Gross beta	10 pCi/g	
	GEA	10 pCi/g	
Metals			
Paint	Arsenic	5.0 mg/L (TCLP)	40 CFR 261.24
	Barium	100 mg/L (TCLP)	
	Cadmium	1.0 mg/L (TCLP)	
	Chromium	5.0 mg/L (TCLP)	

Table 5. Regulatory Action Levels and Basis. (2 Pages)

Media	COCs	Preliminary Action Level	Basis for Setting Action Level
	Lead	5.0 mg/L (TCLP)	
	Mercury	0.20 mg/L (TCLP)	
	Selenium	1.0 mg/L (TCLP)	
	Silver	5.0 mg/L (TCLP)	
Nonmetals			
Paint	PCB	10 ppm	40 CFR 268.48

CFR = *Code of Federal Regulations*
TCLP = toxicity characteristic leachate procedure

1.6.3 Required Inputs for Decision Making

The Table 6 lists the sampling and analysis requirements for each of the media involved in the decision-making process.

Table 6. Sample Design.

Media	COCs	Sample Type and Location	Sampling Method	Analysis
Paint	Gross alpha, gross beta, GEA	One composite sample from the door surface	Scrape paint from both sides of the door. Combine into single composite sample.	Gross alpha/beta by GPC, GEA
	PCB	One composite sample from the door surface	Scrape paint from both sides of the door. Combine into single composite sample.	PCB – Method 8082-GC
	TCLP metals	One composite sample from the door surface	Scrape paint from both sides of the door. Combine into single composite sample.	TCLP metals by ICP – Method 1311/6010

ICP = inductively coupled plasma

2.0 PROJECT MANAGEMENT

This section identifies the individuals or organizations participating in the project and discusses the 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 staff performing the work.

2.1 PROJECT/TASK ORGANIZATION

Table 7 identifies the individuals participating in the project planning and identifies their organization, specific roles, and responsibilities.

The following organizations will provide support for the sampling efforts:

- The Surveillance/Maintenance and Transition Project will provide project management, task leadership, and engineering support for the planning and sampling associated with this SAI. Support will include the following:

  – Provide task management necessary to carry out tasks
  – Coordinate support for sampling activities.

- The 233-S Decommissioning Project will provide waste management for the door in accordance with the CERCLA activities that were involved in generating this door.

Table 7. REDOX Door Characterization Team Members.

Name	Organization	Role and Responsibility
Bill Price	BHI	Environmental Technologies
Chris Kemp	BHI	Environmental Lead
Duane Jacques	CHI	Technical Support
Greg Borden	BHI	Waste Disposition
Todd Grabner	BHI	Waste Shipper
Rich Lipinski	BHI	Waste Disposition
Wendy Thompson	BHI	Sampling/Data Oversight
Rick Woods	BHI	Task Lead

BHI = Bechtel Hanford, Inc.
CHI = CH2M Hill Hanford, Inc.

- The Analytical Field Services and Sample Management organizations will provide personnel to support planning and implementation of sampling activities. Support will include the following:

  – Develop and issue the sampling authorization form
  – Provide unique sample identification number
  – Arrange for laboratory analysis of sample
  – Provide clean certified sample bottle/container
  – Document sampling activities in a controlled logbook
  – Initiate chain-of-custody documentation for samples

- Collect samples
- Package and ship samples
- Receive data packages from the laboratory
- Provide laboratory data packages to the project.

- The Field Support organization will provide field management, field engineering, and coordination of other field support functions as required to perform sampling. This includes conducting and documenting pre-job meetings when supporting sampling.

- The Environmental Technologies organization will provide waste management and sampling support that will include the following:

  - Provide waste designation and prepare waste profiles
  - Provide a Waste Transportation Specialist
  - Coordinate waste disposal.

- The Quality, Safety, and Health organization will provide safety planning to support field activities.

- The Compliance and Quality Programs organization is responsible for performing independent quality assurance (QA) activities, as appropriate.

2.2 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The required detection limits and the precision and accuracy requirements for each of the analyses to be performed are summarized in Table 8.

Table 8. Summary of Data Quality Requirements. (2 Pages)

Media	COCs	Analytical Method	Regulatory Action Level	Practical Quantitation Limit	Precision	Accuracy
Paint	Gross alpha	GPC	5 pCi/g	5 pCi/g	±20%	±20%
	Gross beta	GPC	10 pCi/g	5 pCi/g	±20%	±20%
	GEA	GEA	10 pCi/g	1 pCi/g	±20%	±20%
	Arsenic	TCLP metals by ICP – 1311/6010	5.0 mg/L	2.5 mg/L	±20%	±20%
	Barium		100 mg/L	50 mg/L	±20%	±20%

Table 8. Summary of Data Quality Requirements. (2 Pages)

Media	COCs	Analytical Method	Regulatory Action Level	Practical Quantitation Limit	Precision	Accuracy
	Cadmium		1.0 mg/L	0.5 mg/L	±20%	±20%
	Chromium		5.0 mg/L	2.5 mg/L	±20%	±20%
	Lead		5.0 mg/L	2.5 mg/L	±20%	±20%
	Selenium		1.0 mg/L	0.5 mg/L	±20%	±20%
	Silver		5.0 mg/L	2.5 mg/L	±20%	±20%
	PCB	PCBs by 8082 - GC	10 ppm	5 ppm	±20%	±20%

2.3 SPECIAL TRAINING REQUIREMENTS

Training or certification requirements for personnel are described in BHI-HR-02, *ERC Training Procedures*, and BHI-QA-03, *ERC Quality Assurance Program Plans*, Plan No. 5.1, "Field Sampling Quality Assurance Program Plan." Field personnel shall have completed the following mandatory training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- Radiation Worker Training
- Hanford General Employee Training.

