WASTE ENCAPSULATION AND STORAGE FACILITY
ADDENDUM HB
HOT CELL G DANGEROUS WASTE MANAGEMENT UNIT
CLOSURE PLAN

CHANGE CONTROL LOG

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The "**Modification Number**" represents Ecology's method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number
11/16/2020	8C.2020.10F

This page intentionally left blank.

WASTE ENCAPSULATION AND STORAGE FACILITY
ADDENDUM HB
HOT CELL G DANGEROUS WASTE MANAGEMENT UNIT
CLOSURE PLAN

This page intentionally left blank.

ADDENDUM HB
CLOSURE PLAN

TABLE OF CONTENTS

HB.1 Introduction 5
HB.2 Hot Cell G Dangerous Waste Management Unit 5
HB.2.1 Unit Description 5
HB.2.2 Maximum Waste Inventory 6
HB.3 Health and Safety Requirements 6
HB.4 Closure Activities 7
HB.4.1 Initial Closure Phase Activities 7
HB.4.1.1 Records Review 7
HB.4.1.2 Waste and Waste Residue Removals 7
HB.4.1.3 Equipment Deactivation and Removal 8
HB.4.1.4 Visual Inspection of Hot Cell G Dangerous Waste Management Unit Surfaces 8
HB.4.2 Extended Closure Status 8
HB.4.3 Final Closure Phase Activities 9
HB.4.3.1 Demolition of the Hot Cell G Dangerous Waste Management Unit 9
HB.4.3.2 Visual Inspection of Soil Under Hot Cell G Dangerous Waste Management Unit 10
HB.4.3.3 Soil Sampling Under Hot Cell G Dangerous Waste Management Unit 10
HB.5 Identifying and Managing Waste Generated During Closure 10
HB.5.1 Oil Drained from Hot Cell G Viewing Windows 10
HB.5.2 Debris from Demolition 10
HB.6 Identifying and Managing Contaminated Environmental Media 11
HB.7 Closure Performance Standards 11
HB.8 Sampling and Analysis Plan 13
HB.8.1 Sampling and Analysis Plan Requirements 13
HB.8.2 Project Management 13
HB.8.2.1 Project/Task Organization 13
HB.8.3 Sampling Documents and Records 15
HB.8.4 Sampling Design and Analysis 16
HB.8.4.1 Sampling Process Design 16
HB.8.4.2 Soil Sampling Methods and Handling 18
HB.8.4.3 Analytical Methods 20

HB.8.4.4 Quality Control 20
HB.8.5 Data Review, Verification, Validation, and Usability Requirements 21
HB.8.5.1 Data Verification 21
HB.8.5.2 Data Validation 22
HB.8.5.3 Verification of Visual Sample Plan Input Parameters 22
HB.8.5.4 Sampling and Analysis Requirements to Address Removal of Contaminated Soil 22
HB.8.5.5 Resolving Contamination Identified During Focused Sampling 22
HB.8.6 Revisions to the Sampling and Analysis Plan and Constituents to be Analyzed 23
HB.9 Confirmation and Certification of Closure Activities 23
HB.9.1 Role of the Independent Qualified Registered Professional Engineer 23
HB.9.2 Certification of Closure Performance Standards 23
HB.9.3 Conditions that will be Achieved when Closure is Complete 24
HB.10 Closure Schedule and Time Frame 24
HB.11 Cost of Closure 29

FIGURES

Figure HB-1 Waste Encapsulation and Storage Facility Dangerous Waste Management Units 6
Figure HB-2 Sampling and Analysis Plan Project Organization 15
Figure HB-3 Waste Encapsulation and Storage Facility Hot Cell G Dangerous Waste Management Unit Closure Schedule Timeline 27

TABLES

Table HB-1 Inspection Schedule for the Hot Cell G Dangerous Waste Management Unit 9
Table HB-2 Closure Performance Standards for Soil and Analytical Performance Requirements 12
Table HB-3 Visual Sample Plan Parameter Inputs 17
Table HB-4 Preservation, Container, and Holding Time Requirements for Soil Samples 19
Table HB-5 Project Quality Control Sampling Summary 20
Table HB-6 Waste Encapsulation and Storage Facility Hot Cell G Dangerous Waste Management Unit Closure Activities Schedule 25

HB.1 Introduction

This addendum describes closure activities for the Hot Cell G Dangerous Waste Management Unit (DWMU), which is part of the Waste Encapsulation and Storage Facility (WESF) Operating Unit Group (OUG). Hot Cell G is a miscellaneous storage unit, and closure activities are performed under WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste* (hereinafter called the Hanford Facility RCRA Permit).

Clean closure refers to closure activities that result in full removal of all waste and full removal or decontamination of all structures, equipment, debris, environmental media (such as soil and groundwater), and other materials affected by releases from a unit (Ecology Publication #94-111, *Guidance for Clean Closure of Dangerous Waste Units and Facilities*). This plan details the initial and final closure activities necessary to achieve clean closure of the Hot Cell G DWMU.

Initial closure will include records review, equipment deactivation (if needed), and visual inspection of the Hot Cell G DWMU. Final closure of Hot Cell G will coincide with the removal of Hot Cell A through Hot Cell F closing unit, and will include removal of Hot Cell G visual inspection of underlying soil, area-wide soil sampling, and focused soil sampling, as necessary. If final closure performance standards are achieved, certification of final closure will be provided to the Washington State Department of Ecology (Ecology). Closure of the Hot Cell G DWMU will be performed in accordance with the closure schedule provided in Section HB.10.

This Closure Plan complies with the closure requirements outlined in Washington Administrative Code (WAC) 173-303-610(2) through (6), Dangerous Waste Regulations, *Closure and post-closure*, and has been developed using historical information, process knowledge, and various guidance documents.

HB.2 Hot Cell G Dangerous Waste Management Unit

Hot Cell G is located in the southwest portion of the 225-B Building (Figure HB-1). The following sections provide information in regards to the physical construction and operation of the Hot Cell G DWMU.

HB.2.1 Unit Description

Hot Cell G is constructed of high density concrete with inner dimensions of approximately 4.9 by 2 by 4.11 m (16 by 8 by 13.5 ft) with approximately 89 cm (35 in.) thick walls. The floor of the hot cell consists of an approximately 3 cm (1 in.) steel plate across the top of the hot pipe trench, then topped with 17.1 cm (6.75 in.) of high density concrete for a total floor thickness of approximately 20 cm (8 in.). The floors and walls are coated with white paint that is resistant to radiation and corrosion. Removable cover blocks with an opening for capsule transfer operations top the hot cell and provide access to the canyon through the cell ceiling. The opening is covered by a movable shield gate for positive control of the Hot Cell G boundary.

Service piping is embedded in the concrete walls of Hot Cell G. Service piping includes utility services (e.g., air, water, and electricity) that support process equipment operation. For further information on Hot Cell G design and operation, see WESF Addendum C, “Process Information.”

