0090699

DOE/RL-2010-76
Revision 0

Sampling and Analysis Plan for Sediment Analysis to Support Demolition of the 600 Area Purgewater Storage and Treatment Facility Unit 1

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

U.S. DEPARTMENT OF ENERGY
Richland Operations Office

P.O. Box 550
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

TS-6-1
attached to: 0090698

DOE/RL-2010-76
Revision 0

Sampling and Analysis Plan for Sediment Analysis to Support Demolition of the 600 Area Purgewater Storage and Treatment Facility Unit 1

Date Published
September 2010

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

U.S. DEPARTMENT OF ENERGY

Richland Operations Office

P.O. Box 550
Richland, Washington 99352

RECEIVED
SEP 29 2010
EDMC

Release Approval 9/2/2010
Date

Approved for Public Release;
Further Dissemination Unlimited

TRADEMARK DISCLAIMER
Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

Approval Page

Title: *Sampling and Analysis Plan for Sediment Analysis to Support Demolition of the 600 Area Purgewater Storage and Treatment Facility Unit 1*

Concerrence:

U.S. Department of Energy, Richland Operations Office

Signature Date 9/7/10

Washington State Department of Ecology

Signature Date 9/8/10

THIS PAGE INTENTIONALLY
LEFT BLANK

Contents

Figures

Tables

Terms

AEA	alpha energy analysis
aGs	amber glass
ALARA	as low as reasonably achievable
ASAP	as soon as possible
ASTM	American Society for Testing and Materials
CAS	Chemical Abstracts Service
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
CWM	clear wide mouth
DOE	U.S. Department of Energy
DQI	data quality indicator
DQO	data quality objective
ECO	Environmental Compliance Officer
ERDF	Environmental Restoration Disposal Facility
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
FTB	full trip blank
G	glass
GEA	gamma energy analysis
GPC	gas proportional counting
HDPE	high density polyethylene
HEIS	Hanford Environmental Information System (database)
ID	inside diameter
IDMS	Integrated Data Management System
LDR	Land Disposal Restriction
N/A	not applicable
NCO	Nuclear Chemical Operator

OD	outside diameter
PCB	polychlorinated biphenyl
POC	Point of Contact
ppm	Parts per million
PSTF	Purgewater Storage and Treatment Facility
PTFE	polytetrafluoroethylene
QA	quality assurance
QC	quality control
QAPjP	Quality Assurance Project Plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RCT	Radiological Control Technician
RL	DOE Richland Operations Office
RPD	relative percent difference
SAP	sampling and analysis plan
TCLP	toxicity characteristic leaching procedure
TPA	Tri-Party Agreement
UHC	underlying hazardous constituent
VOA	volatile organic analysis
WAC	*Washington Administrative Code*
WIDS	Waste Information Data System (database)

1 Introduction

The *Hanford Facility Dangerous Waste Closure/Postclosure Plan for the 600 Area Purgewater Storage and Treatment Facility* (DOE/RL-2008-73), hereafter referred to as the Closure Plan, includes a process to close the 600 Area Purgewater Storage and Treatment Facility (PSTF) Unit 1. The Closure Plan identifies that sediment will be removed, the structure will be demolished, underlying soil will be removed, and verification sampling and analysis will be conducted to demonstrate clean closure per the *Washington Administrative Code* (WAC) 173-303-610. Verification of clean closure is beyond the scope of this sampling and analysis plan (SAP) and will be conducted under a separate SAP attached to the Closure Plan.

1.1 Background

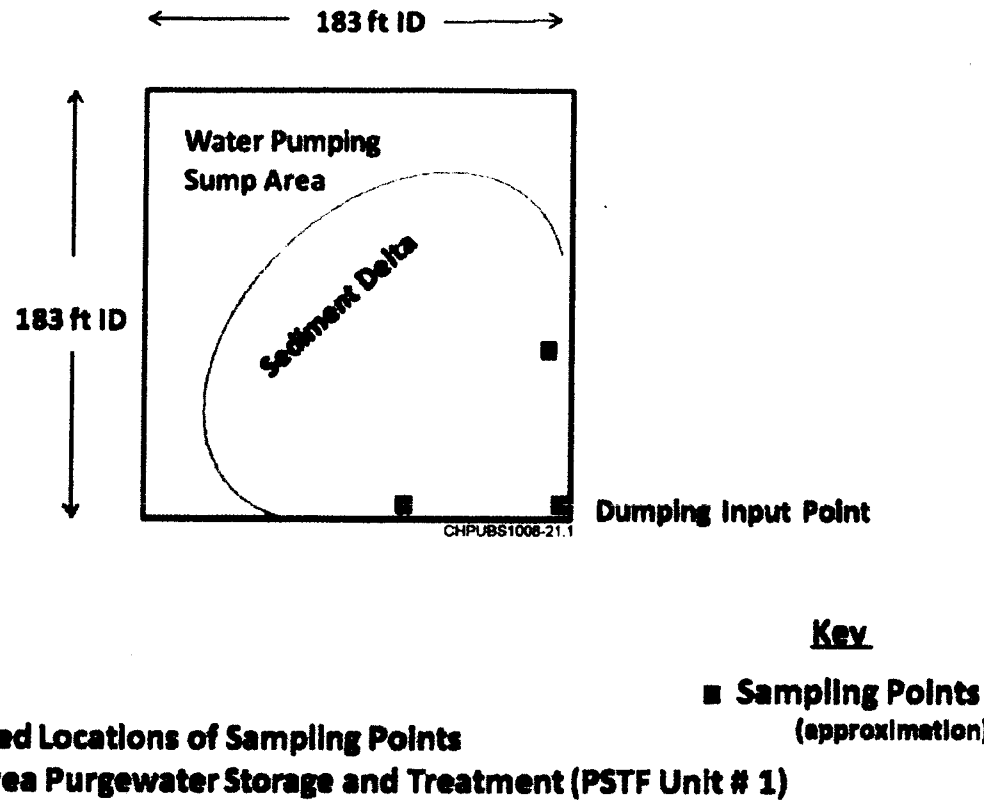
The PSTF (Figure 1-1) is an open containment treatment structure designed to receive Hanford Site purgewater generated from purging monitoring wells, drilling and construction of new wells, development of new wells, pumping tests, and periodic cleaning and renovations of wells. The PSTF Unit 1, which has been in operation for approximately 20 years, was covered as a Dangerous Waste facility under the "Hanford Facility Dangerous Waste Permit," WA7 89000 8967, Attachment 5, *Purgewater Management Plan,* July 1990. The purgewater was treated using solar evaporation to reduce the volume of water. Along with the purgewater, solids were deposited as sediment in the unit. Windblown silt also has accumulated as part of the sediment.

The well sediment is thought to be configured in the form of a delta emanating outward from the dump point in the northeast corner. At the dump point the sediment is thought to be about 2.5 ft thick. Outward from the delta, it is thought that the sediment was predominantly windblown sand and silt mixed with decomposed organic matter. The farther out on the distal portion of the delta, the well sediments are thinner and probably include a higher proportion of windblown sediment and decayed organic matter. Currently, pumping of the water is occurring outside of the dumping area. The pumped water is being filtered to remove suspended organic matter and the water is being trucked to the Effluent Treatment Facility (ETF).

The interior, inside diameter (ID), of the unit is 183 ft in width. Concrete extends outward by 5 ft on all sides. The outside diameter (OD) covers 193 to 195 ft on a side. The concrete slabs support a steel frame structure and provide ties for steel cables that are about 4 ft apart. The sides extend vertically 5 ft.

To implement clean closure of PSTF Unit 1 sediment, plastic liners, geotechnical fabrics, concrete, steel, and underlying soil will be removed and dispositioned at ERDF. This SAP was identified in the Closure Plan as a separate plan requiring approval by the Washington State Department of Ecology (Ecology) prior to conducting the sediment sampling. The analytical results obtained from this sampling effort will be used to support acceptance of the sediment and other closure wastes into the Environmental Restoration Disposal Facility (ERDF).

This plan provides for sampling and analysis of sediment to provide analytical data to complete waste designation for the sediment under WAC 173-303-090 (8), "Dangerous Waste Characteristics,"ensure land disposal restriction requirements under WAC 173-303-140, "Land Disposal Restrictions," are met to identify whether polychlorinated biphenyls (PCBs) regulated for disposal are present at concentrations greater than 50 mg/kg and to obtain radiological results for meeting the acceptance criteria for ERDF.



Note: ID= Inside Diameter is 183 ft. The liner is surrounded by a 5-ft wide slab.

Figure 1-1. Generalized Locations of Sampling Points

No sampling and analysis is planned for the other demolition materials. The results from analyzing the sediment will be used as worst-case concentrations for the other closure wastes. The sediment will have the highest concentrations of contaminants. The results from analyzing the sediment will be used for other closure wastes. If the sediment does not require treatment prior to disposal at ERDF, the sediment will be mixed with other closure wastes as PSTF Unit 1 is demolished. Waste acceptance requirements for ERDF are identified in WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria.*

1.2 Meetings

A data quality objective (DQO) meeting was held on May 27, 2010 to address a list of target analytes and define, in an appropriate characterization sample design. The results of the DQO meeting are summarized in Section 1.4.

1.3 Target Analytes

The purgewater tank contains groundwater evaporation solid residue from across the Hanford Site from multiple operable units, waste units, and routine monitoring activities. Input of contaminants was controlled with a waste analysis plan and ongoing analytical reports from source organizations inputting purgewater. About 20 million gallons of purge water originated from about 7,000 wells. The purgewater originated from drilling wastes, well development, pumping tests, purging associated from monitoring, and from well maintenance activities. No process water from facilities was permitted to enter the PSTF Unit #1. The original agreement excluded certain wells known to have high levels of contamination. The unit treated groundwater by evaporation to reduce the volume. From 1996 through 2010, water at the unit was sampled twice a year in accordance with BHI-01176, *Waste Analysis Plan for the Purgewater Storage and Treatment Facility.*

The "Dangerous Waste Permit Application, Part A" (WA7890008967) form identifies waste codes based on process knowledge for listed waste constituents in groundwater and characteristic waste codes from the management of groundwater over the years. In particular, 200-ZP-1 was identified as contributing carbon tetrachloride (D019), and the 100 Areas were identified as contributing chromium (D007).

