

**WASTE ENCAPSULATION AND STORAGE FACILITY
ADDENDUM HA
POOL CELLS 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

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ADDENDUM HA
POOL CELLS DANGEROUS WASTE MANAGEMENT UNIT
CLOSURE PLAN**

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**ADDENDUM HA
CLOSURE PLAN**

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1 **HA.1 Introduction**

2 This addendum describes closure activities for the Pool Cells (1 through 8 and 12) Dangerous Waste
3 Management Unit (DWMU), which is part of the Waste Encapsulation and Storage Facility (WESF)
4 Operating Unit Group (OUG). The Pool Cells DWMU is a miscellaneous storage unit, and closure
5 activities are performed under WA7890008967, *Hanford Facility Resource Conservation and Recovery*
6 *Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous*
7 *Waste* (hereinafter called the Hanford Facility RCRA Permit).

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

13 Initial closure will include pool cell water removal, records review, equipment deactivation, and visual
14 inspection of the Pool Cells DWMU. Final closure of the Pool Cells DWMU will coincide with the
15 removal of Hot Cells A through F closing unit, and will include removal of the pool cells, visual
16 inspection of underlying soil, area-wide soil sampling, and focused soil sampling, as necessary. If final
17 closure performance standards are achieved, certification of final closure will be provided to the
18 Washington State Department of Ecology (Ecology). Closure of the Pool Cells DWMU will be
19 performed in accordance with the closure schedule provided in Section HA.10.

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

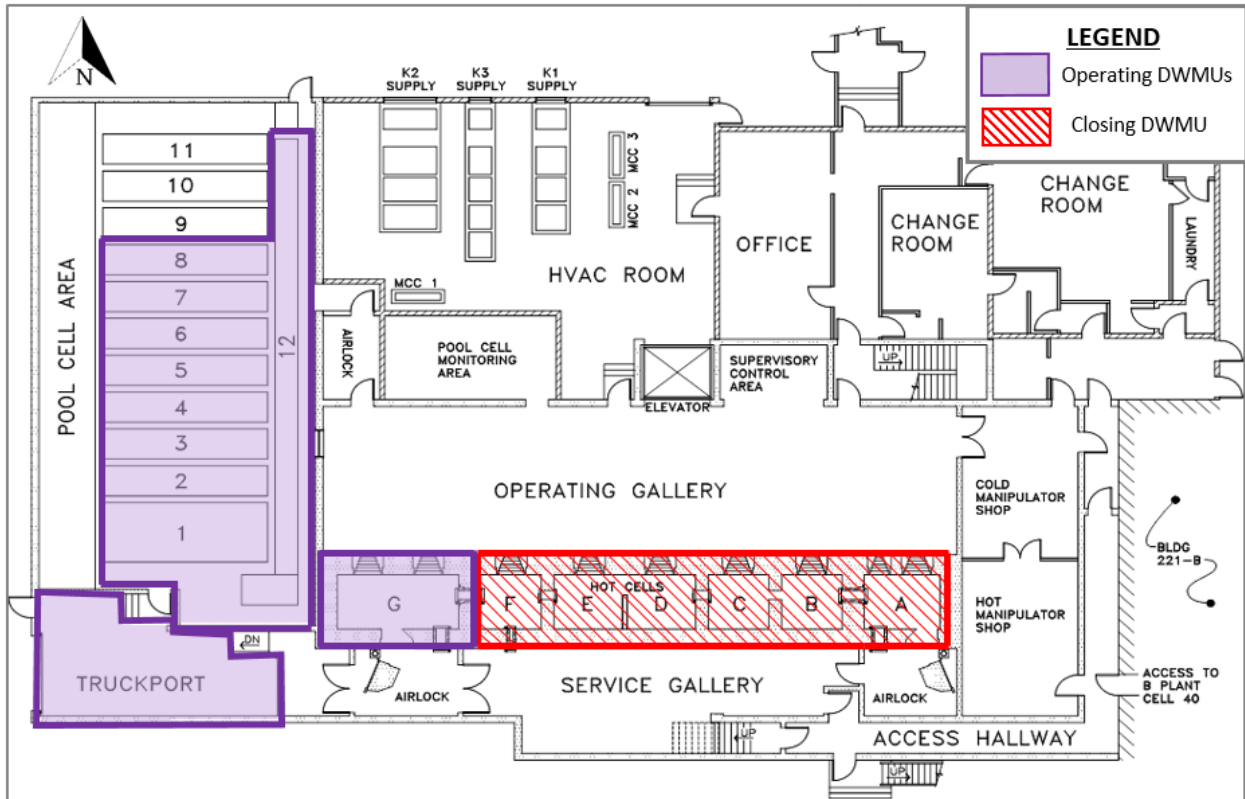
23 **HA.2 Pool Cells Dangerous Waste Management Unit**

24 The pool cell area is located on the west end of the 225-B Building (Figure HA-1). Dimensions of the
25 individual pool cells are provided in Table HA-1. The pool cell area has 12 pool cells that support
26 underwater storage of the cesium and strontium capsules; however, only Pool Cells 1 through 8 and 12
27 comprise the Pool Cells DWMU. Additional views and photographs can be found in the WESF
28 Addendum A, "Part A Form."

29 **HA.2.1 Unit Description**

30 All pool cells are constructed of reinforced structural concrete with stainless steel liners. The pool cell
31 liners are constructed of 16-gauge type 304 stainless steel on the sides and 14-gauge type 304 stainless
32 steel flooring. The pool cell walls are approximately 30 cm (12 in.) thick, while the pool cell floors
33 (with the exception of Pool Cell 12, which is approximately 46 cm [18 in.] thick) are approximately
34 53 cm (21 in.) thick. Pool Cell 12 runs along the east end of Pool Cells 1 through 11 (Figure HA-1) and
35 contains a cask pit located at the southern end of the pool. Table HA-1 provides dimensions of pool cells
36 and cask pit.