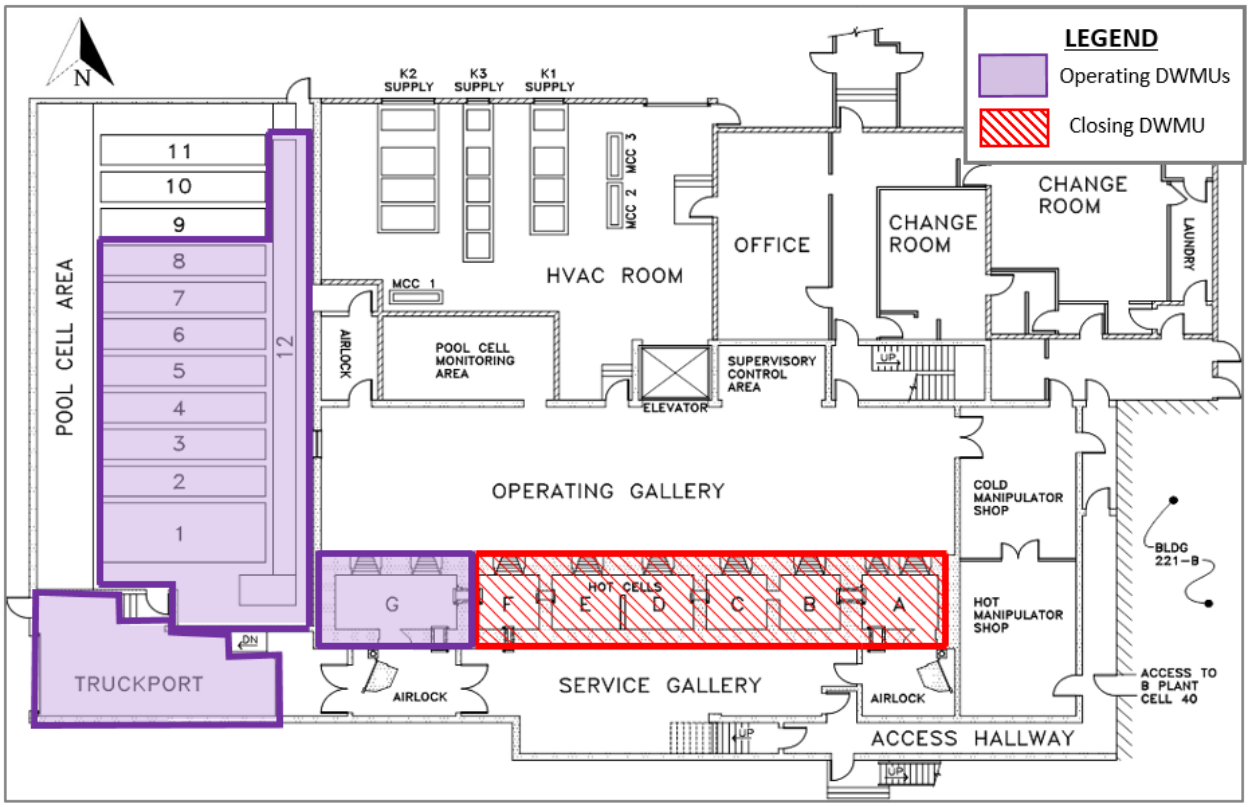

Figure HB-1 Waste Encapsulation and Storage Facility Dangerous Waste Management Units

HB.2.2 Maximum Waste Inventory

WESF stores 1,936 stainless steel capsules containing radioactive cesium chloride and strontium fluoride salts. Waste inventory is described further in WESF Addendum A.

HB.3 Health and Safety Requirements

Closure of the Hot Cell G DWMU will be performed in a manner to ensure the safety of personnel and the surrounding environment. Qualified personnel will be trained in and perform all necessary closure activities in compliance with the applicable safety and environmental procedures identified in WESF Addendum G, "Personnel Training." All field operations will be performed in accordance with applicable health and safety requirements. Personnel will be equipped with appropriate personal protective equipment for the closure activity being performed.

The Permittees have instituted training and qualification programs to meet training requirements imposed by regulations, U.S. Department of Energy (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. Attachment 5, *Hanford Facility Personnel Training Program*, to the Hanford Facility RCRA Permit (WA7890008967) describes specific training requirements for Hanford Facility personnel. The Permittees will comply with the training matrix detailed in WESF Addendum G, which provides training requirements for Hanford Facility personnel, whose job tasks are

directly associated with the Hot Cell G DWMU. Training records are maintained for each employee in an electronic database. The Permittees' training organization maintains the training records system.

During the closure period, the Hot Cell G DWMU will be inspected to prevent threats to human health and the environment in accordance with WAC 173-303-320, *General inspection*, requirements and Section HB.4.2. Security measures in effect at WESF during closure are identified in WESF Addendum E, "Security."

HB.4 Closure Activities

At final closure, Hot Cell G DWMU will be certified as clean closed under Washington State's *Hazardous Waste Management Act* (Revised Code of Washington [RCW] 70.105, *Hazardous Waste Management*) and applicable regulatory requirements of WAC 173-303. Clean closure determinations for the Hot Cell G DWMU will be based on successful completion of initial and final closure activities outlined in this section.

The following initial closure activities will be performed:

- Records review (Section HB.4.1.1).
- Waste or waste residue removal, if found during records review (Section HB.4.1.2).
- Equipment deactivation activities and, if necessary, removal activities (Sections HB.4.1.3).
- Visual inspection (Section HB.4.1.4).

Final closure activities for Hot Cell G DWMU will include the following activities:

- Hot Cell G DWMU removal (Section HB.4.3.1).
- Visual inspection of underlying soil and determination if focused samples are required (Section HB.4.3.2).
- Collection of grid samples in conjunction with Hot Cell A through Hot Cell F soil sampling and, if necessary, focused soil sample collection (Section HB.4.3.3).
- Final clean closure confirmation and transmittal (Section HB.9).

Upon acceptance of final closure certification by Ecology, a permit modification request will be submitted to remove the Hot Cell G DWMU from the Hanford Facility RCRA Permit (WA7890008967).

HB.4.1 Initial Closure Phase Activities

Cesium and strontium capsules will be removed from the WESF OUG prior to initiating closure activities. Activities associated with movement of the capsules will be monitored and documented in the operating record.

HB.4.1.1 Records Review

WESF capsule storage, operating, inspection, and spill records will be reviewed for documented spills or potential releases of mixed waste within Hot Cell G DWMU, and subsequent cleanup activities. Results of the records review will be documented in the operating record.

HB.4.1.2 Waste and Waste Residue Removals

Historic operating records and related documents do not contain any evidence of releases of mixed waste into the WESF OUG. Hot Cell G is constructed of high-density concrete with a steel plate on the floor (WESF Addendum C). In the event a capsule breached both the inner and outer capsules simultaneously, engineering controls and distance to groundwater (94 m [310 ft]) make contamination of groundwater unlikely.

While dangerous waste and mixed waste residues are not anticipated, if found during clean closure activities, then they will be treated as a newly generated waste and managed in accordance with all applicable requirements of WAC 173-303-170, *Requirements for generators of dangerous waste*, through WAC 173-303-230, *Special conditions*, and WAC 173-303-610.

HB.4.1.3 Equipment Deactivation and Removal

Hot Cell G DWMU will contain the equipment listed below during capsule transfer operations:

- Loading and sealing equipment.
- Piping.
- Manipulators.
- Lead windows.
- Shielded storage.
- Transfer cart.
- Hot Cell G crane.
- Tubes and hoses.

At the time of closure, remaining equipment within the Hot Cell G DWMU boundary will be evaluated to determine if it will be deactivated and/or removed. Removed equipment may be relocated and stored for future use. If equipment removed from Hot Cell G DWMU is deemed a waste, then it will be treated as a newly generated waste to comply with requirements noted in the previous section. If equipment or other waste residue designates as a dangerous waste, it will be subject to Land Disposal Restrictions (LDR) requirements of WAC 173-303-140, *Land disposal restrictions*, which include by reference 40 Code of Federal Regulations (CFR) 268, *Land Disposal Restrictions*. Such dangerous waste or waste residue will be treated, stored, or shipped to an approved waste disposal facility.