The Closure Plan identified the following waste codes based on sources of groundwater:

- F001 because of a carbon tetrachloride groundwater plume
- D007 because of chromium
- D019 depending on the concentration of carbon tetrachloride in the water
- State-only F003 because of past discharges of methanol at 100 Area wells
- F001, F002, state-only F003, F004, and F005 because of an association with the single-shell tank system wells in the 200-East and 200-West Areas
- The single-shell tank system wells contained 1,1,1-trichloroethane, methylene chloride, acetone, methyl isobutyl ketone, total cresols, and methyl ethyl ketone

The Closure Plan identified the following target analytes:

- carbon tetrachloride
- 1,1,1-trichloroethane
- 1,1-dichloroethane degradation product of 1,1,1-trichloroethane in a reducing environment
- methylene chloride
- acetone
- methyl isobutyl ketone
- total cresols
- methyl ethyl ketone
- chromium
- methanol

The WCH-191 waste acceptance criteria require consideration of numerous aspects. Some aspects, such as the presence of free liquids, will be addressed at the time of demolition. This SAP addresses the following requirements and associated limits:

- WAC 173-303-140 [40 CFR 268.48(8)] for metals, organic compounds, and cyanide
- If PCB compounds over 50 parts per million (ppm) are present, then the waste will be identified as PCB containing (this does not preclude ERDF disposition)
- WAC 173-303-090(8) for toxic characteristic dangerous waste compounds
- Manmade radionuclides (Hanford associated radionuclides and limits are listed)

All purgewater released in the PSTF Unit 1 originated from groundwater. No facility waste water was released into the unit. No credible sources contributing to groundwater that are associated with WCH-191 prohibitions or limitations exist for the following:

- Ignitable characteristics D001
- Corrosivity D002
- Reactivity characteristics D003
- Asbestos

Limited process knowledge has been attributed to the sediments because waste acceptance and periodic monitoring addressed the water liquid medium. Because of the diverse sources of purgewater and the waste acceptance criteria, a "methods-based" analytical strategy was selected to give wide breadth of detection of contaminants in purgewater sediment. It is planned that the laboratory will report on all detections and quantitative measurements of contaminants made using this broad suite of analytical methods. The list of analytes is a conservative approach to address potential contaminants with relevant regulatory limits. The following methods are included in the methods-based approach:

- Chemical Methods
  - Metals (EPA Method 6010) with toxicity characteristic leaching procedure (TCLP) extraction (EPA Method 1311)
  - Hexavalent Chromium (EPA Method 7196)
  - Mercury (EPA Method 7470)
  - Cyanide (EPA Method Total Cyanide 9010)
  - Volatile Organic Analyses (EPA Method 8260)
  - Ethyl acetate (EPA Method 8015)
  - Semi-volatile organic analyses (EPA Method 8270)
  - Phenols (EPA Method 8270)
  - Methanol (EPA Method 8015-M)
  - Pesticides (EPA Method 8081)
  - Herbicides (EPA Method 8150)
  - PCBs (EPA Method 8080/8082)
  - pH (EPA Methods 150.1/9040/9045)
- Radiological Methods

Gross alpha
Gross beta
Gamma spec (cesium-137)
Iodine-129
Gas proportional counting (strontium-89/-90)

Liquid scintillation (C-14, technetium-99, and tritium)
Isotopic uranium alpha energy analysis (AEA)
  - Total radiological uranium

Chapter 2 presents tables containing target analyte lists to be reported under the methods based strategy.

1.4 Data Quality Objectives Summary

A DQO process was implemented that involved multiple subject matter experts. A conservative, compliance, analytical strategy was utilized to select target analytes. Solids that accumulated in PSTF Unit 1 originated as fine solids suspended in groundwater. As water was discharged into the unit, it flowed across the unit. With time, the solids settled. As solids accumulated, they were spread across the facility to ensure that there would be no drying and air exposure. The ongoing spreading was implemented as a radiological operational control to avoid airborne releases.

1.4.1 Step 1: Problem Statement

Representative data need to be collected to show that PSTF Unit 1 sediment meets ERDF waste acceptance criteria.

1.4.2 Step 2: Decision Statements

1. Do the constituent concentrations identified in the closure plan for waste codes F001 through F005 exceed the land disposal restriction standards in 40 CFR 268.48?
2. Does the sediment contain constituents that exceed the toxic characteristic dangerous limits in WAC 173-303-090(8) for waste codes D004 through D043?
3. Does the sediment contain PCBs over 50 ppm?
4. Does the sediment contain underlying hazardous constituents (UHCs) reasonably expected to be present in the sediment that exceed the universal treatment standard levels in 40 CFR 268.48? This question only applies if the sediment displays a toxicity characteristic criteria under WAC 173-303-090(8).
5. Does the sediment contain radionuclides above the ERDF waste acceptance criteria limits?

1.4.2.1 Alternative Actions

Alternative actions for waste disposition that exceeds identified limits incorporated in WCH-191 are as follows:

1. Dispose sediment and closure wastes to ERDF.
2. Perform treatment of the sediment to the WAC 173-303 standards.
3. Apply for a variance under the land disposal restrictions (WAC 173-140) to dispose of the sediment and/or closure wastes

For this SAP, other closure wastes will not be sampled because the sediment is used as a bounding case with the assumption that contaminant concentrations are below acceptance criteria for ERDF. For demolition and waste disposition, all media will be boxed together and loaded for transportation.

1.4.3 Step 3: Inputs

A great deal of information was available from the 20-year life of PSTF Unit 1. Some of the information was identified as assumptions prior to initiating the DQO process. Significant inputs to the DQO include the following:

- Closure Plan (DOE/RL-2008-73)
- Identification of embedded (incorporation by reference) requirements in WCH-191, as well as concentration limit tables in WCH-191, which requires identification of waste containing over 50 ppm of PCBs
- Identification of specific analytes and limits in WAC 173-303-090(8) (all contaminants)
- Identification of specific potential UHCs and limits from 40 CFR 268.48
- Health and safety constraints about access to the interior of PSTF Unit 1
- Inputs to identify how laboratories might ensure detection limits for high salt samples

A sampling strategy is needed to establish representativeness. Representative sampling requires selection of locations, analytes, equipment, and sampling methods. Alternative methods to achieve representative sampling were considered.

1.4.3.1 Selection of Target Analyte List

Analysis will use a methods-based approach. Target analytes are driven by specific regulatory limits and WCH-191 requirements.

1.4.4 Step 4: Boundaries

Figure 1-1 illustrates the general layout and sampling points for three samples and the boundaries have been identified.

- Sediment within Unit 1 should be sampled in a comprehensive manner with respect to the range in distances from the point of discharge into the unit and with respect to the full depth in the unit.
- The geometry of sediment is known to be a wedge with the thickest location being at the dump point into the unit. The wedge of sediment may be present across about one-third or more of the unit. The sampling points should be in the sediment delta area and have sufficient thickness to give an adequate volume of material. Each sampling point should have a composite sample made from the entire thickness.
- Only one medium will be sampled—the sediment. No sampling is planned for debris; i.e., liners, geotechnical fabric, concrete, steel angle iron, stainless steel cables, sheet metal, and soils removed during demolition activities. It is planned that the sediment will provide a bounding contaminate case.

1.4.5 Step 5: Decision Rules

If regulatory or ERDF waste acceptance criteria limits are not exceeded, waste may be disposed to ERDF without further processing or additional approvals (e.g., Land Disposal Restriction [LDR] variance). All decision rules address conditions to dispose of waste to ERDF. These limits relate to listed constituents, toxic characteristic constituents, UHCs, PCBs, and radionuclides as identified in the decision statements in Section 1.4.2. If any limit is exceeded, then the sediment may be treated, or a variance application may be submitted.

1.4.6 Step 6: Specify Limits on Decision Error

Some risk from decisions exists if detection limits are not achieved. Analytical interferences may occur, due to high salt content, related to concentration by evaporation. Decision risk could occur if achieved detection limits are not adequate to compare with regulatory concentration limits.

Risks will be minimized by notifying the laboratory in advance about high salt samples. Discussions have been held with the laboratory on the need to meet the contract detection limits for the high salt samples.

1.4.7 Step 7: Optimize Sample Design

As a result of the DQO process, the following sampling design was selected:

- One full depth sample (until resistance is felt) will be taken at the discharge point for emptying into the tank. A composite sample will be made to represent the full depth of sediment at the sampling points. The total depth of sediment of the sample intervals will be recorded.
- Two samples will be taken, one from each side to the left and right of the discharge location. These samples will be taken approximately at half the length of the fan. The locations must be probed to ensure that at least 1 ft of sediment is present to ensure adequate sample volume of sediment.
- One full trip blank (FTB) quality control (QC) sample will be taken in correspondence to existing quality assurance requirements.
- To prevent lost of volatile organic analysis (VOA) during the homogenization process, the VOA sample bottles will be filled prior to this step. Containers will be filled with VOA samples before compositing.
- All samples will be homogenized by mixing prior to distribution into sample bottles.

2 Quality Assurance Project Plan

This Quality Assurance Project Plan (QAPjP) establishes the quality requirements for environmental data collection, including planning, implementation, and assessment of sampling, field measurements, and laboratory analysis. This QAPjP complies with the following requirements:

- DOE O 414.1C, Quality Assurance
- 10 CFR 830, Subpart A, "Quality Assurance Requirements"
- EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans*

Sections 6.5 of Ecology et al., 1989a, *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement), and Ecology et al. 1989b, Attachment 2: *Action Plan*, require the quality assurance (QA) and QC and sampling and analysis activities to specify the QA requirements for treatment, storage, and disposal units; therefore, this QAPjP follows the QA elements of EPA/240/B-01/003. This QAPjP demonstrates conformance to Part B requirements of ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*.

This QAPjP is divided into the following three sections, which describe the quality requirements and controls applicable to this investigation:

- Project Management (Section 2.1)
- Data Generation and Acquisition (Section 2.2)
- Assessment and Oversight (Section 2.3)

2.1 Project Management

The following subsections address the basic aspects of project management and are designed to ensure that the project has defined goals, that the participants understand the goals and the approaches used, and that the planned outputs are appropriately documented. Project management roles and responsibilities discussed in this section apply to the major activities covered under the SAP.

2.1.1 Project/Task Organization

The permittee for a Dangerous Waste Permit (WA780008967) is responsible for planning, coordinating, sampling, preparation, packaging, and shipping samples to the laboratory. With regard to sampling and characterization, the project organization is described in the following subsections and is shown graphically in Figure 2-1. The Project Manager maintains a list of individuals or organizations as points of contact for each functional element in Figure 2-1. For each functional primary contractor role, there is a corresponding oversight role within the U.S. Department of Energy (DOE) Richland Operations Office (RL).

Regulatory Project Manager. Ecology has assigned Project Managers that are responsible for oversight of cleanup projects and activities. Ecology has approval authority as the lead regulatory agency for the work being performed under this SAP. Ecology will work with DOE-RL to resolve concerns over the work as described in this SAP.

