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Addendum H3

Closure Plans

CWC-WRAP

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H3 – CWC-WRAP

H3 Introduction

Addendum H3 discusses closure activities for the Central Waste Complex – Waste Receiving and Processing (CWC-WRAP) Operating Unit Group (OUG).

H3.1 Facility Contact Information

The Hanford Facility is owned by the U.S. Government and operated by the U.S. Department of Energy. The contact information is as follows:

U.S. Department of Energy, Richland Operations Office
P.O. Box 550
Richland, WA 99352
(509) 372-2400

H3.2 Facility Description

The Hanford Site is located in southeastern Washington State. The Site is owned by the U.S. Government, and it is managed and operated by the U.S. Department of Energy (DOE). Dangerous waste and mixed waste (containing both dangerous and radioactive components) are generated and managed at the Hanford Site.

H3.3 Facility History, Function, Location, and Layout

The CWC-WRAP is located in Hanford's 200 West Area. (Figure 1) Waste management operations began at CWC in August 1988 and WRAP began waste management operations in March 1997. The CWC provides container storage and treatment for dangerous, mixed, and *Toxic Substances Control Act of 1976* polychlorinated biphenyl (TSCA-PCB) waste, including the retrievably stored transuranic (TRU) waste being retrieved from the Hanford Facility Low-Level Burial Grounds. The waste received and processed by CWC has been generated both on and off the Hanford Site. The primary mission for WRAP is to process TRU and transuranic-mixed (TRUM) waste to meet the Waste Isolation Pilot Plant (WIPP) acceptance requirements; however, WRAP also has processing capabilities to disposition low-level waste (LLW) and mixed low-level waste (MLLW). The waste received and processed by WRAP has been generated both on and off the Hanford Site.

Previously, CWC and WRAP were managed as separate OUGs; however, due to similar missions and operational capabilities they are now being combined into one OUG.

H3.4 Products and Production Processes

The CWC-WRAP OUG does not produce products and does not have production processes. The section is not applicable.

H3.5 Dangerous Waste and Used Oil Management Units

The CWC dangerous waste management units (DWMUs) are designed for storage but also can sort, treat, repackage, sample, and physically/chemically screen to characterize waste. Additionally, the CWC can verify the characterization of containers of mixed waste and can perform nondestructive examination on an as-needed basis. Limited treatment of mixed waste is provided in the 2402-W, 2403-W, and 2404-W series buildings' DWMUs. Treatment will consist of absorption of free liquids, absorption to accomplish deactivation, and neutralization of corrosive materials.

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The WRAP DWMUs began waste management operations in March 1997. The primary mission for WRAP is to process TRU and TRUM waste to meet the WIPP acceptance requirements; however, WRAP also has processing capabilities to disposition LLW and MLLW, including TSCA-PCB mixed and non-mixed radioactively contaminated wastes. The waste received and processed by WRAP has been generated both on and off the Hanford Site. The storage and treatment DWMUs provide space for the storage and processing of mixed and non-mixed radioactive wastes, including TSCA-PCB contaminated mixed and non-mixed radioactively contaminated wastes. Waste treatment at Building 2336-W includes repackaging; solidification and/or absorption; puncturing and decanting aerosol cans; amalgamation of mercury using various metals or sulfur based reactants; neutralization of acids and bases; deactivation of corrosives, ignitables, and/or reactives; stabilization; and volume reduction.

The current Part A application for the CWC-WRAP OUG identifies the DWMUs' various *Resource Conservation and Recovery Act of 1976* (RCRA) permitted capabilities, as well as permitted operating DWMUs and closing DWMUs.

This summary closure plan will add closing DWMUs for the CWC-WRAP OUG and serve as an overarching document for those units' closure plans.

The CWC-WRAP consists of the following storage and/or treatment DWMUs identified in purple on Figure 1:

- Flammable and Alkali Metal Waste Storage Modules (Storage)
- 2402–W Series Waste Storage Buildings (Storage and Treatment)
- 2403–WA through WC Series Waste Storage Buildings (Storage and Treatment)
- 2403-WD Waste Storage Building (Storage and Treatment)
- 2404-WA Waste Storage Building (Storage and Treatment)
- CWC Tank D-10 Outside Storage Area (Storage)
- CWC East Outside Storage Area (Storage)
- CWC Shipping and Receiving Area (Storage)
- 2336-W Building Process Area (Storage and Treatment within gloveboxes)
- 2336-W Building NDA/NDE Area (Storage)
- 2336-W Building Shipping and Receiving Area (Storage)
- 2336-W Building Room 152 (Storage)
- 2404-WB Waste Storage Building (Storage)
- 2404-WC Waste Storage Building (Storage and Treatment)
- HERTR and Super HENC Waste Outdoor Storage Area (Storage)

Following are the CWC-WRAP OUG closing DWMUs identified in red on Figure 1:

- CWC Outside Storage Area A (Closing DWMU)
- CWC Outside Storage Area B (Closing DWMU)
- CWC 2401W Waste Storage Building (Closing DWMU)

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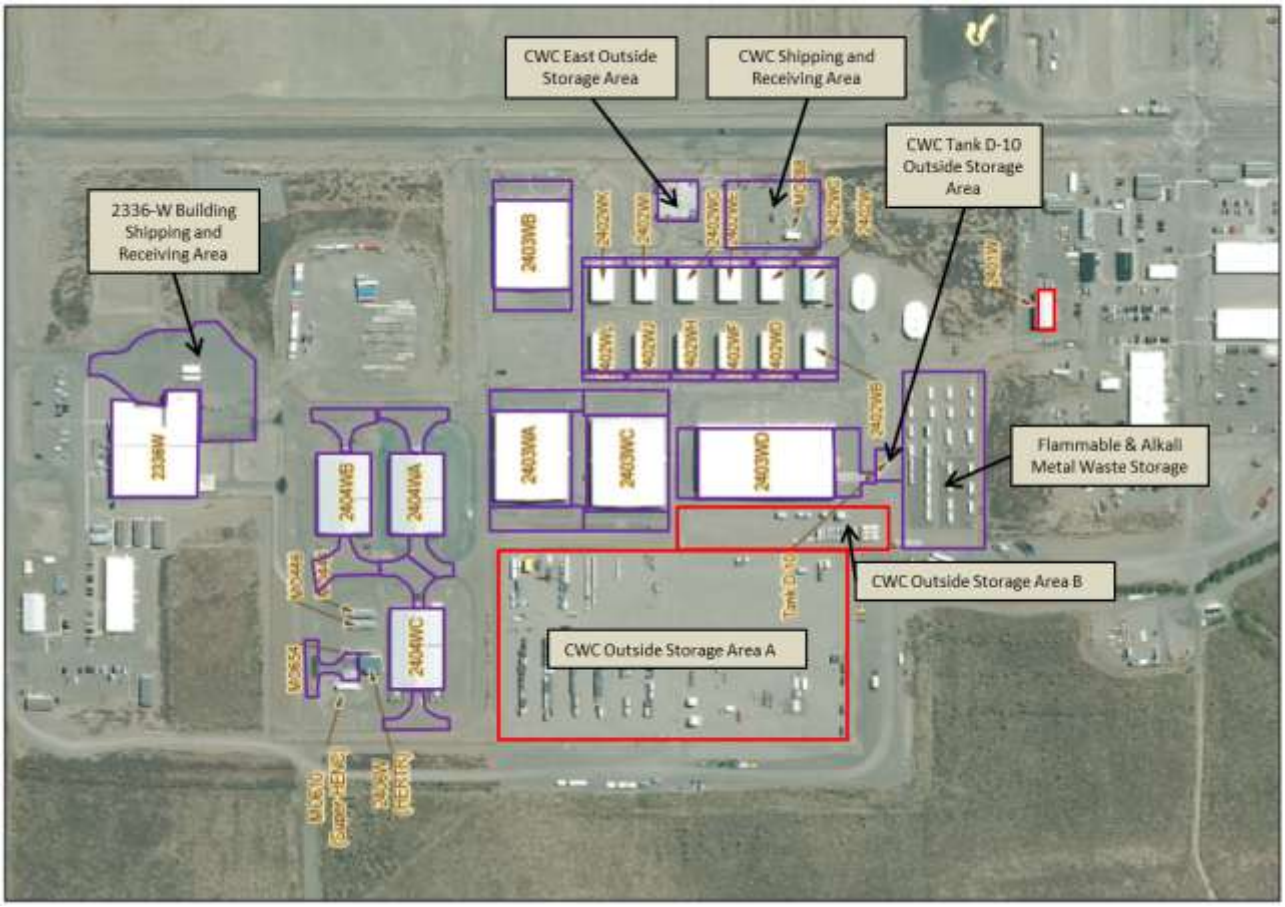

Figure 1. CWC-WRAP Operating and Closing DWMU

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H3 – CWC-WRAP
H3.A - Appendix A – CWC-WRAP Outdoor Storage Area A *(includes Care & Maintenance during closure)*

A1 Introduction

This appendix discusses closure activities for the Central Waste Complex-Waste Receiving and Processing (CWC-WRAP) Operating Unit Group (OUG) Outdoor Storage Area A dangerous waste management unit (Area A) (Figure A-1). The U.S. Department of Energy (DOE) has agreed through a Consent Agreement and Final Order with the U.S. Environmental Protection Agency (EPA) to close this DWMU. The closure will be performed in accordance with the included schedule. This closure plan complies with Washington Administrative Code (WAC) 173-303-610(2) through WAC 173-303-610(6) and represents the baseline for closure. Amendments to this closure plan will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b).

A1.1 Unit Description

Area A was activated in December 2006 with the primary purpose of storing large transuranic mixed (TRUM) waste boxes removed from storage as part of the Waste Retrieval Project. Area A is a gravel-covered, rectangular-shaped outdoor storage area west of the 2403-series buildings and is approximately 252 m (827 ft) long and 140 m (459 ft) wide, with a total area of 35,280 m^2 (379,751 ft^2). Area A is an uncovered area that does not have a constructed secondary containment for management of containers with liquids.

Transfer of additional dangerous, mixed, or *Toxic Substances Control Act of 1976* polychlorinated biphenyl (TSCA-PCB) waste into Area A is not authorized.

A1.1.1 Maximum Waste Inventory

The total accumulative maximum inventory of Area A consists of 451 *Resource Conservation and Recovery act of 1976* (RCRA)-regulated waste containers with a total volume of 7,083 m^3 (9,264 yd^3) and 11 TSCA-PCB containers with a total volume of 13 m^3 (17 yd^3). As of August 2013, Area A currently contains 171 mixed waste containers with a total volume of 5,183 m^3 (6,779 yd^3) consisting of TRUM or TSCA-PCB TRUM waste, and one TSCA-PCB waste container with a total volume of 10 m^3 (13 yd^3). The TRUM and TSCA-PCB TRUM waste was first introduced into Area A in 2006. Details on the waste containers are presented in Section A3.4 of this closure plan.

Closure performance standards for the Area A will be based on requirements found in WAC 173-303-610(2), “Dangerous Waste Regulations,” “Closure and Post-Closure,” which require closure of the facility in a manner that:

- Minimizes the need for further maintenance;
- Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and
- Returns the land to the appearance and use of surrounding land areas to the degree possible, given the nature of the previous dangerous waste activity

These performance standards are addressed in the Sections A2.1 and A3.13 of this closure plan.

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Figure A-1. CWC 2401W Building and Outside Storage Areas

A2 Closure Performance Standard

A2.1 Clean Closure Levels

The Area A will be clean closed. In accordance with WAC 173-303-610(2)(b)(i), the clean closure levels for soil will be the numeric cleanup levels calculated using unrestricted use exposure assumptions according to the *Model Toxics Control Act* (MTCA) (WAC 173-340, "Model Toxics Control Act-Cleanup") cleanup regulations (WAC 173-340-700 through -760, excluding WAC 173-340-745). These numeric cleanup levels will be calculated according to the MTCA Method B unrestricted use standards current at the time of closure.

Sampling and analysis will support clean closure levels for the Area A gravel and soil. Should sampling and analysis of the Area A indicate contamination above the MTCA Method B unrestricted use standards, then the potential for groundwater contamination will be reviewed and discussed with Ecology. Any required changes to this closure plan and the associated sampling and analysis plan (SAP) resulting from the discussions will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b).

A3 Closure Activities

As a storage unit, clean closure determination for Area A will be based on a review of the operational history, operating records (including any dangerous and mixed waste releases), waste management records, and a visual inspection of the area to verify that waste-related staining is not present. Subsequently, soil characterization will be conducted via a SAP to demonstrate that clean closure numeric levels have been achieved.

Area A currently stores mixed waste. An extended period will be needed to ship these containers to another receiving treatment, storage, and/or disposal (TSD) facility for waste processing (see Section A3.3). These shipments must be completed prior to final clean closure verification.

Due to the extended closure period that will be required to complete closure activities, closure activities have been divided into near-term and extended period activities.

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Near-term closure activities required to achieve and verify clean closure for soil are as follows:

- Review waste container storage, operating, and inspection records up through July 2013. (Completed. See Section A3.4.)
- Perform a visual inspection of the gravel areas currently accessible (i.e., not under waste containers or restricted due to contamination areas.) (Completed. See Section A3.4.)

Extended closure activities include the following activities:

- Continue weekly inspections in accordance with Addendum I, *Inspection Requirements*, for the Part V CWC-WRAP closing unit group
- Remove all dangerous waste inventory
- Review waste container storage, operating, and inspection records from August 2013 through the last waste removal
- Perform an additional visual inspection of gravel and visible surface soil once all waste is removed
- Update the SAP through the permit modification process to incorporate any issues identified during the visual inspections and updated records review (if necessary)
- Perform sampling and analysis to confirm clean closure standards are met

A3.1 Health and Safety Requirements

Closure will be performed in a manner to ensure the safety of personnel and the surrounding environment. Qualified personnel will perform any necessary closure activities in compliance with established safety and environmental procedures. Personnel will be equipped with appropriate personal protective equipment. Qualified personnel will be trained in applicable safety and environmental procedures in accordance with the Solid Waste Operations Complex (SWOC) CWC-WRAP, Addendum G, *Personnel Training*, and have appropriate training and experience in sampling activities. Field operations will be performed in accordance with applicable health and safety requirements.

The Permittees have instituted training or qualification programs to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. Field personnel typically have completed the following training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- 8-Hour Hazardous Waste Worker Refresher Training (as required)
- Hanford General Employee Training

Project-specific safety training addressed explicitly to the project and the day's activity will be provided, including the following:

- Training to provide the knowledge and skills that sampling personnel need to perform work safely and in accordance with QA requirements
- Requirement that samplers be qualified in the type of sampling being performed in the field

In addition, pre-job briefings will be performed to evaluate activities and associated hazards by considering many factors, including the following:

- Objective of the activities

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- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required
- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work
- Level of management control
- Proximity of emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittees training organization maintains the training records system.

A3.2 Care and Maintenance During Closure

Due to the nature of the waste and extended period necessary for closing Area A, the Permittees must ensure that the dangerous waste containers stored in Area A do not pose a risk to human health and the environment. The Permittee has taken, and will continue to take steps to prevent threats to human health and the environment, including compliance with all applicable RCRA compliance requirements. These RCRA compliance requirements include dangerous waste management unit inspections, personnel training, and emergency preparedness. No new mixed waste containers will be accepted in Area A.

As identified in Addendum I, *Inspection Requirements*, weekly inspections of dangerous or mixed waste containers will continue until all containers have been removed from Area A. Upon removal of the containers, annual inspections will be performed until such a time as the closure certification is complete.

In addition to required inspections, the CWC-WRAP OUG has a contingency plan that satisfies the requirements of WAC 173-303-350. A copy of the contingency plan for CWC-WRAP OUG is kept in the RCRA operating record.

A3.3 Removal of Wastes and Waste Residues

Removal of waste from Area A will begin as part of the closure process and is governed by the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement; HFFACO) (Ecology et al., 1989) major Milestone M-091-00, and additional waste stream M-091 milestones. Currently, the capacity to process the large containers of contact-handled (CH)-TRUM and remote-handled (RH)-TRUM waste does not exist on the Hanford Site. Commercial capabilities are available to process containers with low grams of plutonium of CH-TRUM waste and low-dose-rate RH-TRUM waste. For TRUM waste, a “large container” is defined as any container that is larger than a 208 L (55 gal) drum or standard waste box.

The schedule for these waste removal activities is associated with Tri-Party Agreement milestones (HFFACO as amended):

- Completion of the conceptual design of large container CH-TRUM and RH-TRUM waste repackaging capability is scheduled in Tri-Party Agreement Milestone M-091-01A.
- Completion of the definitive design of large container CH-TRUM and RH-TRUM waste repackaging capability is scheduled in Tri-Party Agreement Milestone M-091-01B.
- Completion of construction for large container waste repackaging capabilities is scheduled in Tri-Party Agreement Milestone M-091-01B.

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- Completion of certification and shipment of large containers of CH-TRUM and RH-TRUM waste is scheduled in Tri-Party Agreement Milestone M-091-44.

A3.4 CWC Outside Storage Area A Records Review and Visual Inspection

To support the development of this closure plan and the associated SAP (Attachment A), a review of the Area A RCRA operating records was completed (Table A-1). The records review included the following RCRA operating record documents: facility operating logbooks (which contain the facility spill log), waste management records, and weekly inspections. The RCRA operating record documents that were reviewed focused on the period during active dangerous, mixed, or TSCA-PCB waste storage. The facility operating records reviewed to date identified one area of interest related to container 231ZDR-11.

Waste management records for the TRUM and TSCA-PCB TRUM waste containers stored in Area A were reviewed to determine the target analytes to be included in the closure plan SAP. Currently, 164 TRUM and 7 TSCA-PCB TRUM waste containers are being stored in Area A. Container data are presented in Table A-2.

A visual inspection was performed of the visible ground surface in Area A on August 14, 2013, to identify any dangerous waste-related staining. No waste-related staining was identified during the visual inspection; however, once all waste is removed, an additional visual inspection will be conducted.

Supporting documentation for the RCRA operating records review and visual inspection are documented in Attachment B. These include the CWC Outdoor Waste Container Storage Area A Daily Operating Log Book Review sheet, the CWC Outdoor Waste Container Storage Area A Weekly Dangerous Waste Inspection Checklist Review, the CWC Outdoor Container Storage Area “A” visual inspection sheet, and any additional supporting information.

A3.5 Unit Components, Parts, and Ancillary Equipment

Area A does not have any components, parts, or ancillary equipment.

A3.6 Inspection of Units Before Decontamination

Decontamination activities are not planned for Area A.

A3.7 Decontamination

Decontamination activities are not planned for Area A.

A3.8 Identifying and Managing Contaminated Environmental Media

If contaminated media are identified during the final visual inspection or as a result of the confirmation sampling, the contaminated materials will be removed and packaged, and a waste determination will be completed in accordance with applicable environmental and waste management procedures. Treatment or disposal of the resulting waste will be performed at an approved TSD facility.

A3.9 Confirming Clean Closure

Area A will be clean closed. During closure activities, all waste will be removed. After all of the waste has been removed, a visual inspection of the area will be performed to identify any waste-related staining of the gravel or visible surface soil. Since all dangerous waste will be removed and sampling will confirm that contamination does not remain, post-closure escape of dangerous waste and any associated dangerous waste constituents, leachate, contaminated runoff, and dangerous waste decomposition products to the ground, surface water, groundwater, or air is not anticipated.

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Table A-1. Operating Records Review Summary

Document Title	Document Type	Facility	Start Date	End Date	Items of Concern Noted
Weekly RCRA Inspection Checklist for CWC	Weekly Inspection	CWC – Area A	01/05/2006	06/26/2013	Yes[a]
Weekly CWC RCRA/Non-RCRA Inspection Checklist	Weekly Inspection	CWC-Area A	01/03/2012	12/27/2012	Yes[a]
Daily Operating Logbook	Logbook	CWC Area-A	12/06/2006	08/12/2013	Yes[a]

a. Item of concern was the 231ZDR-11 box on 02/06/2012.

N/A = not applicable

Table A-2. CWC Outdoor Storage Area B Container Data

Container Quantity	Facility ID	Storage Unit	Waste Package Type	Package Volume (m^3)	Waste Type	Earliest Moved In Date	Latest Moved Out Date	Assigned Waste Code
171	CWC	Area A	Various large containers	5183	TRUM/ TSCA-PCB TRUM	December 2006	N/A[a]	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D027, D028, D029, D030, D033, D034, D035, D037, D038, D043, D032, F001, F002, F003, F004, F005
1	CWC	Area A	Various large containers	10	TSCA-PCB	December 2006	N/A[a]	N/A
280	CWC	Area A	Various	1900	Mixed	December 2006	August 2013	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D027, D028, D029, D030, D033, D034, D035, D037, D038, D043, D032, F001, F002, F003, F004, F005
10	CWC	Area A	Various	3	TSCA-PCB	December 2006	August 2013	N/A

a. Current container inventory for CWC Outdoor Storage Area A.

N/A = not applicable

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Record reviews have been completed for the operational period of December 2006 through July 2013, as discussed in Section A3.4 of this closure plan. Prior to the startup of closure activities, a review of the RCRA operating records from August 2013, through closure startup will be performed. The records review will include the following RCRA operating record documents: facility operating logbooks (including spill reports) and weekly inspections.

Once all waste has been removed, sampling will be conducted to confirm that unrestricted use cleanup standards (MTCA B) for soil have been achieved. Once analytical results confirm clean closure levels of target analytes, a determination will be made to leave the gravel surface of the Area A in place.

A3.10 Sampling and Analysis and Constituents to Be Analyzed

A3.10.1 Sampling and Analysis Plan

Sampling and analysis of the gravel and soil will be conducted to confirm that clean closure levels have been achieved at Area A. All sampling and analysis will be performed in accordance with the sampling and quality standards established in the closure SAP (Attachment A). The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the American Society for Testing and Materials (ASTM) *Annual Book of ASTM Standards*; and applicable EPA guidance. Sampling and analysis activities will meet applicable requirements of SW-846, the ASTM standards, EPA-approved methods, and *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68).

A3.10.2 Revisions to the Sampling and Analysis Plan and Constituents to be Analyzed

If changes to the SAP are necessary due to unexpected events during closure that will affect sampling, a revision to this SAP will be submitted no later than 30 days after the unexpected event as a permit modification as required in WAC 173-303-610(3)(b)(iii).

A3.11 Role of the Independent Qualified Registered Professional Engineer

An independent, qualified, registered professional engineer will be retained to provide certification of the closure, as required by WAC 173-303-610(6). The resulting engineering report will be retained in the operating record.

A3.12 Closure Certification

In accordance with WAC 173-303-610(6), within 60 days of completion of closure of the Area A DWMU, a certification that the DWMU has been closed in accordance with the specifications in this closure plan will be submitted to the Washington State Department of Ecology by registered mail. The certification will be signed by the owner or operator and by an independent qualified registered professional engineer.

A3.13 Conditions That Will Be Achieved When Closure Is Complete

Upon confirmation of clean closure levels through sampling and analysis, Area A will remain in an "as-is" state, with the gravel remaining in place. The area and buildings surrounding Area A are active DWMUs that will continue to be used; therefore, removal of the gravel is not necessary, and the land will not be restored to its pre-operational appearance. The storage area marking will be removed after the closure activities are completed. A permit modification request will be submitted after clean closure has been confirmed to remove Area A DWMU from the sitewide permit active DWMUs.

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A4 Closure Schedule and Time Frame

Due to the container size and nature of the waste being stored in Area A, closure of Area A will take place over an extended period of time; therefore, meeting the 180-day requirement to complete closure activities in the DWMU as required in WAC 173-303-610(4) is not possible. The closure schedule and period to treat, remove, and dispose the large containers of waste will be developed based on Tri-Party Agreement Milestone M-091-00 and other sub-milestones noted in Section A3.3 (Figure A-2).

Approval of this closure plan will grant the Hanford Site an extended closure period in accordance with WAC 173-303-610(4)(c) and a separate extension request will not be filed.

A5 Closure Costs

An annual report outlining updated projections of anticipated closure costs for the Hanford Facility TSD units having final status is not required per Permit Condition II.H.

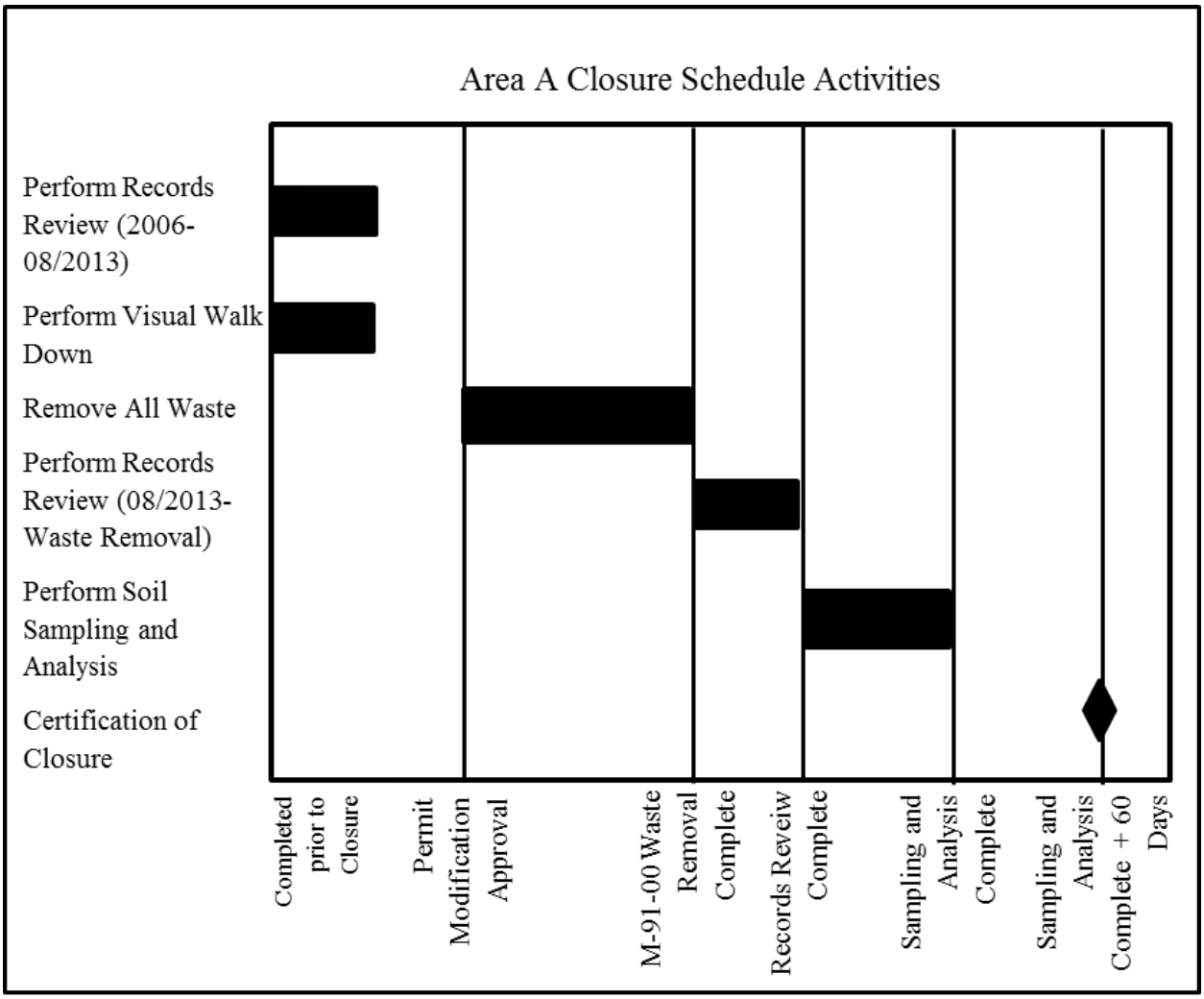

Figure A-2. CWC Outdoor Storage Area A Closure Schedule Activities

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Attachment A

CWC-WRAP Outdoor Storage Area A

Sample and Analysis Plan

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CWC-WRAP Outdoor Storage Area A

Sample and Analysis Plan

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Terms

ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Services
CWC	Central Waste Complex
CWC-WRAP	Central Waste Complex Operating-Waste Receiving and Processing Unit Group
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQA	data quality assessment
DQI	data quality indicator
DUP	field duplicate
EB	equipment blank
ECO	Environmental Compliance Officer
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FSP	field sampling plan
FTB	full trip blank
FWS	Field Work Supervisor
FXR	field transfer blank
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Documents*
HEIS	Hanford Environmental Information System
MDA	minimum detectable activity
POC	point of contact
QA	quality assurance
QAPjP	quality assurance project plan
QC	quality control
RPD	relative percent difference
SAF	sampling authorization form
SAP	sampling and analysis plan
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*

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VOA	volatile organic analysis
VOC	volatile organic compound
VSP	Visual Sample Plan (software)

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1 Introduction

1.1 Purpose

The purpose of the sampling and analysis plan (SAP) is to assist in the determination that clean closure levels have been achieved for Central Waste Complex-Waste Receiving and Processing (CWC-WRAP) Outside Storage Area A (Area A).

Sampling and analysis of the gravel and/or soil will be conducted to confirm that clean closure levels have been achieved. Sampling includes grid sampling over Area A and focused sampling in the former storage location of container 231ZDR-11. All sampling and analysis will be performed in accordance with the sampling and quality standards established in this closure SAP. The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the American Society for Testing and Materials (ASTM) *Annual Book of ASTM Standards*, and applicable U.S. Environmental Protection Agency (EPA) guidance. Sampling and analysis activities will meet applicable requirements in SW-846, the ASTM standards, EPA-approved methods, and *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (U.S. Department of Energy, Richland Operations Office [DOE/RL-96-68]).

1.2 Statement of the Problem

The objective of the sampling described in this document is to verify that the MTCA Level B closure performance standards for soil were met demonstrating clean closure of the Area A.

1.3 Target Analytes

The target analytes were determined by reviewing waste management records for the dangerous waste stored in Area A (Table 1-1).

Table 1-1. Target Analyte List

Target Analyte	CAS Number	Target Analyte	CAS Number
Arsenic (D004)	7440-38-2	Trichloroethylene (F001) (F002)	79-01-6
Barium (D005)	7440-39-3	Chlorobenzene (F002)	108-90-7
Cadmium (D006)	7440-43-9	1,1,2-Trichloroethane (F002)	79-00-5
Chromium (Hexavalent) (D007)	18540-29-9	Acetone (F003)	67-64-1
Lead (D008)	7439-92-1	N-butyl alcohol (F003)	71-36-3
Mercury (D009)	7439-97-6	Cyclohexanone (F003)	108-94-1
Selenium (D010)	7782-49-2	Ethyl acetate (F003)	141-78-6
Silver (D011)	7440-22-4	Ethyl benzene (F003)	100-41-4
Benzene (D018) (F005)	71-43-1	Ethyl ether (F003)	60-29-7

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Table 1-1. Target Analyte List

Target Analyte	CAS Number	Target Analyte	CAS Number
Carbon tetrachloride (D019) (F001) (F002)	56-23-5	Methanol (F003)	67-56-1
Chloroform (D022)	67-66-3	Methyl isobutyl ketone (F003)	108-10-1
1,4-Dichlorobenzene (D027)	106-46-7	Ortho-dichlorobenzene (F002)	95-50-1
1,2-Dichloroethane (D028)	107-06-2	m-Xylene (F003)	108-38-3
1,1-Dichloroethylene (D029)	75-35-4	o-Xylene (F003)	95-47-6
2,4-Dinitrotoluene (D030)	121-14-2	p-Xylene (F003)	106-42-3
Hexachlorobenzene (D032)	118-74-1	Benzene, nitro (F004)	98-95-3
Hexachlorobutadiene (D033)	87-68-3	*m*-cresol (F004)	108-39-4
Hexachoroethane (D034)	67-72-1	*o*-cresol (F004)	95-48-7
Methyl ethyl ketone (MEK) (D035) (F005)	78-93-3	*p*-cresol (F004)	106-44-5
Pentachlorophenol (D037)	87-86-5	Carbon disulfide (F005)	75-15-0
Pyridine (D038) (F005)	110-86-1	2-Ethoxyethanol (F005)	110-80-5
Vinyl chloride (D043)	75-01-4	Isobutanol (F005)	78-83-1
Chlorinated fluorocarbons (1,1,2-Trichloro-1,2,2-trifluoroethane) (F001) (F002)	76-13-1	2-Nitropropane (F005)	79-46-9
Methylene chloride (F001) (F002)	75-09-2	Pyridine (F005)	110-86-1
Tetrachloroethylene (F001) (F002)	127-18-4	Toluene (F005)	108-88-3
1,1,1-Trichloroethane (F001) (F002)	71-55-6	Polychlorinated biphenyl (PCB)	1336-36-3

1.4 Project Schedule

The sampling and analysis schedule will be determined by the associated *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989a) Milestone M-091-00 activities. Sampling will not commence until all dangerous waste containers have been removed from Area A.

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2 Quality Assurance Project Plan

The 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 requirements of the following:

- 10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements"
- DOE O 414.1D, *Quality Assurance*
- *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA/240/B-01/003)
- *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68)

This chapter describes the applicable quality requirements and controls. Sections 6.5 and 7.8 of *Hanford Federal Facility Agreement and Consent Order Action Plan* (Tri-Party Agreement Action Plan) (Ecology et al., 1989b) require the quality assurance (QA)/quality control (QC) and sampling and analysis activities to specify the QA requirements for treatment, storage, and disposal units, as well as for past-practice processes. Therefore, this QAPjP follows the QA elements of EPA/240/B-01/003. This QAPjP demonstrates conformance to Part B requirements of *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4-2004).

This QAPjP is divided into the following four sections, which describe the quality requirements and controls applicable to this investigation: Project Management, Data Generation and Acquisition, Assessment and Oversight, and Data Validation and Usability.

2.1 Project Management

The following subsections address project management and 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 is responsible for planning, coordinating, sampling, preparation, packaging, and shipping samples to the laboratory. The project organization (regarding sampling and characterization) is described in the following subsections and shown graphically in Figure 2-1. The Project Manager maintains a list of individuals or organizations as points of contact (POCs) for each functional element in Figure 2-1.

The project has several key positions, including the following:

- **Regulatory Project Manager:** The Washington State Department of Ecology (Ecology) has assigned project managers responsible for oversight of cleanup projects and activities. Ecology, as lead regulatory agency for the CWC Area A closure sampling project, has oversight authority 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 in accordance with the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement; Ecology et al., 1989).

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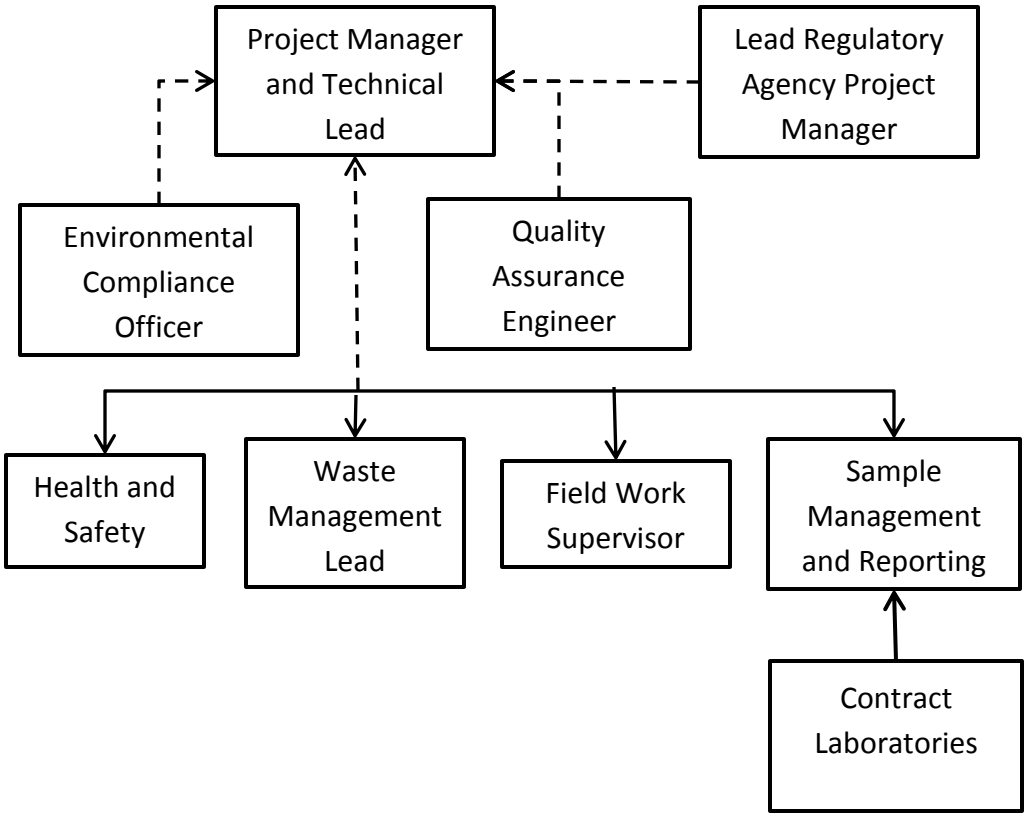

Figure 2-1. CWC Outdoor Storage Area A Closure Sampling Project Organization

- **Project Manager**. The Project Manager provides oversight for activities and coordinates with DOE-RL, EPA, Ecology, and contract management. In addition, support is provided to the project technical lead to ensure that work is performed safely and cost effectively. The Project Manager (or designee) for the CWC Area A closure sampling is responsible for direct management of sampling documents and requirements, field activities, and subcontracted tasks. The Project Manager is responsible for ensuring that the project personnel are working to the current version of the SAP. The Project Manager works closely with QA, Health and Safety, and the Field Work Supervisor (FWS) to integrate these and other lead disciplines in planning and implementing the work scope. The Project Manager also coordinates with DOE-RL and the primary contractor management on all sampling activities. The Project Manager supports DOE-RL in coordinating sampling activities with the regulators.