HB.4.1.4 Visual Inspection of Hot Cell G Dangerous Waste Management Unit Surfaces

After equipment has been deactivated or removed from Hot Cell G, a visual inspection will be performed. The purpose of the initial closure visual inspection is to evaluate surfaces for dangerous waste-related staining, cracks, holes, or other breaches in Hot Cell G that may be significant enough to allow migration of contaminants. Notation will be made in the operating record documenting results of the visual inspection and any focus sampling required during the final closure phase (Section HB.4.3.3).

HB.4.2 Extended Closure Status

Extended closure status is the period between initial and final closure phases. The Hot Cell G DWMU will be considered in extended closure when the initial closure activities are completed (Section HB.9).

During the extended closure period, inspections will continue to maintain the facility in a manner that prevent threats to human health and the environment. Upon initiation of closure and through the extended closure period, annual inspections of the DWMU will be performed in accordance with Table HB-1. Annual inspections are deemed sufficient because any structural degradation of the DWMU that could potentially cause a release of dangerous waste constituents to the environment would occur slowly and can be identified at this inspection frequency.

Table HB-1 Inspection Schedule for the Hot Cell G Dangerous Waste Management Unit

Inspection Item/Area	Frequency	Types of Problems and Evaluation Criteria
Posted warning signs[a]	Annually	Verify that signs are posted and legible.
225-B Building exterior surfaces and surrounding area[a]	Annually	Check for structural damage to the building. Check outside the building for liquid accumulation or signs of a release of hazardous waste.
Hot Cell G[b]	Annually	Check for cracks, gaps, or other degradation of the DWMU that could compromise the integrity.

[a] Inspection will continue during initial closure activities and through extended closure until final certification.

[b] Inspection will begin after initial closure activities are completed until final certification.

DWMU = Dangerous Waste Management Unit

HB.4.3 Final Closure Phase Activities

The final closure phase for Hot Cell G will coincide with final closure of Hot Cells A through F. The DWMU shall remain in place until future remedial actions take place.

HB.4.3.1 Demolition of the Hot Cell G Dangerous Waste Management Unit

The following primary activities are required to complete demolition of the Hot Cell G DWMU as described in the following sections:

- Location of utilities.
- Mobilization of equipment.
- Demolition and disposal of Hot Cell G DWMU.

HB.4.3.1.1 Location of Utilities

Prior to demolition, any in-use utilities will be located as well as the underground fire water line. The fire water line supplies water to the fire hydrant, which can be used as the water supply for dust suppression during demolition activities.

HB.4.3.1.2 Equipment Mobilization

Resources, equipment, and materials (e.g., support trailers, excavators, front loaders, sand, and water fog cannons) necessary to perform demolition will be staged in designated laydown areas in proximity to WESF.

HB.4.3.1.3 Demolition and Removal of Hot Cell G

Demolition of the Hot Cell G DWMU will be accomplished by rubblizing the concrete structure. Rubblized concrete will be placed into bulk containers and then removed and managed as debris (Section HB.5.2).

Water may be used to control dust generated from demolition activities. The amount of water used will be minimized to prevent ponding and runoff. While unlikely, other controls such as portable ventilation filter units, high efficiency particulate air filtered vacuum cleaners or fogging agents may be used.

Additional storm water runon and runoff controls may be implemented, as needed. Waste will be disposed in an appropriate disposal facility.

HB.4.3.2 Visual Inspection of Soil Under Hot Cell G Dangerous Waste Management Unit

Once the Hot Cell G DWMU has been removed, a visual inspection will be conducted to identify any dangerous waste-related staining in the underlying soil. Information from the initial closure phase inspection (Section HB.4.1.4) and records review (Section HB.4.1.1) will be included in this final closure phase inspection. The initial inspection will include notation on where areas of concern were located, including possible evidence of contaminant migration to soil, if any.

Notation will be made in the operating record documenting results of the visual inspection. Based on the results of this inspection, focused samples may be required (Section HB.4.3.3) to achieve closure performance standards.

HB.4.3.3 Soil Sampling Under Hot Cell G Dangerous Waste Management Unit

The final closure phase for the Hot Cell G DWMU will include grid sampling and, if needed, focused soil sampling. Soil samples will be collected after removal of the DWMU structures. Grid sampling will occur in conjunction with the Truckport, Pool Cells, and Hot Cell A through Hot Cell F DWMUs (Section HB.8.4). Results of the laboratory analysis will be compared to closure performance standards for soil (Section HB.9).

If focused soil sampling is required as a result of the findings during the initial closure phase records review (Section HB.4.1.1) or visual inspections (Sections HB.4.1.4 and HB.4.3.2), then samples will be collected at the identified locations. Results of the laboratory analysis will be compared to closure performance standards for soil (Section HB.7). Any waste generated during soil sample collection will be managed as a newly generated waste (Section HB.6).

HB.5 Identifying and Managing Waste Generated During Closure

Closure activities for the Hot Cell G DWMU could potentially result in generation of two waste streams requiring proper management and disposal: oil drained from Hot Cell G viewing windows and debris from demolition.

HB.5.1 Oil Drained from Hot Cell G Viewing Windows

The oil between the panes of glass in each viewing window will be drained and collected in preapproved containers. The oil between the glass sections is a white mineral oil with no hazardous properties; therefore, it will be managed as nondangerous maintenance waste and disposed at an approved disposal facility.

HB.5.2 Debris from Demolition

Debris from demolition includes but is not limited to the following:

- Concrete and associated rubblized debris.
- Miscellaneous support equipment.
- Construction materials.
- Equipment removed from Hot Cell G that is not reused.

Debris generated during closure activities will be characterized and managed as a newly generated waste stream. The preferred management of debris resulting from demolition of Hot Cell G is in bulk form. Bulk waste will be characterized and placed into bulk containers such as roll-off boxes for disposal that will be stored in a suitable area in proximity to the DWMU.

If any waste is identified as hazardous waste, including debris, it must be properly disposed or decontaminated in accordance with WAC 173-303-610(5). The hazardous debris waste will be handled in accordance with all applicable requirements of WAC 173-303-170 through WAC 173-303-230. Accumulations of hazardous debris will be containerized and, labeled appropriately, and staged at central accumulation areas in accordance with WAC 173-303-200, *Conditions for exemption for a large quantity generator that accumulates dangerous waste*, standards. Waste containers meeting U.S. Department of Transportation (DOT) requirements will be packaged, labeled, and shipped in accordance with 49 CFR, *Transportation*, criteria. Waste packaged in non-DOT regulation (large or irregular shaped) containers will be shipped in accordance with the DOE/RL-2001-36, *Hanford Sitewide Transportation Safety Document*. Management and disposal of hazardous waste generated during closure will be documented and included as part of the clean closure certification (Section HC.9). Bulk containers containing hazardous waste will be covered when waste is not being added or removed. Lightweight material (e.g., plastic and paper) will be bagged, if appropriate, prior to placement in the bulk container to eliminate the potential for materials blowing out of the bulk container.