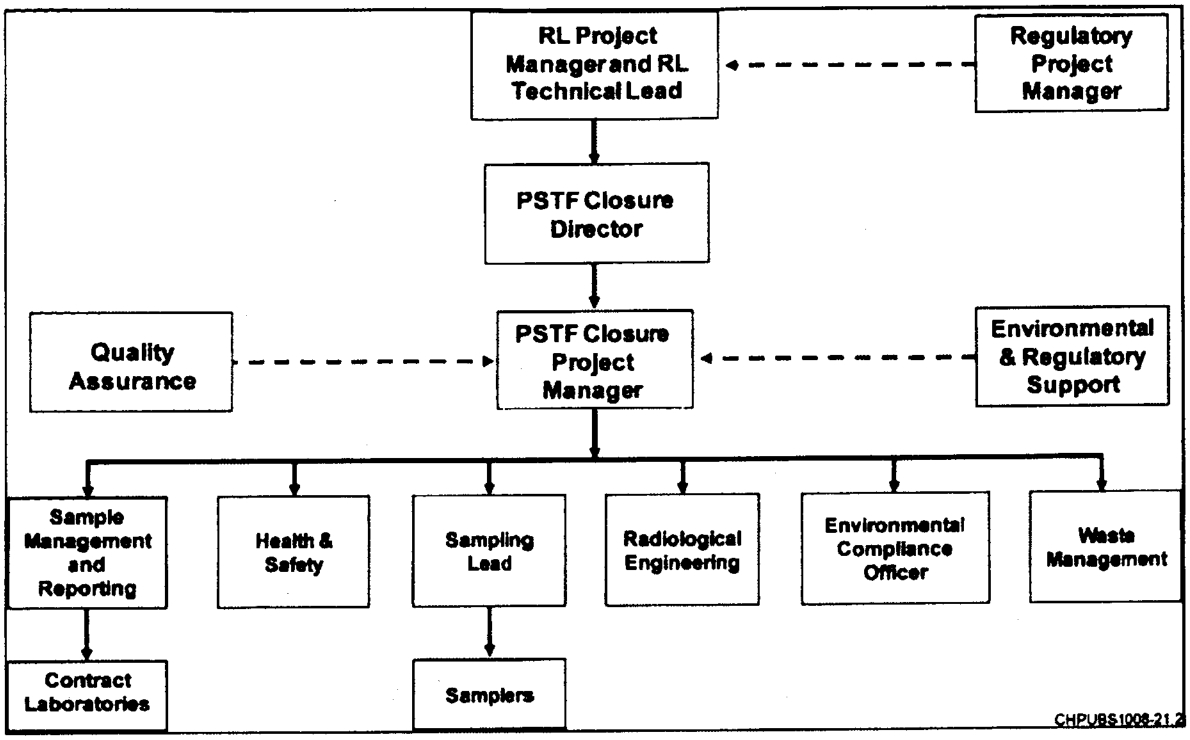


Figure 2-1. Project Organization

DOE-RL Project Manager. The DOE-RL Project Manager is responsible for authorizing the Contractor to perform activities under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA); the *Resource Conservation and Recovery Act of 1974* (RCRA); *Hanford Facility Dangerous Waste Permit, WA7 89000 8967*, Attachment 5, *Purgewater Management Plan* (July, 1990); the *Atomic Energy Act of 1954*; and the Tri-Party Agreement for the Hanford Site (Ecology et al. 1989a). The DOE-RL Project Manager is also responsible for obtaining lead regulatory agency approval of the SAP authorizing the field sampling activities. The DOE-RL Project Manager directs closure efforts and coordinates all other efforts for this action. The project is supported by DOE-RL Technical Leads.

DOE-RL Technical Lead. The DOE-RL Technical Lead is responsible for overseeing day-to-day activities of the Contractor performing the work scope, working with the Contractor and the regulatory agencies to identify and resolve issues, and providing technical input to the DOE-RL Project Manager.

PSTF Closure Director. The PSTF Closure Director oversees all project activities and coordinates with the DOE-RL Technical Lead, Regulatory Project Manager, and primary contractor management in support of sampling activities. In addition, support is provided to the DOE-RL Project Manager to ensure that the work is performed safely and cost effectively.

PSTF Closure Project Manager. The PSTF Closure Project Manager is responsible for direct management of sampling documents and requirements, field activities, and subcontracted tasks. The PSTF Closure Project Manager ensures that the Sampling Lead, samplers, and others responsible for implementation of this SAP are provided with current copies of this document and including any revisions. The PSTF Closure Project Manager works closely with QA, Health and Safety, and the Sampling Lead to integrate these and the other lead disciplines in planning and implementing the work scope. The PSTF

Closure Project Manager also coordinates with and reports to the PSTF Closure Director, the DOE-RL Technical Lead, and the primary contractor management on sampling activities.

Quality Assurance. The QA lead supports the PSTF Closure Project Manager and is responsible for QA issues on the project. Responsibilities include overseeing implementation of the project QA requirements; reviewing project documents, including the DQO summary report and SAP; and participating in QA assessments of sample collection and analysis activities, as appropriate.

Health and Safety. The Health and Safety organization responsibilities include coordinating industrial health and safety support within the project as carried out through health and safety plans, job hazard analyses, and other pertinent safety documents required by federal regulation or by internal primary contractor work requirements. In addition, Health and Safety provides assistance to project personnel to comply with applicable health and safety standards and requirements. Personnel protective clothing requirements are coordinated with the Radiological Engineering Lead.

Sampling Lead. The Sampling Lead has the overall responsibility to support the planning, coordinating, and executing of field characterization activities. Responsibilities also include directing training, mock-ups, and practice sessions with field personnel to ensure that the sampling design is understood and can be performed as specified. The Sampling Lead communicates with the PSTF Closure Project Manager to identify field constraints that could affect the sampling design. In addition, the Sampling Lead directs the procurement and installation of materials and equipment needed to support the fieldwork. The Sampling Lead (Figure 2-1) will ensure that analytical data is made available to the Contractor Waste Management staff as soon as practicable.

Samplers. The samplers collect samples, including QC samples, and prepare sample blanks according to the SAP, corresponding field procedures, and work packages. The samplers complete the field logbook, chain-of-custody forms, and shipping paperwork.

Environmental and Regulatory Support. The Environmental and Regulatory Support Lead is responsible for the performance of the DQO process for this project. Responsibilities include development and documentation of the sampling DQOs and SAP, including the sampling design and the resolution of technical issues. The Environmental and Regulatory Support Lead is the designated subject matter expert for regulatory compliance issues.

Environmental Compliance Officer. The Environmental Compliance Officer (ECO) provides technical oversight, direction, and acceptance of project and subcontracted environmental work and develops appropriate mitigation measures with a goal of minimizing adverse environmental impacts. The ECO also reviews plans, procedures, and technical documents to ensure that environmental requirements have been addressed; identifies environmental issues that affect operations and develops cost-effective solutions; and responds to environmental/regulatory issues or concerns raised by DOE or regulatory agency staff.

Sample Management and Reporting. The Sample Management and Reporting organization is responsible for identifying data needs in a DQO process. Related responsibilities include developing the SAP, including documenting the data needs and the sampling design, preparing associated presentations, resolving technical issues, and preparing revisions to the SAP. Sample Management and Reporting develops and oversees the implementation of the letter of instruction to the analytical laboratories. The sample data are managed in accordance with applicable procedures and work plans. Sample Management and Reporting coordinates laboratory analytical work, ensuring that the laboratories conform to Hanford Site internal laboratory QA requirements, or their equivalent, as approved by DOE. Sample Management and Reporting receives analytical data from the laboratories and performs data entry into the Hanford

Environmental Information System (HEIS). Sample Management and Reporting is responsible for informing the PSTF Project Manager of any issues reported by the analytical laboratory.

Contract Laboratories. The contract laboratories analyze samples in accordance with established procedures and provide sample reports and explanation of results. The laboratories must meet site-specific QA requirements and have approved QA plans in place. The laboratory supplies QC documentation to support data packages.

Radiological Engineering. The Radiological Engineering Lead is responsible for health physics support within the project. Specific responsibilities include conducting as low as reasonably achievable (ALARA) reviews, exposure, and release modeling, and radiological controls optimization for all work planning. In addition, the Radiological Engineer identifies radiological hazards and implements appropriate controls to maintain worker exposures to hazards at ALARA levels (e.g., personal protective equipment). The Radiological Engineering Lead also interfaces with the project Health and Safety representative and plans and directs Radiological Control Technician (RCT) support.

Waste Management. The Waste Management lead communicates policies and procedures and ensures project compliance for storage, transportation, disposal, and waste tracking in a safe and cost-effective manner. Other responsibilities include identifying waste management sampling and characterization requirements to ensure regulatory compliance and interpreting the characterization data to generate waste designations, profiles, and other documents that confirm compliance with waste acceptance criteria. The Contractor Waste Management staff will provide an interface relationship with the ERDF Waste Management staff to ensure that the analytical data is used to complete a final waste profile, complete waste designation, and inform the project when an authorization to ship is available.

2.1.2 Problem Definition/Background

The PSTF Unit 1 (Waste Information Data System [WIDS] site 600-214) is a million gallon structure, built in 1990. The unit is a steel-framed structure that is double lined with a high-density-polyethylene, reinforced with steel cables, and surrounded with concrete exterior reinforcement. The unit provided storage and treatment of purgewater generated from Hanford Site groundwater monitoring wells. Treatment is by solar evaporation. The site is near the northeast corner of 200-East Area. The unit occupies about one acre and has a square configuration with a 183-ft interior diameter. The exterior diameter is about 193 to 195 ft and includes 5 ft wide concrete slabs that surround the facility and provide structural support for the iron framework and tension cables. East of the tank is the truck unloading area and west of the tanks is a leak detection riser.

It is assumed that sediment will be considered as a single mass of waste (decision unit) based upon extensive internal mixing of purgewater and windblown sand and vegetation and from periodic monitoring and progressive well drilling across the Hanford Site. Waste was input from a single point and has been spread by flow and dispersion with fire hoses. At the time of waste removal, the wastewater will have been largely removed by pumping and evaporation and the waste will be removed as a single solid medium. The sediment will be mixed with demolition debris and excavated soil in waste transportation boxes.

The EPA TCLP procedure, Method 1311, is associated with limits for constituents identified in WAC 173-303-090(8) and some constituents identified in 40 CFR 268.48. The TCLP extractions will be done for metals; however, for this SAP, the TCLP procedures will only be used for metal analyses. Total analyses will be used for non-metal analyses with calculation for comparison to the leachate limit. It is assumed the site conceptual model included the following purgewater inputs to PSTF Unit 1:

- Evaporated purgewater (groundwater), well sediments, and windblown sand were included.