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**Figure HA-1 Waste Encapsulation and Storage Facility
Dangerous Waste Management Units**

Table HA-1 Pool Cell Dimensions

Area	Width (m [ft])	Length (m [ft])	Depth (m [ft])
Pool Cell 1	2.7 (8.8)	6.6 (21.8)	5.5 (18)
Pool Cell 2-11	1.3 (4.4)	6.6 (21.8)	5.5 (18)
Pool Cell 12	0.9 (3)	19.8 (64.9)	4.7 (15.5)
Cask Pit	1.3 (4.4)	2.3 (7.4)	5.5 (18)

5

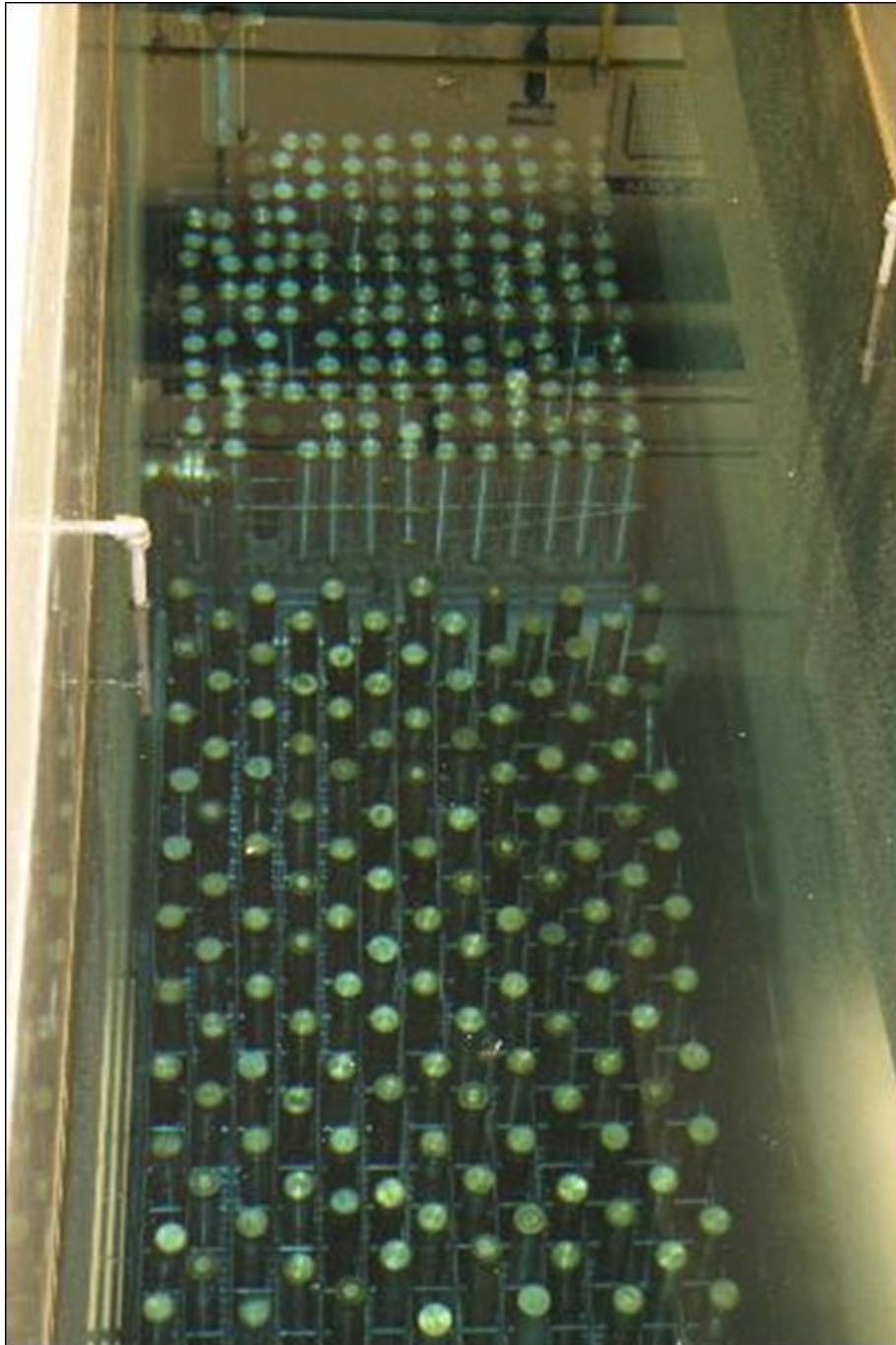
HA.2.2 Pool Cell Storage Operations

Due to the radioactive nature of the mixed waste contents, all cesium and strontium capsules are stored underwater (Figure HA-2), which provides capsule cooling and shielding from the radioactive component of the mixed waste contents for worker protection. Capsule storage, maintenance, and management operations are designed to maintain the structural integrity of the double-walled capsules, therefore ensuring that the sealed capsules will not rupture or leak.

For further information on pool cell design and operation, see WESF Addendum C, “Process Information.”