Dangerous and mixed waste subject to LDR requirements of WAC 173-303-140, which includes by reference 40 CFR 268 will be characterized and designated at the WESF, as applicable, prior to being stored, treated, and/or disposed of in an approved facility.

HB.6 Identifying and Managing Contaminated Environmental Media

If contaminated environmental media (soil) is identified as a result of clean closure verification sampling activities (i.e., samples indicate contamination above clean closure standards), the nature and extent of contamination will be evaluated. Soil surrounding the sampling node location, which indicated contamination above clean closure levels, will be removed horizontally to the next adjacent node locations where contamination was not identified and to a depth of approximately 3 ft (0.9 m). Contaminated soil will be removed using equipment capable of removing the quantity of material required to complete removal and clean close the DWMU. Following removal of contaminated soil, additional confirmatory sampling efforts will be conducted in accordance with the approved Closure Plan Sampling and Analysis Plan (SAP) (Section HB.8), at the same node location(s) where contamination was identified, to demonstrate clean closure levels.

Contaminated media (soil) will be managed as a newly generated waste stream in accordance with WAC 173-303-610(5) and handled in accordance with all applicable requirements of WAC 173-303-170 through WAC 173-303-230.

Contaminated soil will be containerized, labeled, and sampled for waste characterization. Accumulations of contaminated media will be placed in DOT-compliant containers and sent to an approved disposal facility or staged at central accumulation areas in accordance with WAC 173-303-200 standards. Waste subject to LDR requirements of WAC 173-303-140, which includes by reference 40 CFR 268, will be characterized and designated at the WESF, as applicable, prior to being stored, treated, and/or disposed of in an approved facility. While undergoing final activities to clean close the WESF OUG, the Permittees will provide a more detailed evaluation of how contaminated environmental media will be managed in accordance with Ecology clean closure guidance.

Management and disposal of waste generated during closure will be documented in the WESF Operating Record and included as part of the clean closure certification documentation.

HB.7 Closure Performance Standards

Closure performance standards for the Hot Cell G DWMU will be based on WAC 173-303-610(2) which, in accordance with WAC 173-303-610(2)(a), requires 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 atmosphere.
- 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.

For the Hot Cell G DWMU, the point of compliance or location where it is determined that the closure performance standard has been achieved is the soil beneath the DWMU. Clean closure will be accomplished through removal of the Hot Cell G DWMU and sampling of soil beneath the DWMU structure. Soil closure performance standards are described below. Confirmation of these standards is addressed in Section HB.9.

The Hot Cell G DWMU will be clean closed. Once the WESF DWMUs are removed, the remaining underlying soil will be sampled and must meet clean closure levels. In accordance with WAC 173-303-610(2)(b)(i), clean closure levels for the soil are the numeric cleanup levels calculated using unrestricted-use exposure assumptions according to WAC 173-340, *Model Toxics Control Act—Cleanup* (MTCA) regulations (WAC 173-340-700, *Overview of cleanup standards*, through WAC 173-340-760, *Sediment cleanup standards* [excluding WAC 173-340-745, *Soil cleanup standards for industrial properties*]). These numeric cleanup levels have been calculated according to the requirements of WAC 173-303-610(2)(b)(i) as of the effective date of the permit modification.

The miscellaneous unit performance standards identified in WAC 173-303-680, *Miscellaneous units*, Sections (2)(b)(i) through (4), as required by WAC 173-303-610(2)(b), are addressed in Table HB-2.

Table HB-2 Closure Performance Standards for Soil and Analytical Performance Requirements

CAS Number	Waste Code	Analyte	Closure Performance Standards		PQL (mg/kg)
			Value (mg/kg)	MTCA Basis	
SW-846 Method 6010			**Accuracy Requirement ±30% Recovery Precision Requirement ≤30 RPD[b]**		
7440-39-3	D005	Barium	1.60E+04	Direct soil contact – Noncancer (Method B)	2.00E+00
7440-43-9	D006	Cadmium	8.00E+01	Direct soil contact – Noncancer (Method B)	5.00E-01
7439-92-1	D008	Lead[a]	2.50E+02	Unrestricted land use (Method A)	5.00E+00
7440-22-4	D011	Silver	4.00E+02	Direct soil contact – Noncancer (Method B)	1.00E+00
SW-846 Method 7196			**Accuracy Requirement ±30% Recovery Precision Requirement ≤30 RPD[b]**		
18540-29-9	D007	Chromium VI	2.40E+02	Direct soil contact – Noncancer (Method B)	1.00E+00

References: SW-846, 2019, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Third Edition; Final Update IV-B, as amended.

WAC 173-340, *Model Toxics Control Act—Cleanup*.

[a]Closure performance standards are the numeric cleanup levels calculated using unrestricted use exposure assumptions according to MTCA (WAC 173-340) Method A (unrestricted use standards). MTCA Method A values were used when MTCA Method B values were not available.

[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.

CAS = Chemical Abstracts Service
PQL = Practical Quantitation Limit
MTCA = Model Toxics Control Act
RPD = Relative Percent Difference

A null hypothesis is generally assumed to be true until evidence indicates otherwise. The null hypothesis, as defined in WAC 173-340-200, *Definitions*, is that the underlying soil, once Hot Cell G DWMU has been removed, is assumed to be above unrestricted use cleanup levels, commonly called MTCA (WAC 173-340) Method B levels. Therefore, the site is presumed to be contaminated. Rejection of the null hypothesis means that sampling and analysis results of the site indicated soil contamination below the MTCA Method B levels. Sampling and analysis in accordance with the SAP (Section HB.8.1) will be used to determine whether the null hypothesis can be rejected, thereby confirming that soil meets the closure performance standards (MTCA Method B).

Because the DWMU is anticipated to be clean, should sampling and analysis determine that the null hypothesis can be accepted (indicating that the site is contaminated), such an event will be considered an unexpected event during closure, and the soil would then be identified as contaminated environmental media and managed in accordance with Section HB.6.

HB.8 Sampling and Analysis Plan

Sampling and analysis of the Hot Cell G DWMU underlying soil will be conducted to confirm whether closure performance standards (Section HB.7) have been achieved (Section HB.9.2). Sampling includes grid samples and, if necessary, focused samples. Sampling and analysis will be performed in accordance with the sampling and quality standards established in this closure SAP.

HB.8.1 Sampling and Analysis Plan Requirements

Soil sampling and analysis activities were designed using the U.S. Environmental Protection Agency (EPA) guidance document EPA/240/R-02/005, *Guidance on Choosing a Sampling Design for Environmental Data Collection for use in Developing a Quality Assurance Project Plan*, and Ecology Publication #94-111, and will be conducted via this SAP. The objective of the sampling described in this section is to determine if the closure performance standards for soil have been satisfied. Focused sampling will be conducted under the Hot Cell G DWMU, as needed.

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 V; ASTM International, 2017, Annual Book of ASTM Standards; and EPA guidance. Sampling and analysis activities will meet applicable requirements of SW-846, ASTM standards, and EPA-approved methods at the time of closure.

HB.8.2 Project Management

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

HB.8.2.1 Project/Task Organization

The Permittees are responsible for planning, coordinating, sampling, preparing, packaging, and shipping samples to the contract analytical laboratory. The project has the following key positions.

Regulatory Representative. Ecology will assign an Ecology employee as Project Manager responsible for oversight of the WESF Hot Cell G closure.

Project Manager and Technical Lead. The Project Manager provides oversight of closure activities and coordinates with the DOE-Richland Operations Office (DOE-RL), 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 WESF Hot Cell G closure 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 approved version of the SAP.