- Some water-associated contaminants were removed during evaporation and when the water was pumped for treatment at the nearby 200 Area ETF. (Water will be sent to the ETF before sediment is removed.)
- Some organic chemicals will have been impacted by solar exposure, heat, and biological activity. Extensive algal and other biological processes have been observed to be aggressively active. Overall, the sediment is alkaline with a pH of about 10.2 with high concentrations of "salts," and high turbidity in the associated water.
- Based on the media and pH, it is determined that the sediment does not display the characteristics of ignitability, corrosivity, or reactivity.

2.1.3 Project/Task Description

This sampling activity is planned to collect representative solid medium samples from the PSTF Unit 1 for the purpose of supplying data for designation of waste to be dispositioned at ERDF. As necessary, data could be used to support waste treatment before disposal. Use of the itemized analytical methods and specific reporting requirements will ensure that adequate data is collected to compare against concentration limits applicable to ERDF.

2.1.3.1 Methods-Based Approach

As described in Section 1.3, specific analytical methods will be run to identify relevant detections and contaminant concentrations in sediment. In addition to the methods-based approach, laboratories will be asked to report on lists of chemical and radiological contaminants (target analyte lists in Table 2-1 and Table 2-2). The methods based approach provides an analytical specification that has the potential to cover numerous potential contaminants.

2.1.3.2 Target Analytes

The target analytes are listed in Table 2-1 and Table 2-2.

Target analytes were chosen based on the rationale presented in the DQO process description (Section 1.4.2). The Hanford Site annual groundwater report was reviewed to identify some groundwater generator sources.

2.1.4 Quality Objectives and Criteria

The QA objective of this plan is to develop implementation guidance for providing data of known and appropriate quality. Data quality indicators (DQIs) describe data quality by evaluation against identified DQOs and the work activities identified in this SAP. The applicable QC guidelines, quantitative target limits, and levels of effort for assessing data quality are dictated by the intended use of the data and the nature of the analytical method. The principal DQIs are precision, bias or accuracy, representativeness, comparability, completeness, and sensitivity. These DQIs are defined for the purposes of this document in Table 2-3.

Table 2-1. Performance Requirements for Chemical Analyses

Chemical Target Analytes	CAS Number	Preliminary Action Level: TC Dangerous Waste Threshold[a] (mg/L)	Preliminary Action Level: Universal Treatment Standard[b]	Analytical Method[c]	Required Detection Limits	Precision Requirements (%)	Accuracy Requirements (%)
Metals							
Antimony	7440-36-0	N/A	1.15 mg/L	EPA Method 1311/6010	1.2 mg/L	≤30[d]	70-130[d]
Arsenic	7440-38-2	5.0	5.0 mg/L	EPA Method 1311/6010	0.5 mg/L	≤30[d]	70-130[d]
Barium	7440-39-3	100.0	21 mg/L	EPA Method 1311/6010	10 mg/L	≤30[d]	70-130[d]
Beryllium	7440-41-7	N/A	1.22 mg/L	EPA Method 1311/6010	0.1 mg/L	≤30[d]	70-130[d]
Cadmium	7440-43-9	1.0	0.11 mg/L	EPA Method 1311/6010	0.1 mg/L	≤30[d]	70-130[d]
Chromium	7440-47-3	5.0	0.60 mg/L	EPA Method 1311/6010	0.5 mg/L	≤30[d]	70-130[d]
Hexavalent Chromium	18540-29-9	N/A	N/A	EPA Method 7196	500 mg/L	≤30[d]	70-130[d]
Lead	7439-92-1	5.0	0.75 mg/L	EPA Method 1311/6010	0.5 mg/L	≤30[d]	70-130[d]
Manganese	7439-96-5	N/A	N/A	EPA Method 1311/6010	0.1 mg/L	≤30[d]	70-130[d]
Mercury	7439-97-6	0.2	0.025 mg/L	EPA Method 1311/7471	0.02 mg/L	≤30[d]	70-130[d]
Nickel	7440-02-0	N/A	11 mg/L	EPA Method 1311/6010	1.0 mg/L	≤30[d]	70-130[d]
Selenium	7782-49-2	1.0	5.7 mg/L	EPA Method 1311/6010	0.5 mg/L	≤30[d]	70-130[d]
Silver	7440-22-4	5.0	0.14[a] mg/L	EPA Method 1311/6010	0.5 mg/L	≤30[d]	70-130[d]
General Inorganic Compounds							
Cyanide (Amenable)[f]	57-12-5	N/A	30 mg/kg	N/A	N/A	N/A[f]	N/A[f]
Cyanide (Total)	57-12-5	N/A	590 mg/kg	EPA Method 9010	0.5 mg/kg	≤30[d]	70-130[d]
Volatile Organic Compounds							
1,1,1-Trichloroethane	71-55-6	N/A	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
1,1-Dichloroethane	75-34-3	N/A	6.0 mg/kg	EPA Method 8260	0.010 mg/kg	≤30[e]	70-130[e]

Table 2-1. Performance Requirements for Chemical Analyses

Chemical Target Analytes	CAS Number	Preliminary Action Level		Analytical Method[c]	Required Detection Limits	Precision Require-ments (%)	Accuracy Require-ments (%)
		TC Dangerous Waste Threshold[a] (mg/L)	Universal Treatment Standard[b]				
1,2-Dichloroethane	107-06-2	0.5	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
1,1-Dichloroethylene	75-35-4	0.7	6.0 mg/kg	EPA Method 8260	0.010 mg/kg	≤30[e]	70-130[e]
1,4-Dioxane	123-91-1	N/A	170 mg/kg	EPA Method 8260	0.5 mg/kg	≤30[e]	70-130[e]
Acetone	67-64-1	N/A	160 mg/kg	EPA Method 8260	0.020 mg/kg	≤30[e]	70-130[e]
Benzene	71-43-2	0.5	10 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Carbon disulfide	75-15-0	N/A	96 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Carbon tetrachloride	56-23-5	0.5	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Chlorobenzene	108-90-7	100.0	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Chloroform	67-66-3	6.0	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Ethyl Benzene	100-41-4	N/A	10 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
4-Methyl-2-Pentanone	108-10-1	N/A	33 mg/kg	EPA Method 8260	0.010 mg/kg	≤30[e]	70-130[e]
Methylene chloride	75-09-2	N/A	30 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Trichloroethylene	79-01-6	0.5	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Toluene	108-88-3	N/A	10 mg/kg	EPA Method 8260	0.005 mg/kg	≤30[e]	70-130[e]
Vinyl Chloride	75-01-4	0.2	6.0 mg/kg	EPA Method 8260	0.005 mg/kg	≤3%[e]	70-130[e]
Xylene (Total)	1330-20-7	N/A	30 mg/kg	EPA Method 8260	0.010 mg/kg	≤30[e]	70-130[e]

Table 2-1. Performance Requirements for Chemical Analyses

Chemical Target Analytes	CAS Number	Preliminary Action Level		Analytical Method[c]	Required Detection Limits	Precision Require-ments (%)	Accuracy Require-ments (%)
		TC Dangerous Waste Threshold[a] (mg/L)	Universal Treatment Standard[b]				
Non-Halogenated Volatile Organic Compounds							
Ethyl acetate	141-78-6	N/A	33 mg/kg	EPA Method 8015 or 8260	5.0 mg/kg	≤30[e]	70-130[e]
Methanol	67-56-1	N/A	15 mg/kg	EPA Method 8015M	1.0 mg/kg	≤30[e]	70-130[e]
Semivolatile Organic Compounds							
1,4 Dichlorobenzene	106-46-7	7.5	6.0 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
2,4-Dinitrotoluene	121-14-2	0.13	140 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
2,4-Dimethylphenol	105-67-9	N/A	14 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
2,4,5-Trichlorophenol	95-95-4	400.0	7.4 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
2,4,6-Trichlorophenol	88-06-2	2.0	7.4 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Butylbenzylphthalate	85-68-7	N/A	28 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Diethylphthalate	84-66-2	N/A	28 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Di-n-butyl phthalate	84-74-2	N/A	28 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Hexachlorobenzene	118-74-1	0.13	10 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Hexachlorobutadiene	87-68-3	0.5	5.6 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Hexachloroethane	67-72-1	3.0	30 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Nitrobenzene	98-95-3	2.0	14 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Phenol	108-95-2	N/A	6.2 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Pyridine	110-86-1	5.0	16 mg/kg	EPA Method 8270	0.66 mg/kg	≤30[e]	70-130[e]
m+p-Cresol	65794-96-9	N/A	5.6 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]

Table 2-1. Performance Requirements for Chemical Analyses

Chemical Target Analytes	CAS Number	Preliminary Action Level: TC Dangerous Waste Threshold[a] (mg/L)	Preliminary Action Level: Universal Treatment Standard[b]	Analytical Method[c]	Required Detection Limits	Precision Require-ments (%)	Accuracy Require-ments (%)
o-Cresol	95-48-7	200.0	5.6 mg/kg	EPA Method 8270	0.33 mg/kg	≤30[e]	70-130[e]
Cresol (total)	1319-77-3	200.0	5.6 mg/kg	EPA Method 8270	0.33 mg/kg	≤30%[e]	70-130[e]
Pesticides							
4,4'-DDD	72-54-8	N/A	0.087 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
4 ,4'-DDE	72-55-9	N/A	0.087 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
4,4'-DDT	50-29-3	N/A	0.087 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
Aldrin	309-00-2	N/A	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Chlordane	57-74-9	0.03	0.26 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Dieldrin	60-57-1	N/A	0.13 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
Endosulfan I	959-98-8	N/A	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Endosulfan II	33213-65-9	N/A	0.13 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
Endosulfan Sulfate	1031-07-8	N/A	0.13 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
Endrin	72-20-8	0.02	0.13 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
Endrin Aldehyde	7421-93-4	N/A	0.13 mg/kg	EPA Method 8081	0.0033 mg/kg	≤30[e]	70-130[e]
Heptachlor	76-44-8	0.008	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Heptachlor Epoxide	1024-57-3	0.008	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Alpha-BHC	319-84-6	N/A	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Beta-BHC	319-85-7	N/A	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Delta-BHC	319-86-8	N/A	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]