- **Environmental Compliance and Quality Assurance**. 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, protocols, 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-RL and/or regulatory agencies. The ECO also oversees project implementation for compliance with applicable internal and external environmental requirements.

  The QA POC is matrixed to the Project Manager and is responsible for QA issues on the project. Responsibilities include overseeing implementation of the project QA requirements, reviewing project documents (including SAP and the QAPjP), and participating in QA assessments on sample

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collection and analysis activities, as appropriate. The QA POC must be independent of the unit generating the data.

- **Health and Safety:** The Health and Safety organization's responsibility for coordinating industrial safety and health 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 assists project personnel in complying with applicable health and safety standards and requirements.

- **Sample Management and Reporting:** The Permittee's sampling organization coordinates laboratory analytical work, ensuring that laboratories conform to Hanford Site internal laboratory QA requirements (or their equivalent), as approved by DOE-RL, EPA, and Ecology. The sampling organization receives the analytical data from the laboratories, performs the data entry into the Hanford Environmental Information System (HEIS) database, and arranges for data validation. The sampling organization is responsible for informing the Project Manager of any issues reported by the analytical laboratory. The sampling organization develops and oversees implementation of the letter of instruction to the analytical laboratories, oversees data validation, and works with the Project Manager to prepare a characterization report on the sampling and analysis results.

- **Contract Laboratories:** The contract laboratories analyze samples in accordance with established procedures and provide necessary sample reports and explanation of results in support of data validation. The laboratories must meet site-specific QA requirements and must have an approved QA plan in place.

- **Waste Management:** The Waste Management organization communicates policies and protocols, and ensures project compliance for storage, transportation, disposal, and waste tracking in a safe and cost-effective manner. In addition, Waste Management is responsible for identifying waste management sampling/characterization requirements to ensure regulatory compliance, interpreting the characterization data to generate waste designations and profiles, and preparing and maintaining other documents confirming compliance with waste acceptance criteria.

- **Fieldwork Supervisor:** The FWS is responsible for planning and coordinating field sampling resources. The FWS ensures that samplers are appropriately trained and available. Additional related responsibilities include ensuring that the sampling design is understood and can be performed as specified by directing training, mock-ups, and practice sessions with field personnel.

  The FWS directs the samplers. The samplers collect soil samples, including replicates/duplicates, and prepare sample blanks in accordance with the SAP, corresponding protocols, and work packages. The samplers complete field logbook entries, chain-of-custody forms, and shipping paperwork, and ensure delivery of the samples to the analytical laboratory.

2.1.2 Quality Objectives and Criteria

The QA objective of this plan is to develop implementation guidance providing data of known and appropriate quality. Data quality indicators (DQIs) describe data quality by evaluation against identified data needs 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 2-1. The DQIs will be evaluated during the data quality assessment (DQA) process (Section 2.4.5).

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Quality objectives and project-specific analytical performance requirements are presented in Table 2-2. In consultation with the laboratory, the Project Manager, the sampling organization, and/or others as appropriate, identify appropriate analytical methods.

2.1.3 Special Training/Certification

A graded approach is used to ensure that workers receive a level of training that is commensurate with responsibilities and compliant with applicable DOE orders and government regulations. The FWS, in coordination with line management, will ensure that special training requirements for field personnel are met.

Typical training requirements or qualifications have been instituted by the Permittee to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. Field personnel typically have completed the following training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- 8-Hour Hazardous Waste Worker Refresher Training (as required)
- Hanford General Employee Training

Project-specific safety training addressed explicitly to the project and the day's activity will be provided, including the following:

- Training to provide the knowledge and skills that sampling personnel need to perform work safely will be in accordance with QA requirements.
- Requirement that samplers be qualified in the type of sampling being performed in the field.

In addition, pre-job briefings will be performed to evaluate activities and associated hazards by considering many factors, including the following:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required
- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work
- Level of management control
- Proximity of emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittee's training organization maintains the training records system.

2.1.4 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

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control process. Changes to the SAP affecting the data needs will be submitted as a permit modification in accordance with WAC 173-303-610 to the DOE and lead regulatory agency.

The FWS is responsible for ensuring that the field instructions are maintained and aligned with any revisions or approved changes to the SAP. The FWS 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 protocols.

The Project Manager, FWS, or designee is responsible for communicating field corrective action requirements and ensuring that 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 FWS, 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 contain the records or references to their storage locations. The following will be included in the project file, 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 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 hardcopy 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 required by the Tri-Party Agreement (Ecology et al., 1989a) will be managed in accordance with the requirements therein.

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Precision	The measure of the degree of reproducibility of measurements under prescribed similar conditions. May 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. 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.	Field precision: At randomly selected locations, duplicate samples will be taken one per 20 samples per media. Laboratory precision; analysis of laboratory duplicate or matrix spike duplicate.	If 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 an accepted reference or true value. Sample accuracy is expressed as the percent recovery of a spiked sample.	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).	Laboratory accuracy Determination based on matrix spikes and matrix spike duplicates.	If recovery does not meet objective: • Qualify the data before use • Request re-analysis or remeasurement

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Representa-tiveness	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. Judgment sampling ensures areas most likely to be contaminated, based on current information, will be evaluated. Random sampling is based on ensuring all members of the group are equally likely to be chosen and allows probability statements to be made about the quality of estimates derived from the data.	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

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
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.	Sampling personnel will use the same sampling protocols. Samples will be submitted to the same laboratories when possible (based on laboratory contracts) for analysis by the same methods, thus data results will be comparable.	If data are not comparable to other data sets: • 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. • Revise sampling/analysis protocols to ensure future comparability

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Completeness	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.	Sampling personnel will use the same sampling protocols. Samples will be submitted to the same laboratories when possible (based on laboratory contracts) for analysis by the same methods, thus data results will be comparable.	If data are not comparable to other data sets: • 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. • Revise sampling/analysis protocols to ensure future comparability
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, which can be routinely quantified and reported by a laboratory.	Ensure sensitivity, as measured detection limits, is appropriate for the action levels.	If sensitivity does not meet objective: • Request reanalysis or remeasurement. • Qualify/reject the data before use.

DQI = data quality indicators
QA = quality assurance

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Table 2-2. Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a] (mg/kg)		Practical Quantitation Limit[d]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
			Carcinogen	Non-carcinogen			
Performance Requirements for Laboratory Measurements (Nonradiological)							
7440-38-2	Arsenic	SW-846 Method 6010 or 200.8	0.667	24	10	±30	≤30
7440-39-3	Barium	SW-846 Method 6010 or 200.8	N/A	16,000	2.0	±30	≤30
7440-43-9	Cadmium	SW-846 Method 6010 or 200.8	N/A	80	0.5	±30	≤30
18540-29-9	Chromium (Hexavalent)	SW-846 Method 6010 or 200.8	N/A	240	1.0	±30	≤30
7439-91-1	Lead	SW-846 Method 6010 or 200.8	N/A	250	5.0	±30	≤30
7439-97-6	Mercury	SW-846 Method 7471 or 200.8	N/A	24	0.2	±30	≤30
7782-49-2	Selenium	SW-846 Method 6010 or 200.8	N/A	400	10	±30	≤30
7440-22-4	Silver	SW-846 Method 6010 or 200.8	N/A	400	1.0	±30	≤30
71-43-2	Benzene	SW-846 Method 8260	18.2	320	0.005	N/A[c]	≤20
56-23-5	Carbon tetrachloride	SW-846 Method 8260	14.3	320	0.005	N/A[c]	≤20
67-66-3	Chloroform	SW-846 Method 8260	164	800	0.005	N/A[c]	≤20
106-46-7	1,4-Dichlorobenzene	SW-846 Method 8260	41.7	1600	0.004	N/A[c]	≤20

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Table 2-2. Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a] (mg/kg)		Practical Quantitation Limit[d]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
			Carcinogen	Non-carcinogen			
107-06-2	1,2-Dichloroethane	SW-846 Method 8260	11	1600	0.005	N/A[c]	≤20
75-35-4	1,1-Dichloroethylene	SW-846 Method 8260	1.67	4000	0.01	N/A[c]	≤20
121-14-2	2,4-Dinitrotoluene	SW-846 Method 8270	N/A	160	0.33	N/A[c]	≤20
118-74-1	Hexachlorobenzene	SW-846 Method 8270	62.5	64	0.33	N/A[c]	≤20
87-68-3	Hexachlorobutadiene	SW-846 Method 8270	12.8	16	0.33	N/A[c]	≤20
67-72-1	Hexachloroethane	SW-846 Method 8270	25	56	0.005	N/A[c]	≤20
78-93-3	Methyl ethyl ketone (MEK) (2-butanone)	SW-846 Method 8260	N/A	48,000	0.01	N/A[c]	≤20
87-86-5	Pentachlorophenol	SW-846 Method 8260	8.33	2,400	0.33	N/A[c]	≤20
110-86-1	Pyridine	SW-846 Method 8260	N/A	80	0.005	N/A[c]	≤20
75-01-4	Vinyl chloride	SW-846 Method 8260	66.7	240	0.01	N/A[c]	≤20
76-13-1	Chlorinated fluorocarbons (1,1,2-Trichloro-1,2,2-trifluoroethane)	SW-846 Method 8260	N/A	2400000	0.01	N/A[c]	≤20
75-09-2	Methylene chloride	SW-846 Method 8260	133	4,800	0.005	N/A[c]	N/A[c]
127-18-4	Tetrachloroethylene	SW-846 Method 8260	1.85	800	0.005	N/A[c]	N/A[c]
71-55-6	1,1,1-Trichloroethane	SW-846 Method 8260	N/A	165,000	0.005	N/A[c]	N/A[c]
79-01-6	Trichloroethylene	SW-846 Method 8260	21.7	40	0.005	N/A[c]	N/A[c]
108-90-7	Chlorobenzene	SW-846 Method 8260	N/A	1,600	0.005	N/A[c]	N/A[c]
79-00-5	1,1,2-trichloroethane	SW-846 Method 8260	17.5	320	0.005	N/A[c]	N/A[c]

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Table 2-2. Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a] (mg/kg)		Practical Quantitation Limit[d]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
			Carcinogen	Non-carcinogen			
67-64-1	Acetone	SW-846 Method 8260	N/A	72,000	0.02	N/A[c]	≤20
71-36-3	N-butyl alcohol (I-Butanol)	SW-846 Method 8260	N/A	8,000	0.1	N/A[c]	N/A[c]
108-94-1	Cyclohexanone	SW-846 Method 8270	N/A	400,000	200	N/A[c]	N/A[c]
141-78-6	Ethyl acetate	SW-846 Method 8015	N/A	72,000	5.0	N/A[c]	N/A[c]
100-41-4	Ethyl benzene	SW-846 Method 8260	N/A	8,000	0.005	N/A[c]	N/A[c]
60-29-7	Ethyl ether	SW-846 Method 8260	N/A	16,000	0.005	N/A[c]	N/A[c]
67-56-1	Methanol	SW-846 Method 8260	N/A	40000	1.0	N/A[c]	≤20
108-10-1	Methyl isobutyl ketone (MIBK) (4-Methyl-2-Pentanone)	SW-846 Method 8260	N/A	6,400	0.01	N/A[c]	N/A[c]
95-50-1	Ortho-dichlorobenzene	SW-846 Method 8270	N/A	7,200	0.33	N/A[c]	N/A[c]
108-38-3	m-Xylene	SW-846 Method 8260`	N/A	16,000	0.005	N/A[c]	N/A[c]
95-47-6	o-Xylene	SW-846 Method 8260	N/A	16,000	0.005	N/A[c]	N/A[c]
106-42-3	p-Xylene	SW-846 Method 8260	N/A	16,000	0.005	N/A[c]	N/A[c]
98-95-3	Benzene, nitro	SW-846 Method 8270	N/A	160	0.33	N/A[c]	N/A[c]
108-39-4	*m*-cresol	SW-846 Method 8270	N/A	4000	0.66	N/A[c]	≤20
95-48-7	*o*-cresol	SW-846 Method 8270	N/A	4000	0.33	N/A[c]	≤20
106-44-5	*p*-cresol	SW-846 Method 8270	N/A	400	0.33	N/A[c]	≤20
75-15-0	Carbon disulfide	SW-846 Method 8260	N/A	8,000	0.005	N/A[c]	N/A[c]
110-80-5	2-Ethoxyethanol	SW-846 Method 8270	N/A	3,2000	200	N/A[c]	N/A[c]

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Table 2-2. Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a] (mg/kg)		Practical Quantitation Limit[d]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
			Carcinogen	Non-carcinogen			
78-83-1	Isobutanol	SW-846 Method 8260	N/A	24,000	0.5	N/A[c]	N/A[c]
79-46-9	2-Nitropropane	SW-846 Method 8260	0.105	N/A	1	N/A[c]	N/A[c]
110-86-1	Pyridine	SW-846 Method 8260	N/A	80	0.005	N/A[c]	N/A[c]
108-88-3	Toluene	SW-846 Method 8260	N/A	6,400	0.005	N/A[c]	N/A[c]
1336-36-3	Polychlorinated biphenyls	SW-846 Method 8082	0.5	1.6	0.16	N/A[c]	≤20

a. Closure performance standards are the numeric cleanup levels calculated using unrestricted use exposure assumptions according to the MTCA cleanup regulation (WAC 173-340-740, -747, -and -7490 through -7494). These numeric clean-up levels will be calculated according to MTCA Method B (unrestricted use standards)

b. Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples is also performed. Precision criteria for batch laboratory replicate matrix spike analyses or replicate sample analyses.

c. Determined by the laboratory based on historical data or statistically derived control limits. Limits are reported with the data. Where specific acceptance criteria are listed, those acceptance criteria may be used in place of statistically derived acceptance criteria.

d. For these analytical performance requirements, the Required Detection Limit and the Practical Quantification Limit are identical.

CAS = Chemical Abstract Services

MTCA = *Model Toxics Control Act*

N/A = not applicable

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2.2 Data Generation and Acquisition

The following subsections present the requirements for sampling methods and identification, sample handling and custody, analytical methods, measurement and analysis, data collection or generation, data handling, and field and laboratory QC. The requirements for instrument calibration and maintenance, supply inspections, and data management are also addressed. The sampling design is presented in the field sampling plan (Section 3) of this SAP.

The FWS is responsible for ensuring that all field procedures are followed completely and that field sampling personnel are adequately trained to perform sampling activities under this SAP. The field team lead must document all deviations from procedures or other problems pertaining to sample collection, chain-of-custody, sample analytes, sample transport, or noncompliant monitoring. As appropriate, such deviations or problems will be documented in the field logbook or in nonconformance report forms in accordance with internal corrective action procedures. The FWS or Project Manager is responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to field activities.

2.2.1 Sampling Process Design

The sampling design uses a systematic and grid sampling approach with judgmental sampling under the former storage location of the 231ZDR-11 container. Judgmental sampling will be taken of any dangerous waste-related staining.

Additional sampling process design details are provided in Section 3.

2.2.2 Analytical Methods

Analytical methods and parameters are provided in Table 2-2. These analytical methods are controlled in accordance with the laboratory's QA plan and the requirements of this QAPjP. Laboratory operations and analytical services shall comply with Volume 4 of HASQARD (DOE/RL-96-68, Laboratory Technical Requirements) and any specific criteria identified in Table 2-2. Criteria in Table 2-2 take precedence over similar criteria in HASQARD. In consultation with the laboratory, the project manager, and/or others as appropriate, changes to analytical methods can be approved as long as the method is based upon a nationally recognized standard (e.g., EPA, American Society for Testing and Materials [ASTM]) method, the new method achieves project data needs as well or better than the replaced method, and the new method is required due to the nature of the sample. Oversight of offsite analytical laboratories to qualify them for performing Hanford Site analytical work is performed as necessary.

If the laboratory uses a nonstandard or unapproved method, then the laboratory must provide method validation data to confirm that the method is adequate for the intended use of the data. This includes information such as determination of detection limits, quantitation limits, typical recoveries, and analytical precision and bias. Deviations from the analytical methods noted in Table 2-2 must be approved in consultation with the Project Manager.

Issues that may affect analytical results are to be resolved in coordination with the project manager.

2.2.3 Quality Control

The QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained. Field QC samples will be collected to evaluate the potential for cross-contamination and provide information pertinent to field sampling variability. Laboratory QC samples estimate the precision and bias of the analytical data. Field and laboratory QC samples are summarized in Table 2-3.

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Table 2-3. Project QC Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Field QC		
Full trip blank (FTB)	One per 20 samples per media sampled.	Contamination from containers or transportation.
Equipment rinsate blank (EB)	As needed If only disposable equipment is used, an equipment blank is not required. Otherwise, one per 20 samples per media [a]	Adequacy of sampling equipment decontamination and contamination from non-dedicated equipment.
Field duplicate (DUP)	One per batch[h], 20 samples maximum of each media sampled (soil samples [b])	Precision, including sampling and analytical variability.
Field Split Samples (SPLIT)	As needed. When needed, the minimum is one per analytical method, per media sampled, for analyses performed where detection limit and precision and accuracy criteria have been defined in the Performance Requirements tables.	Precision, including sampling, analytical, and inter-laboratory.
Laboratory QC[h]		
Method Blanks	1 per batch[h]	Laboratory Contamination
Laboratory Duplicates	[c]	Laboratory Reproducibility and precision
Matrix Spikes	[c]	Matrix effect/laboratory accuracy
Matrix Spike Duplicates	[c]	Laboratory reproducibility, accuracy, and precision
Surrogates	[c]	Recovery/yield
Tracers	[c]	Recovery/yield
Laboratory Control Samples	1 per batch[h]	Evaluate Laboratory Accuracy
Performance Evaluation Programs[d]	Annual	Evaluate Laboratory Accuracy
Double-Blind Standards	Quarterly[e]	Evaluate Laboratory Accuracy
Audit/Assessment	Annually[f] or Every 3 years[g]	Evaluate overall laboratory performance and operations

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Table 2-3. Project QC Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated

a. Whenever a new type of non-dedicated equipment is used, an equipment blank shall be collected every time sampling occurs until it can be shown that less frequent collection of equipment blanks is adequate to monitor the decontamination procedure for the non-dedicated equipment.
b. Soil grab samples are exempted from duplicate sampling.
c. As defined in the laboratory contract or QA plan and/or analysis procedures.
d. Nationally recognized program, such as DOE Mixed Analyte Performance Evaluation Program or Environmental Resource Associates.
e. Soil matrix double-blind standards are submitted by request of Analytical Services.
f. DOE QSAS requires annual audit of commercial laboratories.
g. HASQARD does not define a frequency for assessment of on-site laboratories. Three year evaluated supplier list requirement is typically applied.
h. Batching across projects is allowing for similar matrices.
QA = Quality assurance.
QC = Quality control.
VOC = Volatile organic compound.

2.2.3.1 Field Quality Control Samples

Field QC samples will be collected to evaluate the potential for cross-contamination and to provide information pertinent to field sampling variability and laboratory performance to help ensure reliable data are obtained. Field QC samples include field duplicates, split samples, and three types of field blanks. The three types of field blanks are full trip, field transfer, and equipment blanks. Field blanks are typically prepared using high-purity reagent water. Silica sand should be used, instead of reagent water, when required by the SAP. The QC samples and the required frequency for collection are described in this subsection. Particular care will be exercised to avoid the following common ways in which cross-contamination or background contamination may compromise 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
- Improperly decontaminating equipment before sampling or between sampling events

This number of QC samples is conservatively established based on site procedures that call for approximately one set of QC samples per 20 samples.

- **Full trip blank (FTB):** FTBs are prepared by the sampling team prior to traveling to the sampling site. The preserved bottle set is either for volatile organic analysis (VOA) only or identical to the set that will be collected in the field. It is filled with high purity reagent water or silica sand, as appropriate to the primary sample media. The bottles are sealed and transported, unopened, to the field in the same storage containers used for samples collected the same day. The FTBs are typically analyzed for the same constituents as the samples from the associated sampling event. FTBs are used to evaluate potential contamination of the samples attributable to the sample bottles, preservative, handling, storage, and transportation.

- **Field transfer blank (FXR):** FXRs are preserved VOA sample bottles filled at the sample collection site with high purity reagent water or silica sand (as appropriate to the primary sample media) that has been transported to the field. The samples are prepared during sampling to evaluate potential

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contamination attributable to field conditions. After collection, FXR sample bottles are sealed and placed in the same storage containers with the samples collected the same day for the associated sampling event. The FXR samples will be analyzed for volatile organic compounds (VOCs) only.

- **Equipment blank (EB):** EBs consist of high purity reagent water or silica sand passed through or poured over the decontaminated sampling equipment identical to the sample set that will be collected and placed in sample containers, as identified on the project sampling authorization form (SAF). The EB sample bottles are placed in the same storage containers with the samples from the associated sampling event. The EB samples will be analyzed for the same constituents as the samples from the associated sampling event. The EBs will be used to evaluate the effectiveness of the decontamination process.

Equipment blanks are collected from reusable sampling devices on a 1-in-20 basis and are not required for disposable sampling equipment.

For the field blanks (i.e., FTB, FXR, and EB), results greater than two times the method detection limit or minimum detectable activity (MDA) are identified as suspect contamination. However, for common laboratory contaminants such as acetone, methylene chloride, 2-butanone, toluene, and phthalate esters, the limit is five times the method detection limit.

- **Field duplicates:** Field duplicates (DUP) are independent samples collected as close as possible to the same time and same location as the parent sample and are intended to be identical. DUPs are collected at a frequency of one in 20 samples. Soil grab samples are exempt from DUPs. DUPs are two separate samples collected from the same source, placed in separate sample containers, and analyzed independently. The DUPs should be collected from an area expected to have some contamination so valid comparisons between the samples can be made (i.e., some constituents will be greater than detection limit).

DUPs must agree within 20 percent, as measured by the RPD, to be acceptable. Only those DUPs with at least one result greater than five times the MTCA Level B limit are evaluated. DUP results not satisfying evaluation criteria will be qualified and flagged in HEIS, as appropriate.

Soil DUPs will be collected and homogenized before dividing into two separate samples in the field. VOA soil duplicates will be sampled as collocated samples (described below). DUPs are stored and transported together and will be analyzed for the same constituents. The DUPs are used to determine precision for both sampling and laboratory measurements. Evaluation of the results can provide an indication of intra-laboratory variability. Large RPDs can be an indication of potential laboratory performance problems and should be investigated.

Collocated samples are two samples collected as close as possible to the same time and location and are not homogenized. This sampling protocol is used when homogenizing samples for split or duplicate samples could affect the quality of data (i.e., VOA analysis).

- **Field split samples:** Field split samples (SPLIT) are two samples collected as close as possible to the same time and same location and are intended to be identical. VOA soil splits will be sampled as collocated samples, as described previously. SPLITs are stored in separate containers and analyzed by different laboratories for the same or similar analytes. SPLITs are inter-laboratory comparison samples used to evaluate comparability between laboratories. Large RPDs can be an indication of potential laboratory performance problems and should be investigated.

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2.2.3.2 Laboratory Quality Control Samples

The laboratory QC samples (e.g., method blanks and laboratory control sample/blank spike) are defined for the three-digit EPA methods (EPA/600/4-79/20, *Methods for Chemical Analysis of Water and Wastes*) 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.

The QC checks outside of control limits will be reflected in the narrative of the analytical report and during the DQA process, if performed.

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 25 percent of the expected values, although the limits may vary considerably depending upon the method and analyte.

2.2.4 Equipment

Equipment used for collection, measurement, and testing should meet applicable standards (e.g., ASTM) or will have been evaluated as acceptable and valid in accordance with the procedures, requirements, and specifications. The FWS, field technical representative, or equivalent will ensure that 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 that directly affect the quality of analytical data will be subject to preventive maintenance measures to minimize 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), 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.

2.2.5 Inspection of Consumable Supplies

Consumables, supplies, and reagents will be reviewed in accordance with the current requirements of SW-846, or other EPA method being used, or by an approved site analytical procedure. Potential contamination is monitored by field QC samples and laboratory blanks. The lot number from the manufacturer certified, pre-cleaned sample containers will be recorded in the sampler's logbook.

2.2.6 Data Management

Data resulting from the implementation of the SAP will be stored in the HEIS database. Reports and supporting analytical data packages will be subject to final technical review by qualified reviewers before submittal to the regulatory agencies or before inclusion in reports or technical memoranda.

2.2.7 Field Documentation Management

Field documentation shall be maintained in the form of chain-of-custody/sample analysis request forms and logbook entries. Other documentation is described in Section 2.1.4. Approved work control packages and procedures will be used to document field activities, including nonradiological measurements, when this SAP is implemented. Field activities will be recorded in the field logbook.

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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, Regulatory Compliance, QA, and/or Health and Safety organizations may conduct 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. The project manager will determine whether a DQA will be performed for the activities identified in this SAP. The DQA process, if performed, is discussed in Section 2.4. The results of the DQA will be provided to the project manager. No other planned assessments have been identified.

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. When appropriate, corrective actions will be taken by the Project Manager.

2.3.2 Reports to Management

Management will be made aware of deficiencies identified by self-assessments, corrective actions from ECOs, and findings from QA assessments and surveillances.

2.4 Data Review, Verification, and Validation, and Usability Requirements

Analytical results will be received from the laboratory, loaded into a database (e.g., HEIS), and verified (Section 2.4.1). A total of 5 percent of the data will be validated (Section 2.4.4). A DQA may be performed, if requested, on the final data (Section 2.4.5). At the direction of the Project Manager (or designee), analytical data packages will be subject to final technical review by qualified personnel before submittal to the regulatory agencies or inclusion in reports.

2.4.1 Verification and Validation Methods

Validation activities will be based on EPA functional guidelines. Data validation may be performed by the Permittee and/or by a party independent of both the data collector and the data user. Data validation qualifiers must be compatible with the HEIS database.

When outliers or questionable results are identified, the data associated with these outliers and questionable data will be evaluated and additional data validation will be performed. The additional data validation will consist of selecting up to an additional 5 percent of the statistical outliers and/or questionable data. The additional validation will begin with Level C and may increase to Levels D and E, as needed, to ensure that data are usable. Level C validation is a review of the QC data, while Levels D and E include review of calibration data and calculations of representative samples from the data set. Data validation results will be documented in data validation reports. An example of questionable data is a positive detection greater than the practical quantitation limit or reporting limit in soil from a site that should not have exhibited contamination. Similarly, results below background would not be expected and could trigger a validation inquiry. The determination of data usability will be conducted and documented in a DQA report.

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Data validation results will be documented in data validation reports, which will be included in the project file.

2.4.2 Data Verification and Usability Methods

Review of field paperwork, analytical data packages, and electronic files from the laboratory information management system will be performed. Sampling documents include the soil sampling record, chain-of-custody forms, field logbook pages, and other paperwork associated with sampling and shipping. These documents are reviewed for completeness, approvals, and legibility. Analytical and QC data from the laboratories are verified to be complete, reported correctly, and within applicable limits. Laboratory documents will be rechecked to verify the condition of the samples upon receipt at the laboratory and determine if problems arose during analysis that may have affected the data. When issues arise with samples before the analytical data is processed, resolution of those issues will be initiated.

2.4.3 Resolution of Analytical System Errors

Errors reported by the laboratories are reported and a sample disposition record is initiated in accordance with Permittee procedures. This process is used to document analytical errors and to establish resolution with the Project Manager. In addition, the Permittee QA Engineer receives reports providing summaries and statistics of the analytical errors.

2.4.4 Data Validation

The format and requirements for data validation activities are based upon the most current version of *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA-540-R-08-01 [OSWER 9240.1-48]) and *National Functional Guidelines for Inorganic Superfund Data Review* (USEPA-540-R-10-011 [OSWER 9240.1-51]). Performance of data validation activities is arranged, typically by a party independent of the data collector, the data generator, and the data user. The independent party as well as Project QA personnel review third party data validation reports for completeness and contractual compliance. A total of 5 percent of the results will undergo Level C validation, as defined by the validation guidelines.

2.4.5 Data Quality Assessment

The DQA process compares completed field activities to those in corresponding documents and provides an evaluation of the resulting data. The purpose of the DQA is to determine whether quantitative data are of the correct type and are of adequate quality and quantity to meet the project data quality objectives. The assessment will be consistent with the DQA process in *Data Quality Assessment: A Reviewer's Guide* (EPA/240/B-06/002), and *Data Quality Assessment: Statistical Methods for Practitioners* (EPA/240/B-06/003).

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3 Field Sampling Plan

The purpose of the field sampling plan (FSP) is to provide a discussion of the project sampling and analytical requirements. This includes defining the number and location of samples, sampling methods, and analyses that will be performed, overall sampling objectives, and a discussion of waste management.

3.1 Site Background and Objectives

Site background information is contained in Section 1. The target analytes are presented in Table 1-1. The objective of the FSP is to identify project sampling and analysis activities clearly. The FSP uses the sampling design identified during the systematic planning process and identifies sampling locations, the total number of samples to be collected, and the analyses to be performed.

3.2 Sampling Design

The sampling design is a systematic and grid sampling approach, with judgmental sampling in the previous storage location of the 231ZDR-11 container. In addition, judgmental sampling will be performed for any waste-related staining identified in the visual inspection performed as part of closure activities and addressed in the closure plan. The systematic and grid sampling, and the judgmental sampling methods are described as follows:

- **Systematic and Grid Sampling:** In systematic and grid sampling, samples are collected at regularly spaced intervals over space or time. An initial location or time is chosen at random, and then the remaining sampling locations are defined so the locations are at regular intervals over an area (grid) or time (systematic). Systematic and grid sampling is used to search for hot spots and to infer means, percentiles, or other parameters, and is useful for estimating spatial patterns or trends over time. This design provides a practical method for designating sample locations and ensures uniform coverage of a site, unit, or process.

- **Judgmental Sampling:** In judgmental sampling, the selection of sampling units (i.e., the number and location and/or timing of collecting samples) is based on knowledge of the feature or condition under investigation and on professional judgment. Judgmental sampling is distinguished from probability-based sampling in that inferences are based on professional judgment, not statistical scientific theory. Therefore, conclusions about the target population are limited and depend entirely on the validity and accuracy of professional judgment. Probabilistic statements about parameters are not possible.

3.3 Sample Location and Frequency

Table 3-1 provides the sample locations, frequencies, and sampling methods to be used. Grab samples will be collect into containers at the node sample locations indicated by the Visual Sample Plan (VSP) software and shown in Figure 3-1. Attachment C of the CWC-WRAP Outdoor Storage Area A Closure Plan provides VSP software supporting documentation.

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

Sampling Objectives	Sample Matrix	Sample Locations	Number of Samples	Number of QA Samples	Sampling Methods
Decision unit	Soil	Surface samples taken at 0 to 15.2 cm (0 to 6 in.) bgs. See VSP software map (Figure 3-1) for exact locations.	20	One each of the following samples: full trip blank, field transfer blank, equipment rinsate blank, and field duplicate.	Grab

bgs = below ground surface

QA = quality assurance

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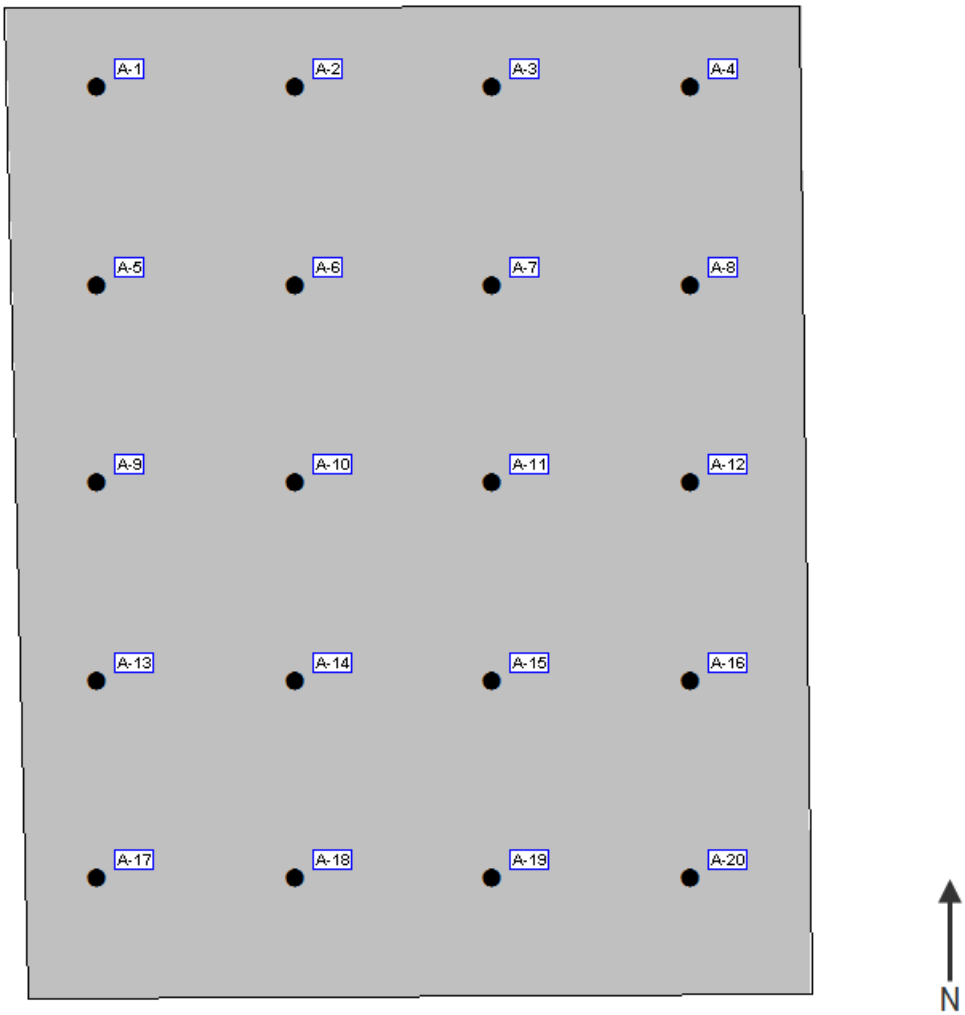

Figure 3-1. CWC Outdoor Storage Area A Sampling Locations

3.4 Sampling Methods

To ensure sample and data usability, sampling associated with this SAP will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling. The Project Manager and contractor management are responsible for ensuring that all field procedures are followed completely and that field sampling personnel are adequately trained to perform sampling activities.

Grab sample matrix will consist of gravel and soil collected in pre-cleaned sample containers taken at a depth of 0 to 15.2 cm (0 to 6 in.) below ground surface. For the purpose of this SAP, ground surface is defined as the exposed surface layer once loose gravel has been moved aside. To gather the most representative sample, loose gravel will be moved aside to expose the surface soil and compacted gravel. Once the compacted gravel and soil is sampled, the sampled media will be screened to remove material larger than approximately 2 mm (0.08 in) in diameter. To ensure sample and data usability, sampling will

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be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling.

Sample container, preservation, and holding time requirements are specified in Table 3-2 for soil samples. These requirements are in accordance with the analytical method specified. The final container type and volumes will be identified on the sampling authorization form and the chain-of-custody form.

Field sampling shall comply with HASQARD requirements (DOE/RL-96-68), Volumes 1 and 2.