The Project Manager works closely with quality assurance (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 Regulatory Representative.

Environmental Compliance Officer. The Environmental Compliance Officer 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.

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 internal primary contractor work requirements.

Waste Management. The Waste Management communicates policies and protocols, and ensures project compliance for storage, transportation, disposal, and waste tracking.

Field Work 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 achievable, understood, and can be performed as specified.

Sample Management and Reporting. The Permittee's sampling organization coordinates field sampling as well as laboratory analytical work, ensuring that laboratories conform to the specifications of SW-846 analytical methodology at the time of closure. 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 contract analytical laboratory.

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 roles described above make up the project organization structure (regarding sampling and analysis) and interact in a manner shown graphically in Figure HB-2.

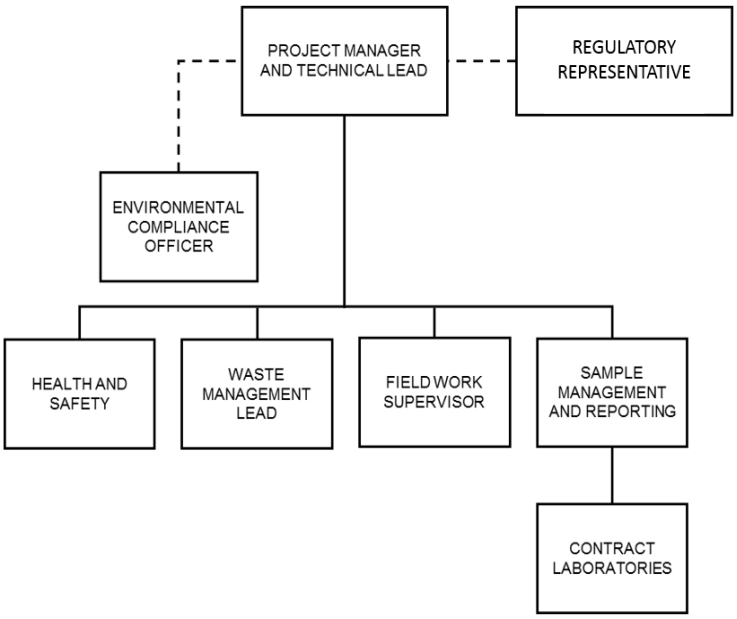

Figure HB-2 Sampling and Analysis Plan Project Organization

HB.8.3 Sampling Documents and Records

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. After review, logbooks will be signed by the 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 following records or references to their storage locations:

- Field logbooks or operational records.
- Data forms.
- Global positioning system data.
- Chain-of-Custody (COC) forms.
- Sample receipt records.
- Inspection or assessment reports and corrective action reports.
- Interim progress reports.
- Final reports.
- Laboratory data packages.
- Data verification and validation reports.

The contract analytical laboratory is responsible for maintaining and having available on request:

- Analytical logbooks.

- Raw data and quality control (QC) sample records.
- Standard reference material and/or proficiency test sample data.
- Instrument calibration information.

Records may be stored in either electronic or hard copy format. Regardless of medium or format, documentation and records are controlled in accordance with internal work requirements and processes to ensure the accuracy and retrievability of stored records. Records generated during closure will be maintained in the facility operating record for a minimum of 5 years after the clean closure certification has been accepted by Ecology.

HB.8.4 Sampling Design and Analysis

The sampling design includes input parameters used to determine the number and location of samples. The primary purpose of sampling the soil at the grid and focused sample locations is to determine if analytical results exceed closure performance standards (Table HB-2).

HB.8.4.1 Sampling Process Design

This SAP takes guidance from Section 7.0 in Ecology Publication #94-111 to determine the type of sampling design that will be used to demonstrate clean closure. When designing the sampling plan, both focused and grid sampling methods were considered. The basis for focused and grid (area-wide) sampling is described in the following paragraphs.

Focused (Judgmental) Sampling. As identified in Ecology Publication #94-111, Section 7.2.2, "Focused Sampling," defines selective sampling of areas where contamination is expected or releases have been documented. As a results of the records review (Section HB.4.1.1) or visual inspections (Sections HB.4.1.4 or HB.4.3.2), focused sampling may be required.

Selection of focused sampling units (i.e., the number and location of samples) is generally based on knowledge of the feature or condition under investigation and on professional judgment. Focused 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.

The use of statistical evaluation for focused data is not possible. Focused data must be reviewed directly against the closure performance standards as to whether they are above or below the closure performance standards.

Grid (Area-Wide or Random) Sampling. Section 7.2.1, "Area-Wide Sampling" (also called "grid sampling") in Ecology Publication #94-111 is appropriate when the spatial distribution of contamination at or from the closure unit is uncertain. Section 7.3, "Sampling to Determine or Confirm Clean Closure," in Ecology Publication #94-111 identifies the grid sampling approach as generally appropriate for sampling to determine or confirm whether closure performance standards are achieved.

In grid sampling, samples are collected at regularly-spaced intervals over an area. 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). 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.

Once WESF OUG has been removed, the area will be measured and dimensions documented. Using measurements for the underlying soil area, the quantity and location of the area wide samples will be determined using the Visual Sample Plan (VSP) software. VSP is a tool used throughout Washington State and nationally that statistically determines the quantity of samples required to accept or reject the null hypothesis based on input parameters specific to the unit or area.

For grid sampling determination in VSP, both parametric and nonparametric equations rely on assumptions about the data population. Typically, however, nonparametric equations require fewer assumptions and allow for more uncertainty about the distribution of data. Alternatively, if parametric assumptions are valid, the required number of samples is usually less than if a nonparametric equation was used. VSP parameter inputs, and the basis for those inputs, are detailed in Table HB-3.

Table HB-3 Visual Sample Plan Parameter Inputs

Parameter	Value	Basis
Primary objective of the sampling design	Null hypothesis	Compare a site mean or median to a fixed threshold. The basis is that the null hypothesis is true (site is contaminated). Clean closure requires rejection of the null hypothesis.
Type of sampling design	Nonparametric	Data are not assumed to be normally distributed.
Working null hypothesis	The mean value exceeds the threshold	The null hypothesis assumes that the site is dirty, requiring the sampling and analysis to demonstrate through statistical analysis that the site is clean (MTCA [WAC 173-340] Method B closure performance standards).
Grid sampling pattern	Triangular	A triangular pattern provided an even distribution of sample locations.
Standard deviation (S)	45%	This is the assumed standard deviation value relative to a unit action level for the sampling area. The value of 45% is conservative based on consideration of past verification sampling. (Number of samples calculated increases with higher standard deviation values relative to a unit action level.)
Delta (Δ)	40%	This is the width of the grey region. It is a user-defined value relative to a unit action level. The value of 40% balances unnecessary remediation cost with sampling cost. A Type II error with the grey region would result in cleanup of a site that is already clean.
Alpha (α)	5%	This is the acceptable error of deciding a dirty site is clean when the true mean is equal to the action level. It is a maximum error rate because dirty sites with a true mean above the action level will be easier to detect. A value of 5% was chosen as a practical balance between health risks and sampling cost.
Beta (β)	20%	This is the acceptable error of deciding a clean site is dirty when the true mean is at the lower bound of the grey region. A value of 20% was chosen during the DQO process as a practical balance between unnecessary remediation cost and sampling cost.
MARSSIM sampling overage	20%	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*.