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2 **Figure HA-2 Waste Encapsulation and Storage Facility**
3 **Pool Cell Storing Capsules (June 2012)**

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5 **HA.2.3 Maximum Waste Inventory**

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

1 **HA.3 Health and Safety Requirements**

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

8 The Permittees have instituted training and qualification programs to meet training requirements imposed
9 by regulations, U.S. Department of Energy (DOE) orders, and national standards such as those published
10 by the American National Standards Institute/American Society of Mechanical Engineers. For example,
11 the environmental, safety, and health training program provides workers with the knowledge and skills
12 necessary to execute assigned duties safely. Permit Attachment 5, *Hanford Facility Personnel Training*
13 *Program*, to the Hanford Facility RCRA Permit (WA7890008967) describes specific training
14 requirements for Hanford Facility personnel. The Permittees will comply with the training matrix
15 detailed in WESF Addendum G, which provides training requirements for Hanford Facility personnel,
16 whose job tasks are directly associated with the Pool Cells DWMU. Training records are maintained for
17 each employee in an electronic database. The Permittees' training organization maintains the training
18 records system.

19 During the closure period, the Pool Cells DWMU will be inspected to prevent threats to human health and
20 the environment in accordance with WAC 173-303-320, *General inspection*, requirements and Section
21 HA.4.2. Security measures in effect at WESF during closure are identified in WESF Addendum E,
22 "Security."

23 **HA.4 Closure Activities**

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

29 The following initial closure activities will be performed:

- 30 • Pool cell water removal and characterization (Section HA.4.1.1).
- 31 • Records review (Section HA.4.1.2).
- 32 • Waste or waste residue removal, if found during records review (Section HA.4.1.3).
- 33 • Equipment deactivation activities and, if necessary, removal activities (Section HA.4.1.4).
- 34 • Visual inspection (Section HA.4.1.5).
- 35 • Final closure for the Pool Cells DWMU will coincide with final closure activities of Hot Cells A
36 through F and will include the following activities:
 - 37 • Pool Cells DWMU removal in conjunction with Hot Cells A through F removal
38 (Section HA.4.3.1).
 - 39 • Visual inspection of underlying soil and determination if focused samples are required
40 (Section HA.4.3.2).
 - 41 • Collection of grid samples in conjunction with Hot Cells A through F soil sampling and, if
42 necessary, focused soil sample collection (Section HA.4.3.3).
 - 43 • Final clean closure confirmation and transmittal (Section HA.9).

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

3 **HA.4.1 Initial Closure Phase Activities**

4 Cesium and strontium capsules will be removed from the Pool Cells DWMU prior to initiating closure
5 activities. Activities associated with movement of the capsules will be monitored and documented in the
6 operating record.

7 **HA.4.1.1 Pool Cell Water Removal**

8 The first closure activity for the Pool Cells DWMU consists of removing the water from Pool Cells 1
9 through 8 and 12. Prior to removal, the water will be recirculated and then sampled and characterized in
10 accordance with requirements in WAC 173-303-070, *Designation of dangerous waste*. The water
11 removed from the pool cells will be managed in accordance with Section HA.5.

12 **HA.4.1.2 Records Review**

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

16 **HA.4.1.3 Waste and Waste Residue Removal**

17 Historic operating records and related documents do not contain any evidence of releases of mixed waste
18 into the WESF OUG. Pool cell containment is constructed from a thick concrete barrier. Pool cell water
19 is monitored for gross beta radiation (WESF Addendum C). In the event a capsule breached both the
20 inner and outer capsules simultaneously, engineering controls and distance to groundwater (94 m [310 ft])
21 make contamination of groundwater unlikely.

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

26 **HA.4.1.4 Equipment Deactivation and Removal Activities**

27 The Pool Cells DWMU will contain the equipment listed below during capsule transfer operations:

- 28 • Heat exchangers and braces.
- 29 • Capsule racks.
- 30 • Transfer tubes and isolation valves.

31 At the time of closure, any remaining equipment within the Pool Cells DWMU will be evaluated to
32 determine if it will be deactivated and/or removed. Removed equipment may be relocated and stored for
33 future use. If equipment removed from the Pool Cells DWMU is deemed a waste, then it will be treated
34 as a newly generated waste to comply with requirements noted in the previous section. If equipment or
35 other waste residue designates as a dangerous waste, it will be subject to Land Disposal Restrictions
36 (LDR) requirements of WAC 173-303-140, *Land disposal restrictions*, which include by reference
37 40 Code of Federal Regulations (CFR) 268, *Land Disposal Restrictions*. Such dangerous waste or waste
38 residue will be treated, stored, or shipped to an approved waste disposal facility.

39 **HA.4.1.5 Visual Inspection of Pool Cells Dangerous Waste Management Unit Surfaces**

40 After pool cell water is removed, a visual inspection will be performed. The purpose of the initial closure
41 phase visual inspection is to evaluate surfaces for dangerous waste-related staining, cracks, holes, or other
42 breaches in the pool cell structure that may be significant enough to allow migration of contaminants to

1 the soil beneath the pool cells. Notation will be made in the operating record documenting results of the
 2 visual inspection and any focus sampling required during the final closure phase (Section HA.4.3.3).

3 **HA.4.2 Extended Closure Status**

4 Extended closure status is the period between initial and final closure phases. The Pool Cells DWMU
 5 will be considered in extended closure when the initial closure activities are completed (Section HA.9).

6 During the extended closure period, inspections will continue to maintain the facility in a manner that
 7 prevent threats to human health and the environment. Upon initiation of closure and through the extended
 8 closure period, annual inspections of the DWMU will be performed in accordance with Table HA-2.

9 Annual inspections are deemed sufficient because any structural degradation of the DWMU that could
 10 potentially cause a release of dangerous waste constituents to the environment would occur slowly and
 11 can be identified at this inspection frequency.

12

Table HA-2 Inspection Schedule for the Pool Cells 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.
Interior surfaces of the Pool Cells ^b	Annually	Check for cracks, gaps, or other degradation of the DWMU that could compromise the integrity.