Table 2-1. Performance Requirements for Chemical Analyses

Chemical Target Analytes	CAS Number	Preliminary Action Level: TC Dangerous Waste Threshold[a] (mg/L)	Preliminary Action Level: Universal Treatment Standard[b]	Analytical Method[c]	Required Detection Limits	Precision Requirements (%)	Accuracy Requirements (%)
Gamma-BHC (Lindane)	58-89-9	0.4	0.066 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Methoxychlor	72-43-5	10.0	0.18 mg/kg	EPA Method 8081	0.165 mg/kg	≤30[e]	70-130[e]
Toxaphene	8001-35-2	0.5	2.6 mg/kg	EPA Method 8081	0.00165 mg/kg	≤30[e]	70-130[e]
Herbicides							
2,4-D	94-75-7	10.0	10 mg/kg	EPA Method 8151	0.40 mg/kg	≤30[e]	70-130[e]
2,4,5-TP (Silvex)	93-72-1	1.0	7.9 mg/kg	EPA Method 8051	0.020 mg/kg	≤30[e]	70-130[e]
PCBs							
PCBs (Sum of all Aroclors)	NA	N/A	10 mg/kg	EPA Method 8082	0.116 mg/kg	≤30[e]	70-130[e]
Field Parameters							
pH	N/A	N/A	N/A	EPA Method 150.1/9040/ 9045	0.5 SU	N/A	N/A

a. Toxicity characteristic dangerous waste threshold values from WAC 173-303-090, "Dangerous Waste Characteristics." If sample results do not exceed TCLP value this action level will be considered as met.

b. Value reflects the Universal Treatment standard as an underlying hazardous constituent in accordance with 40 CFR 268.48.

c. See SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition, Final Update IV-8*. Other equivalent analytical methods maybe used (i.e., EPA three-digit methods used instead of four-digit methods).

d. Accuracy criteria specified are for calculated percent recoveries for associated analytical batch matrix spike samples. Additional accuracy evaluation based on statistical control limits for batch laboratory control samples is also performed. The precision criteria shown are for batch laboratory replicate matrix spike or replicate sample relative percent differences.

e. Accuracy criteria are the minimum for associated batch laboratory control sample percent recoveries. Laboratories must meet statistically based control, if more stringent. Additional analyte-specific evaluations also performed for matrix spike and surrogates, as appropriate to the method. Precision criteria for batch laboratory replicate matrix spike samples.

f. Only total cyanide will be run.

Aroclor was a trade name for PCBs marketed by Monsanto Company from 1930 to 1977.

2,4-D	= 2,4-Dichlorophenoxy-acetic acid	CAS	= Chemical Abstracts Service
2,4,5-TP	= 2-(2,4,5-Trichlorophenoxy)propionic acid	N/A	= not applicable
4,4'-DDD	= Dichlorodiphenyldichloroethane	PCB	= polychlorinated biphenyl
4,4'-DDE	= Dichlorodiphenyldichloroethylene	SU	= standard unit
4,4'-DDT	= Dichlorodiphenyltrichloroethane	TC	= toxic characteristic
BHC	= Benzenehexachloride	TCLP	= toxicity characteristic leaching procedure

Table 2-2. Performance Requirements for Radiological Analyses

Radiological Target Analytes	CAS Number	Name/Analytical Technology	Target Required Quantization Limits pCi/g*	Precision Soil	Accuracy Soil
Gross Alpha	12587-46-1	Gross Alpha	5	±35%	70-130%
Gross Beta	12587-47-2	Gross Beta	10	±35%	70-130%
Cesium-137	10045-97-3	Gamma Spec	1	±35%	70-130%
Carbon-14 Low Level	14762-75-5	Carbon-14 – Liquid Scintillation	1	±35%	70-130%
Iodine-129	15046-84-1	Iodine-129	2	±35%	70-130%
Strontium 89/90	14158-27-1 10098-97-2	Total Radioactive Strontium	1	±35%	70-130%
Technetium-99	14133-76-7	Technetium-99 – Liquid Scintillation	15	±35%	70-130%
Tritium	10028-17-8	Tritium – Liquid Scintillation	400	±35%	70-130%
Uranium-234/233	13966-29-5	Uranium Isotopic – AEA	1	±35%	70-130%
Uranium-235/236	15117-96-1	Uranium Isotopic – AEA	1	±35%	70-130%
Uranium-238	U-238	Uranium Isotopic – AEA	1	±35%	70-130%
Uranium, Total Radiological	UTOT-KPA	Total Radiological Uranium	1	±35%	70-130%

* WCH-191 focuses on radionuclides with concentrations over 1 pCi/g. These quantification limits are the best available.

AEA = alpha energy analysis

CAS = Chemical Abstracts Service

UTOT-KPA = total uranium by kinetic phosphorescence analysis

Table 2-3. Data Quality Indicators

Data Quality Indicator	Definition	Example Determination Methodologies	Project Specific Information*	Corrective Actions
Precision	The measure of agreement among repeated measurements of the same property under identical or substantially similar conditions; calculated either as the range or as the standard deviation. May also be expressed as a percentage of the mean of the measurements, such as relative range, relative percent difference, or relative standard deviation (coefficient of variation).	Use the same analytical instrument to make repeated analyses on the same sample. Use the same method to make repeated measurements of the same sample within a single laboratory or have two or more laboratories analyze identical samples with the same method. Split a sample in the field and submit both for sample handling, preservation and storage, and analytical measurements. Collect, process, and analyze collocated samples for information on sample acquisition, handling, shipping, storage, preparation, and analytical processes and measurements.	Laboratory precision; analysis of laboratory duplicate or matrix spike duplicate.	If laboratory duplicate data do not meet objective: • Evaluate apparent cause (e.g., sample heterogeneity) • Request reanalysis or remeasurement • Qualify the data before use
Accuracy	A measure of the overall agreement of a measurement to a known value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations.	Analyze a reference material or reanalyze a sample to which a material of known concentration or amount of pollutant has been added (a spiked sample); usually expressed either as percent recovery or as a percent bias.	Laboratory accuracy determination based on matrix spikes and matrix spike duplicates. Note if any of the samples or analyses are more or less critical than the others in determining follow-up actions.	If recovery does not meet objective: • Qualify the data before use • Request re-analysis or remeasurement

Table 2-3. Data Quality Indicators

Data Quality Indicator	Definition	Example Determination Methodologies	Project Specific Information*	Corrective Actions
Representativeness	A qualitative term to express "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition" (ANSI/ASQC S2-1995).	Evaluate whether measurements are made and physical samples collected in such a manner that the resulting data appropriately reflect the environment or condition being measured or studied.	Samples will be collected as described in the sampling design.	If results are not representative of the system sampled: • Identify the reason for the not being representative • Reject the data, or, if data are otherwise usable, qualify the data for limited use and define the portion of the system that the data represent • Redefine sampling and measurement requirements and protocols • Resample and reanalyze
Comparability	A qualitative term expressing the measure of confidence that one data set can be compared to another and can be combined for the decision(s) to be made.	Compare sample collection and handling methods, sample preparation and analytical procedures, holding times, stability issues, and QA protocols.	The three samples will be submitted to the same laboratory.	If data are not comparable: • Identify appropriate changes to data collection and/or analysis methods • Identify quantifiable bias, if applicable • Qualify the data as appropriate • Resample and/or reanalyze if needed
Completeness	A measure of the amount of valid data needed to be obtained from a measurement system.	Compare the number of valid measurements completed (samples collected or samples analyzed) with those established by the project's quality criteria (data quality objectives or performance/acceptance criteria).	Three valid samples must be collected of which two must be valid. And all target analyte results must be valid.	• Identify quantifiable bias, if applicable • Qualify the data if appropriate • Resample and/or reanalyze if needed

Table 2-3. Data Quality Indicators

Data Quality Indicator	Definition	Example Determination Methodologies	Project Specific Information*	Corrective Actions
Sensitivity	The capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.	Determine the minimum concentration or attribute to be measured by a method (method detection limit), by an instrument (instrument detection limit), or by a laboratory (quantitation limit). The practical quantitation limit is the lowest level that can be routinely quantified and reported by a laboratory.	Ensure sensitivity, as measured detection limits, is appropriate for the action levels. The project will inform the laboratory that sample sets will have adverse levels of salts that may cause some interferences. Analytical requests will specify that maximum efforts will be needed to achieve analytical detection levels. The ECO, DOE-RL Technical Lead, Contractor PM, and Project and ERDF waste management staff will evaluate the achieved detection limits relative to regulatory limits.	If results do not meet detection limits: • Request reanalysis or remeasurement • Qualify/reject the data before use • Determine if these are the best available analyses with respect to the interferences from high salt content

* Field sampling requirements are noted. Laboratories will follow contract requirements for use and interpretation of laboratory control samples; however, high salt content will be noted to the laboratories and a request will be made to assure detection limits are met. The sediment is associated with "salt" content that has accumulated from twenty years of evaporation of drilling and monitoring water. Some salts may be present at saturated levels. To increase the possibility of getting optimum analytical results, the following measures will be taken. Advanced laboratory notification of high salt content will be given to optimize analyses against instrumental interference.

ANSI/ASQC S2-1995, Introduction to Attribute Sampling.

2.1.5 Special Training/Certification

Training requirements applicable to this work are planned, tracked, and verified. Samplers undergo documented, specific training with respect to individual implementing procedures for related phases of preparation, sampling, notebooks, forms, and shipping.

2.1.6 Documents and Records

The Project Manager is responsible for ensuring the current version of the SAP is being used and for providing any updates to field personnel. Version control is maintained by the administrative document control process. Changes to the SAP affecting the DQOs will be reviewed and approved by DOE-RL and the lead regulatory agency prior to implementation.

The Sampling Lead is responsible for ensuring that the field instructions are maintained and aligned with any revisions or approved changes to the SAP. The Sampling Lead will ensure that deviations from the SAP or problems encountered in the field are documented appropriately (e.g., in the field logbook or on nonconformance report forms) in accordance with internal corrective action procedures.

The Project Manager, Sampling Lead, or designee, is responsible for communicating field corrective action requirements and ensuring immediate corrective actions are applied to field activities.

Logbooks are required for field activities. A logbook must be identified with a unique project name and number. The individual(s) responsible for logbooks will be identified in the front of the logbook and only authorized persons may make entries in logbooks. Logbooks will be signed by the field manager, supervisor, cognizant scientist/engineer or other responsible individual. Logbooks will be permanently bound, waterproof, and ruled with sequentially numbered pages. Pages will not be removed from logbooks for any reason. Entries will be made in indelible ink. Corrections will be made by marking through the erroneous data with a single line, entering the correct data, and initialing and dating the changes.

The Project Manager is responsible for ensuring that a project file is properly maintained. The project file will include the following, as appropriate:

- Field logbooks or operational records
- Data Forms
- Global Positioning System data
- Chain-of-custody forms
- Sample receipt records
- Inspection or assessment reports and corrective action reports
- Interim progress reports
- Final reports
- Laboratory data packages
- Verification and validation reports

The project file will contain the records or references to their storage locations.