In addition, sampling personnel shall review this SAI and the applicable sampling procedures identified in this SAI.

3.0 MEASUREMENT/DATA ACQUISITION

This section presents the sampling process design and 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 sampling will consist of scraping paint chips from both the blue and green paint to collect approximately 25 g of paint. A metal paint scraper will be used to remove the paint from the door. The scraper will be pre-cleaned using BHI-EE-01, *Environmental Investigations Procedures*, Procedure 3.2, "Field Decontamination of Sampling Equipment." A new, clean

polyethylene bag will be used to collect the scraped paint chips and composite the sample media. The paint will be scraped from the door in such a manner that the sample will include all layers of paint and primer. In general, the applicable portions of BHI-EE-01, Procedure 4.5, "Sample Compositing," should be followed, to obtain a representative composite sample of the paint material.

The sample requirements are identified in Table 9.

Table 9. Sample Requirements.

Media	COCs	Sample Type and Location	Sampling Method	Analysis
Paint	Radionuclides, PCB, heavy metals	One composite sample from the door surface	Scrape equal volumes of paint from both sides of the door. Combine into single composite sample.	Gross alpha/beta, GEA, PCB (8082-GC), TCLP metals (1311/6010).

3.2 SAMPLE HANDLING, SHIPPING, AND CUSTODY REQUIREMENTS

All sample handling, shipping, and custody should be performed in accordance with BHI-EE-01, Procedure 3.1, "Sample Packaging and Shipping"; Procedure 3.0, "Chain of Custody"; and Procedure 4.2, "Sample Storage and Shipping Facility."

3.3 SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES

The sample preservation, container, and holding-time requirements for the analyses to be performed will be specified on the sampling authorization form in accordance with BHI-EE-01, Procedure 2.0, "Sample Event Coordination."

3.4 QUALITY CONTROL REQUIREMENTS

The QC procedures must be followed in the field and in the laboratory to ensure that reliable data are obtained. Sample collection QC will be performed in accordance with BHI-QA-03, Plan No. 5.1, "Field Sampling Quality Assurance Program Plan." 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. All sample equipment will be procured pre-cleaned disposable or single use equipment or will be cleaned prior to use in accordance with BHI-EE-01, Procedure 3.2, "Field Decontamination of Sampling Equipment".

Field QC samples are not required for this sampling activity. Laboratory QC requirements will be performed as specified in the analytical services statement of work for the selected laboratory.

3.5 FIELD DOCUMENTATION

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

3.6 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated after use by field cleaning using BHI-EE-01, Procedure 3.2, "Field Decontamination of Sampling Equipment."

4.0 ASSESSMENTS AND RESPONSE ACTION

The Compliance and Quality Programs group may conduct random surveillance and assessments in accordance with BHI-MA-02, *ERC Project Procedures*, Procedure 2.7, "Self-Assessment," to verify compliance with the requirements outlined in this SAI, project work packages, the Bechtel Hanford, Inc. (BHI) quality management plan, BHI procedures, and regulatory requirements.

Deficiencies identified by one of these assessments shall be reported in accordance with BHI-MA-02, Procedure 2.7. When appropriate, corrective actions will be taken by the project engineer in accordance with the *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD), Vol. 1, Section 4.0 (DOE-RL 1996a), to minimize recurrence.

5.0 DATA VERIFICATION AND VALIDATION

Data verification and validation are 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 this SAI.

Because of the limited scope of this characterization activity, formal data validation will not be performed. The QA/QC process used in sampling and laboratory procedures will be followed to ensure that the data are useable. The data will be reviewed by Waste Management personnel during the waste designation process.

6.0 WASTE MANAGEMENT

Waste generated by sampling activities will be managed in accordance with BHI-EE-10 and the project site-specific waste management instruction. Waste associated with laboratory analysis will be managed and disposed by the offsite analytical laboratory in accordance with the laboratory statement of work and in accordance with all local, state, and Federal requirements.

7.0 HEALTH AND SAFETY

All field operations will be performed in accordance with BHI health and safety requirements, which are outlined in BHI-SH-01, *ERC Safety and Health Program*, and the requirements of the *Hanford Site Radiological Control Manual* (HSRCM) (DOE-RL 1996b).

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

8.0 REFERENCES

40 CFR 261, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, as amended.

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*, as amended.

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 Program Plans*, Bechtel Hanford, Inc., Richland, Washington.

BHI-SH-01, *ERC Safety and Health Program*, Bechtel Hanford, Inc., Richland, Washington.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601, et seq.

DOE-RL, 1996a, *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD), DOE/RL-96-68, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1996b, *Hanford Site Radiological Control Manual* (HSRCM), DOE/RL-96-109, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.

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