^aInspection will continue during initial closure activities and through extended closure until final certification.

^bInspection will begin after initial closure activities are completed until final certification.

DWMU = Dangerous Waste Management Unit

13

14 **HA.4.3 Final Closure Phase Activities**

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

17 **HA.4.3.1 Demolition of the Pool Cells Dangerous Waste Management Unit**

18 The following primary activities are required to complete demolition of the Pool Cells DWMU as
 19 described in the following sections:

- 20 • Location of utilities.
- 21 • Mobilization of equipment.
- 22 • Demolition and disposal of the Pool Cells DWMU.

23 **HA.4.3.1.1 Location of Utilities**

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

1 **HA.4.3.1.2 Equipment Mobilization**

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

5 **HA.4.3.1.3 Demolition and Removal of the Pool Cells**

6 Demolition of the Pool Cells DWMU will be accomplished by rubblizing the concrete structure.
7 Rubblized concrete will be placed into bulk containers, and then removed and managed as debris (Section
8 HA.5.2).

9 Water may be used to control dust generated from demolition activities. The amount of water used will
10 be minimized to prevent ponding and runoff. While unlikely, other controls such as portable ventilation
11 filter units, high efficiency particulate air filtered vacuum cleaners or fogging agents may be used.
12 Additional storm water runoff and runoff controls may be implemented, as needed. Waste will be
13 disposed in an appropriate disposal facility.

14 **HA.4.3.2 Visual Inspection of Soil Under Pool Cells Dangerous Waste Management Unit**

15 Once the Pool Cells DWMU has been removed, a visual inspection will be conducted to identify any
16 dangerous waste-related staining in the underlying soil. Information from the initial closure phase
17 inspection (Section HA.4.1.5) and records review (Section HA.4.1.2) will be included in this final closure
18 phase inspection. The initial inspection will include notation on where areas of concern were located,
19 including possible evidence of contaminant migration to soil, if any.

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

23 **HA.4.3.3 Soil Sampling Under Pool Cells Dangerous Waste Management Unit**

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

29 If focused soil sampling is required as a result of the findings during the initial closure phase records
30 review (Section HA.4.1.2) or visual inspections (Sections HA.4.1.5 and HA.4.3.2), then samples will be
31 collected at the identified locations. Results of the laboratory analysis will be compared to closure
32 performance standards for soil in Section HA.7. Any waste generated during soil sample collection will
33 be managed as a newly generated waste (Section HA.6).

34 **HA.5 Identifying and Managing Waste Generated During Closure**

35 Closure activities for the Pool Cells DWMU could potentially result in generation of two waste streams
36 requiring proper management and disposal: water removed from pool cells and debris from demolition.

37 **HA.5.1 Water Removed from Pool Cells**

38 During initial closure for the Pool Cells DWMU, the water is removed from Pool Cells 1 through 8 and
39 12, and is anticipated to be nondangerous. Prior to removal, the water will be recirculated, as described in
40 WESF Addendum C, and then sampled and characterized in accordance with requirements in
41 WAC 173-303-070. Until confirmation of nondangerous waste designation, sampled water will be
42 considered a newly generated solid waste stream and handled in accordance with all applicable
43 requirements of WAC 173-303-170 through WAC 173-303-230. The water will be managed as a newly
44 generated waste and transported to an appropriate waste facility.

1 **HA.5.2 Debris from Demolition**

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

- 3 • Concrete and associated rubblized debris.
- 4 • Miscellaneous support equipment.
- 5 • Construction materials.
- 6 • Equipment removed from the pool cells that is not reused.

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

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

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

28 **HA.6 Identifying and Managing Contaminated Environmental Media**

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

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

42 Contaminated soil will be containerized, labeled, and sampled for waste characterization. Accumulations
43 of contaminated media will be placed in DOT-compliant containers and sent to an approved disposal
44 facility or staged at central accumulation areas in accordance with WAC 173-303-200 standards. Waste
45 subject to LDR requirements of WAC 173-303-140, which includes by reference 40 CFR 268, will be

1 characterized and designated at the WESF, as applicable, prior to being stored, treated, and/or disposed of
2 in an approved facility. While undergoing final activities to clean close the WESF OUG, the Permittees
3 will provide a more detailed evaluation of how contaminated environmental media will be managed in
4 accordance with Ecology clean closure guidance.

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

7 **HA.7 Closure Performance Standards**

8 Closure performance standards for the Pool Cells DWMU will be based on WAC 173-303-610(2) which,
9 in accordance with WAC 173-303-610(2)(a), requires closure of the facility in a manner that:

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

17 For the Pool Cells DWMU, the point of compliance or location where it is determined that the closure
18 performance standard has been achieved is the soil beneath the WESF DWMU. Clean closure will be
19 accomplished through removal of the Pool Cells DWMU and sampling of soil beneath the DWMU
20 structure. Soil closure performance standards are described below. Confirmation of these standards is
21 addressed in Section HA.9.

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

30 The miscellaneous unit performance standards identified in WAC 173-303-680, *Miscellaneous units*,
31 Sections (2)(b)(i) through (4) as required by WAC 173-303-610(2)(b), are addressed in Table HA-3.

1

Table HA-3 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 $\pm 30\%$ 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 $\pm 30\%$ 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*.

^aClosure 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.

^bAccuracy 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

2

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

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

1 **HA.8 Sampling and Analysis Plan**

2 Sampling and analysis of the Pool Cells DWMU underlying soil will be conducted to confirm whether
3 closure performance standards (Section HA.7) have been achieved (Section HA.9.2). Sampling includes
4 grid samples and, if necessary, focused samples. Sampling and analysis will be performed in accordance
5 with the sampling and quality standards established in this closure SAP.