The laboratory is responsible for maintaining, and having available upon request, the following:

- Analytical logbooks
- Raw data and QC sample records

- Standard reference material and/or proficiency test sample data
- Instrument calibration information

Records may be stored in either electronic or hard copy format. Documentation and records, regardless of medium or format, are controlled in accordance with internal work requirements and processes to ensure the accuracy and retrievability of stored records. Records will be managed in accordance with the requirements of the Tri-Party Agreement.

2.2 Data Generation and Acquisition

The following subsections address data generation and acquisition to ensure that the project's methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are appropriate and documented. Analytical data packages are transmitted to the Administrative Record in addition to having data entered into HEIS.

2.2.1 Sampling Process Design

The Project Manager and the Health and Safety representative identified that there was risk to workers from putting workers into the PSTF Unit 1. This unit has been formally designated a confined space. Unit 1 is large and workers could be as far as 100 ft from assistance. The unit is associated with unpleasant odors. There would be considerable risk to workers from trying to wade through sticky, quick-sand-like, organically active sediment. There are tripping hazards from submerged and tangled ropes, steel cables, floats, wood, and rotting and fresh tumble weeds. Related work is not authorized until hazard analysis and hazard controls have been documented.

The DQO process identified a three point sampling strategy. The first sampling point would be at the dump point where purgewater was discharged into the tank. Waste is thickest there and the oldest waste may be represented in a full depth push sample. Thickness of sediment is anticipated to be 2.5 ft thick.

The second and third sample will be taken about halfway along the sides from the dump point. A goal will be to pick a point with about 1 ft of sediment. Currently, specific points cannot be identified owing to a lack of visibility in the murky water and floating debris.

This three-point-sampling approach is representative under the assumptions identified as part of the DQO process. With lower water, a better understanding will be possible on the distribution of sediment. Probing and careful measurements will be necessary to ensure that sampling devices do not penetrate the unit liners and that there is adequate thickness to sample at least 1 ft of sediment.

The sample records will be labeled to address the high biological activity. The samples may need some screening to remove coarse rotten tumble weed fragments and algal mats that have been accumulating for 20 years. The chain of custody forms will include a notation about high organic content, potential for odors, and high salt content.

In addition, the types, number, and location of samples are provided in Section 3 of this SAP.

2.2.2 Sampling Methods

Sampling is described in Section 3, and specific information includes the following:

- Field sampling methods
- Sample preservation, containers, and holding times
- Corrective actions for sampling activities
- Decontamination of sampling equipment

2.2.3 Sample Handling and Custody

A sampling and data tracking database is used to track the samples from the point of collection through the laboratory analysis process. Samplers should note any anomaly with a sample.

Laboratory analytical results are entered and maintained in the HEIS database. The HEIS sample numbers are issued to the sampling organization for the project. Each chemical, radiological, and physical properties sample is identified and labeled with a unique HEIS sample number.

Specific sample handling information is provided in Section 3 and includes the following:

- Container requirements
- Container labeling and tracking process
- Sample custody requirements
- Shipping and transportation

Sample custody during laboratory analysis is addressed in the applicable laboratory standard operating procedures. Laboratory custody procedures will ensure that sample integrity and identification are maintained throughout the analytical process. Storage of samples at the laboratory will be consistent with laboratory instructions prepared by the Sample Management and Reporting organization.

2.2.4 Analytical Methods

Information on analytical methods is provided in Table 2-1 and Table 2-2. These analytical methods are controlled in accordance with the laboratory's QA Plan and the requirements of this QAPjP. The primary contractor participates in overseeing offsite analytical laboratories to qualify them for performing Hanford Site analytical work.

Deviations from the analytical methods noted in Table 2-1 and Table 2-2 must be approved by the Sample Management and Reporting organization in consultation with the Project Manager.

Laboratories providing analytical services in support of this SAP will have a corrective action program in place that addresses analytical system failures and documents the effectiveness of any corrective actions. Issues that may affect analytical results are to be resolved by the Sample Management and Reporting organization in coordination with the Project Manager.

2.2.5 Quality Control

The QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained. A field QC sample will be collected to evaluate the potential for cross-contamination. Field QC sampling will include the collection of one FTB. Laboratory QC samples estimate the precision and bias of the analytical data. Field and laboratory QC samples are summarized in Table 2-4.

Table 2-4. Project Quality Control Sampling Summary

QC Sample Type	Purpose	Frequency
	Field QC	
Full Trip Blank	Assess contamination from containers or transportation.	One per sample batch.
	Laboratory QC	
Matrix Spike	Identify analytical (preparation + analysis) bias; possible matrix affect on the analytical method used.	When required by the method guidance, one per samples set or as identified by the method guidance per media sampled.
Matrix Duplicate or Matrix Spike Duplicate	Estimate analytical bias and precision.	When required by the method guidance, one per samples set or as identified by the method guidance per media sampled.
Laboratory Control Samples	Assess method accuracy.	One per sample set or as identified by the method guidance.
Surrogates	Estimate recovery/yield.	When required by the method guidance, as identified by the method guidance.

2.2.5.1 Field Quality Control Samples

Field QC samples will be collected to evaluate the potential for cross-contamination, provide information pertinent to field sampling variability and laboratory performance. Field blanks are typically prepared using high purity reagent water. The QC samples and the required frequency for collection are described in this section.

The FTBs are prepared by the sampling team prior to traveling to the sampling site. The preserved bottle set is identical to the set that will be collected in the field. The bottles are sealed and will be transported, unopened, to the field in the same storage containers used for samples collected the same day. The FTBs are analyzed for the same constituents as the samples from the associated sampling event. The FTBs are used to evaluate potential contamination of the samples attributable to the sample bottles, preservative, handling, storage, and transportation.

2.2.5.2 Laboratory Quality Control Samples

The laboratory QC samples (e.g., method blanks, laboratory control sample/blank spike, and matrix spike) are defined for the three-digit EPA methods (EPA/600/4-79/20) and for the four-digit EPA methods (SW-846), and will be run at the frequency specified in the respective reference unless superseded by agreement.

2.2.5.3 Quality Control Requirements

Table 2-4 lists the field QC requirements for sampling. If only disposable equipment is used or equipment is dedicated to a particular well, then an equipment rinsate blank is not required. The Samplers plan to experiment with multiple devices to ensure effective recovery of samples. Consequently, the Samplers need to have flexibility for the selection of the most effective device. No field decontamination of sampling equipment is planned.

For chemical analyses, the control limits for laboratory duplicate samples, matrix spike samples, matrix spike duplicate samples, surrogate recoveries, and laboratory control samples are typically derived from historical data at the laboratories in accordance with SW-846. Typical control limits are within 30 percent of the expected values, although the limits may vary considerably depending upon the method and analyte. For radiological analyses, the control limits for laboratory QC samples are specified in the laboratory contract.

Holding time is the elapsed time period between sample collection and analysis. Exceeding required holding times could result in changes in constituent concentrations due to volatilization, decomposition, or other chemical alterations. Required holding times depend on the analytical method, as specified for three-digit EPA methods (EPA/600/4-79/020) or for the four-digit EPA methods (SW-846).

Additional QC measures include laboratory audits and participation in nationally based performance evaluation studies. The contract laboratories participate in national studies such as the EPA-sanctioned Water Pollution and Water Supply Performance Evaluation studies. The Groundwater Remediation Project periodically audits the analytical laboratories to identify, resolve, and prevent quality problems. Audit results are used to improve performance. Summaries of audit results and performance evaluation studies are presented in the annual groundwater monitoring report.

Data will be qualified and flagged in HEIS, as appropriate. Failure of QC will be determined and evaluated during evaluation of the data by the ECO and the waste designators.

2.2.6 Instrument/Equipment Testing, Inspection, and Maintenance

Equipment used for collection, measurement, and testing should meet applicable standards (e.g., American Society for Testing and Materials [ASTM]) or have been evaluated as acceptable and valid in accordance with the procedures, requirements, and specifications. The Sampling Lead, or equivalent, will ensure the data generated from instructions using a software system are backed up and/or downloaded on a regular basis. Software configuration will be acceptance tested prior to use in the field.

Measurement and testing equipment used in the field or in the laboratory directly affecting the quality of analytical data will be subject to preventive maintenance measures to ensure minimization of measurement system downtime. Laboratories and onsite measurement organizations must maintain and calibrate their equipment. Maintenance requirements (e.g., documentation of routine maintenance) will be included in the individual laboratory and onsite organization's QA plan or operating procedures, as appropriate. Maintenance of laboratory instruments will be performed in a manner consistent with the three-digit EPA methods (EPA/600/4-79/020) and four-digit EPA methods (SW-846), as amended, or with auditable DOE Hanford Site and contractual requirements. Consumables, supplies, and reagents will be reviewed per SW-846 requirements and will be appropriate for their use.

2.2.7 Instrument/Equipment Calibration and Frequency

Specific field equipment calibration information is provided in Section 3. Analytical laboratory instruments and measuring equipment are calibrated in accordance with the laboratory's QA plan.

2.2.8 Inspection/Acceptance of Supplies and Consumables

Supplies and consumables used in support of sampling and analysis activities are procured in accordance with internal work requirements and processes described in the contractor acquisition system. Responsibilities and interfaces necessary to ensure that items procured/acquired for the contractor meet the specific technical and quality requirements must be in place. The procurement system ensures purchased items comply with applicable procurement specifications. Supplies and consumables are checked and accepted by users prior to use.

Supplies and consumables procured by the analytical laboratories are procured, checked, and used in accordance with the laboratory's QA plan.

2.2.9 Nondirect Measurements

Nondirect measurements include data obtained from sources such as computer databases, programs, literature files, and historical databases. Nondirect measurements will not be evaluated as part of this activity.

2.2.10 Data Management

The Sample Management and Reporting organization, in coordination with the Project Manager, is responsible for ensuring that analytical data is appropriately reviewed, managed, and stored in accordance with the applicable programmatic requirements governing data management procedures. Electronic data access, when appropriate, will be via a database (e.g., HEIS). Where electronic data are not available, hard copies will be provided in accordance with Section 9.6 of the Tri-Party Agreement Action Plan (Ecology et al., 1989b).

Laboratory errors are reported to the Sample Management and Reporting organization. For reported laboratory errors, a sample issue resolution form will be initiated in accordance with contractor procedures. This process is used to document analytical errors and to establish their resolution with the Project Manager. The sample issue resolution forms become a permanent part of the analytical data package for future reference and for records management.