Reference: EPA 402-R-97-016, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*.

WAC 173-340, *Model Toxics Control Act—Cleanup*.

DQO = Data Quality Objective

MTCA = Model Toxics Control Act

The decision rule for demonstrating compliance with the MTCA (WAC 173-340) Method B closure requirements includes a three-part test that compares sample results to the closure performance standards:

- The 95% upper confidence limit on the true data mean must be less than the MTCA Method B closure performance standard.
- No sample concentration can be more than twice the closure performance standards.
- Less than 10% of the samples can exceed the closure performance standards.

For the purpose of utilizing VSP software, the null hypothesis will be that the site is considered contaminated until proven clean, and it will be tested by comparing a site mean to a fixed threshold. However, in addition to ensuring the site mean does not exceed the MTCA (WAC 173-340) Method B clean closure performance standards, data will be evaluated to ensure that less than 10% of the individual values exceed MTCA (WAC 173-340) Method B clean closure performance standards and that no values are more than twice the cleanup level.

Area-wide sample locations will be determined using the area-wide grid with a random start sampling method run in VSP. Statistical analysis of systematically collected data are valid if a random start to the grid is used. The first node location will be chosen at random by VSP, and subsequent sample locations will be assigned by VSP using a grid sampling layout. The dimensions of the sample area will be entered into VSP to determine the locations of samples. The triangular grid sampling layout will provide an even distribution of sample locations. The samples will be taken from the node locations indicated by VSP and will be assigned sample location identifications and sample numbers using HEIS.

HB.8.4.2 Soil Sampling Methods and Handling

The sample matrix will consist of soil collected in clean sample containers. Soil will be collected at a depth of no more than 15 cm (6 in.) below surface of the soil, unless staining or discoloration indicates that contamination is below that depth. For the purpose of this SAP, ground surface is defined as the exposed soil surface layer once the Hot Cell G structure has been removed as part of the final closure activities. Once the soil is collected, it will be screened to remove material larger than approximately 2 mm (0.08 in.) in diameter, which allows for a larger surface area-to-volume ratio. This ratio increases the likelihood of identifying any potential contamination in the sample.

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. Sampling generally includes the following:

- Preparation and review of sampling paperwork such as COCs or labels.
- Sample container and equipment preparation.
- Field walkdown of sample area (includes marking sample locations).
- Sample collection.
- Sample packaging and shipping.

Sample preservation and holding time requirements are specified in Table HB-4. These requirements are in accordance with the analytical method specified. The final container types and volumes will be identified on the sample authorization form and COC form.

Table HB-4 Preservation, Container, and Holding Time Requirements for Soil Samples

EPA Method	Analysis/Analytes	Preservation Requirement	Holding Time
6010	ICP-OES (metals)	Cool ≤6°C	180 days
7196	Colorimetric (chromium VI)	Cool ≤6°C	30 days to extraction 24 hours after extraction

Reference: SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Third Edition; Final Update V.
EPA = U.S. Environmental Protection Agency
ICP = Inductively Coupled Plasma
OES = Optical Emission Spectrometry

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. HEIS sample numbers are issued to the sampling organization for the project. Each sample is identified and labeled with a unique HEIS sample number.

To prevent potential contamination of the samples, clean equipment will be used for each sampling activity. Level I EPA pre-cleaned sample containers will be used for samples collected for chemical analysis. Container sizes may vary, depending on laboratory-specific volumes/requirements for meeting the PQL.

The date and time of sample collection, and the sample location, depth, and corresponding HEIS numbers will be documented in the sampler's field logbook. A custody seal (e.g., evidence tape) will be affixed to each sample container or the sample collection package in such a way as to indicate potential tampering. Each sample container will be labeled with the following information on firmly affixed, water-resistant labels:

- Sample authorization form number.
- HEIS number.
- Sample collection date and time.
- Sampler identification (e.g., initials).
- Analysis required.
- Preservation method (if applicable).

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

- Analysis required.
- Sample location.
- Matrix (soil).

Sample custody will be maintained in accordance with existing Hanford Facility protocols to ensure maintenance of sample integrity throughout the analytical process. COC protocols will be followed throughout sample collection, transfer, analysis, and disposal to ensure that sample integrity is maintained.

Newly generated waste resulting from sampling activities will be containerized, labeled, characterized, designated as a dangerous or non-dangerous waste, stored, and treated, if necessary, to meet the LDRs in 40 CFR 268, incorporated into WAC 173-303-140(2)(a) by reference, then ultimately disposed of in an approved waste disposal facility in accordance with WAC 173-303-610(5).

HB.8.4.3 Analytical Methods

All analyses and testing will be performed consistent with this Closure Plan, laboratory contracts, and laboratory analytical procedures at the time of closure. The selected laboratory must be accredited by Ecology for the parameters and methods used. The approved laboratory must ensure that data satisfy all the project specific data acceptance criteria in this SAP. If a target analyte is detected at or above the clean closure level but less than the PQL of the analytical method, Ecology will be notified, and alternatives will be discussed to demonstrate clean closure levels.

Analytical methods and performance requirements associated with the target analytes are outlined in Table HB-2.

HB.8.4.4 Quality Control

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 HB-5.

Table HB-5 Project Quality Control Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Field Quality Control		
Trip blanks	One per 20 samples per media sampled. One per cooler for VOCs.	Contamination from containers or transportation.
Equipment rinsate blanks	If only disposable equipment is used, then an equipment blank is not required. Otherwise, one per 20 samples per analytical method per media sampled, or one per day.[a]	Adequacy of sampling equipment decontamination and contamination from non-dedicated equipment.
Field duplicates	One per batch[g], 20 samples maximum of each media sampled (soil samples).	Precision, including sampling and analytical variability.
Field split samples	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.[h]	Precision, including sampling, analytical, and interlaboratory.
Laboratory Quality Control		
Method blanks	1 per batch[g]	Laboratory contamination.
Lab duplicates	[b]	Laboratory reproducibility and precision.
Matrix spikes	[b]	Matrix effect/laboratory accuracy.

Table HB-5 Project Quality Control Sampling Summary

QC Sample Type	Frequency	Characteristics Evaluated
Matrix spike duplicates	[b]	Laboratory reproducibility, accuracy, and precision.
Surrogates	[b]	Recovery/yield.
Tracers	[b]	Recovery/yield.
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.

Reference: DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Document*.

[a]Whenever a new type of nondedicated 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 nondedicated equipment.

[b]As defined in the laboratory contract or quality assurance plan and/or analysis procedures.

[c]Nationally recognized program, such as DOE Mixed Analyte Performance Evaluation Program or Environmental Resource Associates.

[d]Soil matrix double-blind standards are submitted by request of Analytical Services.

[e]DOE Quality Systems for Analytical Services requires annual audit of commercial laboratories.

[f]DOE/RL-96-68 does not define a frequency for assessment of onsite laboratories. Three year evaluated supplier list requirement is typically applied.

[g]Batching across projects is allowing for similar matrices.

[h]Field split samples are generally used for interlaboratory comparison as periodic checks in large sample sets or when a particular method or laboratory has been producing unexpected results. Field splits are not required for small, discrete sample sets undergoing routing analyses using methods for which splits have been submitted as part of larger sample sets. Whenever a new type of nondedicated 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 nondedicated equipment.