6 **HA.8.1 Sampling and Analysis Plan Requirements**

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

13 The closure SAP details sampling and analysis procedures in accordance with SW-846, *Test Methods for*
14 *Evaluating Solid Waste: Physical/Chemical Methods*, Third Edition; Final Update V; ASTM
15 International, 2017, Annual Book of ASTM Standards; and EPA guidance. Sampling and analysis
16 activities will meet applicable requirements of SW-846, ASTM standards, and EPA-approved methods at
17 the time of closure.

18 **HA.8.2 Project Management**

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

23 **HA.8.2.1 Project/Task Organization**

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

26 **Regulatory Representative.** Ecology will assign an Ecology employee as Project Manager responsible
27 for oversight of the WESF Pool Cells closure.

28 **Project Manager and Technical Lead.** The Project Manager provides oversight of closure activities and
29 coordinates with the DOE-Richland Operations Office (DOE-RL), Ecology, and contract management. In
30 addition, support is provided to the project technical lead to ensure that work is performed safely and cost
31 effectively.

32 The Project Manager (or designee) for WESF Pool Cells closure is responsible for direct management of
33 sampling documents and requirements, field activities, and subcontracted tasks. The Project Manager is
34 responsible for ensuring that project personnel are working to the approved version of the SAP.

35 The Project Manager works closely with Quality Assurance (QA), Health and Safety, and the Field Work
36 Supervisor (FWS) to integrate these and other lead disciplines in planning and implementing the work
37 scope. The Project Manager also coordinates with DOE-RL and the primary contractor management on
38 all sampling activities. The Project Manager supports DOE-RL in coordinating sampling activities with
39 the Regulatory Representative.

40 **Environmental Compliance Officer.** The Environmental Compliance Officer provides technical
41 oversight, direction, and acceptance of project and subcontracted environmental work, and
42 develops appropriate mitigation measures with a goal of minimizing adverse environmental impacts.

1 **Health and Safety.** The Health and Safety organization is responsible for coordinating industrial safety
 2 and health support within the project as carried out through health and safety plans, job hazard analyses,
 3 and other pertinent safety documents required by federal regulation or internal primary contractor work
 4 requirements.

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

7 **Field Work Supervisor.** The FWS is responsible for planning and coordinating field sampling resources.
 8 The FWS ensures that samplers are appropriately trained and available. Additional related responsibilities
 9 include ensuring that the sampling design is achievable, understood, and can be performed as specified.

10 **Sample Management and Reporting.** The Permittee’s sampling organization coordinates field
 11 sampling as well as laboratory analytical work, ensuring that laboratories conform to the specifications of
 12 SW-846 analytical methodology at the time of closure. The sampling organization receives the analytical
 13 data from the laboratories, performs the data entry into the Hanford Environmental Information System
 14 (HEIS) database, and arranges for data validation. The sampling organization is responsible for
 15 informing the Project Manager of any issues reported by the contract analytical laboratory.

16 **Contract Laboratories.** The contract laboratories analyze samples in accordance with established
 17 procedures and provide necessary sample reports and explanation of results in support of data validation.

18 The roles described above make up the project organization structure (regarding sampling and analysis)
 19 and interact in a manner shown graphically in Figure HA-3.

20

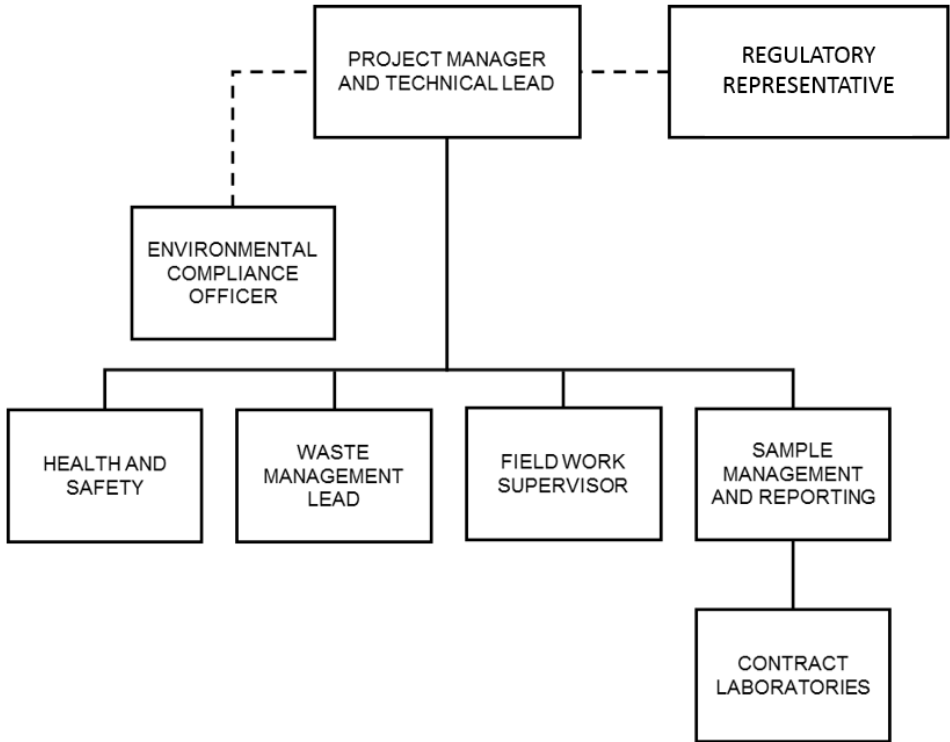


Figure HA-3 Sampling and Analysis Plan Project Organization

21
22

1 **HA.8.3 Sampling Documents and Records**

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

9 The Project Manager is responsible for ensuring that a project file is properly maintained. The project file
10 will contain the following records or references to their storage locations:

- 11 • Field logbooks or operational records.
- 12 • Data forms.
- 13 • Global positioning system data.
- 14 • Chain-of-Custody (COC) forms.
- 15 • Sample receipt records.
- 16 • Inspection or assessment reports and corrective action reports.
- 17 • Interim progress reports.
- 18 • Final reports.
- 19 • Laboratory data packages.
- 20 • Data verification and validation reports.