Table 3-2. Sample Preservation, Container, and Holding Time for Soil Samples

Method	Analysis/Analytes	Preservation Requirement	Holding Time	Bottle Type	Minimum Sample Size
EPA 6010	Metals	Cool ~4°C	6 months	G/P	20 g
EPA 7471	Mercury by cold vapor atomic absorption	None	28 days	G/P	15 g
EPA 8082	Polychlorinated biphenyl	None	1 year	aG	250 g
EPA 8260	Volatile organic analytes	Cool ~4°C	14 days	G	5 × 40 g
EPA 8270	Semivolatile organic compound	Cool ~4°C	14/40 days	aG	250 g
EPA 300.0	Anions	Cool ~4°C	48 hours/28 days	G/P	120 g
EPA 9056A	Anions	None	48 hours/28 days	G/P	250 g
EPA 200.8	Metals by ICP/MS	None	6 months	G/P	10 g

Notes:

For EPA Method 300.0, see EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes.*

For the four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B.*

48 hours/28 days = 48 hours for nitrate, nitrite, and phosphate; others, 28 days

aG = amber glass
G = glass
ICP/MS = inductively coupled plasma/mass spectrometry
P = plastic

3.4.1 Decontamination of Sampling Equipment

To prevent potential contamination of the samples, care should be taken to use decontaminated equipment for each sampling activity.

3.5 Sample Handling

A sampling and data tracking database (e.g., HEIS) is used to track the samples from the point of collection through the laboratory analysis process. Samplers should note any anomaly with a sample (e.g., sample appears unusual) and inform the Project Manager.

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

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3.5.1 Packaging

Level I EPA pre-cleaned sample containers will be used for soil samples collected for chemical analysis. Container sizes may vary depending on laboratory-specific volumes/requirements for meeting analytical detection limits. Preliminary container types and volumes are identified in Table 3-2.

3.5.2 Container Labeling

The sample locations, depths, and corresponding HEIS numbers are documented in the sampler's field logbook. Except for VOA samples, a custody seal (i.e., evidence tape) will be affixed to the lid of each sample container and or sample collection package in such a way as to indicate potential tampering. 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 and any other required labels/documentation can be fixed to the exterior of a plastic bag holding the VOA vials in such a manner that prevents potential tampering.

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

- Sampling Authorization Form number
- HEIS number
- Sample collection date and time
- Sampler identification
- Analysis required
- Preservation method (if applicable)
- Chain-of-custody identification number

In addition to the above information, sample records must include the following:

- Sample location
- Matrix (water, soil, etc.)

3.5.3 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 protocols will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained. A chain-of-custody record is 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 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

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- Preservatives
- Signatures of individuals involved in sample transfer
- Requested analyses (or reference thereto)

3.5.4 Sample Transportation

All packaging and transportation instructions will be in compliance with the applicable transportation regulations, DOE requirements, and contactor requirements. Regulations for classifying, describing, packaging, marking, labeling, and transporting hazardous materials, hazardous substances, and hazardous waste mandated by the U.S. Department of Transportation as described in 49 CFR 171 "General Information, Regulations, and Definitions," through Part 177, "Carriage By Public Highway". Carrier specific requirements also should be considered when preparing sample shipments conveyed by air freight providers.

Samples containing hazardous constituents shall be considered hazardous material in transportation and transported according to DOT 49 CFR, "Transportation," "Shippers – General Requirements for Shipments and Packagings," are exceeded. Samples shall be screened, or relevant historical data shall be used, to determine if these values are exceeded. When screening or historical data indicate that samples are radioactive, they shall be properly classified, describes, packaged, marked, labeled, and transported according to DOT requirements.

3.5.5 Corrective Actions and Deviations for Sampling Activities

The Project Manager, FWS, or designee must document deviations from procedures or other issues pertaining to sample collection, chain-of-custody, target analytes sample transport, or noncompliance. Examples of deviations include samples not collected because of field conditions, changes in sample locations because of physical obstructions, or additions of sample depths.

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, FWS, or designee will be responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to sampling activities.

Changes in sample locations not affecting the data needs will require notification and approval of the Project Manager. Changes to sample locations affecting the data needs will require concurrence from DOE-RL and the lead regulatory agency. Changes to the SAP will be documented as noted in Section 2.1.4.

3.6 Documentation of field activities

Logbooks or data forms are required for field activities. Requirements for the logbook are provided in Section 2.1.4. Data forms may be used to collect field information; however, the 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, and weather conditions
- Names, titles, and 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, splits, duplicates, matrix spikes, and blanks)

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- 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

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4 Management of Waste

All waste generated during sampling activities will be managed in accordance with applicable regulations.

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5 Health and Safety

Field operations will be performed in accordance with health and safety requirements and appropriate project requirements. The project's site-specific health and safety plan will be followed. Work control documents will be prepared to control site operations further. Safety documentation will include an activity hazard analysis.

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Attachment B

RCRA Records Review and Visual Inspection Supporting Documentation

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CWC, Outdoor Container Storage Area "A"

Purpose:

A visual inspection walkdown of the CWC outdoor container storage area "A" was performed to determine if there is any evidence of spills and/or leaks from waste packages containing dangerous waste that were and are stored at this location. The inspection was to identify and document by photographing any waste related staining of the storage area surface (i.e., gravel and soil), and to denote any remaining waste related items.

The inspection was performed on August 14, 2013, by Brett M. Barnes (CHPRC) Environmental Compliance Officer.

Results:

Staining (excluding herbicides) was observed at the northeast corner of the outdoor storage area "A" (see attached photos). Stains appear to be rust. No other stains were observed.

Some debris materials were observed:

- Metal pallets
- Wood pallets
- Composite roofing material
- Metal ladders
- Wooden boxes
- Buckets
- Metal banding strips
- Cinder blocks
- Tie-downs
- Rubber chocks
- Fiberglass rods with orange flags
- Tables
- Metal posts
- Railroad ties
- Pressure treated lumber
- Other types of lumber
- Rubber mats
- Tool boxes
- Metal railings
- Concrete barriers
- Change trailer

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- Portable electrical lighting
- Tumbleweeds
- Extension cords
- Nylon rope
- Cylinders for applying fixative
- Plastic chain
- Metal chain
- Concrete personnel protection barriers
- Wagons
- Metal pipes
- Brooms
- Plastic traffic markers

Housekeeping will be performed on the area prior to closure and the debris material will be removed.

Signature/Date:

Brett M. Barnes: Brett M. Barnes 9/3/13

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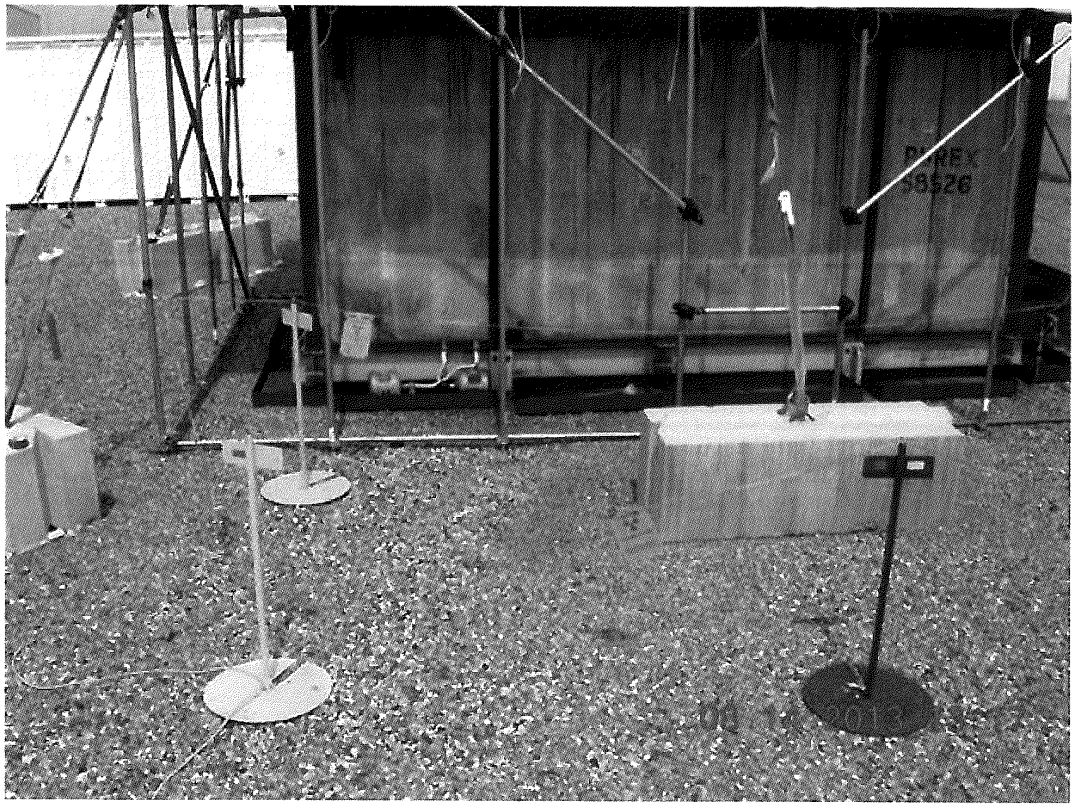
Strickling, Lana R

From:	Barnes, Brett M
Sent:	Tuesday, September 03, 2013 1:24 PM
To:	Horn, Sarah R; Strickling, Lana R
Cc:	Engelmann, Richard H; Dixon, Brian J; Ruck, Fred A III; Seaver, Jennie R
Subject:	REVISED CWC OUTDOOR CONTAINER STORAGE AREA "A" CLOSURE INSPECTION REPORT
Attachments:	SPDQ0638013090313010.pdf

All, please ignore my previous closure inspection reports...I had to correct some editorial comments.

Attached is the closure inspection report for the CWC Outdoor Container Storage Area "A." The photographs that are attached to this report are directly below, in descending order. Should you have any questions, please call me on my cell phone, 521-3053.

Brett M. Barnes
Environmental Compliance Officer



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CWC Outdoor Waste Container Storage Area A
Weekly Dangerous Waste Inspection Checklist Review

Title of Weekly Waste Inspection Form: Weekly RCRA Inspection Checklist for CWC

Date of Weekly Waste Inspection Review: Finalized 9/5/13

Reviewer's Name: Lana Strickling

A review of the summary sheets completed by Linda Carr, which covered both CWC Outdoor Storage Areas A and B, was performed. Weekly RCRA Inspection checklists could not be located for the following time period: Mid September 2008 – Mid December 2008.

Waste Management Units: CWC Outdoor Waste Container Storage Area A

Time Frame of Weekly Inspections: 1/5/06 – 6/26/13

Items of Concern Noted: YES _ X__ NO _ __
If "YES", complete entire checklist.
If "NO", skip to Reviewer's signature and date.

Items of Concern: One item of concern was noted for CWC Outside Waste Container Storage Area A. On 2/6/12, dangerous waste box 231ZDR-11 was identified as "leaking" during the weekly RCRA inspection. Subsequent review determined this was a radiological contamination event. Mitigative actions were performed via work package 2X-12-01430, *Apply Fixative and Absorbent to Contamination Area.*

Reviewer's Signature and Date: Lana Strickling 9/6/13

Instructions:

Review Weekly Waste Inspection checklists for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted, check "NO" and skip to the signature and date field. Note that if no items of concern are noted for an extended period of time, the "Time Frame of Weekly Inspections" can be January 1, 20xx to December 31, 20xx or even several years if no items of concern are noted.

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CWC Outdoor Waste Container Storage Area A
Weekly Dangerous Waste Inspection Checklist Review

If unplanned spills, releases or discharges are referenced on the inspection checklist, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of weekly waste inspection checklists noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

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CWC Weekly Dangerous Waste Inspection Checklist Review

Title of Weekly Waste Inspection Form:	Weekly CWC RCRA/Non-RCRA Inspection Checklist
Date of Review:	8/8/2013
Reviewer's Name:	Linda Carr
Waste Management Units:	Outside Staging Areas
Time Frame of Weekly Inspections:	2012-January 3 - December 27
Items of Concern Noted (Circle) If "YES", complete entire checklist. If "NO", skip to Reviewer's signature and date.	YES☒ NO☐
Items of Concerns:	leak (week 2/8/12)

Attach copies of Weekly Inspection sheets noting concern.

Dates of Corrective Actions:	"Plan now in Progress 2/8/12"

Attach copies of Weekly Inspection sheets noting concern.

Reviewer's Signature and Date: Linda Carr 9/4/13

Instructions:

Review Weekly Waste Inspection checklists for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted, check "NO" and skip to the signature and date field. Note that if no items of concern are noted for an extended period of time, the "Time Frame of Daily Inspections" can be January 1, 20xx to December 31, 20xx or even several years if no items of concern are noted.
If unplanned spills, releases or discharges are referenced on the inspection checklist, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action. Attach copies of daily waste inspection checklists noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

Page **1** of **1**

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Appendix A - Weekly CWC RCRA/Non-RCRA Inspection Checklists

Location/Facility/Module: OUTSIDE STORAGE AREAS Date/Time: 02/08/12 13:45

Weekly CWC RCRA Checklist

#	Yes	No	N/A	Area Inspection
1	✓			Marker-barricades (chain barricades, chain-link fences, marker posts, etc.) around area are intact and in good condition. Area ground postings are intact, unobscured, legible and in good condition?
2			① ✓	Containment curbing and flooring is free of scratches that penetrate to the concrete, cracks, or gaps and is sufficiently impervious to contain leaks, spills, and accumulated rainfall?
3	✓			Area is generally dry and free of accumulated water. There is no standing and/or unexpected water or snow accumulation in or around area?
4	✓			Areas where dangerous waste may be accumulated have "Danger – Unauthorized Personnel Keep Out" (or an equivalent legend) and "No Smoking" signs posted?
5	✓			Postings are accurate, intact, visible, legible and in good condition?
6			② ✓	Secondary containment system is free of liquid? If "No", notify FWS and go to SW-080-003.
#	**Yes**	**No**	**N/A**	**Container Inspection**
7		* ✓		Container integrity is not compromised by punctures, dents, penetrating scratches, loose lids, bulging, excessive corrosion or other physical damage/deterioration. [TSR 5.6.4.b]
8		* ✓		Containers are closed, are stored in a manner which will not rupture the containers or cause them to leak, and show no evidence of spillage or leakage, such as moisture on the sides or underneath?
9	✓			Container top does not have excessive buildup of dirt/debris that would possibly interfere with the proper operation of the drum's ventilation system (such as, clogging of NucFils).
10	✓			Container marking/labeling is intact, unobscured, legible and in good condition?
11	✓			Dangerous/hazardous waste containers are marked as "hazardous" or "dangerous" and have major risk label, as applicable?
12	✓			Aisle space between rows of containers appears to be at least 36 inches? [FHA SWOC Key 1.3.1.13][FHA Key #10]
13	✓			Containers are stored in rows no more than 2 wide?
14	✓			Containers are elevated (palletized)?

Weekly CWC Non-RCRA Checklist

#	Yes	No	N/A	Area Inspected/Description of Non-RCRA Items
15	✓			Lighting is adequate to complete inspection (where applicable)?
16	✓			Areas in and around waste stored in the facilities/modules are free of combustibles such as tumbleweeds, paper, rags, trash, empty wood pallets, etc.? [TSR 5.7.1.b&c][TSR 5.6.4.h]
17	✓			Roadways are clear and unobstructed. Fire fighting vehicles have free and easy access to the area. Exits are clear and unobstructed?
18	✓			PCB label at facilities/modules entrances are intact, unobscured, legible and in good condition (where applicable)?
19	✓			Pallet condition is adequate to ensure module stability.
20	✓			Aisle space between rows of containers appears to be at least 36 inches? [FHA SWOC Key 1.3.1.13][FHA Key #10]
21	✓			Waste containers staged or stored outside are no higher than 2 tiers. [TSR 5.6.4.a]
22	✓			Space between inside waste array zones is > 12 ft and free of combustibles. [TSR 5.6.4.g]
23			③ ✓	Third-tier drums are banded horizontally with metal band (single drum banded to pallet) [TSR 5.6.4.a]

Comments: SEE open item # 11-015

① Container are sitting on dirt/gravel ② No secondary containment.
③ No third tier drums.
* Container # 231-ZDR-11 was found to be leaking. Work plan & recovery now in progress.

Operator (print/sign/date/time): Christine Kiehn Christine Kiehn 02/08/12 13:45
FWS (print/sign/date/time): Dwayne Bierman [signature] 2/8/12 1863

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CWC Outdoor Waste Container Storage Area A
Daily Operating Log Book Review

Date of Log Book Review: 8/12/13

Reviewer's Name: Joel Williams

Daily Operating Log Book Document No./Log Book Timeframe (Month/Year to Month/Year):

LOGBOOK NUMBER	DATES
HNF-N-450-84	12-06-2006 through 07-09-2007
HNF-N-450-85	07-10-2007 through 02-06-2008
HNF-N-450-91	02-07-2008 through 08-26-2008
HNF-N-450-94	08-27-2008 through 04-16-2009
HNF-N-450-95	04-20-2009 through 11-17-2009
HNF-N-450-100	11-02-2009 through 06-23-2010
HNF-N-450-103	06-24-2010 through 01-16-2011
HNF-N-450-107	01-19-2011 through 08-11-2011
HNF-N-450-109	08-15-2011 through 03-06-2012
HNF-N-450-110	03-07-2012 through 07-16-2012
HNF-N-450-113	07-07-2012 through 12-01-2012
HNF-N-450-111	12-02-2012 through 05-01-3013
HNF-N-450-112	05-02-2013 through 08-12-2013

Items of Concern Noted (Circle) YES__X__ NO____

If "YES", complete entire checklist.
If "NO", skip to Reviewer's signature and date.

Items of Concern (Attach copies of log book pages noting concern)

On 2/6/12, box 231ZDR-11 was identified as having contamination area levels around the box. See attached logbook pages.

Dates of Corrective Actions:

Mitigative actions were performed via work package 2X-12-01430, *Apply Fixative and Absorbent to Contamination Area.*

Reviewer's Signature and Date: Lana Stickling for Joel Williams per telecon 9/5/13

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Page 118 HNF-N-450-109 2-6-12 Days Cont. ②

1501 millwrites have completed work for packages 2X-12-002 and 2X-12-00215 for today. will work again at a later

1612 Turned logbook duties over to Patty Carter. Janelle.

1613 Janelle Junker - TOOK over Logbook Patricia Carter Patricia Carter.

2048 Reentry team reentering zone 14 to perform rad s ph testing BOX 231 ZDR-11

2209 Exiting Team Expansion Area after surveys Expan area posted CA. Last entry Patricia Carter Patricia Security Checks all buildings Locked.

2308 Late Entry 1440 Rad Con Found CA Level contamination around Was Box 231 ZDR-11 in Zone 14, Rad Con notified Operation manager Dwayne Bierman

2311 SDO completed logbook review Dwayne Bierman

No further entries
DB 2/6/12

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pg. 123 HNR-N-450-109 02-11-2012 Days (3)

0900 Richard A. Monlux is The Logbook Custodian, Dave Gilles is The Be
Richard A Monlux Richard A Monlux

0906 Notified Dave Gilles on The status of Box 231ZDR-11 catch Con
in CWC's Expansion Area Z14. The Following Results were Repor
To Dave Gilles. The North 2 catch Containers are empty, The
catch Container is Approximant 1/2 inch from overflow, The SouthWe
corner catch Container is Full, The South catch Container is Em
(center), The SouthEast catch Container is Full, and the East
Container is Approximant 1/4 inch from overflow. The 3 gallon ca
bottles are as follows from East to West #1 Empty, #2 Empty, #3 Empt
is Approximant 3/4 To The Full line.

1334 Checked on status of Box 231ZDR-11 catch Containers No change fr
Previous entery.

2010 SDO Reviewed Logbook D A Gilles

No further entries this date
2-11-12

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HNF-N-450-111 1-30-13 DAY PAGE 61 (1)

0625 Reviewed LOG AND ASSUMED DUTIES AS SDO. DA Giles

0700 BED/SDO Dave Gilles logbook custodian Dave Cleavenger Dave Cleavenger
Minimum shift compliment verified. CWC/LLBG is in stand-by mode

0725 Patrol has been notified for access to 3A, 3AE, 4B + 4C

0804 Management safety drive through of CWC complex completed with no issu

0900 Perform Ultrasonic Testing on fire piping in 2402WG

1310 The 3 gallon container has liquid in it. catch pans have moisture in them
Straps are tight and in good condition. No change to tear and punctures.
The Box is not dripping.

1520 End of shift sweep complete

1523 Last Entry Dave Cleavenger Dave Cleavenger

1750 LATE ENTRY 1900 NCO NOTIFIED FWS THAT PRIOR TO STARTING A PLANNED ACTIVITY TO APPLY INVISABLUE TO THE 231ZDR-11 BOX (2X-12-8498) HE OBSERVED THE LOWER SOUTH RAIL (ANGLE IRON) OF THE BOX DRIPPING IN 2 SPOTS. THE DRIPS WERE IN THE AREA ADJACENT TO THE CATCH CONTAINER IN THE WESTERN MOST SOUTH CATCH PAN. DRIP RATE WAS REPORTED TO BE 1 DRIP EVERY 5-6 SECONDS. LIQUID WAS NOTED IN THE CATCH CONTAINER AND THE CATCH PAN. RADCON PERFORMED BOUNDARY SURVEYS AND FOUND NO SPREAD OF CONTAMIN THE NCO AND TEAM CONTINUED WITH THE ACTIVITY AND APPLIED A HEAVY COAT OF INVISABLUE TO THE ENTIRE PERIMITER OF THE BOX. THE FWS NOTIFIED THE SDO/OPS MANAGER WHO NOTIFIED THE FACILITY MANAGER AND DIRECTOR. FACILITY MANAGER AND OPS MANAGER OBSERVED THE BOX. WEATHER CONDITIONS DURING THE PAST 2 DAYS HAD HIGH TEMPERATURES IN THE MID 40'S AND MID 50'S AS OPPOSED TO THE BELOW FREEZING TEMPERATURES OF THE PAST FEW WEEKS. AN ENTRY TO REPLACE THE CATCH CONTAINER AND REMOVE LIQUID FROM THE CATCH PAN IS PLANNED FOR TOMORROW. APPROPRIATE NOTIFICATIONS HAVE BEEN MADE.

1810 SDO LOG REVIEW COMPLETE. DA Giles

NO FURTHER ENTRIES

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Attachment C

Visual Sampling Plan Software Supporting Documentation

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Systematic sampling locations for comparing a median with a fixed threshold (nonparametric - MARSSIM)

Summary

This report summarizes the sampling design used, associated statistical assumptions, as well as general guidelines for conducting post-sampling data analysis. Sampling plan components presented here include how many sampling locations to choose and where within the sampling area to collect those samples. The type of medium to sample (i.e., soil, groundwater, etc.) and how to analyze the samples (in-situ, fixed laboratory, etc.) are addressed in other sections of the sampling plan.

The following table summarizes the sampling design developed. A figure that shows sampling locations in the field and a table that lists sampling location coordinates are also provided below.

SUMMARY OF SAMPLING DESIGN	
Primary Objective of Design	Compare a site mean or median to a fixed threshold
Type of Sampling Design	Nonparametric
Sample Placement (Location) in the Field	Systematic with a random start location
Working (Null) Hypothesis	The median(mean) value at the site exceeds the threshold
Formula for calculating number of sampling locations	Sign Test - MARSSIM version
Calculated total number of samples	20
Number of samples on map [a]	20
Number of selected sample areas [b]	1
Specified sampling area [c]	0.00 m^2
Size of grid / Area of grid cell [d]	0.00149158 x 0.00149159 feet / 2.22482e-006 ft^2
Grid pattern	Rectangular

[a] This number may differ from the calculated number because of 1) grid edge effects, 2) adding judgment samples, or 3) selecting or unselecting sample areas.

[b] The number of selected sample areas is the number of colored areas on the map of the site. These sample areas contain the locations where samples are collected.

[c] The sampling area is the total surface area of the selected colored sample areas on the map of the site.

[d] Size of grid / Area of grid cell gives the linear and square dimensions of the grid used to systematically place samples.

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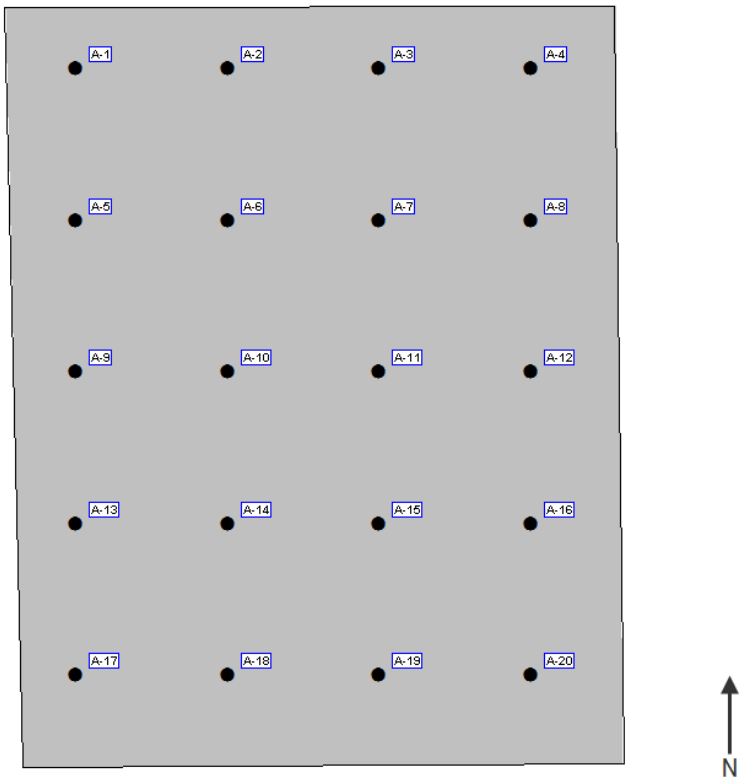

Area: CWC A					
X Coord	**Y Coord**	**Label**	**Value**	**Type**	**Historical**
119.642340	46.554124	A-17		Systematic	
119.642794	46.554124	A-18		Systematic	
119.643249	46.554124	A-19		Systematic	
119.643703	46.554124	A-20		Systematic	
119.642340	46.554578	A-13		Systematic	
119.642794	46.554578	A-14		Systematic	
119.643249	46.554578	A-15		Systematic	
119.643703	46.554578	A-16		Systematic	
119.642340	46.555033	A-9		Systematic	
119.642794	46.555033	A-10		Systematic	
119.643249	46.555033	A-11		Systematic	
119.643703	46.555033	A-12		Systematic	
119.642340	46.555488	A-5		Systematic	
119.642794	46.555488	A-6		Systematic	
119.643249	46.555488	A-7		Systematic	
119.643703	46.555488	A-8		Systematic	
119.642340	46.555942	A-1		Systematic	
119.642794	46.555942	A-2		Systematic	

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119.643249	46.555942	A-3		Systematic	
119.643703	46.555942	A-4		Systematic	

Primary Sampling Objective
The primary purpose of sampling at this site is to compare a site median or mean value with a fixed threshold. The working hypothesis (or 'null' hypothesis) is that the median(mean) value at the site is equal to or exceeds the threshold. The alternative hypothesis is that the median(mean) value is less than the threshold. VSP calculates the number of samples required to reject the null hypothesis in favor of the alternative one, given a selected sampling approach and inputs to the associated equation.

Selected Sampling Approach
A nonparametric systematic sampling approach with a random start was used to determine the number of samples and to specify sampling locations. A nonparametric formula was chosen because the conceptual model and historical information (e.g., historical data from this site or a very similar site) indicate that typical parametric assumptions may not be true.

Both parametric and non-parametric equations rely on assumptions about the population. Typically, however, non-parametric equations require fewer assumptions and allow for more uncertainty about the statistical distribution of values at the site. The trade-off is that if the parametric assumptions are valid, the required number of samples is usually less than if a non-parametric equation was used.

Locating the sample points over a systematic grid with a random start ensures spatial coverage of the site. Statistical analyses of systematically collected data are valid if a random start to the grid is used. One disadvantage of systematically collected samples is that spatial variability or patterns may not be discovered if the grid spacing is large relative to the spatial patterns.

Number of Total Samples: Calculation Equation and Inputs
The equation used to calculate the number of samples is based on a Sign test (see PNNL 13450 for discussion). For this site, the null hypothesis is rejected in favor of the alternative one if the median(mean) is sufficiently smaller than the threshold. The number of samples to collect is calculated so that if the inputs to the equation are true, the calculated number of samples will cause the null hypothesis to be rejected.

The formula used to calculate the number of samples is:

$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(SignP - 0.5)^2}$$

where

$$SignP = \Phi\left(\frac{\Delta}{s_{total}}\right)$$

$\Phi(z)$ is the cumulative standard normal distribution on $(-\infty,z)$ (see PNNL-13450 for details),
n is the number of samples,
S_{total} is the estimated standard deviation of the measured values including analytical error,
Δ is the width of the gray region,
α is the acceptable probability of incorrectly concluding the site median(mean) is less than the threshold,
β is the acceptable probability of incorrectly concluding the site median(mean) exceeds the threshold,
$Z_{1-\alpha}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\alpha}$ is $1-\alpha$,
$Z_{1-\beta}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\beta}$ is $1-\beta$.

Note: MARSSIM suggests that the number of samples should be increased by at least 20% to account for missing or unusable data and uncertainty in the calculated value of n. VSP allows a user-supplied percent overage as discussed in MARSSIM (EPA 2000, p. 5-33).

The values of these inputs that result in the calculated number of sampling locations are:

Analyte	n[a]	Parameter

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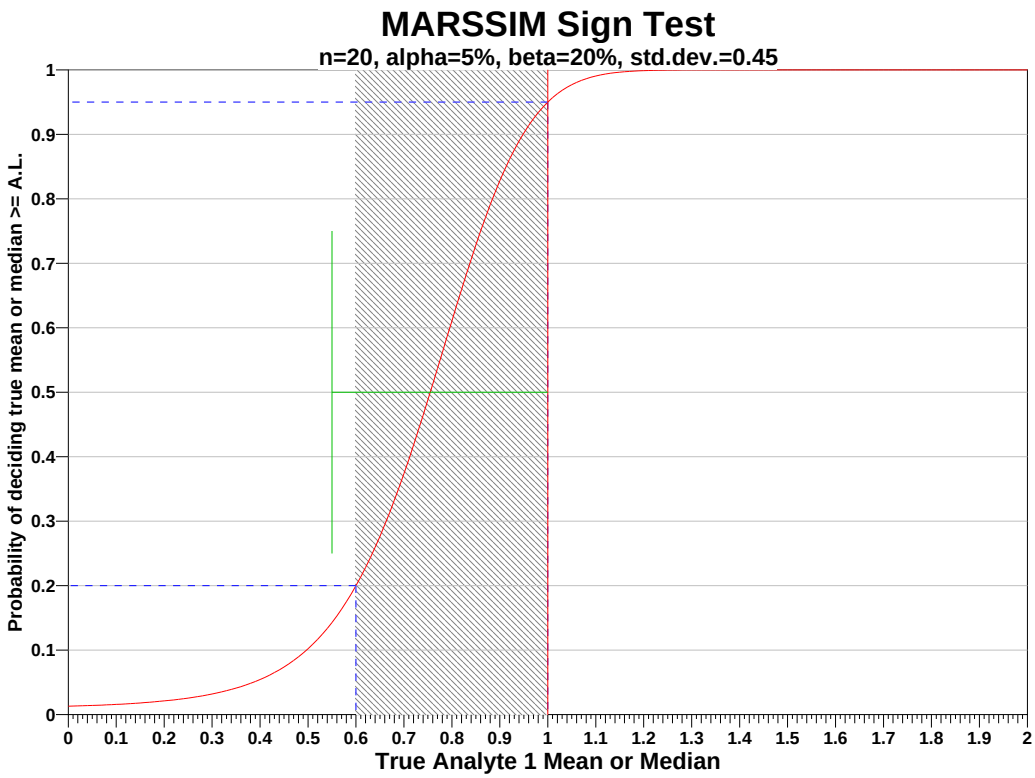
	S	Δ	α	β	$Z_{1-\alpha}$ [b]	$Z_{1-\beta}$ [c]	
Analyte 1	20	0.45	0.4	0.05	0.2	1.64485	0.841621

[a] The final number of samples has been increased by the MARSSIM Overage of 20%.
[b] This value is automatically calculated by VSP based upon the user defined value of α.
[c] This value is automatically calculated by VSP based upon the user defined value of β.

The following figure is a performance goal diagram, described in EPA's QA/G-4 guidance (EPA, 2000). It shows the probability of concluding the sample area is dirty on the vertical axis versus a range of possible true median(mean) values for the site on the horizontal axis. This graph contains all of the inputs to the number of samples equation and pictorially represents the calculation.

The red vertical line is shown at the threshold (action limit) on the horizontal axis. The width of the gray shaded area is equal to Δ; the upper horizontal dashed blue line is positioned at 1-α on the vertical axis; the lower horizontal dashed blue line is positioned at β on the vertical axis. The vertical green line is positioned at one standard deviation below the threshold. The shape of the red curve corresponds to the estimates of variability. The calculated number of samples results in the curve that passes through the lower bound of Δ at β and the upper bound of Δ at 1-α. If any of the inputs change, the number of samples that result in the correct curve changes.



Statistical Assumptions
The assumptions associated with the formulas for computing the number of samples are:
1. the computed sign test statistic is normally distributed,
2. the variance estimate, S^2, is reasonable and representative of the population being sampled,
3. the population values are not spatially or temporally correlated, and
4. the sampling locations will be selected probabilistically.

The first three assumptions will be assessed in a post data collection analysis. The last assumption is valid because the gridded sample locations were selected based on a random start.

Sensitivity Analysis
The sensitivity of the calculation of number of samples was explored by varying the standard deviation, lower bound of gray region (% of action level), beta (%), probability of mistakenly concluding that μ > action level and alpha (%),

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probability of mistakenly concluding that μ < action level. The following table shows the results of this analysis.

Number of Samples							
AL=1		**α=5**		**α=10**		**α=15**	
		s=0.9	**s=0.45**	**s=0.9**	**s=0.45**	**s=0.9**	**s=0.45**
LBGR=90	**β=15**	1103	280	825	209	659	167
	β=20	948	240	692	176	542	138
	β=25	826	209	587	149	449	114
LBGR=80	**β=15**	280	75	209	56	167	45
	β=20	240	64	176	47	138	36
	β=25	209	56	149	40	114	30
LBGR=70	**β=15**	128	36	95	27	77	22
	β=20	110	32	81	23	63	18
	β=25	95	27	69	20	52	15

s = Standard Deviation
LBGR = Lower Bound of Gray Region (% of Action Level)
β = Beta (%), Probability of mistakenly concluding that μ > action level
α = Alpha (%), Probability of mistakenly concluding that μ < action level
AL = Action Level (Threshold)

Recommended Data Analysis Activities
Post data collection activities generally follow those outlined in EPA's Guidance for Data Quality Assessment (EPA, 2000). The data analysts will become familiar with the context of the problem and goals for data collection and assessment. The data will be verified and validated before being subjected to statistical or other analyses. Graphical and analytical tools will be used to verify to the extent possible the assumptions of any statistical analyses that are performed as well as to achieve a general understanding of the data. The data will be assessed to determine whether they are adequate in both quality and quantity to support the primary objective of sampling.

Because the primary objective for sampling for this site is to compare the site median(mean) value with a threshold value, the data will be assessed in this context. Assuming the data are adequate, at least one statistical test will be done to perform a comparison between the data and the threshold of interest. Results of the exploratory and quantitative assessments of the data will be reported, along with conclusions that may be supported by them.

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H3 – CWC-WRAP
H3.B - Attachment B – CWC-WRAP Outdoor Storage Area B *(includes Care & Maintenance during closure)*

B1 Introduction

This appendix discusses closure activities for the Central Waste Complex-Waste Receiving and Processing (CWC-WRAP) Operating Unit Group (OUG) Outdoor Storage Area B dangerous waste management unit (Area B) (Figure B-1). The U.S. Department of Energy (DOE) has agreed through a Consent Agreement and Final Order with the U.S. Environmental Protection Agency (EPA) to close this DWMU. The closure will be performed in accordance with the included schedule. This closure plan complies with Washington Administrative Code (WAC) 173-303-610(2) through WAC 173-303-610(6) and represents the baseline for closure. Amendments to this closure plan will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b).

B1.1 Unit Description

Area B was activated in 2006 with the primary purpose of storing large transuranic mixed waste (TRUM) waste boxes removed from storage as part of the Waste Retrieval Project and large waste containers from other Hanford generators (e.g., 212N crates). The Area B is located between the CWC Outside Storage Area A and the 2403-Series buildings. The Area B is a gravel covered, rectangular-shaped outside storage area approximately 257 m (281 yd) long and 20 m (22 yd) wide for a total area of 5,140 m^2 (6,147 yd^2). Area B is an uncovered area that does not have a constructed secondary containment system.

Transfer of additional dangerous or mixed waste into the Area B is not authorized.