Planning for sample collection and analysis will be in accordance with the programmatic requirements governing fixed laboratory sample collection activities, as discussed in the sampling procedures. In the event that specific procedures do not exist for a particular work evolution, or if it is determined additional guidance is needed to complete certain tasks is needed, a work package will be developed to adequately control the activities, as appropriate. Examples of sampling procedure requirements include activities associated with the following:

- Chain of custody/sample analysis requests
- Project and sample identification for sampling services
- Control of certificates of analysis
- Logbooks
- Checklists
- Sample packaging and shipping

Approved work control packages and procedures will be used to document field activities including radiological and non-radiological measurements when this SAP is implemented. Field activities will be recorded in the field logbook. Examples of the types of documentation for field radiological data include the following:

- Instructions regarding the minimum requirements for documenting radiological controls information in accordance with 10 CFR 835, "Occupational Radiation Protection"
- Instructions for managing the identification, creation, review, approval, storage, transfer, and retrieval of primary contractor radiological records

- The minimum standards and practices necessary for preparing, performing, and retaining radiologically related records
- The indoctrination of personnel on the development and implementation of sample plans
- The requirements associated with preparing and transporting regulated material
- Daily report of surveys and measurements collected during conduct of field investigation activities

Data will be cross referenced between laboratory analytical data and measurements to facilitate interpreting the investigation results.

2.3 Assessment and Oversight

The elements in assessment and oversight address the activities for assessing the effectiveness of project implementation and associated QA and QC activities. The purpose of assessment is to ensure that the QAPjP is implemented as prescribed.

2.3.1 Assessments and Response Actions

Contractor management, ECO, QA, and/or Health and Safety organizations may conduct random surveillances and assessments to verify compliance with the requirements outlined in this SAP, project work packages, the project quality management plan, procedures, and regulatory requirements.

If circumstances arise in the field dictating the need for additional assessment activities, then additional assessments would be performed. Deficiencies identified by these assessments will be reported in accordance with existing programmatic requirements. The project's line management chain coordinates the corrective actions/deficiencies in accordance with the contractor QA program, the corrective action management program, and associated procedures implementing these programs.

Oversight activities in the analytical laboratories, including corrective action management, are conducted in accordance with the laboratory QA plan. The contractor oversees offsite analytical laboratories and qualifies the laboratories for performing Hanford Site analytical work.

2.3.2 Reports to Management

Reports to management on data quality issues will be made if and when these issues are identified. Issues reported by the laboratories are communicated to the Sample Management and Reporting organization, which then initiates a sample issue resolution form in accordance with contractor procedures. This process is used to document analytical or sample issues and to establish resolution with the Project Manager.

3 Field Sampling Plan

3.1 Site Background and Objectives

This sampling activity is planned to collect representative sediment samples from PSTF Unit 1 for the purpose of supplying data to disposition sediment and closure wastes at ERDF. Closure wastes are comprised of plastic, concrete, steel angle iron, stainless steel cables, steel chains, wood, tumble weeds, and organic muck containing windblown silt and sand and will be disposed with the sediment, but no sampling is planned for these materials. These other materials will be mixed with the sediment for disposal. These materials are thought to be relatively uncontaminated and therefore, pure sediment would represent the worst case for disposal.

Table 3-1 describes sample collection, and Section 3.3 identifies a collection of three samples.

3.2 Documentation of Field Activities

Logbooks or data forms are required for field activities. Requirements for the logbook are provided in Section 2.1.6. Data forms may be used to collect field information; however, the information recorded on data forms must follow the same requirements as those for logbooks. The data forms must be referenced in the logbooks.

A summary of information to be recorded in logbooks is as follows:

- Purpose of activity
- Day, date, time, weather conditions
- Names, titles, organizations of personnel present
- Deviations from the QAPjP or procedures
- All site activities, including field tests
- Materials quality documentation (e.g., certifications)
- Details of samples collected (e.g., preparation, matrix spikes, and blanks)
- Location and types of samples
- Chain-of-custody details and variances relating to chain-of-custody
- Field measurements
- Field calibrations and surveys, and equipment identification numbers, as applicable
- Equipment decontaminated, number of decontaminations, and variations to any decontamination procedures
- Equipment failures or breakdowns, and descriptions of any corrective actions
- Telephone calls relating to field activities

Table 3-1. Sample Locations, Frequencies, and Sampling Methods

Sampling Objectives	Sample Matrix	Sample Locations	Allowable Variation on Locations	Number of Samples	Number of Quality Control Field Samples	Sampling Methods	Sampling Frequency
Collect one representative core sample from three locations. A total of three samples will be collected. Quality assurance samples.	Sediment/ Sludge	Purgewater Unit 1. One collection location at truck dump point. One sample each from two sampling points along sides from dump point. Prefer sampling points have greater than 1 ft thick sediment.	The dump point sample location should be in the immediate location of the dump point. The two side sampling points are flexible and can be identified by probing depths to find greater than 1 ft thick sediment.	A total of three samples	One full trip blank	To be defined in field work package. A hollow tube type sampler that can be pushed to full depth for best recovery will be considered. The physical properties of the sediment are not known at this time. A field trial will be run to ensure that a full-length sample can be retrieved from a total depth of about 2.5 ft. SW-846 recommends a trier sampler. Depending upon resistance, packing, and suction, an auger or piston sampler could be tried. A driven outer tube may be necessary to ensure full depth of penetration of the core recovery device or auger. Most soil samplers	One-time effort

Table 3-1. Sample Locations, Frequencies, and Sampling Methods

Sampling Objectives	Sample Matrix	Sample Locations	Allowable Variation on Locations	Number of Samples	Number of Quality Control Field Samples	Sampling Methods	Sampling Frequency
						will not penetrate to 4 ft, especially with flowing materials and sludge. The sampling method needs to ensure the integrity of the liners so as not to initiate a release from the facility. The bottom is located approximately 5 ft from the top of the side rim. A sharp type of bottom on the sampler, like a gouge sampler, should be avoided.	

3.3 Sampling Design

The sampling design shown on Figure 1-1 was selected as appropriate to verify previous analytical results.

- One full-depth sample will be taken at the discharge point for emptying into the unit. A composite sample will be made to represent the full length. Samples for VOA will be removed before the compositing process.
- Two samples will be taken, one from each side to the left and right of the discharge location. These samples will be taken at the farthest points from the discharge location where sediment is at least 1 ft thick. It is expected that these locations will be less than half of the side distance from point of discharge. The locations must be probed to ensure that at least 1 ft of sediment is present. These samples would represent later materials that spilled on to the distal portion of the sediment fan or were redistributed there as part of operations.
- One FTB QC sample will be taken.

There may be noxious vapors from degrading vegetable matter. This is an industrial hygiene issue related to worker protection. Debris in the form of tumbleweeds, algae, and bird fecal matter is present. It is assumed that coarse vegetation residue will be removed from samples. Worker safety will be ensured by the oversight of an industrial hygienist who will participate in hazard analysis and controls.

3.4 Calibration of Field Equipment

Radiation Protection and Industrial Hygiene will calibrate instruments according to proscribed procedures. Calibrations will be recorded on record sheets or logbooks by those technicians.

Calibrations must be performed as follows:

- Prior to initial use of a field analytical measurement system
- At the frequency recommended by the manufacturer or procedure, or as required by regulations
- Upon failure to meet specified QC criteria

Field instrumentation, calibration, and QA checks will be performed as follows:

- Calibration of radiological field instruments on the Hanford Site is performed by Pacific Northwest National Laboratory, as specified in their program documentation.
- Daily calibration checks will be performed and documented for each instrument used to characterize areas under investigation. These checks will be made on standard materials sufficiently like the matrix under consideration for direct comparison of data. Analysis times will be sufficient to establish detection efficiency and resolution.
- Standards used for calibration will be traceable to nationally or internationally recognized standard agency source or measurement system, if available.

3.5 Sample Location and Frequency

Table 3-1 identifies field QC sampling that will be sent to both laboratories.

3.6 Sample Methods

All samples will be sediment samples. All samples will have a rapid turnaround priority. Sample preservation, containers, and holding times are presented in Table 3-2 and Table 3-3.

Table 3-2. Bottles, Preservation, and Holding Times for Chemicals

Target Group	Name/Analytical Technology (or equivalent)	Bottle		Preservation	Holding Time
		Number	Type		
TCLP Metals	EPA Method 6010B	2	CWM 8 oz	Cool ~4C	6 months
Chromium, hexavalent	EPA Method 7196	1	CWM 250 g	Cool ~4C	30/7 days
TCLP Mercury	EPA Method 7471	1	CWM 8 oz	Cool ~4C	28 days
Cyanide	Total Cyanide 9010	1	PTFE or CWM 200 ml	Cool ~4C	14 days
VOA	EPA Method 8260	5	aGs 5x40 ml	Cool ~4C	14 Days
Ethyl acetate	EPA Method 8015	5	aGs 5x40 ml	Cool ~4C	14 Days
Organic Base, Semi VOA, Phenols	EPA Method 8270	5	CWM 250 ml	Cool ~4C	14/40 Days
Methanol	EPA Method 8015-M	1	CWM 250 ml	Cool ~4C	14/40 Days
Pesticides	EPA Method 8081A	1	aGs 8 oz	Cool ~4C	14/40 Days
Herbicide	EPA Method 8151	1	aGs 500 ml	Cool ~4C	14/40 Days
PCB Aroclors	EPA Method 8082	1	aGs 8 oz	Cool ~4C	14/40 Days
pH	EPA Method 150.1	1	CWM 250 ml	Cool ~4C	ASAP

Notes:

Bottle sizes are liberal in anticipation of high salt interferences and to permit repeat processing.

Aroclor was a trade name for PCBs marketed by Monsanto Company from 1930 to 1977.

® Teflon is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.

ASAP = as soon as possible leaching procedure
aGs = amber glass (with Teflon® lid)
AEA = alpha energy analysis
CWM = clear wide mouth (glass jar with Teflon lined lid)
G = glass
HDPE = high density polyethylene
PCB = polychlorinated biphenyl
PTFE = polytetrafluoroethylene (Teflon)
TCLP = toxicity characteristic
VOA = volatile organic analysis

Table 3-3. Bottles, Preservation, and Holding Times for Radionuclides

Target Group	Name/Analytical Technology (or equivalent)	Bottles		Preservation	Holding Time
		Number	Type		
Gross alpha	Gross alpha	1	CWM 500 ml	None	6 months
Gross beta	Gross beta	1	CWM 500 ml	None	6 months
Iodine-129	Iodine-129	1	HDPE 250 ml	None	6 months
Carbon-14	Carbon-14 – liquid scintillation	1	HDPE 250 ml	None	6 months
Cesium-137	GEA	1	HDPE 250 ml	None	6 months
GPC	Total radioactive strontium	1	HDPE 250 ml	None	6 months
Liquid scintillation	Technetium-99 Tritium	2	HDPE 250 ml	None	6 months
AEA	Uranium isotopic	1	HDPE 250 ml	None	6 months
Total radiological uranium	UTOT-KPA	1	HDPE 250 ml	None	6 months

Notes:

Bottle sizes are liberal in anticipation of high salt interferences and to permit repeat processing.