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

- 22 • Analytical logbooks.
- 23 • Raw data and quality control (QC) sample records.
- 24 • Standard reference material and/or proficiency test sample data.
- 25 • Instrument calibration information.
- 26 • Records may be stored in either electronic or hard copy format. Regardless of medium or format,
27 documentation and records are controlled in accordance with internal work requirements and
28 processes to ensure the accuracy and retrievability of stored records. Records generated during
29 closure will be maintained in the facility operating record for a minimum of 5 years after the
30 clean closure certification has been accepted by Ecology.

31 **HA.8.4 Sampling Design and Analysis**

32 The sampling design includes input parameters used to determine the number and location of samples.
33 The primary purpose of sampling the soil at the grid and focused sample locations is to determine if
34 analytical results exceed closure performance standards (Table HA-3).

35 **HA.8.4.1 Sampling Process Design**

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

1 **Focused (Judgmental) Sampling.** As identified in Ecology Publication #94-111, Section 7.2.2,
2 “Focused Sampling” defines selective sampling of areas where contamination is expected or releases have
3 been documented. As a result of the records review (Section HA.4.1.2) or visual inspections (Sections
4 HA.4.1.5 or HA.4.3.2), focused sampling may be required.

5 Selection of focused sampling units (i.e., the number and location of samples) is generally based on
6 knowledge of the feature or condition under investigation and on professional judgment. Focused
7 sampling is distinguished from probability-based sampling in that inferences are based on professional
8 judgment, not statistical scientific theory. Therefore, conclusions about the target population are limited
9 and depend entirely on the validity and accuracy of professional judgment.

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

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

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

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

29 For grid sampling determination in VSP, both parametric and nonparametric equations rely on
30 assumptions about the data population. Typically, however, nonparametric equations require fewer
31 assumptions and allow for more uncertainty about the distribution of data. Alternatively, if parametric
32 assumptions are valid, the required number of samples is usually less than if a nonparametric equation
33 was used. VSP parameter inputs, and the basis for those inputs, are detailed in Table HA-4.

1

Table HA-4 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

2

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

- 3 • The 95% upper confidence limit on the true data mean must be less than the MTCA Method B
4 closure performance standard.
- 5 • No sample concentration can be more than twice the closure performance standards.
- 6 • Less than 10% of the samples can exceed the closure performance standards.
- 7 • For the purpose of utilizing VSP software, the null hypothesis will be that the site is considered
8 contaminated until proven clean, and it will be tested by comparing a site mean to a fixed
9 threshold. However, in addition to ensuring the site mean does not exceed the MTCA
10 (WAC 173-340) Method B clean closure performance standards, data will be evaluated to ensure
11 that less than 10% of the individual values exceed MTCA (WAC 173-340) Method B clean
12 closure performance standards and that no values are more than twice the cleanup level.
- 13 • Area-wide sample locations will be determined using the area-wide grid with a random start
14 sampling method run in VSP. Statistical analysis of systematically collected data are valid if a
15 random start to the grid is used. The first node location will be chosen at random by VSP, and
16 subsequent sample locations will be assigned by VSP using a grid sampling layout. The
17 dimensions of the sample area will be entered into VSP to determine the locations of samples.
18 The triangular grid sampling layout will provide an even distribution of sample locations. The
19 samples will be taken from the node locations indicated by VSP and will be assigned sample
20 location identifications and sample numbers using HEIS.

21 **HA.8.4.2 Soil Sampling Methods and Handling**

22 The sample matrix will consist of soil collected in clean sample containers. Soil will be collected at a
23 depth of no more than 15 cm (6 in.) below surface of the soil, unless staining or discoloration indicates
24 that contamination is below that depth. For the purpose of this SAP, ground surface is defined as the
25 exposed soil surface layer once the pool cell structure has been removed as part of the final closure
26 activities. Once the soil is collected, it will be screened to remove material larger than approximately
27 2 mm (0.08 in.) in diameter, which allows for a larger surface area-to-volume ratio. This ratio increases
28 the likelihood of identifying any potential contamination in the sample.

29 To ensure sample and data usability, sampling will be performed in accordance with established sampling
30 practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample
31 handling. Sampling generally includes the following:

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

37 Sample preservation and holding time requirements are specified in Table HA-5. These requirements are
38 in accordance with the analytical method specified. The final container types and volumes will be
39 identified on the sample authorization form and COC form.

1

Table HA-5 Preservation, Container, and Holding Time Requirements for Soil Samples

EPA Method	Analysis/Analytes	Preservation Requirement	Holding Time
6010	ICP-OES (metals)	Cool $\leq 6^{\circ}\text{C}$	180 days
7196	Colorimetric (chromium VI)	Cool $\leq 6^{\circ}\text{C}$	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

2

3 A sampling and data tracking database (e.g., HEIS) is used to track the samples from the point of
4 collection through the laboratory analysis process. HEIS sample numbers are issued to the sampling
5 organization for the project. Each sample is identified and labeled with a unique HEIS sample number.

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

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

- 15 • Sample authorization form number.
- 16 • HEIS number.
- 17 • Sample collection date and time.
- 18 • Sampler identification (e.g., initials).
- 19 • Analysis required.
- 20 • Preservation method (if applicable).