B1.1.1 Maximum Waste Inventory

Mixed waste was introduced into Area B in 2006. Waste management tracking records indicate the maximum inventory of mixed waste stored in Area B over its lifetime included 163 *Resource Conservation and Recovery Act of 1976* (RCRA)-regulated waste containers with a total volume of 2,608 m^3 (3,411 yd^3) and one *Toxic Substance Control Act of 1976* polychlorinated biphenyl (TSCA-PCB) waste container with a total volume of 10 m^3 (13 yd^3). As of August 2013, Area B contains five containers of mixed waste with a total volume of 203 m^3 (266 yd^3), which originated from PFP and 212N. Details on the waste containers are presented in Section B3.4 of this closure plan.

Figure B-1. CWC Outside Storage Areas and 2401W Building

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B2 Closure Performance Standard

Closure performance standards for the Area B will be based on requirements found in WAC 173-303-610(2), "Dangerous Waste Regulations," "Closure and Post-Closure," which require closure of the facility in a manner that:

- Minimizes the need for further maintenance;
- Controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and
- Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity

These performance standards are addressed in the Sections B2.1 and B3.13 of this closure plan.

B2.1 Clean Closure Levels

The Area B will be clean closed. In accordance with WAC 173-303-610(2)(b)(i), the clean closure levels for soil will be the numeric cleanup levels calculated using unrestricted use exposure assumptions according to the *Model Toxics Control Act* (MTCA) (WAC 173-340, "Model Toxics Control Act—Cleanup") cleanup regulations (WAC 173-340-700 through -760, excluding WAC 173-340-745). These numeric cleanup levels will be calculated according to MTCA Method B unrestricted use standards current at the time of closure.

Sampling and analysis will support clean closure levels for the Area B gravel and/or soil. Should sampling and analysis of the Area B indicate contamination above the MTCA Method B unrestricted use standards, then the potential for groundwater contamination will be reviewed and discussed with Ecology. Any required changes to this closure plan and the associated SAP resulting from the discussions will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b).

B3 Closure Activities

As a storage unit, clean closure determination for Area B will be based on a review of the operational history, operating records (including any dangerous and/or mixed waste releases), waste management records, and a visual inspection of the area to verify that waste-related staining is not present. Subsequently, soil characterization will be conducted via a sampling and analysis plan (SAP) to demonstrate that clean closure numeric levels have been achieved.

Area B currently stores mixed waste; an extended period will be needed to ship these containers to another receiving treatment, storage, and disposal (TSD) for waste processing (see section B3.3). These shipments must be completed prior to final clean closure verification.

Due to the extended closure period that will be required to complete closure activities, closure activities have been divided into near-term and extended period activities.

Near-term closure activities required to achieve and verify clean closure for soil are as follows:

- Review waste container storage, operating, and inspection records up through July 2013 (Completed. See Section B3.4)
- Perform a visual inspection of the gravel areas currently accessible (i.e., not under waste containers or restricted due to contamination areas.) (Completed. See Section B3.4)

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Extended closure activities include the following:

- Continue weekly inspections in accordance with Addendum I, *Inspection Requirements*, for the Part V CWC-WRAP OUG
- Remove all dangerous waste inventory
- Review waste container storage, operating, and inspection records from August 2013 through the last waste removal
- Perform an additional visual inspection of gravel and visible surface soil once all waste is removed
- Update the SAP through the permit modification process to incorporate any issues identified during the visual inspections and updated records review (if necessary).
- Perform sampling and analysis to confirm clean closure standards are met

B3.1 Health and Safety Requirements

Closure will be performed in a manner to ensure the safety of personnel and the surrounding environment. Qualified personnel will perform any necessary closure activities in compliance with established safety and environmental procedures. Personnel will be equipped with appropriate personal protective equipment. Qualified personnel will be trained in applicable safety and environmental procedures in accordance with the Solid Waste Operations Complex (SWOC) CWC-WRAP, Addendum G, *Personnel Training*, and have appropriate training and experience in sampling activities. Field operations will be performed in accordance with applicable health and safety requirements.

The Permittees have instituted training or qualification programs to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. Field personnel typically have completed the following training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- 8-Hour Hazardous Waste Worker Refresher Training (as required)
- Hanford General Employee Training

Project-specific safety training addressed explicitly to the project and the day's activity will be provided and includes the following:

- Training to provide the knowledge and skills that sampling personnel need to perform work safely and in accordance with QA requirements
- Requirement that samplers be qualified in the type of sampling being performed in the field

In addition, pre-job briefings will be performed to evaluate activities and associated hazards by considering many factors, including the following:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required

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- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work
- Level of management control
- Proximity of emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittees' training organization maintains the training records system.

B3.2 Care and Maintenance During Closure

Due to the nature of the waste and extended period necessary for closing Area B, the Permittees must ensure that the dangerous waste containers stored in Area B do not pose a risk to human health and the environment. The Permittee has taken, and will continue to take steps to prevent threats to human health and the environment, including compliance with all applicable RCRA compliance requirements. These RCRA compliance requirements include dangerous waste management unit inspections, personnel training, and emergency preparedness. No new mixed waste containers will be accepted in Area B.

As identified in Addendum I, *Inspection Requirements,* weekly inspections of dangerous or mixed waste containers will continue until all containers have been removed from Area B. Upon removal of the containers, annual inspections will be performed until such a time as the closure certification is complete.

In addition to required inspections, the CWC-WRAP OUG has a contingency plan that satisfies the requirements of WAC 173-303-350. A copy of the contingency plan for CWC-WRAP OUG is kept in the RCRA operating record.

B3.3 Removal of Wastes and Waste Residues

Removal of waste from Area B will begin as part of the closure process and is governed by the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989) major Milestone M-091-00, and additional waste stream M-091 milestones. Currently, the capacity to process the large containers of contact-handled (CH)-TRUM and remote-handled (RH)-TRUM waste does not exist on the Hanford Site. Commercial capabilities are available to process containers with low grams of plutonium of CH-TRUM waste and low-dose-rate RH-TRUM waste. For TRUM waste, a "large container" is defined as any container that is larger than a 208 L (55 gal) drum or standard waste box.

The schedule for these waste removal activities is associated with Tri-Party Agreement milestones (HFFACO as amended):

- Completion of the conceptual design of large container CH-TRUM waste and RH-TRUM waste repackaging capability is scheduled in the Tri-Party Agreement Milestone M-091-01A.
- Completion of the definitive design of large container CH-TRUM and RH-TRUM waste repackaging capability is scheduled in Tri-Party Agreement Milestone M-091-01B.
- Completion of construction for large container waste repackaging capabilities is scheduled in Tri-Party Agreement Milestone M-091-01B.
- Completion of certification and shipment of large containers of CH-TRUM and RH-TRUM waste is scheduled in Tri-Party Agreement Milestone M-091-44.

B3.4 CWC Outside Storage Area B Records Review and Visual Inspection

To support the development of this closure plan and the associated SAP (Attachment A), a review of the Area B RCRA operating records was completed (Table B- 1). The records review included the following

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RCRA operating record documents: facility operating logbooks (which contain the facility spill log), waste management records, and weekly inspections. The RCRA operating record documents that were reviewed focused on the period during active RCRA-regulated, TRUM, and TSCA-PCB waste storage. The RCRA operating record for the Area B DWMU, including the facility operating logbooks and weekly inspection sheets, indicates that there were no documented spills or releases and no items of concern.

Table B- 1 Operating Records Review Summary

Document Title	Document Type	Facility	Start Date	End Date	Items of Concern Noted
Daily Operating Logbook	Logbook	CWC Area B	12/06/2006	08/12/2013	No
Weekly RCRA Inspection Checklist for CWC	Weekly Inspection	CWC Area B	01/05/2006	06/26/2013	No

N/A = not applicable

Waste management records for the RCRA-regulated, TRUM, and TSCA-PCB waste containers stored in Area B were reviewed to determine the target analytes to be included in the closure plan SAP. Currently, five large containers of TRUM are being stored in Area B. Container data are presented in Table B- 2.

A visual inspection was performed of the visible ground surface in Area B on August 14, 2013, to identify any RCRA-regulated, TRUM, or TSCA-PCB waste-related staining in visible portions of Area B. No waste-related staining was identified during the visual inspection; however, once all waste is removed, an additional visual inspection will be conducted.

Supporting documentation for the RCRA operating records review and visual inspection are documented in Attachment B. These include the CWC Daily Operating Log Book Review Outdoor Waste Container Storage Area B sheet, the CWC Outdoor Waste Container Storage Area B Weekly Dangerous Waste Inspection Checklist Review, and the CWC, Outdoor Container Storage Area “B” visual inspection sheet, and any additional supporting information.

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Table B- 2 CWC Outdoor Storage Area B Container Data

Container Quantity	Facility ID	Storage Unit	Waste Package Type	Package Volume (m^3)	Waste Type	Earliest Moved In Date	Latest Moved Out Date	Assigned Waste Code
5	CWC	OSA "B"	Large Containers	263	TRUM	2006	N/A[a]	D008, D019, F002, F003
158	CWC	OSA "B"	Various	2,345	RCRA-Regulated	2006	August 2013	D008, D019, F002, F003
1	CWC	OSA "B"	Box	10	TSCA-PCB	2006	August 2013	N/A

a. Current container inventory for CWC Outdoor Storage Area B.

N/A = not applicable

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B3.5 Unit Components, Parts, and Ancillary Equipment

Area B does not have components, parts, or ancillary equipment.

B3.6 Inspection of Units Before Decontamination

Decontamination activities are not planned for Area B.

B3.7 Decontamination

Decontamination activities are not planned for Area B.

B3.8 Identifying and Managing Contaminated Environmental Media

If contaminated media are identified during the final visual inspection or as a result of the confirmation sampling, then the contaminated materials will be removed and packaged, and a waste determination will be completed in accordance with applicable environmental and waste management procedures. Treatment or disposal of the resulting waste will be performed at an approved TSD facility.

B3.9 Confirming Clean Closure

Area B will be clean closed. During closure activities, all waste will be removed. After all the waste has been removed, a visual inspection of the area will be performed to identify any waste-related staining of the gravel or visible surface soil. Since all RCRA-regulated, TRUM, and TSCA-PCB waste will be removed and sampling will confirm that contamination does not remain, post-closure escape of dangerous waste and any associated dangerous waste constituents, leachate, contaminated runoff, and dangerous waste decomposition products to the ground, surface water, groundwater, or air is not anticipated.

Record reviews have been completed for the operational period of December 2006 through July 2013, as discussed in Section B3.4 of this closure plan. Prior to the startup of closure activities, a review of the RCRA operating records from August 2013 to closure startup will be performed. The records review will include the following RCRA operating record documents: facility operating logbooks (including spill reports), and weekly inspections.

Once all waste has been removed, sampling will be conducted to confirm that unrestricted use cleanup standards (MTCA B) for soil have been achieved. Once analytical results confirm clean closure levels of target analytes, a determination will be made to leave the gravel surface of the Area B in place.

B3.10 Sampling and Analysis and Constituents to Be Analyzed

B3.10.1 Sampling and Analysis Plan

Sampling and analysis of the gravel and soil will be conducted to confirm that clean closure levels have been achieved at Area B. All sampling and analysis will be performed in accordance with the sampling and quality standards established in the closure SAP (Attachment A). The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the American Society for Testing and Materials (ASTM) *Annual Book of ASTM Standards*; and applicable U.S. Environmental Protection Agency (EPA) guidance. Sampling and analysis activities will meet applicable requirements of SW-846, the ASTM standards, EPA-approved methods, and *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68).

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B3.10.2 Revisions to the Sampling and Analysis Plan and Constituents to be Analyzed

If changes to the SAP are necessary due to unexpected events during closure that will affect sampling, a revision to the SAP will be submitted no later than 30 days after the unexpected event as a permit modification, as required in WAC 173-303-610(3)(b)(iii).

B3.11 Role of the Independent Qualified Registered Professional Engineer

An independent, qualified, registered professional engineer will be retained to provide certification of the closure, and sign the closure certification as required by WAC 173-303-610(6). The resulting engineering report will be retained in the operating record.

B3.12 Closure Certification

In accordance with WAC 173-303-610(6), within 60 days of completion of closure of the Area B DWMU, a certification that the DWMU has been closed in accordance with the specifications in this closure plan will be submitted to Ecology by registered mail. The certification will be signed by the owner or operator and by an independent qualified registered professional engineer.

B3.13 Conditions That Will Be Achieved When Closure Is Complete

Upon confirmation of clean closure levels through sampling and analysis, Area B will remain in an "as-is" state, with the gravel remaining in place. The area and buildings surrounding Area B are active DWMUs that will continue to be used; therefore, removal of gravel is not necessary, and the land will not be restored to its pre-operational appearance. The storage area marking will be removed once the closure activities are completed. A permit modification request will be submitted after clean closure has been confirmed to remove the Area B DWMU from the sitewide permit active DWMUs.

B4 Closure Schedule and Time Frame

Due to the container size and nature of the waste being stored in Area B, closure of Area B will take place over an extended period of time; therefore, meeting the 180-day requirement to complete closure activities in the DWMU as required in WAC 173-303-610(4) is not possible. The closure schedule and period to treat, remove, and dispose the large container waste will be developed based on Tri-Party Agreement Milestone M-091-00 and other sub-milestones noted in Section B3.3 (Figure B-2).

Approval of this closure plan will grant the Hanford Site an extended closure period in accordance with WAC 173-303-610(4)(c) and a separate extension request will not be filed.

B5 Closure Costs

An annual report outlining updated projections of anticipated closure costs for the Hanford Facility TSD units having final status is not required per Permit Condition II.H.

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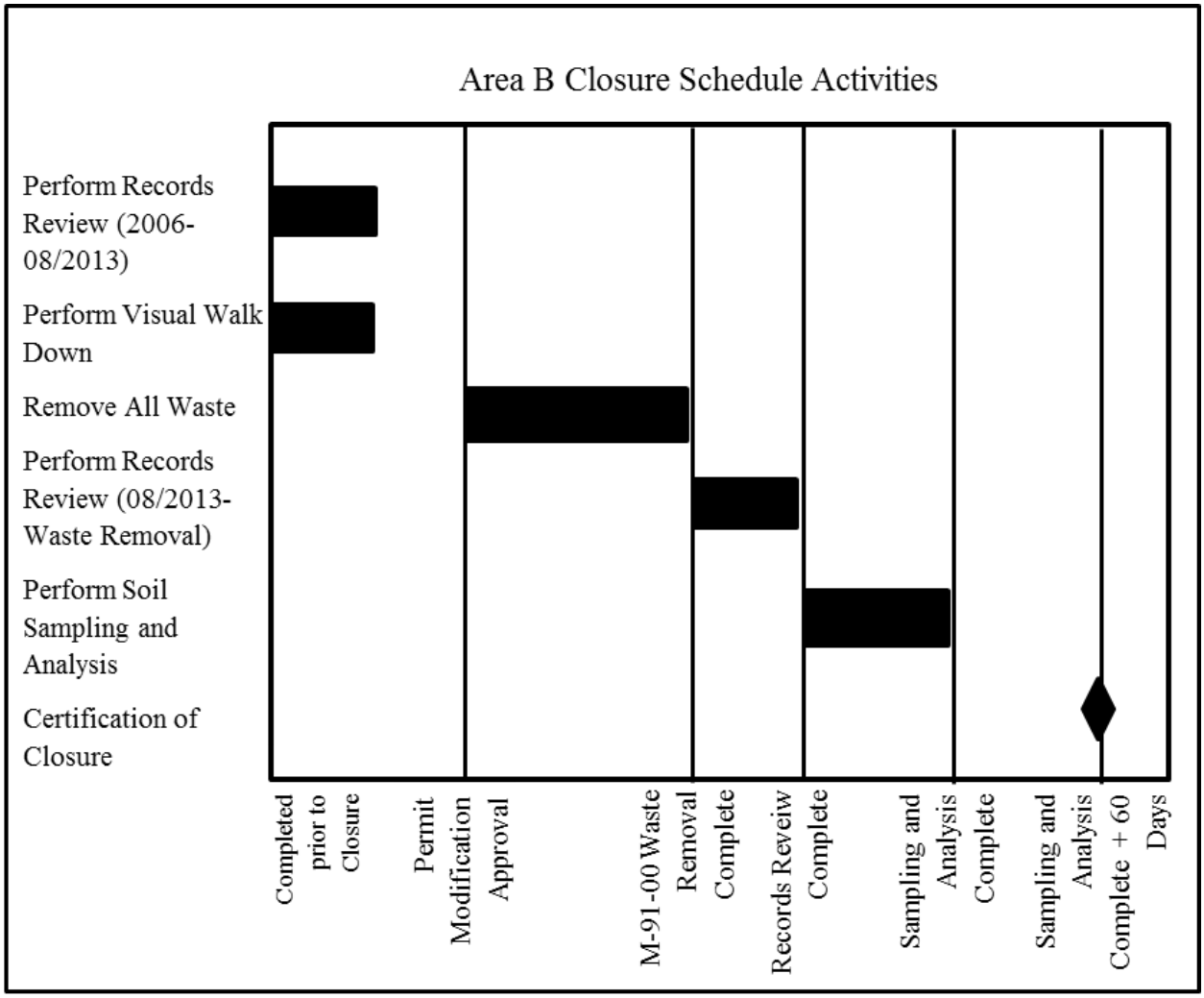

Figure B-2. CWC Outdoor Container Storage Area B Closure Activities

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Attachment A

CWC-WRAP Outdoor Storage Area B

Sample and Analysis Plan

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CWC-WRAP Outdoor Storage Area B

Sample and Analysis Plan

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Terms

ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Services
CWC	Central Waste Complex
CWC-WRAP	Central Waste Complex Operating-Waste Receiving and Processing Unit Group
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQA	data quality assessment
DQI	data quality indicator
EB	equipment blank
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FTB	full trip blank
FXR	field transfer blank
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Documents*
HEIS	Hanford Environmental Information System
MDA	minimum detectable activity
POC	point of contact
QA	quality assurance
QAPjP	quality assurance project plan
QC	quality control
QSAS	Quality Systems for Analytical Services
RCRA	*Resource Conservation and Recovery Act of 1976*
RPD	relative percent difference
SAF	sampling authorization form
SAP	sampling and analysis plan
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRUM	transuranic mixed
VOA	volatile organic analysis

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VOC	volatile organic compound
VSP	Visual Sample Plan (software)

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1 Introduction

1.1 Purpose

The purpose of the sampling and analysis plan (SAP) is to assist in the determination that clean closure levels have been achieved for the Central Waste Complex-Waste Receiving and Processing (CWC-WRAP) Outside Storage Area B (Area B).

Sampling and analysis of the gravel and soil will be conducted to confirm that clean closure levels have been achieved. Sampling includes grid sampling over Area B. All sampling and analysis will be performed in accordance with the sampling and quality standards established in this closure SAP. The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the American Society for Testing and Materials (ASTM) *Annual Book of ASTM Standards*, and applicable U.S. Environmental Protection Agency (EPA) guidance. Sampling and analysis activities will meet applicable requirements in SW-846, the ASTM standards, EPA-approved methods, and *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68).

1.2 Statement of the Problem

The objective of the sampling described in this document is to verify that the MTCA Level B closure performance standards for soil were met demonstrating clean closure of the Area B.

1.3 Target Analytes

The target analytes were determined by reviewing waste management records for the dangerous waste stored in Area B (Table 1-1).

Table 1-1. Target Analyte List

Target Analyte	CAS Number	Target Analyte	CAS Number
Lead (D008)	7439-92-1	N-butyl alcohol (F003)	71-36-3
Carbon tetrachloride (D019) (F001) (F002)	56-23-5	Cyclohexanone (F003)	108-94-1
Chlorinated fluorocarbons (1,1,2-Trichloro-1,2,2-trifluoroethane) (F001) (F002)	76-13-1	Ethyl acetate (F003)	141-78-6
Methylene chloride (F001) (F002)	75-09-2	Ethyl benzene (F003)	100-41-4
Tetrachloroethylene (F001) (F002)	127-18-4	Ethyl ether (F003)	60-29-7
1,1,1-Trichloroethane (F001) (F002)	71-55-6	Methanol (F003)	67-56-1
Trichloroethylene (F001) (F002)	79-01-6	Methyl isobutyl ketone (F003)	108-10-1
Chlorobenzene (F002)	108-90-7	m-Xylene (F003)	108-38-3

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Table 1-1. Target Analyte List

Target Analyte	CAS Number	Target Analyte	CAS Number
Ortho-dichlorobenzene (F002)	95-50-1	o-Xylene (F003)	95-47-6
1,1,2-Trichloroethane (F002)	79-00-5	p-Xylene (F003)	106-42-3
Acetone (F003)	67-64-1	Polychlorinated biphenyl (PCB)	1336-36-3

1.4 Project Schedule

The sampling and analysis schedule will be determined by the associated *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989a) Milestone M-091-00 activities. Sampling will not commence until all dangerous waste containers have been removed from Area B.

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2 Quality Assurance Project Plan

The 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 requirements of the following:

- 10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements"
- DOE O 414.1D, *Quality Assurance*
- *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA/240/B-01/003)
- *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68)

This chapter describes the applicable quality requirements and controls. Sections 6.5 and 7.8 of *Hanford Federal Facility Agreement and Consent Order Action Plan* (Tri-Party Agreement Action Plan) (Ecology et al., 1989b) require the quality assurance (QA)/quality control (QC) and sampling and analysis activities to specify the QA requirements for treatment, storage, and disposal units, as well as for past-practice processes. Therefore, this QAPjP follows the QA elements of EPA/240/B-01/003. This QAPjP demonstrates conformance to Part B requirements of *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4-2004).

This QAPjP is divided into the following four sections, which describe the quality requirements and controls applicable to this investigation: Project Management, Data Generation and Acquisition, Assessment and Oversight, and Data Validation and Usability.

2.1 Project Management

The following subsections address project management and 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 is responsible for planning, coordinating, sampling, preparation, packaging, and shipping samples to the laboratory. The project organization (regarding sampling and characterization) is described in the following subsections and 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.

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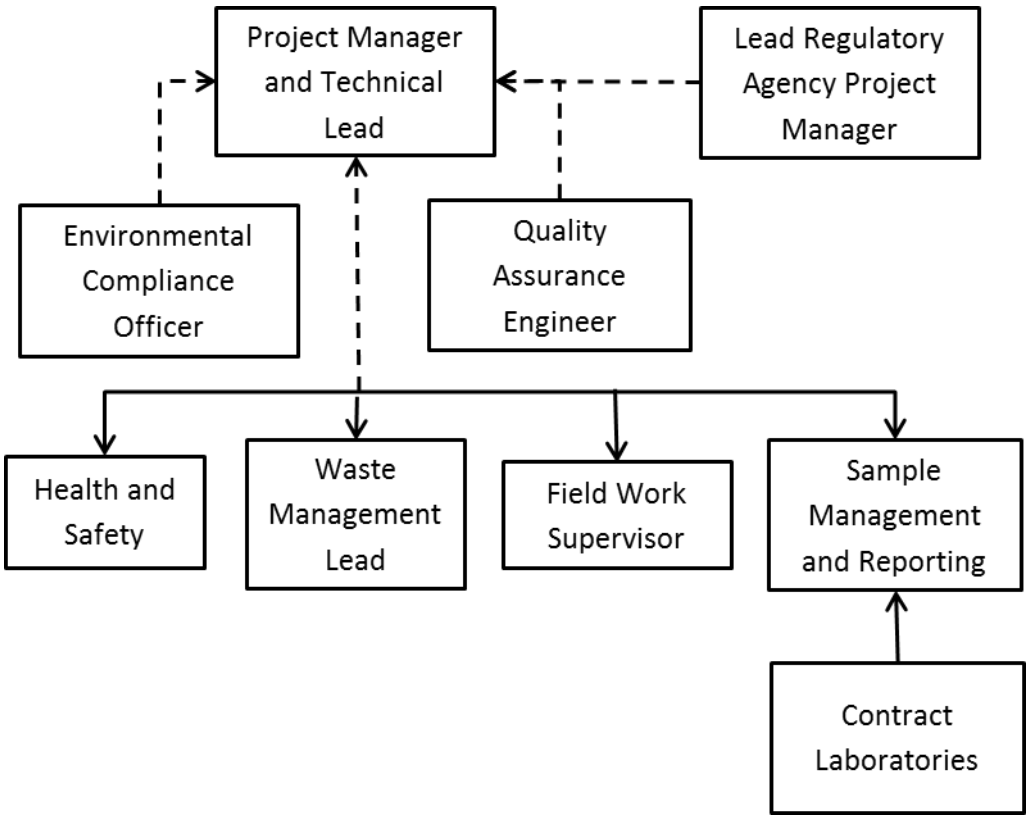

Figure 2-1. CWC Outdoor Storage Area B Closure Sampling Project Organization

The project has several key positions within the U.S. Department of Energy, Richland Operations Office (DOE-RL) organization, including the following:

- **Regulatory Project Manager:** The Washington State Department of Ecology (Ecology) has assigned project managers responsible for oversight of cleanup projects and activities. Ecology, as lead regulatory agency for the CWC Area B closure sampling project, has oversight authority 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 in accordance with the Tri-Party Agreement.

- **Project Manager:** The Project Manager provides oversight for activities and coordinates with DOE-RL, EPA, Ecology, and contract management. In addition, support is provided to the project technical lead to ensure that work is performed safely and cost effectively. The Project Manager (or designee) for the CWC Area B closure sampling is responsible for direct management of sampling documents and requirements, field activities, and subcontracted tasks. The Project Manager is responsible for ensuring that project personnel are working to the current version of the SAP. The Project Manager works closely with QA, Health and Safety, and the Field Work Supervisor (FWS) to integrate these and other lead disciplines in planning and implementing the work scope. The Project Manager coordinates with DOE-RL and the primary contractor management on all sampling activities. The Project Manager supports DOE-RL in coordinating sampling activities with the regulators.

- **Environmental Compliance and Quality Assurance**. 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, protocols, and technical documents to ensure

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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-RL and/or regulatory agencies. The ECO also oversees project implementation for compliance with applicable internal and external environmental requirements.

The QA point of contact (POC) is matrixed to the Project Manager and is responsible for QA issues on the project. Responsibilities include overseeing implementation of the project QA requirements, reviewing project documents (including SAP and the QAPjP), and participating in QA assessments on sample collection and analysis activities, as appropriate. The QA POC must be independent of the unit generating the data.

- **Health and Safety:** The Health and Safety organization is responsible for coordinating industrial safety and health 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 assists project personnel in complying with applicable health and safety standards and requirements.

- **Sample Management and Reporting:** The Permittee's sampling organization coordinates laboratory analytical work, ensuring that laboratories conform to Hanford Site internal laboratory QA requirements (or their equivalent), as approved by DOE-RL, EPA, and Ecology. The sampling organization receives the analytical data from the laboratories, performs the data entry into the Hanford Environmental Information System (HEIS) database, and arranges for data validation. The sampling organization is responsible for informing the Project Manager of any issues reported by the analytical laboratory. The sampling organization develops and oversees implementation of the letter of instruction to the analytical laboratories, oversees data validation, and works with the Project Manager to prepare a characterization report on the sampling and analysis results.

- **Contract laboratories:** The contract laboratories analyze samples in accordance with established protocols and provide necessary sample reports and explanation of results in support of data validation. The laboratories must meet site-specific QA requirements and must have an approved QA plan in place.

- **Waste Management:** Waste Management communicates policies and protocols, and ensures project compliance for storage, transportation, disposal, and waste tracking in a safe and cost-effective manner. In addition, Waste Management is responsible for identifying waste management sampling/characterization requirements to ensure regulatory compliance, interpreting the characterization data to generate waste designations and profiles, and preparing and maintaining other documents confirming compliance with waste acceptance criteria.

- **Fieldwork Supervisor:** The FWS is responsible for planning and coordinating field sampling resources. The FWS ensures that samplers are appropriately trained and available. Additional related responsibilities include ensuring that the sampling design is understood and can be performed as specified by directing training, mock-ups, and practice sessions with field personnel.

The FWS directs the samplers. The samplers collect soil samples, including replicates/duplicates, and prepare sample blanks in accordance with the SAP, corresponding protocols, and work packages. The samplers complete field logbook entries, chain-of-custody forms, and shipping paperwork, and ensure delivery of the samples to the analytical laboratory.

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2.1.2 Quality Objectives and Criteria

The QA objective of this plan is to develop implementation guidance providing data of known and appropriate quality. Data quality indicators (DQIs) describe data quality by evaluation against identified data needs 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 2-1. The DQIs will be evaluated during the data quality assessment (DQA) process (Section 2.4.5).

Quality objectives and project-specific measurement requirements are presented in Table 2-2. In consultation with the laboratory, the Project Manager, the sampling organization, and/or others as appropriate, identify appropriate analytical methods.

2.1.3 Special Training/Certification

A graded approach is used to ensure that workers receive a level of training that is commensurate with responsibilities and compliant with applicable DOE orders and government regulations. The FWS, in coordination with line management, will ensure that special training requirements for field personnel are met.

Typical training requirements or qualifications have been instituted by the Permittee to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. Field personnel typically have completed the following training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- 8-Hour Hazardous Waste Worker Refresher Training (as required)
- Hanford General Employee Training

Project-specific safety training addressed explicitly to the project and the day's activity will be provided and includes the following:

- Training to provide the knowledge and skills that sampling personnel need to perform work safely and in accordance with QA requirements.
- Requirement that samplers be qualified in the type of sampling being performed in the field

In addition, pre-job briefings will be performed to evaluate activities and associated hazards by considering many factors, including the following:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required
- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work

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- Level of management control
- Proximity of emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittee's training organization maintains the training records system.

2.1.4 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 data needs will be submitted as a permit modification in accordance with WAC 173-303-610 to the DOE and lead regulatory agency.

The FWS is responsible for ensuring that the field instructions are maintained and aligned with any revisions or approved changes to the SAP. The FWS 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 protocols.

The Project Manager, FWS, or designee is responsible for communicating field corrective action requirements and ensuring that 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 FWS, 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 contain the records or references to their storage locations. The following will be included in the project file, 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

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Precision	The measure of the degree of reproducibility of measurements under prescribed similar conditions. May 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. 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.	Field precision: At randomly selected locations, duplicate samples will be taken one per 20 samples per media. Laboratory precision; analysis of laboratory duplicate or matrix spike duplicate.	If 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 an accepted reference or true value. Sample accuracy is expressed as the percent recovery of a spiked sample.	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).	Laboratory accuracy Determination based on matrix spikes and matrix spike duplicates.	If recovery does not meet objective: • Qualify the data before use • Request re-analysis or remeasurement

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Representa-tiveness	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. Judgment sampling ensures areas most likely to be contaminated, based on current information, will be evaluated. Random sampling is based on ensuring all members of the group are equally likely to be chosen and allows probability statements to be made about the quality of estimates derived from the data.	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

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
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.	Sampling personnel will use the same sampling protocols. Samples will be submitted to the same laboratories when possible (based on laboratory contracts) for analysis by the same methods, thus data results will be comparable.	If data are not comparable to other data sets: • 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. • Revise sampling/analysis protocols to ensure future comparability

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Completeness	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.	Sampling personnel will use the same sampling protocols. Samples will be submitted to the same laboratories when possible (based on laboratory contracts) for analysis by the same methods, thus data results will be comparable.	If data are not comparable to other data sets: • 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. • Revise sampling/analysis protocols to ensure future comparability
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, which can be routinely quantified and reported by a laboratory.	Ensure sensitivity, as measured detection limits, is appropriate for the action levels.	If sensitivity does not meet objective: • Request reanalysis or remeasurement. • Qualify/reject the data before use.

DQI = data quality indicators
QA = quality assurance

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Table 2-2. Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a] (mg/kg)		Practical Quantitation Limit[d]	Accuracy Req't (Percent Recovery)[b]	Precision Req't (RPD)[b]
			Carcinogen	Non-carcinogen			
Performance Requirements for Laboratory Measurements (Nonradiological)							
7439-91-1	Lead	SW-846 Method 6010 or 200.8	N/A	250	5.0	±30	≤30
56-23-5	Carbon tetrachloride	SW-846 Method 8260	14.3	320	0.005	N/A[c]	≤20
76-13-1	Chlorinated fluorocarbons (1,1,2-Trichloro-1,2,2-trifluoroethane)	SW-846 Method 8260	N/A	2400000	0.01	N/A[c]	≤20
75-09-2	Methylene chloride	SW-846 Method 8260	133	4,800	0.005	N/A[c]	N/A[c]
127-18-4	Tetrachloroethylene	SW-846 Method 8260	1.85	800	0.005	N/A[c]	N/A[c]
71-55-6	1,1,1-Trichloroethane	SW-846 Method 8260	N/A	165,000	0.005	N/A[c]	N/A[c]
79-01-6	Trichloroethylene	SW-846 Method 8260	21.7	40	0.005	N/A[c]	N/A[c]
108-90-7	Chlorobenzene	SW-846 Method 8260	N/A	1,600	0.005	N/A[c]	N/A[c]
79-00-5	1,1,2-trichloroethane	SW-846 Method 8260	17.5	320	0.005	N/A[c]	N/A[c]
67-64-1	Acetone	SW-846 Method 8260	N/A	72,000	0.02	N/A[c]	≤20
71-36-3	N-butyl alcohol (I-Butanol)	SW-846 Method 8260	N/A	8,000	0.1	N/A[c]	N/A[c]
108-94-1	Cyclohexanone	SW-846 Method 8270	N/A	400,000	200	N/A[c]	N/A[c]
141-78-6	Ethyl acetate	SW-846 Method 8015	N/A	72,000	5.0	N/A[c]	N/A[c]
100-41-4	Ethyl benzene	SW-846 Method 8260	N/A	8,000	0.005	N/A[c]	N/A[c]
60-29-7	Ethyl ether	SW-846 Method 8260	N/A	16,000	0.005	N/A[c]	N/A[c]

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Table 2-2. Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a] (mg/kg)		Practical Quantitation Limit[d]	Accuracy Req't (Percent Recovery)[b]	Precision Req't (RPD)[b]
			Carcinogen	Non-carcinogen			
67-56-1	Methanol	SW-846 Method 8260	N/A	40000	1.0	N/A[c]	≤20
108-10-1	Methyl isobutyl ketone (MIBK) (4-Methyl-2-Pentanone)	SW-846 Method 8260	N/A	6,400	0.01	N/A[c]	N/A[c]
95-50-1	Ortho-dichlorobenzene	SW-846 Method 8270	N/A	7,200	0.33	N/A[c]	N/A[c]
108-38-3	m-Xylene	SW-846 Method 8260`	N/A	16,000	0.005	N/A[c]	N/A[c]
95-47-6	o-Xylene	SW-846 Method 8260	N/A	16,000	0.005	N/A[c]	N/A[c]
106-42-3	p-Xylene	SW-846 Method 8260	N/A	16,000	0.005	N/A[c]	N/A[c]
1336-36-3	Polychlorinated biphenyls	SW-846 Method 8082	0.5	1.6	0.16	N/A[c]	≤20

a. Closure performance standards are the numeric cleanup levels calculated using unrestricted use exposure assumptions according to the MTCA cleanup regulation (WAC 173-340-740, -747, -and -7490 through -7494). These numeric clean-up levels will be calculated according to MTCA Method B (unrestricted use standards)

b. Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples is also performed. Precision criteria for batch laboratory replicate matrix spike analyses or replicate sample analyses.

c. Determined by the laboratory based on historical data or statistically derived control limits. Limits are reported with the data. Where specific acceptance criteria are listed, those acceptance criteria may be used in place of statistically derived acceptance criteria.

d. For these analytical performance requirements, the Required Detection Limit and the Practical Quantification Limit are identical.

CAS = Chemical Abstract Services

MTCA = *Model Toxics Control Act*

N/A = not applicable

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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 hardcopy 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 required by the Tri-Party Agreement (Ecology et al., 1989a) will be managed in accordance with the requirements therein.

2.2 Data Generation and Acquisition

The following subsections present the requirements for sampling methods and identification, sample handling and custody, analytical methods, measurement and analysis, data collection or generation, data handling, and field and laboratory QC. The requirements for instrument calibration and maintenance, supply inspections, and data management are also addressed. The sampling design is presented in the field sampling plan (Section 3) of this SAP.

The FWS is responsible for ensuring that all field procedures are followed completely and that field sampling personnel are adequately trained to perform sampling activities under this SAP. The field team lead must document all deviations from procedures or other problems pertaining to sample collection, chain-of-custody, sample analytes, sample transport, or noncompliant monitoring. As appropriate, such deviations or problems will be documented in the field logbook or in nonconformance report forms in accordance with internal corrective action procedures. The FWS or Project Manager is responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to field activities.