DOE = U.S. Department of Energy

QC = Quality Control

VOC = Volatile Organic Compound

HB.8.5 Data Review, Verification, Validation, and Usability Requirements

Analytical results will be received from the contract analytical laboratory, loaded into a database (e.g., HEIS), and verified in accordance with Section HA.8.5.1. Data will be validated as described in Section HB.8.5.2. Grid sample results will be evaluated to ensure VSP model assumptions were correct (Section HB.8.5.3). If analytical results indicate soil contamination (Section HB.8.4.1), then sampling will be required after soil remediation is complete. The approach for collecting confirmatory samples is provided in Sections HB.8.5.4 and HB.8.5.5.

HB.8.5.1 Data Verification

Verification activities ensure analytical data in the database were properly uploaded and reflect the contract laboratory program equivalent data packages. These steps will consider both the primary and QC samples. Steps for data verification include analyzing for the following:

- Amount of data requested matches the amount of data received (number of samples for requested methods of analytes).
- Correct procedures/methods are used.
- Documentation/deliverables are complete.
- Hard copy and electronic versions of the data are identical.
- Data seem reasonable based on analytical methodologies.

HB.8.5.2 Data Validation

The contract analytical laboratory supplies the equivalent of contract laboratory program analytical data packages intended to support data validation by the third party. These data packages are supported by QC test results and raw data. Data validation includes both primary and QC samples, and considers issues with sample collection and analysis.

Controls are in place to preserve the data sent to the validators, such as allowing only additions to be made, not changes to the raw data. The format and requirements for data validation activities are based on the most current version of OSWER 9240.1-48, *National Functional Guidelines for Superfund Organic Methods Data Review*, and OSWER 9240.1-51, *National Functional Guidelines for Inorganic Superfund Data Review*. As defined by the validation guidelines, 5% of the analytical results will undergo Level C validation.

HB.8.5.3 Verification of Visual Sample Plan Input Parameters

Analytical data from grid sampling will be entered back into VSP. If all analytical data for a particular analyte are nondetectable at levels below the closure performance standard, then verification of VSP input parameters is not required for that analyte. VSP software uses the analytical data to determine if the user input parameters were estimated appropriately. Once analytical data are entered into VSP, the software will calculate the true standard deviation and determine if the null hypothesis can be rejected (Section HB.8.4.1). If the calculated standard deviation is smaller than the estimated user input standard deviation, then no additional sampling will be required. If the calculated standard deviation is larger than the estimated standard deviation, then additional sampling may be required.

Verification of the null hypothesis through VSP will determine if the mean value of the site analytical data supports rejection of the null hypothesis (Section HB.8.4.1).

HB.8.5.4 Sampling and Analysis Requirements to Address Removal of Contaminated Soil

In the event that sample results based on the MTCA (WAC 173-340) Method B three-part test (Section HB.8.4.1) indicate contamination above clean closure levels, the contaminated soil will be removed. Following removal of contaminated soil, additional samples will be taken at the same grid location as identified by VSP. Additional focused sampling may be added in areas where contamination is identified (Sections HB.4.1.1, HB.4.1.4, and HB.4.3.2). Additional focused samples will be documented and provided with the closure certification upon request by Ecology. These samples will be analyzed in accordance with the methods specified in Table HB-2, with accompanying QC samples as discussed in Section HB.8.4.4.

HB.8.5.5 Resolving Contamination Identified During Focused Sampling

In the event that focused sample results based on direct comparison (Section HB.8.4.1) indicate contamination above closure performance standards, then the focused sample location will be remediated to remove contaminated soil. Following remediation of the contaminated soil, confirmatory sampling will be performed. Analytical results of confirmatory soil sample(s) collected at focused sample location(s) will be directly compared to the closure performance standard to confirm that the remediation efforts were effective and the area is clean.

HB.8.6 Revisions to the Sampling and Analysis Plan and Constituents to be Analyzed

Changes to the SAP may be necessary due to unanticipated events during closure. An unanticipated event would be an event outside the scope of the SAP or a condition that inhibits implementation of the sampling as written. Any revision to the SAP will be submitted no later than 30 days after an unanticipated event as a permit modification as required in WAC 173-303-610(3)(b) and WAC 173-303-830(4), *Permit changes*.

HB.9 Confirmation and Certification of Closure Activities

Initial closure activities will involve deactivation and removal of equipment (as necessary), records review, and will conclude after the visual inspection (Section HB.4.1).

Confirmation of final closure will be performed using several methods as defined by the type of sample (Section HA.8.4.1). Closure certification is performed by an Independent Qualified Registered Professional Engineer (IQRPE) (Section HB.9.1). Certification will be submitted to Ecology in a manner consistent with Section HB.9.2 and the condition of the Hot Cell G DWMU after closure is described in Section HB.9.3.

HB.9.1 Role of the Independent Qualified Registered Professional Engineer

An IQRPE will be retained to provide certification of closure, as required by WAC 173-303-610(6). The IQRPE will be responsible for observing field activities and reviewing documents associated with initial and final closure of the Hot Cell G DWMU. At a minimum, the following activities will be performed by the IQRPE:

- Review records pertaining to documented spills or releases of mixed waste and subsequent cleanup activities.
- Review equipment deactivation and removal activities, as necessary.
- Review of the visual inspections.
- Observe or review grid and focused sampling activities, as applicable.
- Review soil sampling procedures and results.
- Observe or review contaminated environmental media removal, as applicable.
- Verify that closure activities were performed in accordance with this Closure Plan.

The IQRPE will record observations and reviews in the closure certification, which will then be provided to Ecology and maintained in the WESF portion of the Hanford Facility Operating Record.

HB.9.2 Certification of Closure Performance Standards

In accordance with WAC 173-303-610(6), final closure certification will be submitted to Ecology within 60 days of completion of the closure activities associated with the Hot Cell G DWMU. Certification will demonstrate that the DWMU has been closed in accordance with the specifications in this Closure Plan and will be submitted to Ecology by registered mail or other means that establish proof of receipt (including applicable electronic means). The closure certifications will be signed by the owner or operator, and signed and stamped by an IQRPE.

Upon request by Ecology and in accordance with WAC 173-303-610(6), information will be submitted to support closure certification. This information could include the following:

- All field notes and photographs relative to closure activities.
- Description and justification of any minor deviations from the approved Closure Plan.
- Documentation of the final disposition of all dangerous or mixed waste and corresponding residues (if any).

- Laboratory or field data, including sampling procedures, sampling locations, QA/QC samples, and COC procedures for all samples and measurements, including samples and measurements taken to determine background conditions and determine or confirm clean closure.
- Any data reviewed, tabulation of the analytical results, or report that was used by the IQRPE to determine closure performance standards were achieved.
- Description of the DWMU area upon completion of closure.

HB.9.3 Conditions that will be Achieved when Closure is Complete

Upon completion of the initial closure activities outlined within this Closure Plan, the Hot Cell G DWMU will have achieved initial closure and will enter extended closure status. Upon completion of final closure activities, the Hot Cell G DWMU will have achieved final closure performance standards. Upon approval of closure certification by Ecology, the Hot Cell G DWMU will be considered clean closed under RCRA. Once the closure certification for the Hot Cell G DWMU has been accepted by Ecology, a permit modification request will be submitted to Ecology to remove the Hot Cell G DWMU from the Hanford Facility RCRA Permit.