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

- 22 • Analysis required.
- 23 • Sample location.
- 24 • Matrix (soil).

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

29 Newly generated waste resulting from sampling activities will be containerized, labeled, characterized,
30 designated as a dangerous or non-dangerous waste, stored, and treated, if necessary, to meet the LDRs in
31 40 CFR 268, incorporated into WAC 173-303-140(2)(a) by reference, then ultimately disposed of in an
32 approved waste disposal facility in accordance with WAC 173-303-610(5).

1 **HA.8.4.3 Analytical Methods**

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

8 Analytical methods and performance requirements associated with the target analytes are outlined in
 9 Table HA-3.

10 **HA.8.4.4 Quality Control**

11 QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained.
 12 Field QC samples will be collected to evaluate the potential for cross-contamination and provide
 13 information pertinent to field sampling variability. Laboratory QC samples estimate the precision and
 14 bias of the analytical data. Field and laboratory QC samples are summarized in Table HA-6.

15

Table HA-6 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 HA-6 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*.

^aWhenever 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.

^bAs defined in the laboratory contract or quality assurance plan and/or analysis procedures.

^cNationally recognized program, such as DOE Mixed Analyte Performance Evaluation Program or Environmental Resource Associates.

^dSoil matrix double-blind standards are submitted by request of Analytical Services.

^eDOE Quality Systems for Analytical Services requires annual audit of commercial laboratories.

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

^gBatching across projects is allowing for similar matrices.

^hField 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

1

2 **HA.8.5 Data Review, Verification, Validation, and Usability Requirements**

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

9 **HA.8.5.1 Data Verification**

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

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

7 **HA.8.5.2 Data Validation**

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

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

18 **HA.8.5.3 Verification of Visual Sample Plan Input Parameters**

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

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

29 **HA.8.5.4 Sampling and Analysis Requirements to Address Removal of Contaminated** 30 **Soil**

31 In the event that sample results based on the MTCA (WAC 173-340) Method B three-part test (Section
32 HA.8.4.1) indicate contamination above clean closure levels, the contaminated soil will be removed.
33 Following removal of contaminated soil, additional samples will be taken at the same grid location as
34 identified by VSP. Additional focused sampling may be added in areas where contamination is identified
35 (Sections HA.4.1.2, HA.4.1.5, and HA.4.3.2). Additional focused samples will be documented and
36 provided with the closure certification upon request by Ecology. These samples will be analyzed in
37 accordance with the methods specified in Table HA-3, with accompanying QC samples as discussed in
38 Section HA.8.4.4.

39 **HA.8.5.5 Resolving Contamination Identified During Focused Sampling**

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

1 **HA.8.6 Revisions to the Sampling and Analysis Plan and Constituents to be Analyzed**

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

7 **HA.9 Confirmation and Certification of Closure Activities**

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

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

15 **HA.9.1 Role of the Independent Qualified Registered Professional Engineer**

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

- 20 • Review records pertaining to documented spills or releases of mixed waste and subsequent
21 cleanup activities.
- 22 • Review equipment deactivation and removal activities, as necessary.
- 23 • Review of the visual inspections.
- 24 • Observe or review Pool Cells DWMU removal
- 25 • Observe or review grid and focused sampling activities, as applicable.
- 26 • Review soil sampling procedures and results.
- 27 • Observe or review contaminated environmental media removal, as applicable.
- 28 • Verify that closure activities were performed in accordance with this Closure Plan.

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

31 **HA.9.2 Certification of Closure Performance Standards**

32 In accordance with WAC 173-303-610(6), final closure certification will be submitted to Ecology within
33 60 days of completion of the closure activities associated with the Pool Cells DWMU. Certification will
34 demonstrate that the DWMU has been closed in accordance with the specifications in this Closure Plan
35 and will be submitted to Ecology by registered mail or other means that establish proof of receipt
36 (including applicable electronic means). The closure certifications will be signed by the owner or
37 operator, and signed and stamped by an IQRPE.

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

- 40 • All field notes and photographs relative to closure activities.
- 41 • Description and justification of any minor deviations from the approved Closure Plan.

- 1 • Documentation of the final disposition of all dangerous or mixed waste and corresponding
2 residues (if any).
- 3 • Laboratory or field data, including sampling procedures, sampling locations, QA/QC samples,
4 and COC procedures for all samples and measurements, including samples and measurements
5 taken to determine background conditions and determine or confirm clean closure.
- 6 • Any data reviewed, tabulation of the analytical results, or report that was used by the IQRPE to
7 determine closure performance standards were achieved.
- 8 • Description of the DWMU area upon completion of closure.

9 **HA.9.3 Conditions that will be Achieved when Closure is Complete**

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

17 **HA.10 Closure Schedule and Time Frame**

18 Closure activities for the Pool Cells DWMU as well as the expected duration for each activity are outlined
19 in Table HA-7 and Figure HA-4. Initial closure activities for the Pool Cells DWMU can only begin after
20 the cesium and strontium capsules are removed from WESF. Major Milestone M-092 addresses the
21 disposition path for the cesium and strontium capsules, with a milestone due date of August 31, 2025, to
22 complete the transfer of the cesium and strontium capsules from WESF to a new permitted, interim safe
23 storage facility. In accordance with WAC 173-303-610(3)(c)(i), a notification of intent to close the Pool
24 Cells DWMU will be submitted to Ecology at least 45 days prior to the date on which closure is expected
25 to begin. Closure activities for the Pool Cells DWMU are expected to take longer than the allotted
26 180 days [(WAC 173-303-610(4)(b)]. Therefore, the Permittees request an extension to the start of
27 closure. Approval of this Closure Plan will grant the Hanford Facility an extended closure period for
28 performance of the closure activities in accordance with WAC 173-303-610(4)(b); therefore, a separate
29 extension request will not be filed. During the extended closure period, all steps to prevent threats to
30 human health and the environment, including compliance with all applicable permit requirements, will
31 continue to be taken.