2.2.1 Sampling Process Design

The sampling design uses a systematic and grid sampling. Judgmental sampling will be taken of any *Resource Conservation and Recovery Act of 1976 (*RCRA)-regulated, transuranic mixed (TRUM), or *Toxic Substances Control Act of 1976* polychlorinated biphenyl (TSCA-PCB) waste-related staining. Additional sampling process design details are provided in Section 3.

2.2.2 Analytical Methods

Analytical methods and parameters are provided in Table 2-2. These analytical methods are controlled in accordance with the laboratory's QA plan and the requirements of this QAPjP. Laboratory operations and analytical services shall comply with Volume 4 of HASQARD (DOE/RL-96-68, Laboratory Technical Requirements) and any specific criteria identified in Table 2-2. Criteria in Table 2-2 take precedence over similar criteria in HASQARD. In consultation with the laboratory, the Project Manager and/or others as appropriate, changes to analytical methods can be approved as long as the method is based upon a nationally recognized standard (e.g., EPA, American Society for Testing and Materials [ASTM]) method, the new method achieves project data needs as well or better than the replaced method, and the new method is required due to the nature of the sample. Oversight of offsite analytical laboratories to qualify them for performing Hanford Site analytical work is performed as necessary.

If the laboratory uses a nonstandard or unapproved method, then the laboratory must provide method validation data to confirm that the method is adequate for the intended use of the data. This includes information such as determination of detection limits, quantitation limits, typical recoveries, and

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analytical precision and bias. Deviations from the analytical methods noted in Table 2-2 must be approved in consultation with the Project Manager.

Issues that may affect analytical results are to be resolved in coordination with the Project Manager.

2.2.3 Quality Control

The QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained. Field QC samples will be collected to evaluate the potential for cross-contamination and provide information pertinent to field sampling variability. Field QC sampling will include the collection of full trip blank, field transfer blank, equipment rinsate blank, field duplicate, and field split samples. Laboratory QC samples estimate the precision and bias of the analytical data. Field and laboratory QC samples are summarized in Table 2-3.

Table 2-3. Project QC Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Field QC		
Full trip blank (FTB)	One per 20 samples per media sampled.	Contamination from containers or transportation.
Equipment rinsate blank (EB)	As needed If only disposable equipment is used, an equipment blank is not required. Otherwise, one per 20 samples per media [a]	Adequacy of sampling equipment decontamination and contamination from non-dedicated equipment.
Field duplicate (DUP)	One per batch[h], 20 samples maximum of each media sampled (soil samples [b])	Precision, including sampling and analytical variability.
Field Split Samples (SPLIT)	As needed. When needed, the minimum is one per analytical method, per media sampled, for analyses performed where detection limit and precision and accuracy criteria have been defined in the Performance Requirements tables.	Precision, including sampling, analytical, and inter-laboratory.
Laboratory QC[h]		
Method Blanks	1 per batch[h]	Laboratory Contamination
Lab Duplicates	[c]	Laboratory Reproducibility and precision
Matrix Spikes	[c]	Matrix effect/laboratory accuracy
Matrix Spike Duplicates	[c]	Laboratory reproducibility, accuracy, and precision
Surrogates	[c]	Recovery/yield

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Table 2-3. Project QC Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Tracers	[c]	Recovery/yield
Laboratory Control Samples	1 per batch[h]	Evaluate Laboratory Accuracy
Performance Evaluation Programs[d]	Annual	Evaluate Laboratory Accuracy
Double-Blind Standards	Quarterly[e]	Evaluate Laboratory Accuracy
Audit/Assessment	Annually[f] or Every 3 years[g]	Evaluate overall laboratory performance and operations

a. Whenever a new type of non-dedicated equipment is used, an equipment blank shall be collected every time sampling occurs until it can be shown that less frequent collection of equipment blanks is adequate to monitor the decontamination procedure for the non-dedicated equipment.
b. Soil grab samples are exempted from duplicate sampling.
c. As defined in the laboratory contract or QA plan and/or analysis procedures.
d. Nationally recognized program, such as DOE Mixed Analyte Performance Evaluation Program or Environmental Resource Associates.
e. Soil matrix double-blind standards are submitted by request of Analytical Services.
f DOE QSAS requires annual audit of commercial laboratories.
g. HASQARD does not define a frequency for assessment of on-site laboratories. Three year evaluated supplier list requirement is typically applied.
h. Batching across projects is allowing for similar matrices.
QA = Quality assurance.
QC = Quality control.
QSAS = Quality Systems for Analytical Services
VOC = Volatile organic compound.

2.2.3.1 Field Quality Control Samples

Field QC samples will be collected to evaluate the potential for cross-contamination and to provide information pertinent to field sampling variability and laboratory performance to help ensure reliable data are obtained. Field QC samples include field duplicates, split samples, and three types of field blanks (full trip, field transfer, and equipment blanks). Field blanks are typically prepared using high-purity reagent water. Silica sand should be used, instead of reagent water, when required by the SAP. The QC samples and the required frequency for collection are described in this subsection. Particular care will be exercised to avoid the following common ways in which cross-contamination or background contamination may compromise 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
- Improperly decontaminating equipment before sampling or between sampling events

This number of QC samples is conservatively established based on site procedures that call for approximately one set of QC samples per 20 samples.

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- **Full-trip blanks (FTB):** FTBs are prepared by the sampling team prior to traveling to the sampling site. The preserved bottle set is either for volatile organic analysis (VOA) only or identical to the set that will be collected in the field. It is filled with high purity reagent water or silica sand, as appropriate to the primary sample media. The bottles are sealed and transported, unopened, to the field in the same storage containers used for samples collected the same day. The FTBs are typically analyzed for the same constituents as the samples from the associated sampling event. FTBs are used to evaluate potential contamination of the samples attributable to the sample bottles, preservative, handling, storage, and transportation.

- **Field transfer blank (FXR):** FXRs are preserved VOA sample bottles filled at the sample collection site with high purity reagent water or silica sand (as appropriate to the primary sample media) that has been transported to the field. The samples are prepared during sampling to evaluate potential contamination attributable to field conditions. After collection, FXR sample bottles are sealed and placed in the same storage containers with the samples collected the same day for the associated sampling event. The FXR samples will be analyzed for volatile organic compounds (VOCs) only.

- **Equipment blank (EB):** EBs consist of high purity reagent water or silica sand passed through or poured over the decontaminated sampling equipment identical to the sample set that will be collected and placed in sample containers, as identified on the project sampling authorization form (SAF). The EB sample bottles are placed in the same storage containers with the samples from the associated sampling event. The EB samples will be analyzed for the same constituents as the samples from the associated sampling event. The EBs will be used to evaluate the effectiveness of the decontamination process.

  Equipment blanks are collected from reusable sampling devices on a 1-in-20 basis and are not required for disposable sampling equipment.

  For the field blanks (i.e., FTB, FXR, and EB), results greater than two times the method detection limit or minimum detectable activity (MDA) are identified as suspect contamination. However, for common laboratory contaminants such as acetone, methylene chloride, 2-butanone, toluene, and phthalate esters, the limit is five times the method detection limit.

- **Field duplicates:** Field duplicates (DUP) are independent samples collected as close as possible to the same time and same location as the parent sample and are intended to be identical. DUPs are collected at a frequency of one in 20 samples. Soil grab samples are exempt from DUPs. DUPs are two separate samples collected from the same source, placed in separate sample containers, and analyzed independently. The DUPs should be collected from an area expected to have some contamination so valid comparisons between the samples can be made (i.e., some constituents will be greater than detection limit).

  DUPs must agree within 20 percent, as measured by the RPD, to be acceptable. Only those DUPs with at least one result greater than five times the MTCA Level B limit are evaluated. DUP results not satisfying evaluation criteria will be qualified and flagged in HEIS, as appropriate.

  Soil DUPs will be collected and homogenized before dividing into two separate samples in the field. VOA soil duplicates will be sampled as collocated samples (described below). DUPs are stored and transported together and will be analyzed for the same constituents. The DUPs are used to determine precision for both sampling and laboratory measurements. Evaluation of the results can provide an indication of intra-laboratory variability. Large relative percent differences (RPDs) can be an indication of potential laboratory performance problems and should be investigated.

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Collocated samples are two samples collected as close as possible to the same time and location and are not homogenized. This sampling protocol is used when homogenizing samples for split or duplicate samples could affect the quality of data (i.e. VOA analysis).

- **Field split samples:**. Field split samples (SPLIT) are two samples collected as close as possible to the same time and same location and are intended to be identical. VOA soil splits will be sampled as collocated samples, as described previously. SPLITs are stored in separate containers and analyzed by different laboratories for the same or similar analytes. SPLITs are inter-laboratory comparison samples used to evaluate comparability between laboratories. Large RPDs can be an indication of potential laboratory performance problems and should be investigated.

2.2.3.2 Laboratory Quality Control Samples

The laboratory QC samples (e.g., method blanks and laboratory control sample/blank spike) are defined for the three-digit EPA methods (EPA/600/4-79/20, *Methods for Chemical Analysis of Water and Wastes*) 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.

The QC checks outside of control limits will be reflected in the narrative of the analytical report and during the DQA process, if performed.

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 25 percent of the expected values, although the limits may vary considerably depending upon the method and analyte.

2.2.4 Equipment

Equipment used for collection, measurement, and testing should meet applicable standards (e.g., ASTM) or will have been evaluated as acceptable and valid in accordance with the procedures, requirements, and specifications. The FWS, field technical representative, or equivalent will ensure that 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 that directly affect the quality of analytical data will be subject to preventive maintenance measures to minimize 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), 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.

2.2.5 Inspection of Consumable Supplies

Consumables, supplies, and reagents will be reviewed in accordance with the current requirements of SW-846, or other EPA method being used, or by an approved site analytical procedure. Potential contamination is monitored by field QC samples and laboratory blanks. The lot number from the manufacturer certified, pre-cleaned sample containers will be recorded in the sampler's logbook.

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2.2.6 Data Management

Data resulting from the implementation of the SAP will be stored in the HEIS database. Reports and supporting analytical data packages will be subject to final technical review by qualified reviewers before submittal to the regulatory agencies or before inclusion in reports or technical memoranda.

2.2.7 Field Documentation Management

Field documentation shall be maintained in the form of chain-of-custody/sample analysis request forms and logbook entries. Other documentation is described in Section 2.1.4. Approved work control packages and procedures will be used to document field activities, including nonradiological measurements, when this SAP is implemented. Field activities will be recorded in the field logbook.

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, Regulatory Compliance, QA, and/or Health and Safety organizations may conduct 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. The project manager will determine whether a DQA will be performed for the activities identified in this SAP. The DQA process, if performed, is discussed in Section 2.4. The results of the DQA will be provided to the project manager. No other planned assessments have been identified.

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. When appropriate, corrective actions will be taken by the Project Manager.

2.3.2 Reports to Management

Management will be made aware of deficiencies identified by self-assessments, corrective actions from ECOs, and findings from QA assessments and surveillances.

2.4 Data Review, Verification, and Validation, and Usability Requirements

Analytical results will be received from the laboratory, loaded into a database (e.g., HEIS), and verified (Section 2.4.1). A total of 5 percent of the data will be validated (Section 2.4.4). A DQA may be performed, if requested, on the final data (Section 2.4.5). At the direction of the Project Manager (or designee), analytical data packages will be subject to final technical review by qualified personnel before submittal to the regulatory agencies or inclusion in reports.

2.4.1 Verification and Validation Methods

Validation activities will be based on EPA functional guidelines. Data validation may be performed by the Permittee and/or by a party independent of both the data collector and the data user. Data validation qualifiers must be compatible with the HEIS database.

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When outliers or questionable results are identified, the data associated with these outliers and questionable data will be evaluated and additional data validation will be performed. The additional data validation will consist of selecting up to an additional 5 percent of the statistical outliers and/or questionable data. The additional validation will begin with Level C and may increase to Levels D and E, as needed, to ensure that data are usable. Level C validation is a review of the QC data, while Levels D and E include review of calibration data and calculations of representative samples from the data set. Data validation results will be documented in data validation reports. An example of questionable data is a positive detection greater than the practical quantitation limit or reporting limit in soil from a site that should not have exhibited contamination. Similarly, results below background would not be expected and could trigger a validation inquiry. The determination of data usability will be conducted and documented in a DQA report.

Data validation results will be documented in data validation reports, which will be included in the project file.

2.4.2 Data Verification and Usability Methods

Review of field paperwork, analytical data packages, and electronic files from the laboratory information management system will be performed. Sampling documents include the soil sampling record, chain-of-custody forms, field logbook pages, and other paperwork associated with sampling and shipping. These documents are reviewed for completeness, approvals, and legibility. Analytical and QC data from the laboratories are verified to be complete, reported correctly, and within applicable limits. Laboratory documents will be rechecked to verify the condition of the samples upon receipt at the laboratory and determine if problems arose during analysis that may have affected the data. When issues arise with samples before the analytical data is processed, resolution of those issues will be initiated.

2.4.3 Resolution of Analytical System Errors

Errors reported by the laboratories are reported and a sample disposition record is initiated in accordance with Permittee procedures. This process is used to document analytical errors and to establish resolution with the Project Manager. In addition, the Permittee QA Engineer receives reports providing summaries and statistics of the analytical errors.

2.4.4 Data Validation

The format and requirements for data validation activities are based upon the most current version of *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA-540-R-08-01 [OSWER 9240.1-48]) and *National Functional Guidelines for Inorganic Superfund Data Review* (USEPA-540-R-10-011 [OSWER 9240.1-51]). Performance of data validation activities, typically by a party independent of the data collector, the data generator, and the data user is arranged. Third party data validation reports are reviewed for completeness and contractual compliance and also by Project QA personnel. A total of 5 percent of the results will undergo Level C validation, as defined by the validation guidelines.

2.4.5 Data Quality Assessment

The DQA process compares completed field activities to those in corresponding documents and provides an evaluation of the resulting data. The purpose of the DQA is to determine whether quantitative data are of the correct type and are of adequate quality and quantity to meet the project data quality objectives. The assessment will be consistent with the DQA process in *Data Quality Assessment: A Reviewer's Guide* (EPA/240/B-06/002), and *Data Quality Assessment: Statistical Methods for Practitioners* (EPA/240/B-06/003).

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3 Field Sampling Plan

The purpose of the field sampling plan (FSP) is to provide a discussion of the project sampling and analytical requirements. This includes defining the number and location of samples, sampling methods, and analyses that will be performed, overall sampling objectives, and a discussion of waste management.

3.1 Site Background and Objectives

Site background information is contained in Section 1. The target analytes are presented in Table 1-1. The objective of the FSP is to identify project sampling and analysis activities clearly. The FSP uses the sampling design identified during the systematic planning process and identifies sampling locations, the total number of samples to be collected and the analyses to be performed.

3.2 Sampling Design

The sampling design is a systematic and grid sampling approach using a triangular grid pattern. In addition, judgmental sampling will be performed for any waste-related staining identified in the visual inspection performed as part of closure activities and addressed in the closure plan. The following bullets describe systematic and grid sampling, and judgmental sampling methods.

- **Systematic and Grid Sampling:** In systematic and grid sampling, samples are collected at regularly spaced intervals over space or time. An initial location or time is chosen at random, and then the remaining sampling locations are defined so the locations are at regular intervals over an area (grid) or time (systematic). Systematic and grid sampling is used to search for hot spots and to infer means, percentiles, or other parameters, and it is useful for estimating spatial patterns or trends over time. This design provides a practical method for designating sample locations and ensures uniform coverage of a site, unit, or process.

- **Judgmental Sampling:** In judgmental sampling, the selection of sampling units (i.e., the number and location and/or timing of collecting samples) is based on knowledge of the feature or condition under investigation and on professional judgment. Judgmental sampling is distinguished from probability-based sampling in that inferences are based on professional judgment, not statistical scientific theory. Therefore, conclusions about the target population are limited and depend entirely on the validity and accuracy of professional judgment. Probabilistic statements about parameters are not possible.

3.3 Sample Location and Frequency

Table 3-1 provides the sample locations, frequencies, and sampling methods to be used. Grab samples will be collect directly into containers at the node sample locations indicated by the Visual Sample Plan (VSP) software and shown in Figure 3-1. Attachment C of the CWC-WRAP Outdoor Storage Area B Closure Plan provides supporting documentation for the VSP software.

3.4 Sampling Methods

To ensure sample and data usability, sampling associated with this SAP will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling. The Project Manager and contractor management are responsible for ensuring that all field procedures are followed completely and that field sampling personnel are adequately trained to perform sampling activities.

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

Sampling Objectives	Sample Matrix	Sample Locations	Number of Samples	Number of QA Samples	Sampling Methods
Decision unit	Soil	Surface samples taken at 0 to 15.2 cm (0 to 6 in.) bgs. See VSP software map (Figure 3-1) for exact locations.	20	One each of the following samples: full trip blank, field transfer blank, equipment rinsate blank, and field duplicate.	Grab

bgs = below ground surface

QA = quality assurance

Grab sample matrix will consist of gravel and soil collected in pre-cleaned sample containers taken at a depth of 0 to 15.2 cm (0 to 6 in.) below ground surface. For the purpose of this SAP, ground surface is defined as the exposed surface layer once loose gravel has been moved aside. To gather the most representative sample, loose gravel will be moved aside to expose the surface soil and compacted gravel. Once the compacted gravel and soil is sampled, the sampled media will be screened to remove material larger than approximately 2 mm (0.08 in) in diameter. To ensure sample and data usability, sampling will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling.

Sample container, preservation, and holding time requirements are specified in Table 3-2 for soil samples. These requirements are in accordance with the analytical method specified. The final container type and volumes will be identified on the sampling authorization form and the chain-of-custody form.

Field sampling shall comply with HASQARD requirements (DOE/RL-96-68), Volumes 1 and 2.

Sample preservation, container, and holding time requirements are specified in Table 3-2 for soil samples. These requirements are in accordance with the analytical method specified. The final container type and volumes will be identified on the sampling authorization form and the chain-of-custody form. This monitoring plan defines a “sample” as a filled sample bottle for starting the clock for holding-time restrictions.

3.4.1 Decontamination of Sampling Equipment

To prevent potential contamination of the samples, care should be taken to use decontaminated equipment for each sampling activity.

3.5 Sample Handling

A sampling and data tracking database (e.g., HEIS) is used to track the samples from the point of collection through the laboratory analysis process. Samplers should note any anomaly with a sample (e.g., sample appears unusual) and inform the Project Manager.

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

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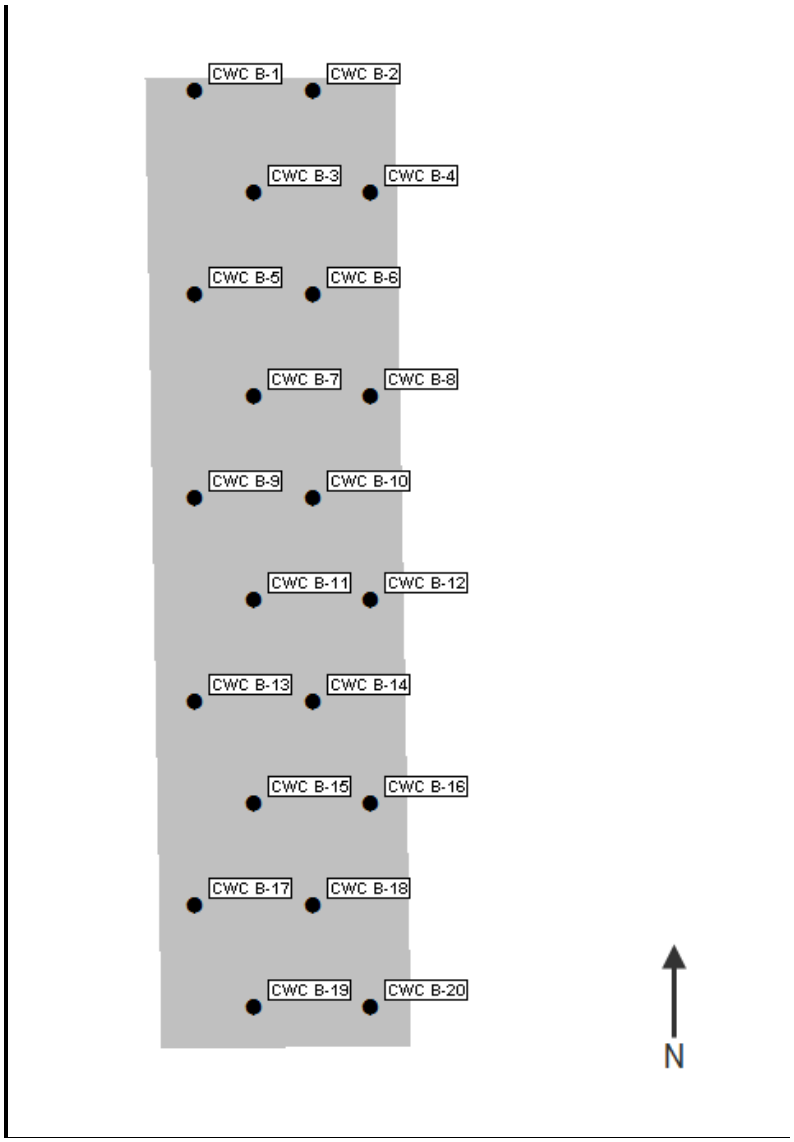

Figure 3-1. CWC Outdoor Storage Area B Sampling Locations

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Table 3-2. Sample Preservation, Container, and Holding Time for Soil Samples

Method	Analysis/Analytes	Preservation Requirement	Holding Time	Bottle Type	Minimum Sample Size
EPA 6010	Metals	Cool ~4°C	6 months	G/P	20 g
EPA 8082	Polychlorinated biphenyl	None	1 year	aG	250 g
EPA 8260	Volatile organic analytes	Cool ~4°C	14 days	G	5 × 40 g
EPA 8270	Semivolatile organic compound	Cool ~4°C	14/40 days	aG	250 g
EPA 200.8	Metals by ICP/MS	None	6 months	G/P	10 g

Notes:

For EPA Method 300.0, see EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes.*

For the four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B.*

48 hours/28 days = 48 hours for nitrate, nitrite, and phosphate; others, 28 days

aG = amber glass
G = glass
ICP/MS = inductively coupled plasma/mass spectrometry
P = plastic

3.5.1 Packaging

Level I EPA pre-cleaned sample containers will be used for soil samples collected for chemical analysis. Container sizes may vary depending on laboratory-specific volumes/requirements for meeting analytical detection limits. Preliminary container types and volumes are identified in Table 3-2.

3.5.2 Container Labeling

The sample locations, depths, and corresponding HEIS numbers are documented in the sampler's field logbook. Except for VOA samples, a custody seal (i.e., evidence tape) will be affixed to the lid of each sample container and or sample collection package in such a way as to indicate potential tampering. 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 and any other required labels/documentation can be fixed to the exterior of a plastic bag holding the VOA vials in such a manner that prevents potential tampering.

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

- Sampling Authorization Form number
- HEIS number
- Sample collection date and time
- Sampler identification
- Analysis required
- Preservation method (if applicable)
- Chain-of-custody identification number

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In addition to the information above, sample records must include the following:

- Sample location
- Matrix (water, soil, etc.)

3.5.3 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 protocols will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained. A chain-of-custody record is 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 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 individuals involved in sample transfer
- Requested analyses (or reference thereto)

3.5.4 Sample Transportation

All packaging and transportation instructions will be in compliance with the applicable transportation regulations, DOE requirements, and contactor requirements. Regulations for classifying, describing, packaging, marking, labeling, and transporting hazardous materials, hazardous substances, and hazardous waste mandated by the U.S. Department of Transportation as described in 49 CFR 171 “General Information, Regulations, and Definitions,” through Part 177, “Carriage By Public Highway”. Carrier specific requirements should also be considered when preparing sample shipments conveyed by air freight providers.

Samples containing hazardous constituents shall be considered hazardous material in transportation and transported according to DOT 49 CFR, “Transportation, “ “Shippers – General Requirements for Shipments and Packagings,” are exceeded. Samples shall be screened, or relevant historical data shall be used, to determine if these values are exceeded. When screening or historical data indicate that samples are radioactive, they shall be properly classified, describes, packaged, marked, labeled, and transported according to DOT requirements.

3.5.5 Corrective Actions and Deviations for Sampling Activities

The project manager, field work supervisor, or designee must document deviations from procedures or other issues pertaining to sample collection, chain-of-custody, target analytes, sample transport, or noncompliance. Examples of deviations include samples not collected because of field conditions, changes in sample locations because of physical obstructions, or additions of sample depths.

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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, FWS, or designee will be responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to sampling activities.

Changes in sample locations not affecting the data needs will require notification and approval of the Project Manager. Changes to sample locations affecting the data needs will require concurrence from DOE-RL and the lead regulatory agency. Changes to the SAP will be documented as noted in Section 2.1.4.

3.6 Documentation of field activities

Logbooks or data forms are required for field activities. Requirements for the logbook are provided in Section 2.1.4. Data forms may be used to collect field information; however, the 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, and weather conditions
- Names, titles, and 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, splits, duplicates, 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

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4 Management of Waste

All waste generated during sampling activities will be managed in accordance with applicable regulations.

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5 Health and Safety

Field operations will be performed in accordance with health and safety requirements and appropriate project requirements. The project's site-specific health and safety plan will be followed. Work control documents will be prepared to control site operations further. Safety documentation will include an activity hazard analysis.

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Attachment B

RCRA Records Review and Facility Visual Inspection Supporting Documentation

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CWC, Outdoor Container Storage Area B

Purpose:

A visual inspection walkdown of the CWC outdoor container storage area "B" was performed to determine if there is any evidence of spills and/or leaks from waste packages containing dangerous waste that were and are stored at this location. The inspection was to identify and document by photographing any waste related staining of the storage area surface (i.e., gravel and soil), and to denote any remaining waste related items.

The inspection was performed on August 14, 2013, by Brett M. Barnes (CHPRC) Environmental Compliance Officer.

Results:

An "L" shaped stain (excluding herbicides) was observed at the northeast corner of the outdoor storage area "B" (see attached photos). Stain appears to be rust. Also observed were small pieces of tumbleweeds scattered throughout the area.

Housekeeping will be performed on the area prior to closure and the debris material will be removed.

Signature/Date:

Brett M. Barnes: Brett M Barnes 9/3/13

Strickling, Lana R

From:	Barnes, Brett M
Sent:	Tuesday, September 03, 2013 1:27 PM
To:	Horn, Sarah R; Strickling, Lana R
Cc:	Engelmann, Richard H; Dixon, Brian J; Ruck, Fred A III; Seaver, Jennie R
Subject:	REVISED CWC OUTDOOR CONTAINER STORAGE AREA "B" CLOSURE INSPECTION REPORT
Attachments:	SPDQ0638013090313011.pdf

All, please ignore my previous closure inspection reports...I had to correct some editorial comments.

Attached is the closure inspection report for the CWC Outdoor Container Storage Area "B." The photographs that are attached to this report are directly below, in descending order. Should you have any questions, please call me on my cell phone, 521-3053.

Brett M. Barnes
Environmental Compliance Officer

1

MAX GROSS WT: 53524 KG
118,000 LBS.
TARE WT: 4990 KG
D-RINGS
LID WT: 11000 LBS
2495 KG
5500 LBS
USA DOT 7A TYPE A
CONTAINER TECHNOLOGIES INC. L.L.C.
163 HELENWOODDETOUR RD. SUITE 1
HELENWOOD, TN 37755
SERIAL:#01
DATE OF MFG.: 2/4/2007
PO: 0031585, REV.001
08 14 2013 10 37

2

CWC Daily Operating Log Book Review
Outdoor Waste Container Storage Area B

Date of Log Book Review: 8/12/13

Reviewer's Name: Joel Williams

Daily Operating Log Book Document No/Log Book Timeframe (Month/Year to Month/Year):

LOGBOOK NUMBER	DATES
HNF-N-450-84	12-06-2006 through 07-09-2007
HNF-N-450-85	07-10-2007 through 02-06-2008
HNF-N-450-91	02-07-2008 through 08-26-2008
HNF-N-450-94	08-27-2008 through 04-16-2009
HNF-N-450-95	04-20-2009 through 11-17-2009
HNF-N-450-100	11-02-2009 through 06-23-2010
HNF-N-450-103	06-24-2010 through 01-16-2011
HNF-N-450-107	01-19-2011 through 08-11-2011
HNF-N-450-109	08-15-2011 through 03-06-2012
HNF-N-450-110	03-07-2012 through 07-16-2012
HNF-N-450-113	07-07-2012 through 12-01-2012
HNF-N-450-111	12-02-2012 through 05-01-3013
HNF-N-450-112	05-02-2013 through 08-12-2013

Items of Concern Noted (Circle) YES ☐ NO ☑
If "YES", complete entire checklist.
If "NO", skip to Reviewer's signature and date.

Items of Concern:
Attach copies of log book pages noting concern.

Log Book Page# Referencing Spill:

Dates of Corrective Actions:
Attach copies of log book pages noting corrective actions.

Log Book Page#
Referencing Corrective Action:

Reviewer's Signature and Date: Tara Stridding for Joel Williams per telecon 9/5/13

Instructions:

Review Daily Operating Log for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

CWC Daily Operating Log Book Review
Outdoor Waste Container Storage Area B

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted,

check "NO" and skip to the signature and date field. Note that if no items of concern are noted for the entire year, the "Log Book Time Frame" can be January 1, 20xx to December 31, 20xx.

If unplanned spills, releases or discharges are referenced in the Daily Operating Log, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of the Daily Operating Log page(s) noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

CWC Outdoor Waste Container Storage Area B
Weekly Dangerous Waste Inspection Checklist Review

Title of Weekly Waste Inspection Form: Weekly RCRA Inspection Checklist for CWC

Date of Weekly Waste Inspection Review: Finalized 9/5/13

Reviewer's Name: Lana Strickling

A review of the summary sheets completed by Linda Carr, which covered both CWC Outdoor Storage Areas A and B, was performed. Weekly RCRA Inspection checklists could not be located for the following time period: Mid September 2008 – Mid December 2008.

Waste Management Units: CWC Outside Waste Container Storage Area B

Time Frame of Weekly Inspections: 1/5/06 – 6/26/13

Items of Concern Noted: YES _ __ NO _X__
If "YES", complete entire checklist.
If "NO", skip to Reviewer's signature and date.

Items of Concern: No items of concern were noted for CWC Outside Waste Container Storage Area B.

Attach copies of Weekly Inspection sheets noting concern.

Dates of Corrective Actions: _____ _____ _____ _____
Attach copies of Weekly Inspection sheets noting concern.

Reviewer's Signature and Date: Lana Strickling 9/6/13

Instructions:

Review Weekly Waste Inspection checklists for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted, check "NO" and skip to the signature and date field. Note that if no items of concern are noted for an extended period of time, the "Time Frame of Weekly Inspections" can be January 1, 20xx to December 31, 20xx or even several years if no items of concern are noted.

CWC Outdoor Waste Container Storage Area B
Weekly Dangerous Waste Inspection Checklist Review

If unplanned spills, releases or discharges are referenced on the inspection checklist, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of weekly waste inspection checklists noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

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Attachment C

Visual Sampling Plan Software Supporting Documentation

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Systematic sampling locations for comparing a median with a fixed threshold (nonparametric - MARSSIM)

Summary

This report summarizes the sampling design used, associated statistical assumptions, as well as general guidelines for conducting post-sampling data analysis. Sampling plan components presented here include how many sampling locations to choose and where within the sampling area to collect those samples. The type of medium to sample (i.e., soil, groundwater, etc.) and how to analyze the samples (in-situ, fixed laboratory, etc.) are addressed in other sections of the sampling plan.

The following table summarizes the sampling design developed. A figure that shows sampling locations in the field and a table that lists sampling location coordinates are also provided below.

SUMMARY OF SAMPLING DESIGN	
Primary Objective of Design	Compare a site mean or median to a fixed threshold
Type of Sampling Design	Nonparametric
Sample Placement (Location) in the Field	Systematic with a random start location
Working (Null) Hypothesis	The median(mean) value at the site exceeds the threshold
Formula for calculating number of sampling locations	Sign Test - MARSSIM version
Calculated total number of samples	20
Number of samples on map [a]	20
Number of selected sample areas [b]	1
Specified sampling area [c]	0.00 ft^2
Size of grid / Area of grid cell [d]	0.000161539 feet / 2.25988e-008 ft^2
Grid pattern	Triangular

[a] This number may differ from the calculated number because of 1) grid edge effects, 2) adding judgment samples, or 3) selecting or unselecting sample areas.

[b] The number of selected sample areas is the number of colored areas on the map of the site. These sample areas contain the locations where samples are collected.

[c] The sampling area is the total surface area of the selected colored sample areas on the map of the site.

[d] Size of grid / Area of grid cell gives the linear and square dimensions of the grid used to systematically place samples.

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Area: CWC Area B					
X Coord	**Y Coord**	**Label**	**Value**	**Type**	**Historical**
119.641956	46.553651	CWC B-19		Systematic	
119.642118	46.553651	CWC B-20		Systematic	
119.641876	46.553791	CWC B-17		Systematic	
119.642037	46.553791	CWC B-18		Systematic	
119.641956	46.553930	CWC B-15		Systematic	
119.642118	46.553930	CWC B-16		Systematic	
119.641876	46.554070	CWC B-13		Systematic	
119.642037	46.554070	CWC B-14		Systematic	
119.641956	46.554210	CWC B-11		Systematic	
119.642118	46.554210	CWC B-12		Systematic	
119.641876	46.554350	CWC B-9		Systematic	
119.642037	46.554350	CWC B-10		Systematic	
119.641956	46.554490	CWC B-7		Systematic	
119.642118	46.554490	CWC B-8		Systematic	
119.641876	46.554630	CWC B-5		Systematic	
119.642037	46.554630	CWC B-6		Systematic	
119.641956	46.554770	CWC B-3		Systematic	
119.642118	46.554770	CWC B-4		Systematic	
119.641876	46.554910	CWC B-1		Systematic	
119.642037	46.554910	CWC B-2		Systematic	

Primary Sampling Objective
The primary purpose of sampling at this site is to compare a site median or mean value with a fixed threshold. The working hypothesis (or 'null' hypothesis) is that the median(mean) value at the site is equal to or exceeds the threshold.

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The alternative hypothesis is that the median(mean) value is less than the threshold. VSP calculates the number of samples required to reject the null hypothesis in favor of the alternative one, given a selected sampling approach and inputs to the associated equation.

Selected Sampling Approach
A nonparametric systematic sampling approach with a random start was used to determine the number of samples and to specify sampling locations. A nonparametric formula was chosen because the conceptual model and historical information (e.g., historical data from this site or a very similar site) indicate that typical parametric assumptions may not be true.

Both parametric and non-parametric equations rely on assumptions about the population. Typically, however, non-parametric equations require fewer assumptions and allow for more uncertainty about the statistical distribution of values at the site. The trade-off is that if the parametric assumptions are valid, the required number of samples is usually less than if a non-parametric equation was used.

Locating the sample points over a systematic grid with a random start ensures spatial coverage of the site. Statistical analyses of systematically collected data are valid if a random start to the grid is used. One disadvantage of systematically collected samples is that spatial variability or patterns may not be discovered if the grid spacing is large relative to the spatial patterns.

Number of Total Samples: Calculation Equation and Inputs
The equation used to calculate the number of samples is based on a Sign test (see PNNL 13450 for discussion). For this site, the null hypothesis is rejected in favor of the alternative one if the median(mean) is sufficiently smaller than the threshold. The number of samples to collect is calculated so that if the inputs to the equation are true, the calculated number of samples will cause the null hypothesis to be rejected.

The formula used to calculate the number of samples is:

$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(SignP - 0.5)^2}$$

where

$$SignP = \Phi\left(\frac{\Delta}{s_{total}}\right)$$

$\Phi(z)$ is the cumulative standard normal distribution on $(-\infty,z)$ (see PNNL-13450 for details),
n is the number of samples,
S_{total} is the estimated standard deviation of the measured values including analytical error,
Δ is the width of the gray region,
α is the acceptable probability of incorrectly concluding the site median(mean) is less than the threshold,
β is the acceptable probability of incorrectly concluding the site median(mean) exceeds the threshold,
$Z_{1-\alpha}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\alpha}$ is $1-\alpha$,
$Z_{1-\beta}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\beta}$ is $1-\beta$.

Note: MARSSIM suggests that the number of samples should be increased by at least 20% to account for missing or unusable data and uncertainty in the calculated value of n. VSP allows a user-supplied percent overage as discussed in MARSSIM (EPA 2000, p. 5-33).