Existing data and technical analysis have shown that alpha, beta-gamma are at about Hanford site background levels. There is no detection of elevated radiation or dose measured by hand held instruments. Sr-90 is about five times background, but is not measurable with hand held instruments. Uranium isotopic analyses have not previously been recorded for these sediments.

AEA = alpha energy analysis

CWM = clear wide mouth (glass jar with Teflon®-lined lid)

GEA = gamma survey analysis

GPC = gas proportional counting

GEA = gamma energy analysis

HDPE = high density polyethylene

TBD = to be determined

UTOT-KPA = total uranium by kinetic phosphorescence analysis

3.7 Corrective Actions and Deviations for Sampling Activities

The Project Manager, Sampling Lead, or designee must document deviations from procedures or other problems pertaining to sample collection, chain-of-custody, target analytes, sample transport, or noncompliant monitoring. Examples of deviations include samples not collected because of field conditions, changes in sample locations because of physical obstructions, or additions of sample depth(s).

As appropriate, such deviations or problems will be documented in the field logbook or on nonconformance report forms in accordance with internal corrective action procedures. The Project Manager, Sampling Lead, or designee will be responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to field activities.

Changes in sample locations not affecting the DQOs will require notification and approval of the Project Manager. Changes to sample locations affecting the DQOs will require concurrence from DOE-RL and the Regulatory Project Manager. Changes to the SAP will be documented as noted in Section 2.1.6.

3.8 Decontamination of Sampling Equipment

Sampling equipment shall be decontaminated in accordance with the sampling equipment procedure for decontamination. To prevent potential contamination of the samples, care should be taken to use decontaminated equipment wrapped with aluminum foil for each sampling activity. Field decontamination will not be used for sampling equipment. Disposable samplers will be used, if possible.

Special care should be taken to avoid the following common ways in which cross-contamination or background contamination may compromise the samples:

- Improperly storing or transporting sampling equipment and sample containers
- Contaminating the equipment or sample bottles by setting the equipment/sample bottle on or near potential contamination sources (e.g., uncovered ground)
- Handling bottles or equipment with dirty hands or gloves

3.9 Radiological Field Data

Alpha- and beta-gamma data collection in the field will be used as needed to support sampling and analysis efforts. Samples will be field screened for evidence of radiological contamination and to fulfill shipping requirements. Prior alpha- and beta-gamma measurements have shown no detectable activity or dose with handheld instruments. Prior laboratory screening has shown alpha- and beta-gamma measurements at Hanford Site background levels. Strontium-90 is three times that of background levels. Screening will be conducted visually and with field instruments. Radiological screening will be performed by the RCT or other qualified personnel. The RCT will record field measurements, noting the instrument reading. Measurements will be relayed for inclusion in the field logbook or operational records daily, as applicable.

The following information will be distributed to personnel performing work in support of this SAP:

- Instructions to RCTs on the methods required to measure sample activity and media for gamma, alpha, and/or beta emissions, as appropriate
- Information regarding the Geiger-Müller, portable alpha meter, dual-phosphors beta/gamma, and sodium iodide portable instruments, to include a physical description of the instruments, radiation and

energy response characteristics, calibration/maintenance and performance testing descriptions, and the application/operation of the instrument

  - These instruments are commonly used on the Hanford Site to obtain measurements of removable surface contamination measurements and direct measurements of the total surface contamination.

- Information on the characteristics associated with the hand-held probes to be used in the performance of direct radiological measurements, including a physical description of the probe, the radiation and energy response characteristics, calibration/maintenance and performance testing descriptions, and application/operation of the instrument

  - The hand-held probe is an alpha detection instrument commonly used on the Hanford Site for obtaining removable surface contamination measurements and direct measurements of the total surface contamination.

3.10 Sample Handling

3.10.1 Packaging

Level I EPA pre-cleaned sample containers will be used for sediment samples collected for chemical analysis. Container sizes may vary depending on laboratory-specific volumes/requirements for meeting analytical detection limits. The Radiological Engineering organization will measure both the contamination levels and dose rates associated with the sample containers. This information, along with other data, will be used to select proper packaging, marking, labeling, and shipping paperwork and to verify that the sample can be received by the analytical laboratory in accordance with the laboratory's acceptance criteria. If the dose rate on the outside of a sample container or the curie content exceeds levels acceptable by an offsite laboratory, the Sampling Lead can send smaller volumes to the laboratory. Preliminary container types and volumes are identified in Table 3-2 and Table 3-3.

3.10.2 Container Labeling

The sample location and corresponding HEIS numbers are documented in the sampler's field logbook. A custody seal (e.g., evidence tape) is affixed to each sample container and/or the sample collection package in such a way as to indicate potential tampering. Except for VOA samples, the custody seal (i.e., evidence tape) will be affixed to the lid of each sample container. The custody seal will be inscribed with the sampler's initials and date. Custody tape is not applied directly to VOA sample containers based on the potential for affecting analyte results and/or fouling of laboratory equipment. Custody seals can be affixed to the exterior of a plastic bag holding vials in such a manner that potential tampering may be detected.

Each sample container will be labeled with the following information on firmly affixed, water resistant labels:

- Sampling Authorization Form
- HEIS number
- Sample collection date and time
- Analysis required
- Preservation method (if applicable)
- Sample authorization form number

In addition, sample records must include the following information:

- Analysis required
- Source of sample
- Matrix
- Field data (radiological readings)

3.10.3 Sample Custody

Sample custody will be maintained in accordance with existing Hanford Site protocols to ensure the maintenance of sample integrity throughout the analytical process. Chain-of-custody procedures will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained. A chain-of-custody record will be initiated in the field at the time of sampling and will accompany each set of samples shipped to any laboratory.

Shipping requirements will determine how sample shipping containers are prepared for shipment. The analyses requested for each sample will be indicated on the accompanying chain-of-custody form. Each time the responsibility changes for the custody of the sample, the new and previous custodians will sign the record and note the date and time. The sampler will make a copy of the signed record before sample shipment and will transmit the copy to the Sample Management and Reporting organization within 48 hours of shipping.

The following information is required on a completed chain-of-custody form:

- Project name
- Signature of sampler
- Unique sample number
- Date and time of collection
- Matrix
- Preservatives
- Signatures of individual involved in sample transfer
- Requested analyses (or reference thereto)

3.10.4 Sample Transportation

Sample transportation will be in compliance with the applicable regulations for packaging, marking, labeling, and shipping hazardous materials, hazardous substances, and hazardous waste mandated by the U.S. Department of Transportation under 49 CFR 171-177, "Chapter 1-Pipeline and Hazardous Materials Safety Administration, Department of Transportation," in association with the International Air Transportation Authority, DOE requirements, and applicable program-specific implementing procedures.

3.11 Management of Waste

All waste generated from PSTF Unit 1 is planned to go to ERDF after sampling, analysis, and completion of a new waste profile and waste designation, based upon waste acceptance criteria and processes identified in WCH-191. All waste media will be loaded in waste boxes to comply with ERDF requirements to minimize void space. In the event that ERDF criteria are not met, alternatives will be considered including variances and treatment of the sediment.

The purpose of this plan is to collect and analyze samples. Sample related waste will be dispositioned according to ongoing processes for analytical waste.

4 References

10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements," *Code of Federal Regulations*. Available at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div6&view=text&node=10:4.0.2.5.26.1&idno=10.

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_09/10cfr835_09.html.

40 CFR 268.48, "Land Disposal Restrictions," "Universal Treatment Standards," *Code of Federal Regulations*. Available at: http://edocket.access.gpo.gov/cfr_2009/julqtr/40cfr268.48.htm.

49 CFR 171 through 177, "Chapter 1—Pipeline and Hazardous Materials Safety Administration, Department of Transportation," *Code of Federal Regulations*. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_08/49cfrv2_08.html.

ANSI/ASQC E4-1994, 1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*, American National Standards Institute/ American Society for Quality Control, New York, New York.

ANSI/ASQC S2-1995, 1995, *Introduction to Attribute Sampling*, American National Standards Institute/American Society for Quality Control, New York, New York.

Atomic Energy Act of 1954, 42 USC 2011, et seq. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0980/ml022200075-vol1.pdf.

BHI-01176, *Waste Analysis Plan for the Purgewater Storage and Treatment Facility*, Rev. 1, Bechtel Hanford, Inc., Richland, Washington.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq. Available at: http://uscode.house.gov/download/pls/42C103.txt.

DOE O 414.1C, 2005, *Quality Assurance*, U.S. Department of Energy, Washington, D.C. Available at: https://www.directives.doe.gov/directives/current-directives/414.1-BOrder-c/view.

DOE/RL-2008-73,2010, *Hanford Facility Dangerous Waste Closure/Postclosure Plan for the 600 Area Purgewater Storage and Treatment Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=0084734.

Ecology, EPA, and DOE, 1989a, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=81.

Ecology, EPA, and DOE, 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=82.

EPA/240/B-01/003, 2001, *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5, Office of Environmental Information, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://www.epa.gov/QUALITY/qs-docs/r5-final.pdf.

EPA-600/4-79-020, 1983, *Methods for Chemical Analysis of Water and Wastes*, Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=D196019611.

Hanford Environmental Information System (HEIS), Hanford Site database, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. Available at: http://www4.law.cornell.edu/uscode/42/6901.html.

SW-846, 2007, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*, as amended, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: www.epa.gov/SW-846/main.htm.

WA7890008967, 2009, Dangerous Waste Permit Application, Part A, Rev. 11. Washington State Department of Ecology, Richland, Washington.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

303-090, "Dangerous Waste Characteristics."

303-140, "Land Disposal Restrictions."

303-330, "Personal Training."

303-610, "Closure and Post-Closure."

Waste Information Data System (WIDS), Hanford Site database, Richland, Washington.

WCH-191, 2009, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, Rev. 1, Washington Closure Hanford, LLC, Richland, Washington.

Distribution

	MS	Quantity
U.S. Department of Energy, Richland Operations Office		**1**
R. D. Hildebrand	A6-38	1
CH2M HILL Plateau Remediation Company		**11**
S. C. Adams	R3-50	1
M. A. Baehler	R3-60	1
W. F. Barrett	R3-19	1
P. M. Gent	R3-50	1
C. T. Narquis	R3-50	1
R. W. Oldham	R3-60	1
F. A. Ruck	H8-45	1
S. T. Smith	H8-43	1
W. R. Thackaberry	R3-60	1
D. Todak	R3-50	1
J. A. Winterhalder	R3-50	1
Lockheed and Martin Enterprise Solutions & Services		**1**
Document Clearance	H6-08	1