32 Within 60 days following completion of final closure activities outlined in this Closure Plan, the closure
33 certification will be submitted to Ecology (Section HA.9.2).

**Table HA-7 Waste Encapsulation and Storage Facility
Pool Cells Dangerous Waste Management Unit Closure Activities Schedule**

Closure Activity Description		
Primary Activity	Description of Activity	Expected Duration
Initial Closure Activities		
Pool cell water removal	Remove pool cell water.	60 days
Records review	Perform review of capsule storage, operating, inspection, and spill records. (Note: Records review will be performed concurrently with pool cell water removal.)	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 Pool Cells DWMU	Inspect structural integrity (visible aspects only) for any dangerous waste related staining, or cracks, holes, or other breaches in the pool cell structure.	10 days
	Document visual inspection: include photos, locations, and dimensions of dangerous waste related staining, or cracks, holes, or other breaches in the Pool Cells DWMU 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 Pool Cells 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 Final Closure Activities Complete*		
Submit final 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 Pool Cells DWMU from the Hanford Facility RCRA Permit.

DWMU = Dangerous Waste Management Unit

Ecology = Washington State Department of Ecology

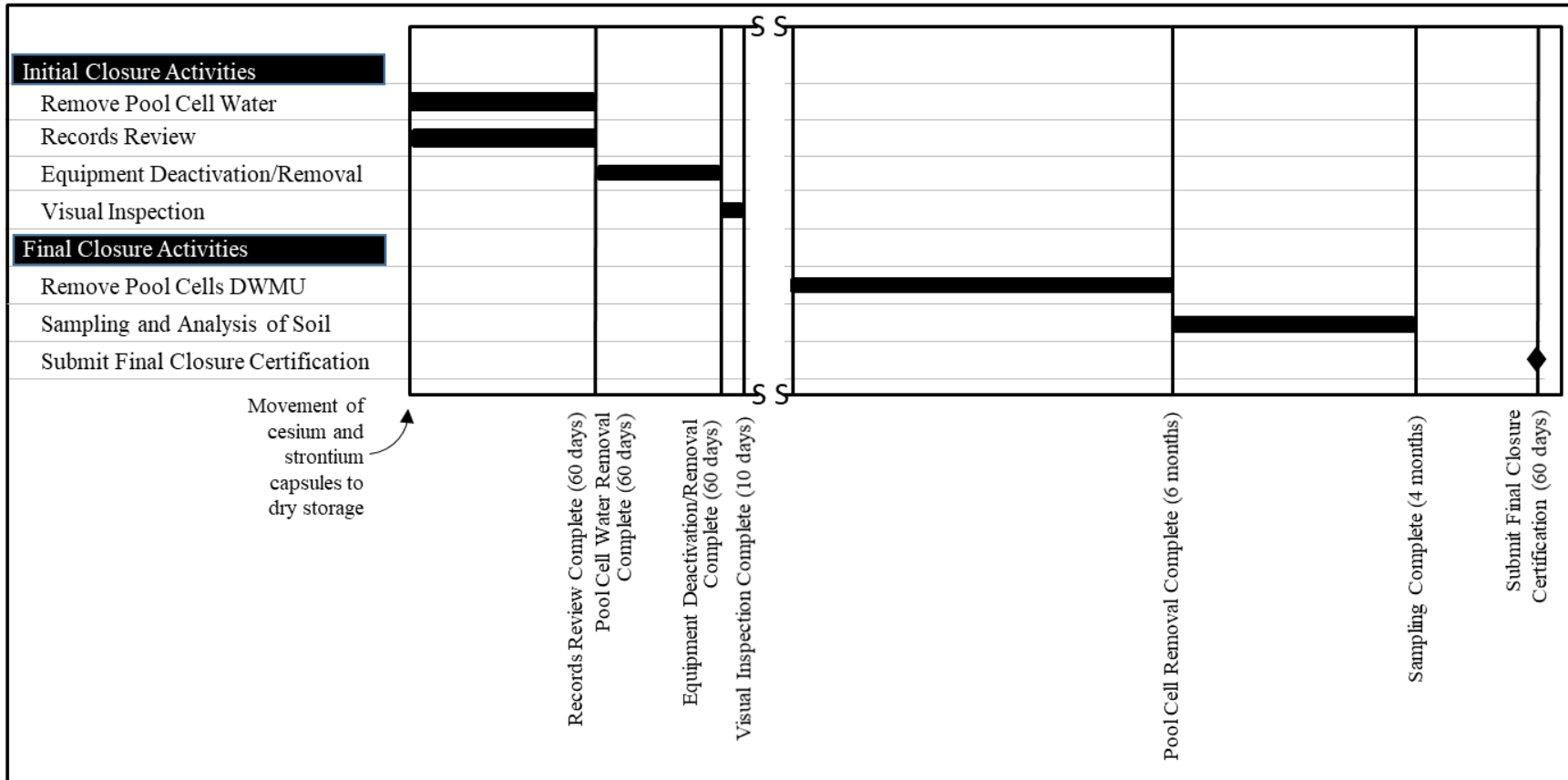
N/A = Not Applicable

RCRA = Resource Conservation and Recovery Act of 1976

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**Figure HA-4 Waste Encapsulation and Storage Facility
Pool Cells Dangerous Waste Management Unit Closure Schedule Timeline**

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1 **HA.11 Cost of Closure**

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

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