The values of these inputs that result in the calculated number of sampling locations are:

Analyte	n[a]	Parameter					
		S	Δ	α	β	$Z_{1-\alpha}$ [b]	$Z_{1-\beta}$ [c]
Analyte 1	20	0.45	0.4	0.05	0.2	1.64485	0.841621

[a] The final number of samples has been increased by the MARSSIM Overage of 20%.
[b] This value is automatically calculated by VSP based upon the user defined value of α.
[c] This value is automatically calculated by VSP based upon the user defined value of β.

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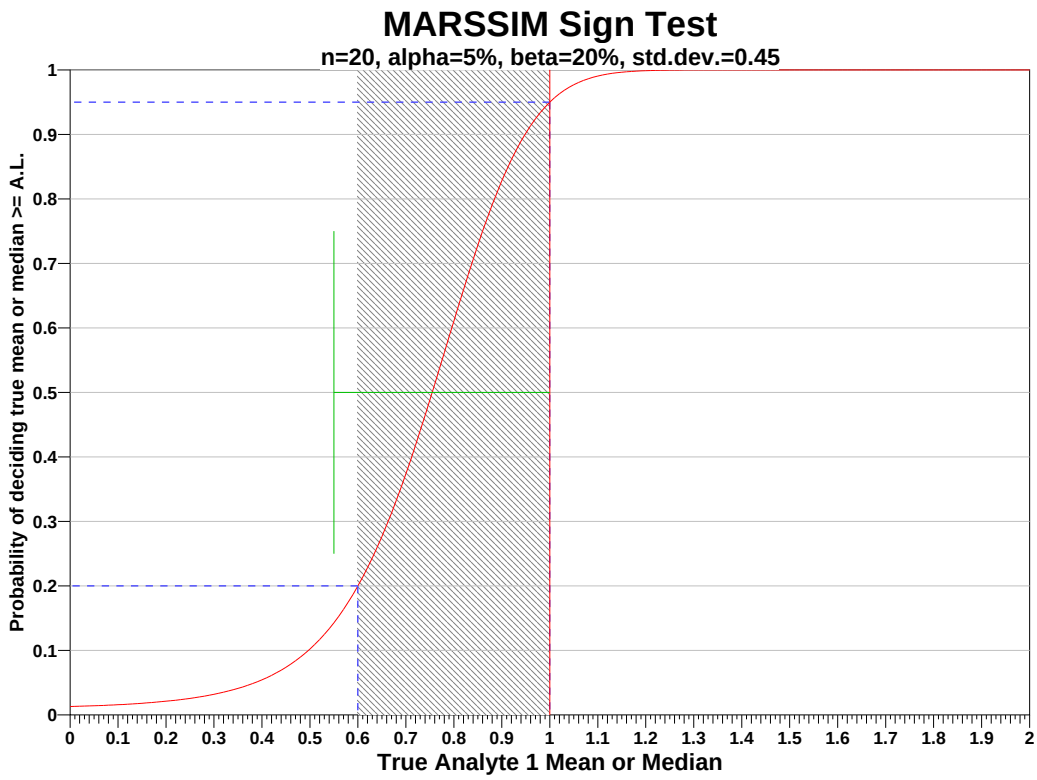
The following figure is a performance goal diagram, described in EPA's QA/G-4 guidance (EPA, 2000). It shows the probability of concluding the sample area is dirty on the vertical axis versus a range of possible true median(mean) values for the site on the horizontal axis. This graph contains all of the inputs to the number of samples equation and pictorially represents the calculation.

The red vertical line is shown at the threshold (action limit) on the horizontal axis. The width of the gray shaded area is equal to Δ; the upper horizontal dashed blue line is positioned at 1-α on the vertical axis; the lower horizontal dashed blue line is positioned at β on the vertical axis. The vertical green line is positioned at one standard deviation below the threshold. The shape of the red curve corresponds to the estimates of variability. The calculated number of samples results in the curve that passes through the lower bound of Δ at β and the upper bound of Δ at 1-α. If any of the inputs change, the number of samples that result in the correct curve changes.



Statistical Assumptions

The assumptions associated with the formulas for computing the number of samples are:

1. the computed sign test statistic is normally distributed,
2. the variance estimate, S^2, is reasonable and representative of the population being sampled,
3. the population values are not spatially or temporally correlated, and
4. the sampling locations will be selected probabilistically.

The first three assumptions will be assessed in a post data collection analysis. The last assumption is valid because the gridded sample locations were selected based on a random start.

Sensitivity Analysis

The sensitivity of the calculation of number of samples was explored by varying the standard deviation, lower bound of gray region (% of action level), beta (%), probability of mistakenly concluding that μ > action level and alpha (%), probability of mistakenly concluding that μ < action level. The following table shows the results of this analysis.

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Number of Samples							
AL=1		α=5		α=10		α=15	
		s=0.9	s=0.45	s=0.9	s=0.45	s=0.9	s=0.45
LBGR=90	β=15	1103	280	825	209	659	167
	β=20	948	240	692	176	542	138
	β=25	826	209	587	149	449	114
LBGR=80	β=15	280	75	209	56	167	45
	β=20	240	64	176	47	138	36
	β=25	209	56	149	40	114	30
LBGR=70	β=15	128	36	95	27	77	22
	β=20	110	32	81	23	63	18
	β=25	95	27	69	20	52	15

s = Standard Deviation
LBGR = Lower Bound of Gray Region (% of Action Level)
β = Beta (%), Probability of mistakenly concluding that μ > action level
α = Alpha (%), Probability of mistakenly concluding that μ < action level
AL = Action Level (Threshold)

Recommended Data Analysis Activities
Post data collection activities generally follow those outlined in EPA's Guidance for Data Quality Assessment (EPA, 2000). The data analysts will become familiar with the context of the problem and goals for data collection and assessment. The data will be verified and validated before being subjected to statistical or other analyses. Graphical and analytical tools will be used to verify to the extent possible the assumptions of any statistical analyses that are performed as well as to achieve a general understanding of the data. The data will be assessed to determine whether they are adequate in both quality and quantity to support the primary objective of sampling.

Because the primary objective for sampling for this site is to compare the site median(mean) value with a threshold value, the data will be assessed in this context. Assuming the data are adequate, at least one statistical test will be done to perform a comparison between the data and the threshold of interest. Results of the exploratory and quantitative assessments of the data will be reported, along with conclusions that may be supported by them.

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H3 – CWC-WRAP
H3.C. Appendix C – CWC-WRAP 2401W Waste Storage Building

C1 Introduction

This Appendix discusses closure activities for the Central Waste Complex-Waste Receiving and Processing (CWC-WRAP) Operating Unit Group (OUG) 2401W Waste Storage Building dangerous waste management unit (2401W Building) (Figure C-1). This dangerous waste management unit (DWMU) is located on the south end of the CWC to the south of the 2402 series buildings. The U.S. Department of Energy (DOE) has agreed through a Consent Agreement and Final Order with the Environmental Protection Agency (EPA) to close this DWMU. The closure will be performed in accordance with the included schedule. This closure plan complies with Washington Administrative Code (WAC) 173-303-610(2) through WAC 173-303-610(6) and represents the baseline for closure. Amendments to this closure plan will be submitted as a permit modification in accordance with WAC 173-303-610(3)(b).

C1.1 Unit Description

The 2401W Building (Figure C-1) is a pre-engineered steel structure. It is approximately 15 m (16 yd) wide by 24 m (26 yd) long by 6 m (7 yd) high (to the eave), with a total waste management area of 371 m^2 (444 yd^2). The foundation is integrated into a perimeter concrete curb, 15.2 cm (6 in.) above grade. Ramps are placed across the curb for loading and unloading operations. The floors were coated with an epoxy resin floor surfacing system that was compatible with the stored waste.

The 2401W Building does not currently store dangerous, mixed, or *Toxic Substances Control Act of 1976* polychlorinated biphenyl (TSCA-PCB) waste. The 2401W Building primarily serves as equipment and material storage for support the CWC-WRAP OUG activities. Future storage and treatment of dangerous, mixed, and TSCA-PCB waste is not authorized within the 2401W Building DWMU, and will not be requested after *Resource Conservation and Recovery Act of 1976* (RCRA) closure is complete.

C1.1.1 Maximum Waste Inventory

The maximum inventory of dangerous, mixed, or TSCA-PCB waste stored in the 2401W Building over its lifetime included 318 containers with a total volume of 203 m^3 (266 yd^3). Dangerous waste was introduced into 2401W Building in May 1989. The 2401W Building also stored 163 TSCA-PCB waste containers with a total volume of 89 m^3 (117 yd^3) and dangerous, mixed, and TSCA-PCB waste in <90-day accumulation areas. Details on the dangerous, mixed, and TSCA-PCB waste containers are presented in Section C3.3 of this closure plan.

Closure performance standards for the 2401W Building will be based on requirements found in WAC 173-303-610(2), “Dangerous Waste Regulations,” “Closure and Post-Closure,” which require closure of the facility in a manner that:

- Minimizes the need for further maintenance;
- Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and
- Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity

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Figure C-1. CWC 2401W Waste Storage Building and Outside Storage Areas

C2 Closure Performance Standard

These performance standards are addressed in the Sections C2.1 and C3.12 of this closure plan.

C2.1 .Clean Closure Levels

The 2401W Building will be clean closed. In accordance with WAC 173-303-610(2)(b)(ii), the clean closure standard for structures is a visually verifiable standard, which is the absence of obvious stains or residues that would indicate potential dangerous waste contamination. Surfaces must be free of indications of potential dangerous waste, except for residual waste stains consisting of light shadows, slight streaks, or minor discoloration. The standard will be verified by the performance and documentation of visual inspections. In addition, decontamination of the flooring area will be conducted in accordance with WAC 173-303-610(b)(ii). Rinsate will be analyzed and the results will be compared to the Universal Treatment Standards (UTS) in WAC 173-303-140(2)(a) to verify that levels of target analytes are below regulatory levels.

C3 Closure Activities

As a storage unit, clean closure determination for 2401W Building is based on a review of the operational history, operating records (including any releases), and a visual inspection of the area to verify that waste-related staining is not present. Based on these reviews, 2401W Building is concluded to be in a safe configuration and will be clean closed under RCRA. Subsequently, sampling will be conducted via a sampling and analysis plan (SAP) (Attachment A) to verify that clean closure numeric levels have been achieved.

Closure activities required to achieve and verify clean closure are as follows:

- Remove all dangerous, mixed, and TSCA-PCB waste inventory. (Complete. See Section C3.2)
- Review waste container storage, operating, and inspection records. (Complete. See Section C3.3)
- Perform a visual inspection of the floor surface
- Perform decontamination of the floor
- Perform sampling and analysis on decontamination rinsate to confirm clean closure standards

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C3.1 Health and Safety Requirements

Closure will be performed in a manner to ensure the safety of personnel and the surrounding environment. Qualified personnel will perform any necessary closure activities in compliance with established safety and environmental procedures. Personnel will be equipped with appropriate personal protective equipment. Qualified personnel will be trained in applicable safety and environmental procedures in accordance with the Solid Waste Operations Complex (SWOC) CWC-WRAP, Addendum G, *Personnel Training*, and have appropriate training and experience in sampling activities. Field operations will be performed in accordance with applicable health and safety requirements.

The Permittees have instituted training or qualification programs to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. Field personnel typically have completed the following training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- 8-Hour Hazardous Waste Worker Refresher Training (as required)
- Hanford General Employee Training

Project-specific safety training addressed explicitly to the project and the day's activity will be provided, including the following:

- Training to provide the knowledge and skills that sampling personnel need to perform work safely and in accordance with QA requirements
- Requirement that samplers be qualified in the type of sampling being performed in the field

In addition, pre-job briefings will be performed to evaluate activities and associated hazards by considering many factors, including the following:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required
- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work
- Level of management control
- Proximity of emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittees training organization maintains the training records system.

C3.2 Removal of Wastes and Waste Residues

No dangerous, mixed, or TSCA-PCB waste is currently stored at the 2401W Building. The last dangerous waste was removed in November 2010 from the <90-day storage area, and dangerous, mixed, or TSCA-PCB waste is no longer being accepted at this area. After RCRA closure activities are complete,

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the 2401W Building will not be used for dangerous, mixed, or TSCA-PCB waste storage. However, the building will be used for equipment and materials storage.

C3.3 CWC Outside Storage 2401W Building Records Review and Visual Inspection

To support the development of this closure plan and the associated SAP, a review of the 2401W Building RCRA operating records was completed (Table C-1). The records review included the following RCRA operating record documents: facility operating logbooks (which contain the facility spill log), waste management records, and weekly inspections. The RCRA operating record documents that were reviewed focused on the period during active dangerous, mixed, and TSCA-PCB waste storage. The RCRA operating record for the 2401W Building DWMU, including the facility operating logbooks and weekly inspection sheets, indicates there were no documented spills or releases.

In 1999, closure of the 2401W Building was considered. The following activities of the closure process for the 2401W Building were completed: records were reviewed and sampling for radiological contamination as an indicator of dangerous waste contamination was completed. There was no sign of radiological contamination with the resulting conclusion that there was also no dangerous waste contamination. The records review performed for this current closure plan focused on the period of dangerous waste storage that occurred after the previous closure sampling occurred in 1999. Supporting documentation for the prior closure efforts is included in Attachment C of this closure plan.

While it is known that dangerous waste was stored in a <90-Day storage area in 2401W in 2010, inspection records for this time are not available and could not be reviewed.

Waste management records for the dangerous waste containers previously stored in the 2401W Building were reviewed to determine the target analytes to be included in the closure plan SAP. Currently, there is no dangerous, mixed, or TSCA-PCB waste stored in the 2401W Building. Container data are presented in Table C-2.

A visual inspection was performed of the visible floor surface in the 2401W Building on August 14, 2013, to identify any dangerous waste related staining. No waste related staining was identified during the visual inspection. Once necessary equipment and materials have been removed to allow visual access to all floor surfaces, an additional visual inspection will be performed.

Supporting documentation for the RCRA operating records review and visual inspection are documented in Attachment B and include the 2401W Daily Operating Logbook Review sheet, the 2401W Weekly Dangerous Waste Inspection Checklist Review sheet, the CWC 2401W Building visual inspection sheet, and any additional supporting information.

C3.4 Unit Components, Parts, and Ancillary Equipment

The 2401W Building does not have any component, parts, or ancillary equipment.

C3.5 Inspection of Units Before Decontamination

Once closure activities begin, all equipment and material will be removed from the 2401W Building. A visual inspection of the coated floor surface will be conducted to identify any dangerous waste-related staining. General housekeeping will take place to remove all material prior to performing the closure decontamination.

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Table C-1. Operating Records Review Summary

Document Title	Document Type	Facility	Start Date	End Date	Items of Concern Noted
Inspection Checklist Central Waste Complex Facilities	Weekly Inspection	CWC-2401W Building	07/1999	12/2000	No
Operating Log Central Waste Complex	Logbook	CWC-2401W	06/01/1999	08/11/1999	No
Daily Operating Logbook	Logbook	CWC-2401W Building	08/12/1999	12/28/2000	No
Daily Operating Logbook	Logbook	CWC-2401W Building	12/06/2006	08/12/2013	No

Table C-2. Mixed Waste Container Data

Container Quantity	Facility ID	Waste Package Type	Total Volume (m^2)	Waste Type	Beginning Storage Date	Ending Storage Date	Assigned Waste Codes
318	2401W	Various	203.4	DW/MW	05/12/1989	12/18/2000	D001, D002, D003, D005, D006, D007, D008, D009, D011, D018, D019, D023, D030, D032, D033, D035, D036, D038, F001, F002, F003, F004, F005, PCB2, U169, WC01, WC02, WP01, WP02, WSC2, WT01, WT02
163	2401W	Various	88.6	TSCA-PCB	07/26/1989	12/18/2000	N/A

DW/MW = Dangerous Waste/Mixed Waste
ID = identification
N/A = not applicable
PCB = polychlorinated biphenyl
TSCA = Toxic Substances Control Act of 1976

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C3.6 Decontamination

The 2401W Building coated floor will be decontaminated in accordance with alternative treatment standards outlined in Ecology's clean closure guidance to meet the definition of a clean debris surface. The rinsate will be collected and sampled in accordance with the SAP (Attachment A).

C3.7 Identifying and Managing Contaminated Environmental Media

The rinsate generated from decontamination of the floor during closure activities will be collected. The rinsate will be sampled and the analytical results will be used to verify clean closure of the 2401W Building. Once sampling has been completed, a waste determination for the rinsate will be completed in accordance with applicable environmental and waste management procedures, and the waste will be dispositioned accordingly.

C3.8 Confirming Clean Closure

The 2401W Building will be clean closed. A review of applicable RCRA operating record documents was completed to determine the release history of the area. Records verification included facility operating record/logbooks and weekly unit inspections, as outlined in Section C3.3 of this closure plan. In addition to records verification, a visual inspection of the visible areas of the floor was performed to identify any dangerous waste-related staining of the storage area flooring. The visual inspection was completed on August 14, 2013, and records reviews were completed and are documented in Attachment B.

All dangerous, mixed, and TSCA-PCB waste has been previously removed, and there have been no documented spills or releases of dangerous, mixed, or TSCA-PCB waste. Therefore, post-closure escape of dangerous waste and any associated dangerous waste constituents, leachate, contaminated runoff, and dangerous waste decomposition products to the ground, surface water, groundwater, or air is not anticipated.

The floor surface will be decontaminated using methods identified in Section C3.5 and the resulting rinsate will be collected and sampled in accordance with the SAP. The analytical results will be verified against the UTS in WAC 173-303-140(2)(a). Once analytical results confirm clean closure levels of target analytes, a determination will be made to leave the flooring surface of the 2401W Building in place.

C3.9 Sampling and Analysis and Constituents to Be Analyzed

C3.9.1 Sampling and Analysis Plan

All sampling and analysis will be performed in accordance with the sampling and quality standards established in the closure SAP (Attachment A). The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the American Society for Testing and Materials (ASTM) *Annual Book of ASTM Standards*; and applicable EPA guidance. Sampling and analysis activities will meet applicable requirements of SW-846, the ASTM standards, EPA-approved methods, and *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68).

C3.10 Role of the Independent Qualified Registered Professional Engineer

An independent, qualified, registered professional engineer will be retained to provide certification of the closure, as required by WAC 173-303-610(6). The resulting engineering report will be retained in the operating record.

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C3.11 Closure Certification

In accordance with WAC 173-303-610(6), within 60 days of completion of closure of the 2401W Building DWMU, a certification that the DWMU has been closed in accordance with the specifications in this closure plan will be submitted to the department by registered mail. The certification will be signed by the owner or operator and by an independent qualified registered professional engineer.

C3.12 Conditions That Will Be Achieved When Closure Is Complete

Upon confirmation of clean closure levels through sampling and analysis, the 2401W Building will remain in an "as-is" state, with the building remaining in place. The 2401W Building will continue to be used for equipment and material storage; therefore, removal of the building is not necessary, and the land will not be restored to its pre-operational appearance. A permit modification request will be submitted after clean closure has been confirmed to remove the 2401W Building DWMU from the sitewide permit active DWMUs.

C4 Closure Schedule and Time Frame

The confirmation sampling and analysis activities will be completed no more than 180 days after approval of the permit modification incorporating this closure plan. Should unexpected circumstances arise and an extension to the 180-day closure activity expiration date is deemed necessary, a Class 1 permit modification request will be submitted to Ecology for approval at least 30 days prior to the 180-day expiration date in accordance with WAC 173-303-610(4)(c) and WAC 173-303-830, Appendix I. The extension request would also demonstrate that all steps to prevent threats to human health and the environment, including compliance with all applicable permit requirements, have been and will be taken. Closure certification will be submitted to Ecology within 60 days following completion of closure activities at the 2401W Building as outlined in Section C3.10 (Figure C-2).

C5 Closure Costs

An annual report outlining updated projections of anticipated closure costs for the Hanford Facility TSD units having final status is not required per Permit Condition II.H.

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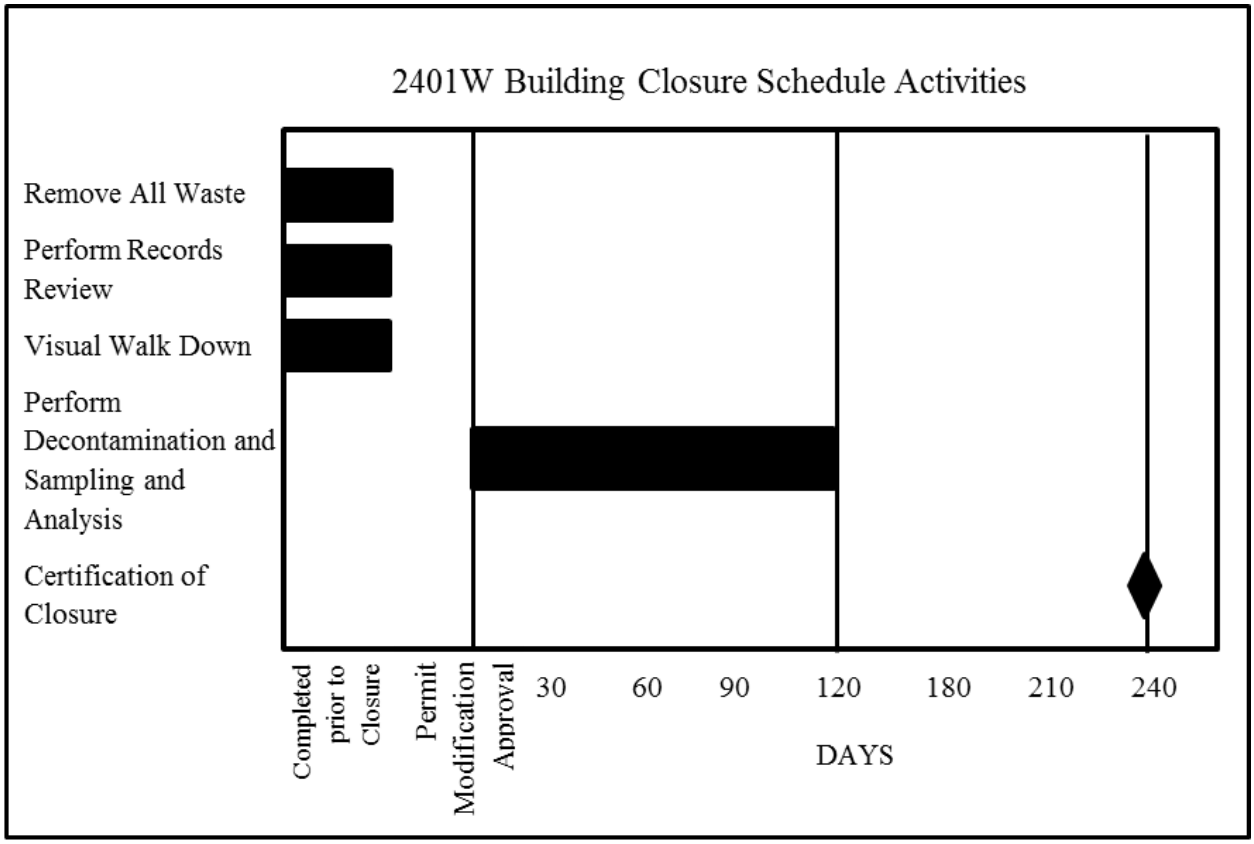

Figure C-2. CWC 2401W Building Closure Schedule Activities

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Attachment A

CWC 2401W Building Sample and Analysis Plan

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CWC-WRAP 2401W Building

Sample and Analysis Plan

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Terms

ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Services
CFR	Code of Federal Regulations
CWC	Central Waste Complex
CWC-WRAP	Central Waste Complex Operating-Waste Receiving and Processing Unit Group
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQA	data quality assessment
DQI	data quality indicator
EB	equipment blank
ECO	Environmental Compliance Officer
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FSP	field sampling plan
FTB	full trip blank
FWS	field work supervisor
FXR	field transfer blank
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Documents*
HEIS	Hanford Environmental Information System
MDA	minimum detectable activity
QA	quality assurance
QAPjP	quality assurance project plan
QC	quality control
RPD	relative percent difference
SAF	sampling authorization form
SAP	sampling and analysis plan
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
VOA	volatile organic analysis
VOC	volatile organic compound

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1 Introduction

1.1 Purpose

The purpose of the sampling and analysis plan (SAP) is to assist in the determination that clean closure levels have been achieved for the Central Waste Complex-Waste Receiving and Processing (CWC-WRAP) 2401W Waste Storage Building (2401W Building).

Sampling and analysis of the containerized rinsate resulting from decontamination of the floor surface will be conducted to confirm that clean closure cleanup levels have been achieved. All sampling and analysis will be performed in accordance with the sampling and quality standards established in this closure SAP. The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*; the American Society for Testing and Materials (ASTM) *Annual Book of ASTM Standards*, and other U.S. Environmental Protection Agency (EPA) approved methods. Sampling and analysis activities will meet applicable requirements in SW-846, the ASTM standards, EPA-approved methods, and *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68).

1.2 Statement of the Problem

The objective of the sampling and analysis described in this document is to verify that the target analytes in rinsate resulting from decontamination of the 2401W Building floor during closure activities meet Universal Treatment Standards in accordance with WAC 173-303-140(2)(a), thereby demonstrating clean closure of the 2041W Building.

1.3 Target Analytes

The target analytes were determined by reviewing waste management records for the dangerous waste stored in the 2401W Building (Table 1-1).

Table 1-1. Target Analyte List

Target Analyte	CAS Number	Target Analyte	CAS Number
Barium (D005)	7440-39-3	Acetone (F003)	67-64-1
Cadmium (D006)	7440-43-9	N-butyl alcohol (F003)	71-36-3
Chromium (Hexavalent) (D007)	18540-29-9	Cyclohexanone (F003)	108-94-1
Lead (D008)	7439-92-1	Ethyl acetate (F003)	141-78-6
Mercury (D009)	7439-97-6	Ethyl benzene (F003)	100-41-4
Silver (D011)	7440-22-4	Ethyl ether (F003)	60-29-7
Benzene (D018) (F005)	71-43-1	Methanol (F003)	67-56-1
Carbon tetrachloride (D019) (F001) (F002)	56-23-5	Methyl isobutyl ketone (F003)	108-10-1
2,4-Dinitrotoluene (D030)	121-14-2	Ortho-dichlorobenzene (F002)	95-50-1

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Table 1-1. Target Analyte List

Target Analyte	CAS Number	Target Analyte	CAS Number
Hexachlorobenzene (D032)	118-74-1	m-Xylene (F003)	108-38-3
Hexachlorobutadiene (D033)	87-68-3	o-Xylene (F003)	95-47-6
Methyl ethyl ketone (MEK) (D035) (F005)	78-93-3	p-Xylene (F003)	106-42-3
Benzene, nitro (D036) (F004) (U169)	98-95-3	*m*-cresol (F004)	108-39-4
Pyridine (D038) (F005)	110-86-1	*o*-cresol (F004)	95-48-7
Chlorinated fluorocarbons (1,1,2-Trichloro-1,2,2-trifluoroethane) (F001) (F002)	76-13-1	*p*-cresol (F004)	106-44-5
Methylene chloride (F001) (F002)	75-09-2	Carbon disulfide (F005)	75-15-0
Tetrachloroethylene (F001) (F002)	127-18-4	2-Ethoxyethanol (F005)	110-80-5
1,1,1-Trichloroethane (F001) (F002)	71-55-6	Isobutanol (F005)	78-83-1
Trichloroethylene (F001) (F002)	79-01-6	2-Nitropropane (F005)	79-46-9
Chlorobenzene (F002)	108-90-7	Pyridine (F005)	110-86-1
1,1,2-Trichloroethane (F002)	79-00-5	Toluene (F005)	108-88-3
		Polychlorinated biphenyl (PCB)	1336-36-3

1.4 Project Schedule

The sampling and analysis will follow the schedule outlined in the 2401W Building closure plan.

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2 Quality Assurance Project Plan

The 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 requirements of the following:

- 10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements"
- DOE O 414.1D, *Quality Assurance*
- *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA/240/B-01/003)
- *Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD)* (DOE/RL-96-68)

This chapter describes the applicable quality requirements and controls. Sections 6.5 and 7.8 of *Hanford Federal Facility Agreement and Consent Order Action Plan* (Tri-Party Agreement Action Plan) (Ecology et al., 1989b) require the quality assurance (QA)/quality control (QC) and sampling and analysis activities to specify the QA requirements for treatment, storage, and disposal units, as well as for past-practice processes. Therefore, this QAPjP follows the QA elements of EPA/240/B-01/003. This QAPjP demonstrates conformance to Part B requirements of *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4-2004).

This QAPjP is divided into the following four sections, which describe the quality requirements and controls applicable to this investigation: Project Management, Data Generation and Acquisition, Assessment and Oversight, and Data Validation and Usability.

2.1 Project Management

The following subsections address project management and 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 or its approved subcontractor is responsible for planning, coordinating, sampling, preparation, packaging, and shipping samples to the laboratory. The project organization (regarding sampling and characterization) is described below 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.

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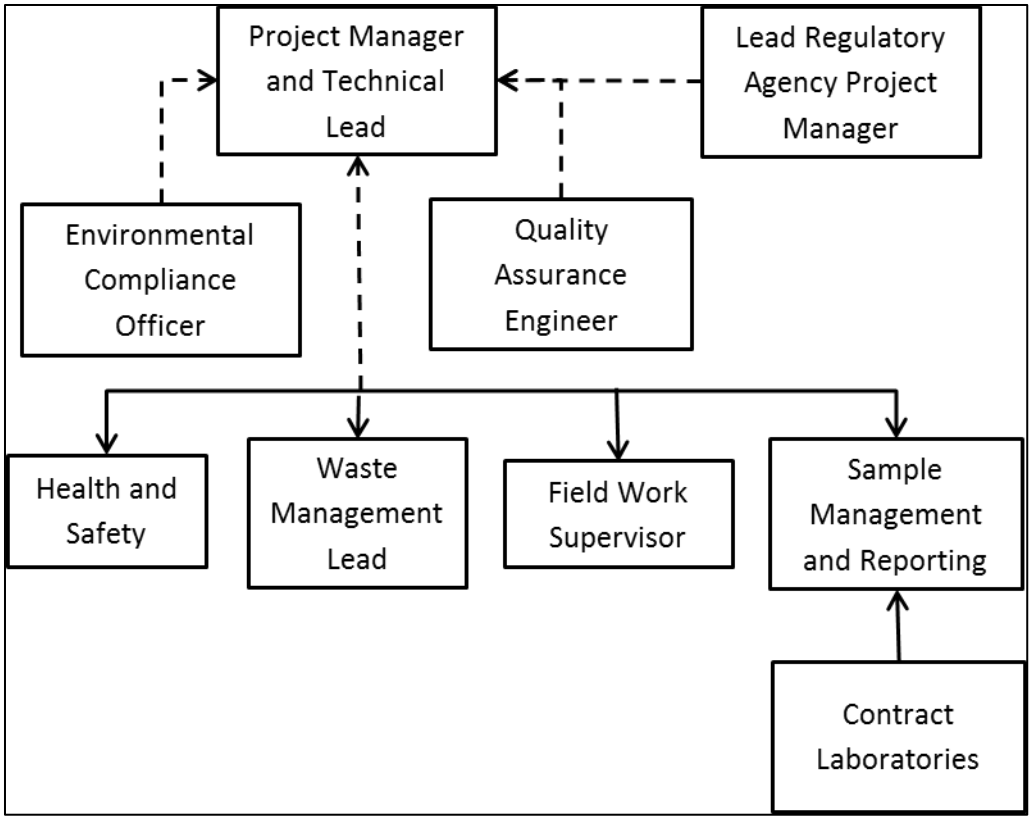

Figure 2-1. CWC 2401W Building Closure Sampling Project Organization

The project has several key positions within the U.S. Department of Energy, Richland Operations Office (DOE-RL) organization, including the following:

- **Regulatory Project Manager:** The Washington State Department of Ecology (Ecology) has assigned project managers responsible for oversight of cleanup projects and activities. Ecology, as lead regulatory agency for the CWC 2401W Building closure sampling project, has oversight authority 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 in accordance with the Tri-Party Agreement.

- **Project Manager:** The Project Manager provides oversight for activities and coordinates with DOE-RL, EPA, Ecology, and contract management. In addition, support is provided to the project technical lead to ensure that work is performed safely and cost effectively. The Project Manager (or designee) for the CWC 2401W Building closure sampling is responsible for direct management of sampling documents and requirements, field activities, and subcontracted tasks. The Project Manager is responsible for ensuring that the project personnel are working to the current version of the SAP. The Project Manager works closely with QA, Health and Safety, and the Field Work Supervisor (FWS) to integrate these and other lead disciplines in planning and implementing the work scope. The Project Manager also coordinates with DOE-RL and the primary contractor management on all sampling activities. The Project Manager supports DOE-RL in coordinating sampling activities with the regulators.

- **Environmental Compliance and Quality Assurance**. 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

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environmental impacts. The ECO also reviews plans, protocols, 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-RL and/or regulatory agencies. The ECO also oversees project implementation for compliance with applicable internal and external environmental requirements.

The QA point of contact (POC) is matrixed to the Project Manager and is responsible for QA issues on the project. Responsibilities include overseeing implementation of the project QA requirements, reviewing project documents (including SAP and the QAPjP), and participating in QA assessments on sample collection and analysis activities, as appropriate. The QA POC must be independent of the unit generating the data.

- **Health and Safety:** The Health and Safety organization's responsibility for coordinating industrial safety and health 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 assists project personnel in complying with applicable health and safety standards and requirements.

- **Sample Management and Reporting:** The Permittee's sampling organization coordinates laboratory analytical work, ensuring that laboratories conform to Hanford Site internal laboratory QA requirements (or their equivalent), as approved by DOE-RL, EPA, and Ecology. The sampling organization receives the analytical data from the laboratories, performs the data entry into the Hanford Environmental Information System (HEIS) database, and arranges for data validation. The sampling organization is responsible for informing the Project Manager of any issues reported by the analytical laboratory. The sampling organization develops and oversees implementation of the letter of instruction to the analytical laboratories, oversees data validation, and works with the Project Manager to prepare a characterization report on the sampling and analysis results.

- **Contract laboratories:** The contract laboratories analyze samples in accordance with established protocols and provide necessary sample reports and explanation of results in support of data validation. The laboratories must meet site-specific QA requirements and must have an approved QA plan in place.

- **Waste Management:** Waste Management communicates policies and protocols, and ensures project compliance for storage, transportation, disposal, and waste tracking in a safe and cost-effective manner. In addition, Waste Management is responsible for identifying waste management sampling/characterization requirements to ensure regulatory compliance, interpreting the characterization data to generate waste designations and profiles, and preparing and maintaining other documents confirming compliance with waste acceptance criteria.

- **Fieldwork Supervisor:** The FWS is responsible for planning and coordinating field sampling resources. The FWS ensures that samplers are appropriately trained and available. Additional related responsibilities include ensuring that the sampling design is understood and can be performed as specified by directing training, mock-ups, and practice sessions with field personnel.

The FWS directs the samplers. The samplers collect rinsate samples, including replicates/duplicates, and prepare sample blanks in accordance with the SAP, corresponding protocols, and work packages. The samplers complete field logbook entries, chain-of-custody forms, and shipping paperwork, and ensure delivery of the samples to the analytical laboratory.

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2.1.2 Quality Objectives and Criteria

The QA objective of this plan is to develop implementation guidance providing data of known and appropriate quality. Data quality indicators (DQIs) describe data quality by evaluation against identified data needs 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 2-1. The DQIs will be evaluated during the data quality assessment (DQA) process (Section 2.4.5).

Quality objectives and project-specific measurement requirements are presented in Table 2-2. In consultation with the laboratory, the Project Manager, the sampling organization, and/or others as appropriate, identify appropriate analytical methods.

2.1.3 Special Training/Certification

A graded approach is used to ensure that workers receive a level of training that is commensurate with responsibilities and compliant with applicable DOE orders and government regulations. The FWS, in coordination with line management, will ensure that special training requirements for field personnel are met.

Typical training requirements or qualifications have been instituted by the Permittee to meet training requirements imposed by regulations, DOE orders, and national standards such as those published by the American National Standards Institute/American Society of Mechanical Engineers. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to execute assigned duties safely. Field personnel typically have completed the following training before starting work:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- 8-Hour Hazardous Waste Worker Refresher Training (as required)
- Hanford General Employee Training

Project-specific safety training addressed explicitly to the project and the day's activity will be provided, including the following:

- Training to provide the knowledge and skills that sampling personnel need to perform work safely and in accordance with QA requirements
- Requirement that samplers be qualified in the type of sampling being performed in the field

In addition, pre-job briefings will be performed to evaluate activities and associated hazards by considering many factors, including the following:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Environment in which the job will be performed
- Facility where the job will be performed
- Equipment and material required
- Safety protocols applicable to the job
- Training requirements for individuals assigned to perform the work

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- Level of management control
- Proximity of emergency contacts

Training records are maintained for each employee in an electronic training record database. The Permittee's training organization maintains the training records system.