HB.10 Closure Schedule and Time Frame

Closure activities for the Hot Cell G DWMU as well as the expected duration for each activity are outlined in Table HB-6 and Figure HB-3. Initial closure activities for the Hot Cell G DWMU can only begin after the cesium and strontium capsules are removed from WESF. Major Milestone M-092 addresses the disposition path for the cesium and strontium capsules, with a milestone due date of August 31, 2025, to complete the transfer of the cesium and strontium capsules from WESF to a new permitted, interim safe storage facility. In accordance with WAC 173-303-610(3)(c)(i), a notification of intent to close the Hot Cell G DWMU will be submitted to Ecology at least 45 days prior to the date on which closure is expected to begin. Closure activities for the Hot Cell G DWMU are expected to take longer than the allotted 180 days [WAC 173-303-610(4)(b)]. Therefore, the Permittees request an extension to the start of closure. Approval of this Closure Plan will grant the Hanford Facility an extended closure period for performance of the closure activities, in accordance with WAC 173-303-610(4)(b); therefore, a separate extension request will not be filed. During the extended closure period, all steps to prevent threats to human health and the environment, including compliance with all applicable permit requirements, will continue to be taken.

Within 60 days following completion of closure activities outlined in this Closure Plan, a closure certification will be submitted to Ecology (Section HB.9.2).

Table HB-6 Waste Encapsulation and Storage Facility Hot Cell G Dangerous Waste Management Unit Closure Activities Schedule

Closure Activity Description		
Primary Activity	**Description of Activity**	**Expected Duration**
Initial Closure Activities		
Records review	Perform review of capsule storage, operating, inspection, and spill records.	60 days
Deactivation and removal of equipment	Equipment will be deactivated and removed, as necessary. If support equipment is removed it will either be re-used, or packaged and shipped as a waste to an approved facility.	60 days
Visual inspection of the Hot Cell G DWMU	Inspect structural integrity (visible aspects only) for any dangerous waste related staining, or cracks, holes, or other breaches in the concrete structure.	10 days
	Document visual inspection: include photos, locations, and dimensions of dangerous waste related staining, or cracks, holes, or other breaches in the Hot Cell G structure (if any).	
Extended Closure Status		
Extended closure period to coincide with clean closure of Hot Cells A–F	Continued surveillances and inspections	To be determined
Final Closure Activities		
Demolition of the Hot Cell G DWMU	Equipment mobilization	10 days
	Demolition and removal of waste generated	6 months
Sampling and analysis of underlying soil (includes data verification and data validation)	N/A	4 months
RCRA Closure Activities Complete*		
Submit clean closure certification to Ecology	N/A	60 days

Reference: WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*.

*RCRA clean closure achieved. Upon acceptance of closure certification by Ecology, a permit modification request will be submitted to remove the Hot Cell G DWMU from the Hanford Facility RCRA Permit.

DWMU = Dangerous Waste Management Unit

Ecology = Washington State Department of Ecology

N/A = Not Applicable

RCRA = *Resource Conservation and Recovery Act of 1976*

This page intentionally left blank.

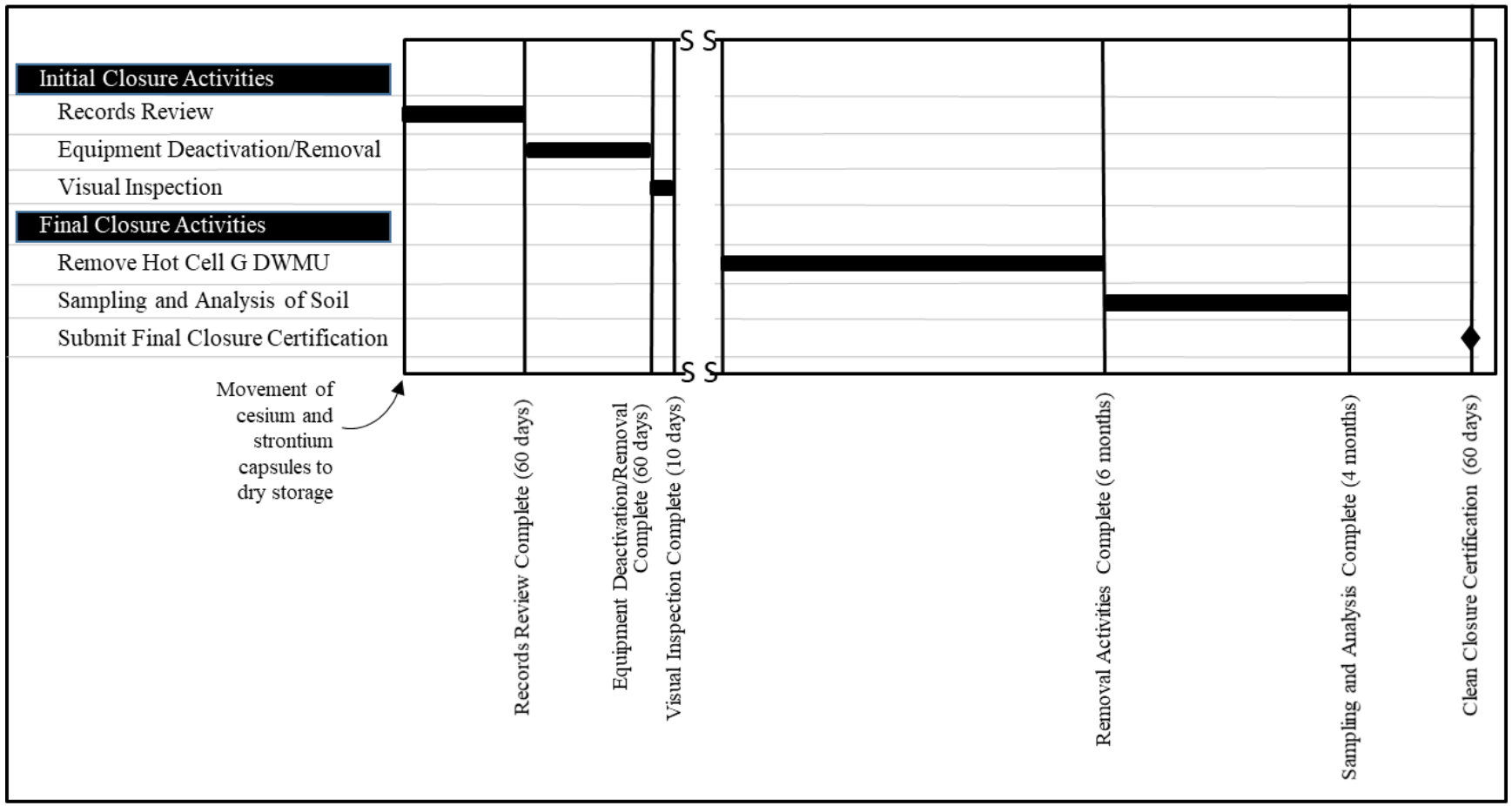

Figure HB-3 Waste Encapsulation and Storage Facility
Hot Cell G Dangerous Waste Management Unit Closure Schedule Timeline

This page intentionally left blank.

HB.11 Cost of Closure

An annual cost estimate outlining updated projections of anticipated closure costs for the Hanford Facility treatment, storage, or disposal units having final status is not required per the Hanford Facility RCRA Permit Condition II.H (WA7890008967). The Hanford Facility is owned by DOE and operated by DOE and its contractors; therefore, the provisions of WAC 173-303-620, *Financial requirements*, are not applicable to the Hanford Facility.

This page intentionally left blank.