2.1.4 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 data needs will be submitted as a permit modification in accordance with WAC 173-303-610 to the DOE and lead regulatory agency.

The FWS is responsible for ensuring that the field instructions are maintained and aligned with any revisions or approved changes to the SAP. The FWS 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 protocols.

The Project Manager, FWS, or designee is responsible for communicating field corrective action requirements and ensuring that 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 FWS, 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 contain the records or references to their storage locations. The following will be included in the project file, 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

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Precision	The measure of the degree of reproducibility of measurements under prescribed similar conditions. May 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. 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.	Field precision: At randomly selected locations, duplicate samples will be taken one per 20 samples per media. Laboratory precision; analysis of laboratory duplicate or matrix spike duplicate.	If 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 an accepted reference or true value. Sample accuracy is expressed as the percent recovery of a spiked sample.	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).	Laboratory accuracy Determination based on matrix spikes and matrix spike duplicates.	If recovery does not meet objective: • Qualify the data before use • Request re-analysis or remeasurement

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Representa-tiveness	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. Judgment sampling ensures areas most likely to be contaminated, based on current information, will be evaluated. Random sampling is based on ensuring all members of the group are equally likely to be chosen and allows probability statements to be made about the quality of estimates derived from the data.	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

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
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.	Sampling personnel will use the same sampling protocols. Samples will be submitted to the same laboratories when possible (based on laboratory contracts) for analysis by the same methods, thus data results will be comparable.	If data are not comparable to other data sets: • 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. • Revise sampling/analysis protocols to ensure future comparability

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Table 2-1. Data Quality Indicators

DQI	Definition	Example Determination Methodologies	Project-Specific Information	Corrective Actions
Completeness	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.	Sampling personnel will use the same sampling protocols. Samples will be submitted to the same laboratories when possible (based on laboratory contracts) for analysis by the same methods, thus data results will be comparable.	If data are not comparable to other data sets: • 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. • Revise sampling/analysis protocols to ensure future comparability
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, which can be routinely quantified and reported by a laboratory.	Ensure sensitivity, as measured detection limits, is appropriate for the action levels.	If sensitivity does not meet objective: • Request reanalysis or remeasurement. • Qualify/reject the data before use.

DQI = data quality indicators
QA = quality assurance

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Table 2-2. Water Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a]	Practical Quantitation Limit (µg/L)[e]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
Performance Requirements for Laboratory Measurements (Nonradiological)						
7440-39-3	Barium	SW-846 Method 6010 or 200.8	21 mg/L TCLP	5.0	±20	≤20
7440-43-9	Cadmium	SW-846 Method 6010 or 200.8	0.11 mg/L TCLP	2.0	±20	≤20
18540-29-9	Chromium (Hexavalent)[f]	SW-846 Method 6010 or 200.8	0.60 mg/L TCLP	2.0	±20	≤20
7439-91-1	Lead	SW-846 Method 6020 or 200.8	0.75 mg/L TCLP	2.0	±20	≤20
7439-97-6	Mercury	SW-846 Method 7471 or 200.8	0.2 mg/L TCLP	0.5	±20	≤20
7440-22-4	Silver	SW-846 Method 6020 or 200.8	0.14 mg/L TCLP	2.0	±20	≤20
71-43-2	Benzene	SW-846 Method 8260	10 mg/L	5.0	N/A[c]	≤20
56-23-5	Carbon tetrachloride	SW-846 Method 8260	6.0 mg/L	5.0	N/A[c]	≤20
121-14-2	2,4-Dinitrotoluene	SW-846 Method 8270	140 mg/L	10	N/A[c]	≤20
87-68-3	Hexachlorobutadiene	SW-846 Method 8270	5.6 mg/L	10	N/A[c]	≤20
78-93-3	Methyl ethyl ketone (MEK) (2-butanone)	SW-846 Method 8260	36 mg/L	10	N/A[c]	≤20
110-86-1	Pyridine	SW-846 Method 8260	16 mg/L	5	N/A[c]	≤20
118-74-1	Hexachlorobenzene	SW-846 Method 8270	10 mg/L	10	N/A[c]	≤20
71-55-6	1,1,1-trichloroethane	SW-846 Method 8260	6 mg/L	5.0	N/A[c]	≤20
76-13-1	Chlorinated fluorocarbons	SW-846 Method 8260	30 mg/L	10	N/A[c]	≤20

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Table 2-2. Water Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a]	Practical Quantitation Limit (µg/L)[e]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
75-09-2	Methylene chloride	SW-846 Method 8260	30 mg/L	5	N/A[c]	≤20
67-64-1	Acetone	SW-846 Method 8260	160 mg/L	20	N/A[c]	≤20
71-36-3	n-butyl alcohol	SW-846 Method 8260	2.6 mg/L	100	N/A[c]	≤20
108-94-1	Cyclohexanone	SW-846 Method 8270	0.75 mg/L TCLP	5	N/A[c]	≤20
141-78-6	Ethyl acetate	SW-846 Method 8015	33 mg/L	5000	N/A[c]	≤20
100-41-4	Ethyl benzene	SW-846 Method 8260	10 mg/L	4	N/A[c]	≤20
60-29-7	Ethyl ether	SW-846 Method 8015	160 mg/L	5000	N/A[c]	≤20
67-56-1	Methanol	SW-846 Method 8015	0.75 mg/L TCLP	1000	N/A[c]	≤20
108-10-1	Methyl isobutyl ketone	SW-846 Method 8260	33 mg/L	10	N/A[c]	≤20
127-18-4	Tetrachloroethylene	SW-846 Method 8260	6 mg/L	5	N/A[c]	≤20
79-01-6	Trichloroethylene	SW-846 Method 8260	6 mg/L	1	N/A[c]	≤20
108-38-3	m-Xylene	SW-846 Method 8260	30 mg/L[d]	5	N/A[c]	≤20
95-47-6	o-Xylene	SW-846 Method 8260	30 mg/L[d]	5	N/A[c]	≤20
106-42-3	p-Xylene	SW-846 Method 8260	30 mg/L[d]	5	N/A[c]	≤20
1336-36-3	Polychlorinated biphenyls	SW-846 Method 8082	10 mg/L	0.5	N/A[c]	≤20
95-48-7	o-Cresol	SW-846 Method 8270	5.6 mg/L	33	N/A[c]	≤20
98-95-3	Benzene, nitro	SW-846 Method 8260	14 mg/L	10	N/A[c]	≤20
108-88-3	Toluene	SW-846 Method 8260	10 mg/L	5	N/A[c]	≤20
79-46-9	2-nitropropane	SW-846 Method 8260	na	10	N/A[c]	≤20
75-15-0	Carbon disulfide	SW-846 Method 8260	4.8 mg/L TCLP	5	N/A[c]	≤20

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Table 2-2. Water Analytical Performance Requirements

CAS Number	Analyte	Analytical Method	Closure Performance Standard[a]	Practical Quantitation Limit (µg/L)[e]	Accuracy Requirement (Percent Recovery)[b]	Precision Requirement (RPD)[b]
78-83-1	Isobutanol	SW-846 Method 8260	170 mg/L	500	N/A[c]	≤20
110-80-5	2-ethoxyethanol	SW-846 Method 8260	na	750	N/A[c]	≤20
108-90-7	Chlorobenzene	SW-846 Method 8260	6 mg/L	2,000,000	N/A[c]	≤20
79-00-5	1,1,2-trichloroethane	SW-846 Method 8260	6 mg/L	5	N/A[c]	≤20
75-69-4	Trichlorofluoromethane	SW-846 Method 8260	30 mg/L	10	N/A[c]	≤20
76-13-1	1,1,2-trichloro-1,2,2-trifluoroethane	SW-846 Method 8260	30 mg/L	10	N/A[c]	≤20
95-50-1	Ortho-dichlorobenzene	SW-846 Method 8260	6 mg/L	10	N/A[c]	≤20

a. Closure performance standards are the universal treatment standards for nonwastewater found in WAC 173-303-140(2)(a)

b. Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples is also performed. Precision criteria for batch laboratory replicate matrix spike analyses or replicate sample analyses.

c. Determined by the laboratory based on historical data or statistically derived control limits. Limits are reported with the data. Where specific acceptance criteria are listed, those acceptance criteria may be used in place of statistically derived acceptance criteria.

d. The 30 mg/L action level is based on the sum of the Xylene isomers.

e. For these analytical performance requirements, the Required Detection Limit and the Practical Quantification Limit are identical.

f. WAC 173-303-140(2)(a) does not provide universal treatment standards specific to hexavalent chromium. Standards provided are for chromium (CAS 7440-47-3).

CAS = Chemical Abstract Services

N/A = not applicable

na = information not available

TCLP = toxic characteristic leaching procedure

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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 hardcopy 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 required by the Tri-Party Agreement (Ecology et al., 1989a) will be managed in accordance with the requirements therein.

2.2 Data Generation and Acquisition

The following subsections present the requirements for sampling methods and identification, sample handling and custody, analytical methods, measurement and analysis, data collection or generation, data handling, and field and laboratory QC. The requirements for instrument calibration and maintenance, supply inspections, and data management are also addressed. The sampling design is presented in the field sampling plan (Section 3) of this SAP.

The FWS is responsible for ensuring that all field procedures are followed completely and that field sampling personnel are adequately trained to perform sampling activities under this SAP. The field team lead must document all deviations from procedures or other problems pertaining to sample collection, chain-of-custody, sample analytes, sample transport, or noncompliant monitoring. As appropriate, such deviations or problems will be documented in the field logbook or in nonconformance report forms in accordance with internal corrective action procedures. The FWS or Project Manager is responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to field activities.

2.2.1 Sampling Process Design

The sampling design consists of grab sampling of the collected rinsate. Additional sampling process design details are provided in Section 3.

2.2.2 Analytical Methods

Analytical methods and parameters are provided in Table 2-2. These analytical methods are controlled in accordance with the laboratory's QA plan and the requirements of this QAPjP. Laboratory operations and analytical services shall comply with Volume 4 of HASQARD (DOE/RL-96-68, Laboratory Technical Requirements) and any specific criteria identified in Table 2-2. Criteria in Table 2-2 take precedence over similar criteria in HASQARD. In consultation with the laboratory, the Project Manager, and/or others as appropriate, changes to analytical methods can be approved as long as the method is based upon a nationally recognized standard (e.g., EPA, American Society for Testing and Materials [ASTM]) method, the new method achieves project data needs as well or better than the replaced method, and the new method is required due to the nature of the sample. Oversight of offsite analytical laboratories to qualify them for performing Hanford Site analytical work is performed as necessary.

If the laboratory uses a nonstandard or unapproved method, then the laboratory must provide method validation data to confirm that the method is adequate for the intended use of the data. This includes information such as determination of detection limits, quantitation limits, typical recoveries, and analytical precision and bias. Deviations from the analytical methods noted in Table 2-2 must be approved in consultation with the Project Manager.

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Issues that may affect analytical results are to be resolved in coordination with the Project Manager.

2.2.3 Quality Control

The QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained. Field QC samples will be collected to evaluate the potential for cross-contamination and provide information pertinent to field sampling variability. Field QC sampling will include the collection of full trip blank, field transfer blank, equipment rinsate blank, field duplicate, and field split samples. Laboratory QC samples estimate the precision and bias of the analytical data. Field and laboratory QC samples are summarized in Table 2-3.

Table 2-3. Project QC Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Field QC		
Full trip blank (FTB)	One per 20 samples per media sampled.	Contamination from containers or transportation.
Equipment rinsate blank (EB)	As needed If only disposable equipment is used, an equipment blank is not required. Otherwise, one per 20 samples per media[a,]	Adequacy of sampling equipment decontamination and contamination from non-dedicated equipment.
Field duplicate (DUP)	One per batch[g], 20 samples maximum of each media sampled	Precision, including sampling and analytical variability.
Field Split Samples (SPLIT)	As needed. When needed, the minimum is one per analytical method, per media sampled, for analyses performed where detection limit and precision and accuracy criteria have been defined in the Performance Requirements tables.	Precision, including sampling, analytical, and inter-laboratory.
Laboratory QC[g]		
Method Blanks	1 per batch[g]	Laboratory Contamination
Lab Duplicates	[b]	Laboratory Reproducibility and precision
Matrix Spikes	[b]	Matrix effect/laboratory accuracy
Matrix Spike Duplicates	[b]	Laboratory reproducibility, accuracy, and precision
Surrogates	[b]	Recovery/yield
Tracers	[b]	Recovery/yield

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Table 2-3. Project QC Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Laboratory Control Samples	1 per batch[g]	Evaluate Laboratory Accuracy
Performance Evaluation Programs[c]	Annual	Evaluate Laboratory Accuracy
Double-Blind Standards	Quarterly[d]	Evaluate Laboratory Accuracy
Audit/Assessment	Annually[e] or Every 3 years[f]	Evaluate overall laboratory performance and operations

a. Whenever a new type of non-dedicated equipment is used, an equipment blank shall be collected every time sampling occurs until it can be shown that less frequent collection of equipment blanks is adequate to monitor the decontamination procedure for the non-dedicated equipment.
b. As defined in the laboratory contract or QA plan and/or analysis procedures.
c. Nationally recognized program, such as DOE Mixed Analyte Performance Evaluation Program or Environmental Resource Associates.
d. Water matrix double-blind standards are submitted quarterly.
e. DOE QSAS requires annual audit of commercial laboratories.
f. HASQARD does not define a frequency for assessment of on-site laboratories. Three year evaluated supplier list requirement is typically applied.
g. Batching across projects is allowing for similar matrices.
QA = Quality assurance.
QC = Quality control.

2.2.3.1 Field Quality Control Samples

Field QC samples will be collected to evaluate the potential for cross-contamination and to provide information pertinent to field sampling variability and laboratory performance to help ensure reliable data are obtained. Field QC samples include field duplicates, split samples, and three types of field blanks (full trip, field transfer, and equipment blanks). Field blanks are typically prepared using high-purity reagent water. Silica sand should be used, instead of reagent water, when required by the SAP. The QC samples and the required frequency for collection are described in this subsection. Particular care will be exercised to avoid the following common ways in which cross-contamination or background contamination may compromise 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
- Improperly decontaminating equipment before sampling or between sampling events

This number of QC samples is conservatively established based on site procedures that call for approximately one set of QC samples per 20 samples.

- **Full-trip blank (FTB):** FTBs are prepared by the sampling team prior to traveling to the sampling site. The preserved bottle set is either for volatile organic analysis (VOA) only or identical to the set that will be collected in the field. It is filled with high purity reagent water or silica sand, as

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appropriate to the primary sample media. The bottles are sealed and transported, unopened, to the field in the same storage containers used for samples collected the same day. The FTBs are typically analyzed for the same constituents as the samples from the associated sampling event. FTBs are used to evaluate potential contamination of the samples attributable to the sample bottles, preservative, handling, storage, and transportation.

- **Field transfer blank (FXR):** FXRs are preserved VOA sample bottles filled at the sample collection site with high purity reagent water or silica sand (as appropriate to the primary sample media) that has been transported to the field. The samples are prepared during sampling to evaluate potential contamination attributable to field conditions. After collection, FXR sample bottles are sealed and placed in the same storage containers with the samples collected the same day for the associated sampling event. The FXR samples will be analyzed for volatile organic compounds (VOCs) only.

- **Equipment blank (EB):** EBs consist of high purity reagent water or silica sand passed through or poured over the decontaminated sampling equipment identical to the sample set that will be collected and placed in sample containers, as identified on the project sampling authorization form (SAF). The EB sample bottles are placed in the same storage containers with the samples from the associated sampling event. The EB samples will be analyzed for the same constituents as the samples from the associated sampling event. The EBs will be used to evaluate the effectiveness of the decontamination process.

Equipment blanks are collected from reusable sampling devices on a 1-in-20 basis and are not required for disposable sampling equipment.

For the field blanks (i.e., FTB, FXR, and EB), results greater than two times the method detection limit or minimum detectable activity (MDA) are identified as suspect contamination. However, for common laboratory contaminants such as acetone, methylene chloride, 2-butanone, toluene, and phthalate esters, the limit is five times the method detection limit. For radiological analytical data, blank results are flagged if they are greater than two times the total MDA.

- **Field duplicates:** Field duplicates (DUP) are independent samples collected as close as possible to the same time and same location as the parent sample and are intended to be identical. DUPs are collected at a frequency of one in 20 samples. DUPs are two separate samples collected from the same source, placed in separate sample containers, and analyzed independently. The DUPs should be collected from an area expected to have some contamination so valid comparisons between the samples can be made (i.e., some constituents will be greater than detection limit).

DUPs must agree within 20 percent, as measured by the RPD, to be acceptable. Only those DUPs with at least one result greater than five times the UTS limit are evaluated. DUP results not satisfying evaluation criteria will be qualified and flagged in HEIS, as appropriate.

DUPs are stored and transported together and will be analyzed for the same constituents. The DUPs are used to determine precision for both sampling and laboratory measurements. Evaluation of the results can provide an indication of intra-laboratory variability. Large relative percent differences (RPDs) can be an indication of potential laboratory performance problems and should be investigated.

Collocated samples are two samples collected as close as possible to the same time and location and are not homogenized. This sampling protocol is used when homogenizing samples for split or duplicate samples could affect the quality of data (i.e., VOA analysis).

- **Field split samples:**. Field split samples (SPLIT) are two samples collected as close as possible to the same time and same location and are intended to be identical. VOA splits will be sampled as

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collocated samples, as described previously. SPLITs are stored in separate containers and analyzed by different laboratories for the same or similar analytes. SPLITs are inter-laboratory comparison samples used to evaluate comparability between laboratories. Large RPDs can be an indication of potential laboratory performance problems and should be investigated.

2.2.3.2 Laboratory Quality Control Samples

The laboratory QC samples (e.g., method blanks and laboratory control sample/blank spike) are defined for the three-digit EPA methods (EPA/600/4-79/20, *Methods for Chemical Analysis of Water and Wastes*) 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.

The QC checks outside of control limits will be reflected in the narrative of the analytical report and during the Data Quality Assessment (DQA) process, if performed.

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 25 percent of the expected values, although the limits may vary considerably depending upon the method and analyte.

2.2.4 Equipment

Equipment used for collection, measurement, and testing should meet applicable standards (e.g., ASTM) or will have been evaluated as acceptable and valid in accordance with the procedures, requirements, and specifications. The FWS, field technical representative, or equivalent will ensure that 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 that directly affect the quality of analytical data will be subject to preventive maintenance measures to minimize 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), 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.

2.2.5 Inspection of Consumable Supplies

Consumables, supplies, and reagents will be reviewed in accordance with the current requirements of SW-846, or other EPA method being used, or by an approved site analytical procedure. Potential contamination is monitored by field QC samples and laboratory blanks. The lot number from the manufacturer certified, pre-cleaned sample containers will be recorded in the sampler's logbook.

2.2.6 Data Management

Data resulting from the implementation of the SAP will be stored in the HEIS database. Reports and supporting analytical data packages will be subject to final technical review by qualified reviewers before submittal to the regulatory agencies or before inclusion in reports or technical memoranda.

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2.2.7 Field Documentation Management

Field documentation shall be maintained in the form of chain-of-custody/sample analysis request forms and logbook entries. Other documentation is described in Section 2.1.3. Approved work control packages and procedures will be used to document field activities, including nonradiological measurements, when this SAP is implemented. Field activities will be recorded in the field logbook.

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, Regulatory Compliance, QA, and/or Health and Safety organizations may conduct 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. The Project Manager will determine whether a DQA will be performed for the activities identified in this SAP. The DQA process, if performed, is discussed in Section 2.4. The results of the DQA will be provided to the Project Manager. No other planned assessments have been identified.

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. When appropriate, corrective actions will be taken by the Project Manager.

2.3.2 Reports to Management

Management will be made aware of deficiencies identified by self-assessments, corrective actions from ECOs, and findings from QA assessments and surveillances.

2.4 Data Review, Verification, and Validation, and Usability Requirements

Analytical results will be received from the laboratory, loaded into a database (e.g., HEIS), and verified (Section 2.4.1). A total of 5 percent of the data will be validated (Section 2.4.3). A DQA may be performed, if requested, on the final data (Section 2.4.4). At the direction of the Project Manager (or designee), analytical data packages will be subject to final technical review by qualified personnel before submittal to the regulatory agencies or inclusion in reports.

2.4.1 Verification and Validation Methods

Validation activities will be based on EPA functional guidelines. Data validation may be performed by the Permittee and/or by a party independent of both the data collector and the data user. Data validation qualifiers must be compatible with the HEIS database.

When outliers or questionable results are identified, the data associated with these outliers and questionable data will be evaluated and additional data validation will be performed. The additional data validation will consist of selecting up to an additional 5 percent of the statistical outliers and/or questionable data. The additional validation will begin with Level C and may increase to Levels D and E, as needed, to ensure that data are usable. Level C validation is a review of the QC data, while Levels D and E include review of calibration data and calculations of representative samples from the data set.

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Data validation results will be documented in data validation reports. An example of questionable data is a positive detection greater than the practical quantitation limit or reporting limit in soil from a site that should not have exhibited contamination. Similarly, results below background would not be expected and could trigger a validation inquiry. The determination of data usability will be conducted and documented in a DQA report.

Data validation results will be documented in data validation reports, which will be included in the project file.

2.4.2 Data Verification and Usability Methods

Review of field paperwork, analytical data packages, and electronic files from the laboratory information management system will be performed. Sampling documents include the soil sampling record, chain-of-custody forms, field logbook pages, and other paperwork associated with sampling and shipping. These documents are reviewed for completeness, approvals, and legibility. Analytical and QC data from the laboratories are verified to be complete, reported correctly, and within applicable limits. Laboratory documents will be rechecked to verify the condition of the samples upon receipt at the laboratory and determines if problems arose during analysis that may have affected the data. When issues arise with samples before the analytical data is processed, resolution of those issues will be initiated.

2.4.3 Resolution of Analytical System Errors

Errors reported by the laboratories are reported and a sample disposition record is initiated in accordance with Permittee procedures. This process is used to document analytical errors and to establish resolution with the Project Manager. In addition, the Permittee QA Engineer receives reports providing summaries and statistics of the analytical errors.

2.4.4 Data Validation

The format and requirements for data validation activities are based upon the most current version of *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA-540-R-08-01 [OSWER 9240.1-48]) and *National Functional Guidelines for Inorganic Superfund Data Review* (USEPA-540-R-10-011 [OSWER 9240.1-51]). Performance of data validation activities, typically by a party independent of the data collector, the data generator, and the data user is arranged. Third party data validation reports are reviewed for completeness and contractual compliance and also by Project QA personnel. A total of 5 percent of the results will undergo Level C validation, as defined by the validation guidelines.

2.4.5 Data Quality Assessment

The DQA process compares completed field activities to those in corresponding documents and provides an evaluation of the resulting data. The purpose of the DQA is to determine whether quantitative data are of the correct type and are of adequate quality and quantity to meet the project data quality objectives. The assessment will be consistent with the DQA process in *Data Quality Assessment: A Reviewer's Guide* (EPA/240/B-06/002), and *Data Quality Assessment: Statistical Methods for Practitioners* (EPA/240/B-06/003).

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3 Field Sampling Plan

The field sampling plan (FSP) provides a discussion of the project sampling and analytical requirements. This includes defining the number and location of samples, sampling methods, and analyses that will be performed, overall sampling objectives, and a discussion of waste management.

3.1 Site Background and Objectives

Site background information is contained in Section 1. The target analytes are presented in Table 1-1. The objective of the field sampling plan is to identify project sampling and analysis activities clearly. The field sampling plan uses the sampling design identified during the systematic planning process and identifies sampling locations, the total number of samples to be collected and the analyses to be performed.

3.2 Sampling Design

The sampling design consists of liquid grab samples taken from the rinsate collected during the decontamination performed as part of the closure verification activities described in the 2401W Building closure plan.

3.3 Sample Location and Frequency

Table 3-1 provides the sample locations, frequencies, and sampling methods to be used. Grab samples of the rinsate will be collected using a composite liquid waste sampler, liquid grab sampler, or similar device.

3.4 Sampling Methods

To ensure sample and data usability, sampling associated with this SAP will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling. The Project Manager and contractor management are responsible for ensuring that all field procedures are followed completely and that field sampling personnel are adequately trained to perform sampling activities.

Grab sample matrix will consist of containerized rinsate liquid collected in pre-cleaned sample containers. To ensure sample and data usability, sampling will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling.

Field sampling shall comply with HASQARD requirements (DOE/RL-96-68), Volumes 1 and 2.

Sample preservation, container, and holding time requirements are specified in Table 3-2 for liquid samples. These requirements are in accordance with the analytical method specified. The final container type and volumes will be identified on the sampling authorization form and the chain-of-custody form. This monitoring plan defines a “sample” as a filled sample bottle for starting the clock for holding-time restrictions.

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

Sampling Objectives	Sample Matrix	Sample Locations	Number of Samples	Number of QA Samples	Sampling Methods	Sampling Frequency
Decision unit	Liquid	Grab samples	One sample per container of rinsate	One each of the following samples: full trip blank, field transfer blank, equipment rinsate blank, and field duplicate.	Samples will be taken using a composite liquid waste sampler, liquid grab sampler, or similar device.	Each container will be sampled one time.

QA = quality assurance

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Table 3-2. Sample Preservation, Container, and Holding Time for Liquid Samples

Method	Analysis/Analytes	Preservation Requirement	Holding Time	Bottle Type	Minimum Sample Size
EPA 6010	Metals	HNO_3 to pH<2	6 months	G/P	500 mL
EPA 7470	Mercury	HNO_3 to pH<2	28 days	G	500 mL
EPA 8015	Volatile organic analytes	None	14/40 days	G	3 x 40 mL
EPA 8082	Polychlorinated biphenyl	None	None	aG	1000 mL
EPA 8260	Volatile organic analytes	HCl or H_2SO_4 to pH<2	14 days	aG	3 × 40 mL
EPA 8270	Semivolatile organic compound	Cool ~4°C	7/40 days	aG	1000 mL
EPA 200.8	Metals by ICP/MS	HNO_3 to pH<2	6 months	G/P	500 mL

Notes:

For the four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B.*

14/40 days = 14 days from sample collection to extraction; 40 days from extraction to analysis

aG = amber glass
G = glass
ICP/MS = inductively coupled plasma/mass spectrometry
P = plastic

3.4.1 Decontamination of Sampling Equipment

To prevent potential contamination of the samples, care should be taken to use decontaminated equipment for each sampling activity.

3.5 Sample Handling

A sampling and data tracking database (e.g., HEIS) is used to track the samples from the point of collection through the laboratory analysis process. Samplers should note any anomaly with a sample (e.g., sample appears unusual) and inform the Project Manager.

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

3.5.1 Packaging

Level I EPA pre-cleaned sample containers will be used for liquid samples collected for chemical analysis. Container sizes may vary depending on laboratory-specific volumes/requirements for meeting analytical detection limits. Preliminary container types and volumes are identified in Table 3-2.

3.5.2 Container Labeling

The sample locations, depths, and corresponding HEIS numbers are documented in the sampler's field logbook. Except for VOA samples, a custody seal (i.e., evidence tape) will be affixed to the lid of each sample container and or sample collection package in such a way as to indicate potential tampering. 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

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equipment. Custody seals and any other required labels/documentation can be fixed to the exterior of a plastic bag holding the VOA vials in such a manner that prevents potential tampering.

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

- Sampling Authorization Form number
- HEIS number
- Sample collection date and time
- Sampler identification
- Analysis required
- Preservation method (if applicable)
- Chain-of-custody identification number

In addition to the above information, sample records must include the following:

- Sample location
- Matrix (water, soil, etc.)

3.5.3 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 protocols will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained. A chain-of-custody record is 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 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 individuals involved in sample transfer
- Requested analyses (or reference thereto)

3.5.4 Sample Transportation

All packaging and transportation instructions will be in compliance with the applicable transportation regulations, DOE requirements, and contactor requirements. Regulations for classifying, describing, packaging, marking, labeling, and transporting hazardous materials, hazardous substances, and hazardous waste mandated by the U.S. Department of Transportation as described in 49 CFR 171 “General Information, Regulations, and Definitions,” through Part 177, “Carriage By Public Highway.” Carrier

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specific requirements should also be considered when preparing sample shipments conveyed by air freight providers.

Samples containing hazardous constituents shall be considered hazardous material in transportation and transported according to DOT 49 CFR, "Transportation," "Shippers – General Requirements for Shipments and Packagings," are exceeded. Samples shall be screened, or relevant historical data shall be used, to determine if these values are exceeded. When screening or historical data indicate that samples are radioactive, they shall be properly classified, describes, packaged, marked, labeled, and transported according to DOT requirements.

3.5.5 Corrective Actions and Deviations for Sampling Activities

The Project Manager, FWS, or designee must document deviations from procedures or other issues pertaining to sample collection, chain-of-custody, target analytes, sample transport, or noncompliance. Examples of deviations include samples not collected because of field conditions, changes in sample locations because of physical obstructions, or additions of sample depths.

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, FWS, or designee will be responsible for communicating field corrective action requirements and for ensuring that immediate corrective actions are applied to sampling activities.

Changes in sample locations not affecting the data needs will require notification and approval of the Project Manager. Changes to sample locations affecting the data needs will require concurrence from DOE-RL and the lead regulatory agency. Changes to the SAP will be documented as noted in Section 2.1.3.

3.6 Documentation of field activities

Logbooks or data forms are required for field activities. Requirements for the logbook are provided in Section 2.1.4. Data forms may be used to collect field information; however, the 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, and weather conditions
- Names, titles, and 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, splits, duplicates, 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

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4 Management of Waste

All waste generated during sampling activities will be managed in accordance with applicable regulations.

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5 Health and Safety

Field operations will be performed in accordance with health and safety requirements and appropriate project requirements. The project's site-specific health and safety plan will be followed. Work control documents will be prepared to control site operations further. Safety documentation will include an activity hazard analysis.

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EPA-505-B-04-900A, 2005, *Intergovernmental Data Quality Task Force Uniform Federal Policy for Quality Assurance Project Plans: Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP Manual*, Version 1, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://www.epa.gov/swerffrr/pdf/ufp_qapp_v1_0305.pdf.

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WAC 173-340, "Model Toxics Control Act--Cleanup," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340.

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Attachment B

RCRA Records Review and Facility Visual Inspection Supporting Documentation

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CWC, 2401-W BUILDING

Purpose:

A visual inspection walkdown of the CWC 2401-W Building to determine if there is any evidence of spills and/or leaks from waste packages containing dangerous that were and are stored at this location. The inspection was to identify and document by photographing any waste related staining of the storage area surface (i.e., concrete floor), and to denote any remaining waste related items.

The inspection was performed on August 14, 2013, by Brett M. Barnes, Environmental Compliance Officer (CHPRC).

Results:

No staining of any kind was identified on the storage area surface.

Housekeeping will be performed on the area prior to closure and the debris material will be removed.

Signature/Date:

Brett M. Barnes: Brett M Barnes 8/14/2013

2401W Weekly Dangerous Waste Inspection Checklist Review

Title of Weekly Waste Inspection Form:	Inspection Checklist Central Waste Complex Facilities
Date of Review:	8/22/13 - 8/26/13
Reviewer's Name:	Lana Strickling
Waste Management Unit:	2401W
Time Frame of Weekly Inspections:	7/99 - 12/00
Items of Concern Noted (Circle) If "YES", complete entire checklist. If "NO", skip to Reviewer's signature and date.	YES☐ NO☒

Items of Concerns:
Attach copies of log book pages noting concern.

Dates of Corrective Actions:
Attach copies of log book pages noting concern.

Reviewer's Signature and Date: Lana Strickling 9/3/13

Instructions:

Review Weekly Waste Inspection checklists for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted, check "NO" and skip to the signature and date field. Note that if no items of concern are noted for an extended period of time, the "Time Frame of Weekly Inspections" can be January 1, 20xx to December 31, 20xx or even several years if no items of concern are noted.

If unplanned spills, releases or discharges are referenced on the inspection checklist, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of weekly waste inspection checklists noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

2401W Daily Operating Log Book Review

Date of Log Book Review:	8/26/13
Reviewer's Name:	Brett Barnes
Daily Operating Log Book Document No:	Operating Log Central Waste Complex (no logbook number)
Log Book Timeframe (Month/Year to Month/Year):	6/1/99 – 8/11/99
Items of Concern Noted If "YES", complete entire checklist. If "NO", skip to Reviewer's signature and date.	YES☐ NO☑

Items of Concern:
Attach copies of log book pages noting concern.

Log Book Page# Referencing Spill:

Dates of Corrective Actions:
Attach copies of log book pages noting corrective actions.

Log Book Page#
Referencing Corrective Action:

Reviewer's Signature and Date: Brett M Barnes 9/4/13

Instructions:

Review Daily Operating Log for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted, check "NO" and skip to the signature and date field. Note that if no items of concern are noted for the entire year, the "Log Book Time Frame" can be January 1, 20xx to December 31, 20xx.

If unplanned spills, releases or discharges are referenced in the Daily Operating Log, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of the Daily Operating Log page(s) noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

2401W Daily Operating Log Book Review

Date of Log Book Review:	8/28/13 – 9/3/13
Reviewer's Name:	Jeff Bramson
Daily Operating Log Book Document No:	See Page 2
Log Book Timeframe (Month/Year to Month/Year):	8/12/99 – 12/28/2000
Items of Concern Noted If "YES", complete entire checklist. If "NO", skip to Reviewer's signature and date.	YES☐ NO☑

Items of Concern:
Attach copies of log book pages noting concern.

Log Book Page# Referencing Spill:

Dates of Corrective Actions:
Attach copies of log book pages noting corrective actions.

Log Book Page#
Referencing Corrective Action:

Reviewer's Signature and Date: 3 Sep 2013

Instructions:

Review Daily Operating Log for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted, check "NO" and skip to the signature and date field. Note that if no items of concern are noted for the entire year, the "Log Book Time Frame" can be January 1, 20xx to December 31, 20xx.

If unplanned spills, releases or discharges are referenced in the Daily Operating Log, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of the Daily Operating Log page(s) noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

2401W Daily Operating Log Book Review

Logbook Number	Start Date	End Date
0001	8/12/99	10/14/99
0005	10/18/99	1/6/00
0002	1/10/00	3/2/00
0003	3/2/00	5/10/00
0001	5/11/00	7/14/00
0002	7/17/00	9/12/00
HNF-N-450-67	9/13/00	11/2/00
HNF-N-450-68	11/3/00	12/28/00

CWC Daily Operating Log Book Review
2401-W

Date of Log Book Review: 8/12/13

Reviewer's Name: Joel Williams

Daily Operating Log Book Document No/Log Book Timeframe (Month/Year to Month/Year):

LOGBOOK NUMBER	DATES
HNF-N-450-84	12-06-2006 through 07-09-2007
HNF-N-450-85	07-10-2007 through 02-06-2008
HNF-N-450-91	02-07-2008 through 08-26-2008
HNF-N-450-94	08-27-2008 through 04-16-2009
HNF-N-450-95	04-20-2009 through 11-17-2009
HNF-N-450-100	11-02-2009 through 06-23-2010
HNF-N-450-103	06-24-2010 through 01-16-2011
HNF-N-450-107	01-19-2011 through 08-11-2011
HNF-N-450-109	08-15-2011 through 03-06-2012
HNF-N-450-110	03-07-2012 through 07-16-2012
HNF-N-450-113	07-07-2012 through 12-01-2012
HNF-N-450-111	12-02-2012 through 05-01-3013
HNF-N-450-112	05-02-2013 through 08-12-2013

Items of Concern Noted (Circle) YES ☐ NO ☑

If "YES", complete entire checklist.
If "NO", skip to Reviewer's signature and date.

Items of Concern:
Attach copies of log book pages noting concern.

Log Book Page# Referencing Spill:

Dates of Corrective Actions:
Attach copies of log book pages noting corrective actions.

Log Book Page#
Referencing Corrective Action:

Reviewer's Signature and Date: Lana Stricling for Joel Williams per telecom.

Instructions:

Review Daily Operating Log for any references to unplanned spills, releases or discharges associated with dangerous waste containers. Anomalies that would not affect closure of the unit such as missing labels, open containers, or dented containers, do not need to be documented.

If items of concern are noted, check "YES" and complete the entire checklist. If no items of concern are noted,

CWC Daily Operating Log Book Review
2401-W

check "NO" and skip to the signature and date field. Note that if no items of concern are noted for the entire year, the "Log Book Time Frame" can be January 1, 20xx to December 31, 20xx.

If unplanned spills, releases or discharges are referenced in the Daily Operating Log, document the item of concern as "spill", "stain", "ruptured container", etc. Also note the date of the corrective action.

Attach copies of the Daily Operating Log page(s) noting the items of concern and corrective actions.

Complete all review fields as applicable.

Sign and date form and deliver to Stephanie Johansen.

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Attachment C

2401-W Waste Storage Building Closure Plan (DOE/RL-99-46, July 1999)

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DOE/RL-99-46

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2401-W Waste Storage Building Closure Plan

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Date Published
July 1999

United States
Department of Energy
Richland, Washington

Approved for Public Release

RELEASE AUTHORIZATION

Document Number:	DOE/RL-99-46, Rev. 0
Document Title:	2401-W Waste Storage Building Closure Plan

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C PRELIMINARY PROFESSIONAL ENGINEER CLOSURE STATEMENT ..... APP C-i

FIGURE

Figure 1. 2401-W Waste Storage Building. 4

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GLOSSARY

2401-W	2401-W Waste Storage Building
CWC	Central Waste Complex
DOE-RL	U.S. Department of Energy,-Richland Operations Office
Ecology	Washington State Department of Ecology
PCB	polychlorinated biphenyl
RCRA	*Resource Conservation and Recovery Act of 1976*
RMIS	Records Management Information System
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code

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DOE/RL-99-46, Rev. 0
07/99

2401-W WASTE STORAGE BUILDING CLOSURE PLAN

This plan describes the performance standards met and closure activities conducted to achieve clean closure of the 2401-W Waste Storage Building (2401-W) (Figure 1). In August 1998, after the last waste container was removed from 2401-W, the U.S. Department of Energy, Richland Operations Office (DOE-RL) notified Washington State Department of Ecology (Ecology) in writing that the 2401-W would no longer receive waste and would be closed as a *Resource Conservation and Recovery Act* (RCRA) *of 1976* treatment, storage, and/or disposal (TSD) unit (98-EAP-475). Pursuant to this notification, closure activities were conducted, as described in this plan, in accordance with Washington Administrative Code (WAC) 173-303-610 and completed on February 9, 1999. Ecology witnessed the closure activities. Consistent with clean closure, no postclosure activities will be necessary. Because 2401-W is a portion of the Central Waste Complex (CWC), these closure activities become the basis for removing this building from the CWC TSD unit boundary.

The 2401-W is a pre-engineered steel building with a sealed concrete floor and a 15.2-centimeter concrete curb around the perimeter of the floor. This building operated from April 1988 until August 1998 storing non-liquid containerized mixed waste. All waste storage occurred indoors. No potential existed for 2401-W operations to have impacted soil. A review of operating records and interviews with cognizant operations personnel indicated that no waste spills occurred in this building (Appendix A). After all waste containers were removed, a radiation survey of the 2401-W floor for radiological release of the building was performed December 17, 1998, which identified no radiological contamination (Appendix B).

1.0 CLOSURE PERFORMANCE STANDARD

Closure of 2401-W was conducted to meet the closure performance standards of WAC 173-303-610(2). 2401-W was considered clean after the entire building floor was verified to be free of dangerous waste contamination by meeting a visual performance standard. The visual performance standard was: no obvious visual signs of potential dangerous waste contamination, except for waste staining consisting of light shadows, slight streaks, or minor discoloration. Achievement of this standard was verified by visual inspections. Any floor area not meeting this standard would have required removal of the indication, a radiation survey, and re-inspection of the removal area.

Because only mixed waste was stored in 2401-W, the presence of radionuclides was considered an indicator parameter for the presence of the dangerous component of the mixed waste. Locations not meeting the visual performance standard, along with floor areas randomly selected during visual inspections, also were required to meet a radiological performance standard. The radiological performance standard, where applied, was: no measurable amount of radiological contamination above background levels. Radiological background was established as described in Appendix B. Achievement of this standard was verified by radiation surveys (Appendix B). Any location that exceeded radiological background would have required removal of the indication, visual inspection, and resurvey.

2.0 CLOSURE ACTIVITIES

This section identifies the closure activities performed to verify 2401-W clean closure conditions. If the record review (Section 2.2) had identified waste spills or if visual or radiological indications had been identified during inspections and surveys (Section 2.3), the floor would have been decontaminated to

remove the indications and the removal area re-inspected and resurveyed. However, because no visual or radiological indications were identified (Appendix B), no decontamination or further activities (e.g., soil or structure sampling) were considered necessary to verify clean closure.

2.1 Closure Activities

By the time of closure, all waste containers had been removed from the 2401-W and no waste handling equipment remained in the building. Closure activities performed to verify 2401-W clean closure conditions consisted of the following:

- Reviewed documents and interviewed personnel to determine spill history (Appendix A)
- Visually inspected building floor
- Performed radiation survey of randomly selected floor locations
- Documented visual inspections and radiation surveys on an inspection checklist (Appendix B)
- Obtained preliminary professional engineer's (PE) statement that closure activities were completed in accordance with this closure plan (Appendix C).

After the closure plan is approved by Ecology, closure certification will be submitted to Ecology in accordance with WAC 173-303-610(6) and the CWC TSD unit boundary will be modified to exclude 2401-W.

2.2 Search of 2401-W Operating Records for Spill History

2401-W operating records were reviewed to identify whether mixed waste spills had occurred. The records included operations logbooks, RCRA weekly inspection records, and 'offnormal' event reports. Former and current cognizant operations personnel also were interviewed. Sufficient operating records and reports exist and cognizant personnel were available to establish a complete history of 2401-W operations. The operating history indicated that no mixed waste spills occurred in 2401-W (Appendix A).

2.3 Visual Inspection and Radiation Surveys

Visual inspection of the 2401-W floor and loading ramp was performed February 9, 1999. The inspections were documented on the radiation survey and visual inspection checklist (Appendix B). No visual indications of potential dangerous waste contamination were identified that required removal or a follow-up radiation survey. During the inspections, one floor area located in grid D-1 was cleaned with damp rags to remove dirt that potentially could have masked a visual or radiological indication (Appendix B). No visual or radiological indication was identified by the visual inspection and radiation survey of the cleaned area.

A radiation survey of randomly selected areas of the floor, the loading ramp, and of the dirt removal area was performed at the time of the visual inspections (Appendix B). The 'direct survey' and 'large area wipe' were the radiation survey methods used and were performed as described in Appendix B. No surveyed area showed measurable radiological levels above background levels.

3.0 CERTIFICATION OF CLOSURE

After completing closure activities, a preliminary PE statement (Appendix C) that the activities were performed in accordance with technical specifications of the closure plan was prepared and provided to Ecology (99-EAP-202). After approval of this closure plan by Ecology, final 2401-W closure certification will be prepared in accordance with WAC 173-303-610(6), transmitted to Ecology, and placed in the Administrative Record.

4.0 REFERENCES

98-EAP-475, Letter to L. J. Cusack, Ecology from James E. Rasmussen, DOE-RL, "Notification of Intent to Close the 2401-W Waste Storage Building", August 28, 1998.

99-EAP-202, Letter to Moses N. Jaraysi, Ecology from J. E. Rasmussen, DOE-RL, "Closure of the 2401-W Waste Storage Building", March 29, 1999.

DOE/RL-91-17, *Hanford Facility Dangerous Waste Permit Application, Central Waste Complex*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

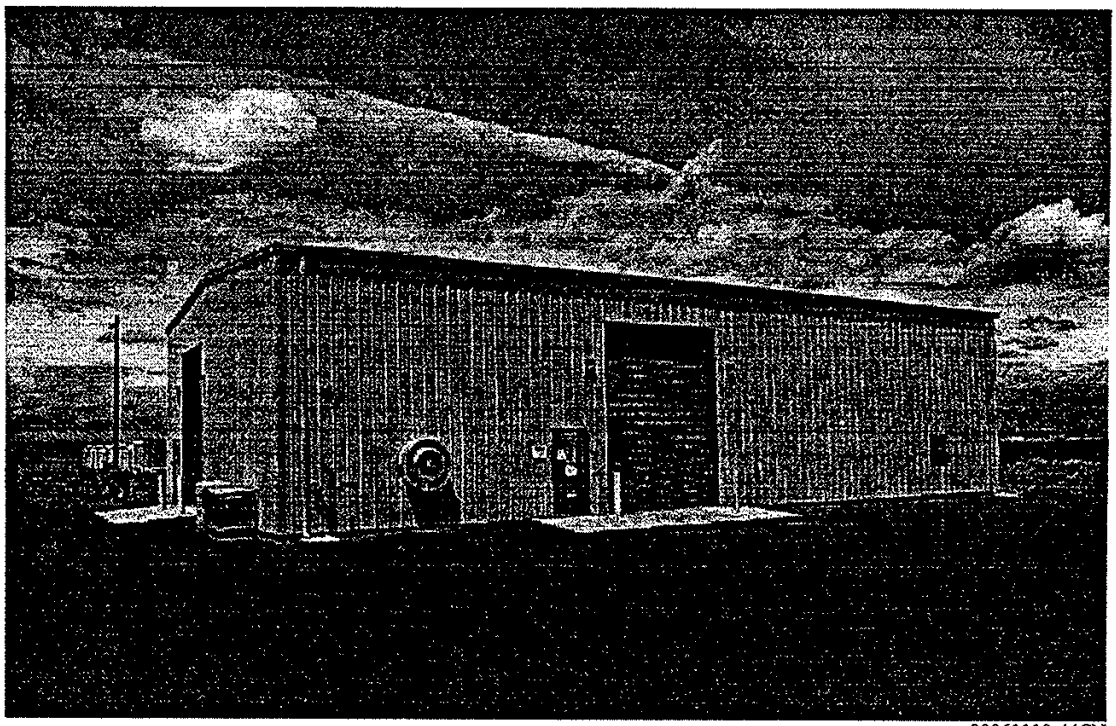

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Figure 1. 2401-W Waste Storage Building.

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APPENDIX A

SEARCH OF CENTRAL WASTE COMPLEX OPERATIONS RECORDS FOR 2401-W WASTE STORAGE BUILDING SPILL HISTORY

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SEARCH OF CENTRAL WASTE COMPLEX OPERATING RECORDS FOR 2401-W WASTE STORAGE BUILDING SPILL HISTORY

For closure of CWC, or any portion of CWC, operating records are reviewed and cognizant operations personnel interviewed to obtain spill history for the portion(s) undergoing closure (DOE/RL-91-17, Rev. 1, Chapter 11.0, Section 11.1.2). Spill history is necessary to help determine the need for and extent of decontamination necessary for clean closure. Closure of 2401-W , a portion of CWC, necessitated such activities to identify dangerous waste spills (if any) to surfaces of the building. As activities required by the approved closure plan, the operating records review and personnel interviews used to establish 2401-W spill history were intended to be sufficiently diligent to allow PE certification of the activities and for use as a credible basis in establishing conclusive 2401-W spill history. Certification by a registered professional engineer (PE) will be obtained.

The records review entailed a page by page review of all available records related to 2401-W operations. The records reviewed to satisfy this requirement included operations logbooks, RCRA weekly inspection records, and a search for 'offnormal' event reports. Also as a requirement, former and current cognizant 2401-W operations personnel were interviewed. Because closure of the 2401-W represents partial closure of CWC, the results of the document review and of personnel interviews will become the basis for removal of the 2401-W from the CWC TSD unit boundary by revision of the CWC Part A, Form 3, and Part B permit applications.

Operating documents and records currently are located as follows.

- Occurrence reports are located at MO 278.
- The most current CWC operating logbook is located in MO-288.
- Weekly inspection records before 1997 were retrieved from Records Management Information System (RMIS).
- All other records were found in the CWC regulatory file located at MO 720.

Background Information

In April 1988, waste storage operations began at the 2401-W. Weekly inspection records for 2401-W show that for all or most of the first 4 months of operations (until 08/03/88) little or no waste was stored in the building. This building was designed to meet all the requirements for storage of mixed waste (DOE/RL 91-17) in metal boxes or drums. Only containers in good condition were accepted. Transuranic waste was double contained. Where incidental free liquids were known to exist, containers were required to be packed with two times the calculated quantity of absorbent required to absorb the entire quantity of free liquids

Operations logbooks document the quantity of waste received at this unit and how waste was managed. These logbooks confirm that this building managed small quantities of specialized waste. When stored, the waste containers were seldom moved and remained in good condition after waste acceptance. Consequently, there was little potential for spills from defective containers, damaged or leaking containers due to container mishandling, or container degradation from weathering. The waste typically remained as stored until all waste finally was removed in August 1998 in preparation for building closure.

Records Review and Personnel Interviews

The event fact sheets, located in MO 278, and occurrence reports relating to CWC operations were reviewed. No event fact sheets or occurrence reports were generated for the 2401-W.

The CWC daily operating logbooks represent the most comprehensive, first-hand record of operations and cover the entire period of 2401-W operations. There are no logs dedicated solely to operations of the 2401-W. Except as noted, handwritten logbooks were available for review from 1988 to present. From the beginning of operations until October 1990, daily operations for all solid waste units (CWC, 224-T Transuranic Waste Storage and Assay Facility, 616 Nonradioactive Dangerous Waste Storage Facility, and Low-Level Burial Grounds) were consolidated into handwritten logbooks identified as sequentially numbered daily operating records (DOR). From February 1991 to the present, a separate logbook has been kept for each unit. The practice of uniquely numbering each operating logbook was discontinued in October 1996.

Handwritten logbooks were not available for review for October 1990 until February 1991, which was the transition period to the new, unit-specific logbooks. During this period, the DORs consisted of typewritten reports summarizing operators' handwritten pocket notebooks. These reports were generated daily and were an authoritative representation of normal daily occurrences and of significant events (e.g., waste shipments and process upsets, such as spills). Typewritten reports were available for the period of operations for which the daily handwritten logs were not available.

The following logbooks and reports were reviewed for evidence of spills. Although mention is made in logbooks of cleanup of rainwater and snowmelt that entered under the building's rollup doors, no mention is made of dangerous waste spills or container breaches that could have lead to spills.

- Logbook - SW-DOR-00003 (10/88 – 9/89)
- Logbook - SW-DOR-00004 (9/89 – 10/90)
- Report - SW-DOR-00005 (9/90 – 9/90, September only)
- Report - SW-DOR-00006 (10/90 – 9/91, Part 1 of 3)
- Logbook - SW-CWC-00001 (2/91-2/93)
- Logbook - SW-CWC-00002 (2/93-8/93)
- Logbook - SW-CWC-00003 (9/93-1/94)
- Logbook - SW-CWC-00004 (1/94-5/94)
- Logbook - SW-CWC-00005 (5/94-9/95)
- Logbook - SW-CWC-00006 (10/95-10/96)
- Logbook (10/96-6/97)
- Logbook (6/97–8/97)
- Logbook (8/97-4/98)
- Logbook (4/98-12/98)
- Logbook (12/98-present).

Weekly RCRA Inspections. Weekly inspections of 2401-W surfaces and of stored containers were documented on checklists. Checklist inspection parameters included unit cleanliness, storage surface integrity, container integrity, and indication of spills. The checklists were complete for the period of operations. Weekly inspection checklists do not indicate any leaking, damaged, or breached waste containers or evidence of spills on containment surfaces near containers. However, the inspection for September 7, 1988 identified that a "small amount" of oil had been spilled to the floor from a forklift by

the east door but had been cleaned up immediately. The following weekly inspection records were reviewed for evidence of spills.

- June 1988 through December 1997 (retrieved from RMIS):
  - SW-2401-W-1989
  - SW-2401-W-1990
  - SW-2401-W-1991
  - SW-2401-W-1992
  - SW-2401-W-1993
  - SW-2401-W-1994
  - SW-2401-W-1995
  - SW-2401-W-1996.

- Weekly Inspection checklists for January 1997 to present (CWC regulatory file):
  - No log number (1/97 – 3/97)
  - No log number (4/97 – 6/97)
  - No log number (7/97 – 9/97)
  - No log number (10/97 – 12/97)
  - No log number (1/98 – 3/98)
  - No log number (4/98-6/98)
  - No log number (7/98-9/98)
  - No log number (9/98-present).

Operations Personnel Interviews. Cognizant current and former CWC operators and operations managers were interviewed for direct or indirect knowledge of waste spills or container breaches in the 2401-W. Management and hands-on operators for the entire period of 2401-W operations were interviewed. All personnel interviewed were asked the following question: "Are you aware of any waste spills, leaks, or waste container breaches in the 2401-W Building?"

<u>Operations managers interviewed.</u>

- The CWC Operations manager from 1987 to November 1990 and again from June 1997 to the present, was interviewed in person October 28, 1998. He responded that during his tenure as operations manger, no spills or container breaches occurred in the 2401-W Building.

- The CWC Operations manager from November 1990 to March 1993 was interviewed in person October 28, 1998. He responded that during his tenure as operations manager, no spills or container breaches occurred in the 2401-W Building.

- The CWC Operations supervisor from March 1993 to June 1997 responded electronically to the potential for leaks at 2401-W on December 10, 1998. She stated that during her tenure as operations manager, no spills or container breaches occurred in the 2401-W Building.

Cognizant operators.

- A CWC Nuclear Process Operator (NPO) from 1988 to the present was interviewed in person October 29, 1998. He stated there had not been any spills or container breaches since the beginning of 2401-W operations.

- A CWC NPO from before 1988 to the present was interviewed October 28, 1998 by telephone. He indicated that no spills or container breaches occurred since the beginning of 2401-W operations.

- A CWC NPO from before 1988 to the present was interviewed December 10, 1998 by telephone. He indicated that that no spills or container breaches occurred since the beginning of 2401-W operations.

Results of Records Review and Personnel Interviews

The operating records review and personnel interviews used to establish 2401-W spill history were sufficiently diligent to allow PE certification of these closure activities and for use as a credible basis in establishing conclusive 2401-W spill history.

Sufficient operating records and reports exist, and cognizant personnel were available for interview, to establish that an authoritative and complete record of 2401-W operations exists.

Operating records and reports and personnel interviews identify no spills to 2401-W surfaces. No occurrence reports were written to document releases to the 2401-W. No mention is made in daily operations logs or in weekly inspection reports of waste spills to 2401-W floors. All personnel interviewed indicated that to their direct or indirect knowledge, no waste leaks or container breaches occurred that could have contaminated 2401-W surfaces. Further, stringent waste acceptance criteria for containers, the relatively small quantity of waste managed at this unit, the minimal level of container handling once waste was stored, and the fact that degradation of containers by weathering was not a factor, greatly minimized the potential for spills.

From the records, reports, and interviews documented herein, it reasonably can be concluded that no dangerous waste spills occurred to the floors of the 2401-W.

APPENDIX B

RADIATION SURVEY AND VISUAL INSPECTION CHECKLIST

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RADIATION SURVEY AND VISUAL INSPECTION CHECKLIST FOR CENTRAL WASTE COMPLEX CLOSURE ACTIVITIES

Instructions for completing this checklist are on pages 3 and 4.

1. Structure undergoing closure: 2401-W Storage Building (Floor Plan, page 5)

2. Components/materials being inspected: Epoxy-coated concrete floor

3. Structure spill history:

   (1) The document reviews and personnel interviews required for determining spill history are complete.

   Chris R. Haas, CR Haas for BM Barnes 2-8-99
   Signature Printed name Date

   (2) Spill(s) are identified on building floor plan. NA [NA per step 3(1) if no documented spills]
   1. (Initial/date)

4. Assigned visual inspectors and radiation survey personnel:

   (1) Visual inspector(s):
   Name: M. L. Hatfield Signature: [signature] Initials: MLH
   D. E. Gagnon Jr [signature] DEG
   Dir. Pitts [signature] [illegible]

   Assigning manager: [signature] 2/9/99
   Signature Date

   (2) Radiation survey personnel:
   Name: Rhonda Sharpe Signature: Rhonda Sharpe Initials: RS
   Roger Holcombe [signature] RH
   Emily Millikin Emily Millikin EM

   Assigning manager: JL Miller EJ Millikin for 2/9/99
   Signature Date

5. Initial Radiation Survey

   (1) Initial radiation survey(s) completed. (Initial/date) RS 12-9-99

   (2) Radiological performance standard met for all surveyed locations. (Yes or No) Yes
   (Initial/date) RS 12-9-99. If No, do step 7.

   (3) Radiation survey comments (if any): Survey of Random Cleanup areas performed; no Contamination was found.

   RS 12-9-99 (Initial/date)

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1

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6. **Initial Visual Inspection**

   (1) Initial visual inspection of all locations is complete. (Initial/date) DSP 12-9-99

   (2) Visual performance standard met for all locations. (Yes or No) Yes
   (Initial/date) DSP 12-9-99. If No, do step 7.

   (3) Visual inspection comments (if any): ~~None~~ DSP 12-9-99 Cleaned stain in section D1 and Re surveyed area.

   DSP 12-9-99 (Initial/date)

7. **Decontamination and Verification** n/a [NA if Steps 5(2) and 6(2) are marked Yes]

   (1) Decontamination method used: _____

   _____/_____ (Initial/date)

   (2) Comments on decontamination (if any): _____

   _____/_____ (Initial/date)

   (3) Decontamination is complete.
   _____/_____(Initial/date)

   Note: Decontamination waste will be collected, designated, and disposed of accordingly.

   (4) Verification of visual and radiological performance standards for decontaminated locations.

   (a) Radiation survey complete and radiological performance standards met at all decontaminated locations. _____/_____(Initial/date)

   (b) Visual inspection complete and visual performance standard met for all decontaminated locations. _____/_____ (Initial/date)

8. Additional comments (if any): None

   DSP 12-9-99 (Initial/date)

9. The checklist is complete. DSP 12-9-99 (Initial/date)

Note: Forward the completed checklist to the CWC Environmental Compliance Officer for placement in the CWC regulatory file.

RADIATION SURVEY AND VISUAL INSPECTION CHECKLIST FOR CENTRAL WASTE COMPLEX CLOSURE ACTIVITIES

Instructions for Completion

1. Identify the CWC structure undergoing closure.

2. Identify the portion of the structure undergoing closure and the type of material (e.g., coated concrete floor).

3. (1) An assigned inspector [step 4(1)] or other cognizant Solid Waste personnel will sign this step when document reviews and personnel interviews required by the closure plan to establish spill history for the locations identified at steps 1 and 2 are complete and documented. If no spills occurred, mark step 3(2) NA.

   (2) If this step is not marked NA, an assigned inspector will sign off that spill history documentation completed for step 3(1) has been reviewed and the location of all documented spills is shown on the gridded floor map (page 5) for inspection.

4. (1) and (2). The appropriate manager will sign off this step when visual inspection and radiation survey personnel are assigned. Inspection and survey personnel will sign and print their name and enter their initials.

5. (1) Initial radiation survey(s) are anticipated to occur at the time of the visual inspections. Inspector(s) will sign off that all randomly selected locations and all visual indications [step 6(2)] have undergone initial radiation survey as described below and all surveyed locations and the survey method used are documented on attached floor plan.

   Performing the radiation survey:

   - **Establishing radiological background.** Radiological background will be established using onsite methods and good health physics practices. The health physics technician will enter the building, turn on the instrument, set the range switch to the lowest range, and allow a 10-second warm up. For the Geiger-Mueller portable survey instrument, the maximum background is limited to 150 counts per minute. Instrument efficiency is based on the instrument being held within ¼" of the surface. For the portable alpha meter, 3 counts per minute will allow efficient operation.

   - **Radiation survey methods.** Radiation survey(s) will consist of using appropriate hand-held instrumentation and/or of smears that will be read with stationary equipment located at MO-438. Large area wipe (LAW), technical smear (TS), static measurement (SM), and scan measurement (Scan) will be used as considered necessary. LAWs entail wipedown of an area approximately 300 square centimeters by hand with a swipe media. The surface is counted with the portable instrument. A TS entails taking wipes of an area approximately 100 square centimeters with the swipe media which is counted by stationary equipment located as MO-438. SMs entail holding the probe within ¼ inch of the area to be surveyed and holding at that location for 10 to 20 seconds. Scans entail holding the probe ¼ inch from the surface and scanning a location at a travel speed of approximately 2 inches per second.

(2) The radiological performance standard is 'no measurable amounts of radiological contamination above background levels'. Any spot, area, or location that exceeds radiological background will be considered a radiological indication that will be identified on the attached floor plan. The TS method will be used to identify the extent of radiological contamination.

(3) Enter any comments regarding the radiation survey.

Note: A current radiological release for the entire 2401-W Storage Building is documented on Radiological Survey Report, Number SW 243073 (Attachment 1).

6. (1) Initial visual inspections will be considered complete and this step signed off when all locations identified in steps 1 and 2 and on the floor plan (page 5) have been inspected for achievement of the visual performance standard.

(2) The dangerous waste performance standard is 'no obvious visual signs of potential dangerous waste contamination'. Surfaces must be free of indications of dangerous waste, except for residual waste stains consisting of light shadows, slight streaks, or minor discoloration. A visual indication is any area that does not meet this standard. *Note: This visual standard is more stringent than the 40 CRF 268.45 'clean debris surface' standard for clean closure of containment structures recommended in Ecology's Guidance for Clean Closure of Dangerous Waste Facilities (Publication #94-111) that allows residual staining and some waste to remain after closure.*

(3) Enter any comments regarding the visual inspections.

7. (1) Surface(s) will be decontaminated by being washed, wiped, or scrubbed by hand using damp cloths, paper towels, or brushes and, as necessary, a nonregulated cleaner or detergent. The decontamination method and materials used will be entered.

(2) Enter any comments regarding decontamination.

(3) This step is signed off when all locations shown as requiring decontamination by steps 5(2) and 6(2) are decontaminated.

(4) (a) Sign off step after all decontaminated locations are surveyed using the TS method (unless survey personnel identify a more appropriate survey method) and the radiological performance standard described in step 5(2) is met.

(b) Sign off step when all decontaminated location(s) have been visually inspected and the visual performance standard described in step 6(2) is met.

Note: Decontamination waste will be collected, designated, and disposed of accordingly.

8. Enter any comments not previously entered.

9. This step is signed off when inspector(s) have reviewed the checklist and all steps are complete and verified, and all visual and radiological indications identified on the floor plan (page 5) are dispositioned. *Note: The completed checklist is to be forwarded to the CWC Environmental Compliance Officer for placement in the CWC regulatory file.*

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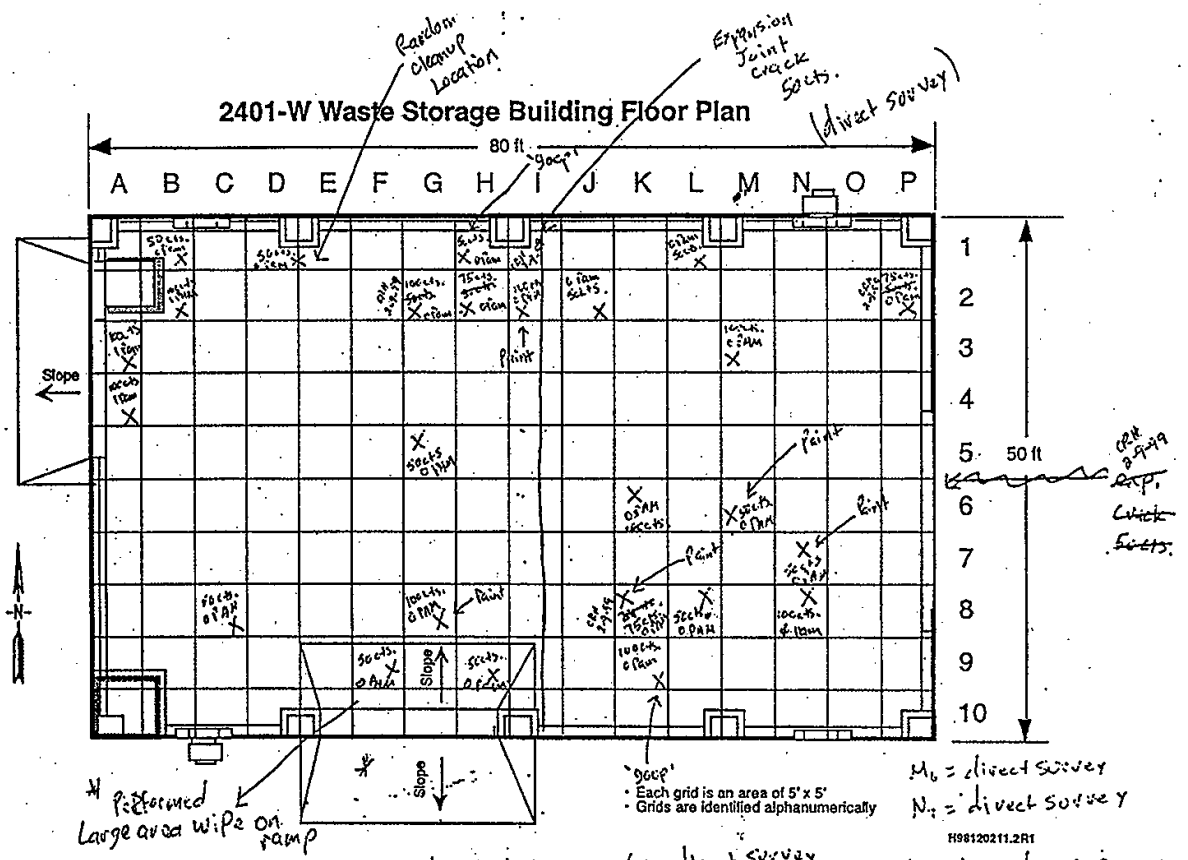

direct survey = 'scan'

B_1 = direct survey
D_1, E_1 = direct survey
H_1 = direct survey
L_1 = direct survey
P_2 = direct survey

H_2 = direct survey
J_2 = direct survey
G_2 = direct survey
B_2 = direct survey
M_2 = direct survey

G_3 = direct survey
L_3 = direct survey
N_3 = direct survey
C_4 = direct survey
K_4 = direct survey

M_6 = direct survey
N_7 = direct survey
F_9, H_9 = direct survey
A_3, A_{10} = direct survey
K_3 = direct survey
G_3 = direct survey
I_2 = direct survey

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PROJECT HANFORD RADIOLOGICAL SURVEY REPORT

Survey Report No. SW 243073

Page 1 of 2

Date	Time (Start/Stop)	Area/Bldg./Room/Location	F.C.
12-17-98	1030 / 1130	200 WEST / 2401-W / 204	SW

RWP Number	Work Package/Job Control Package/JSA	Routine Surveillance Task Number	Radiological Shipping Rec. Number
SW-001	N/A	N/A	N/A

Purpose of Survey (check appropriate box(es)): ☐ Job Coverage, ☐ Required Task, ☐ Material Release, ☐ Rail Shipment

Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill — Alarm Response: ☐ Cam, ☐ ARM, ☐ APM

☐ Exposure Incident ☒ HRA/VHRA Work (Rev. 12-17-98) Other: AREA SURVEY

Job Description: SURVEYED ENTIRE FLOOR AREA OF 2401-W BECAUSE BUILDING WAS EMPTY AND RELEASE SURVEY WAS REQUIRED. N/A → N/A →

DOSE RATE MEASUREMENTS Note 1 F = Field (≥30 cm) C = Contact (<1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
			N/A						

CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA β γ	Direct Gross cpm/PA α	Background β γ	Background α	Total dpm/100 cm² β γ	Total dpm/100 cm² α	Removable dpm/100 cm² β γ	Removable dpm/100 cm² α
1	LARGE AREA WIPES OF	N/A	→						→
↓	TOTAL FLOOR (>1000 cm²)	N/A	→				→	<1000	<BKG
2	SPOT CHECK DIRECT FOR	N/A							→
↓	ALPHA (FLOOR AREA)	80	0	80	0	<5000	<500	N/A	N/A
3	TECHNICAL SWIPES (10)	N/A							→
↓	TAKEN ON FLOOR AREA	N/A						→	<20
			N/A						

AIR SAMPLE MEASUREMENTS (μ Ci/ml)

	BZ	GA	Initial	Decay		BZ	GA	Initial	Decay
α 1			N/A		α 2			N/A	
β γ 1					β γ 2				

Sample Counter Log Number or Sample ID Number: SW 12171998 104 N/A

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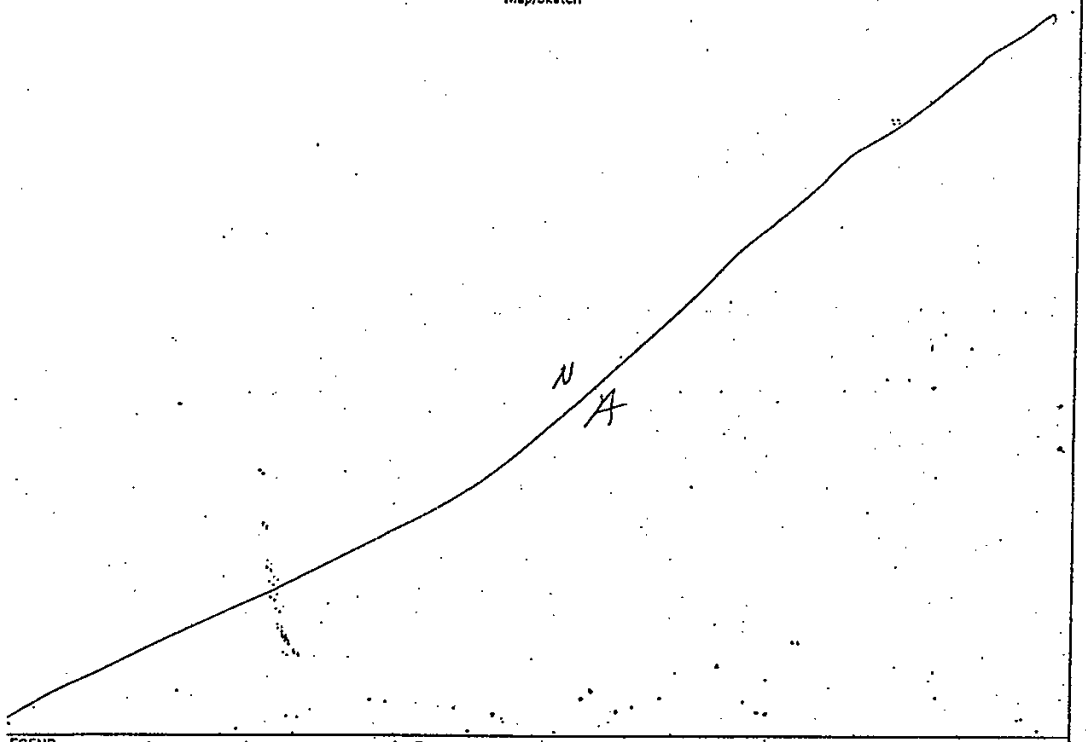
PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT

Survey Report No. SW 243073

Page 2 of 2

Map/Sketch



LEGEND: Smear; Air Sample; LAW; Neutron; Contact Reading; (designation inside); Radiological Area Boundary; Dose Rates in mrem/h unless otherwise noted

COMMENTS: (Additional information as necessary to interpret results)

N/A

Instr./Probe Model	RO-3B (CP)	GM Model g-m probe	PAM	GM MODEL G-M Probe	PAM	SAC-4
Serial No.	N/A	CMEB5-0092	ACHN2 0314	CMEBB-0190	ACHN2 0625	USEB3 0007
	NA	DTEB5-0527	DTHN3 0074	DTHNC-0777	DTHN3 0326	N/A
Efficiency (used)	NA	.10	.14	.10	.14	.57

Name (Print): R. Holcombe / R. Stamper — Payroll No.: 64811 / 81775

Signature: R. Holcomba / R. Stamper

Reviewer: Name (Print): Joel "Dane" Butler — Date: 12/17/98 — Payroll No.: 66703

Signature: Joel "Dane" Butler

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APPENDIX C

PRELIMINARY PROFESSIONAL ENGINEER CLOSURE STATEMENT

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Attachment 01 Page 1 of 1
CO-99-WMH-073
February 12, 1999

PRELIMINARY PROFESSIONAL ENGINEER'S STATEMENT FOR CLOSURE OF THE 2401W STORAGE BUILDING

Chapter 11 of the "Hanford Facility Dangerous Waste Permit Application" (DOE/RL-91-17 Rev 1) gives the closure requirements for the Central Waste Complex Storage Facilities (CWC). The document is in the process of approval by the Washington State Department of Ecology. Closure activities based on the current document have been completed.

Periodic site visits, phone conversations and document reviews were conducted to observe and document the closure activities. Each inspection activity was recorded on the Inspection Checklist for CWC Closure Activities. My field trip observations are recorded on Field Trip Report forms.

All requirements for closure activities stipulated by the current closure documents have been met. The periodic inspections including the final inspection revealed no discrepancies.

The final certification of closure statement will be issued upon Ecology approval of the closure document.

Ronald G. Hollenbeck 2-12-99
Ronald G. Hollenbeck, P.E.
Washington #23750
Fluor Daniel Northwest Inc.

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