

Waste Encapsulation and Storage Facility Interim Status Closure Plan

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


Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford

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Chris Willingham 12/11/2000
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GLOSSARY

1		
2		
3		
4	CFR	Code of Federal Regulations
5		
6	Ecology	Washington State Department of Ecology
7		
8	N/A	not applicable
9		
10	PE	professional engineer
11		
12	Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
13		
14	WAC	Washington Administrative Code
15	WESF	Waste Encapsulation and Storage Facility

METRIC CONVERSION CHART

Into metric units

Out of metric units

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			Length		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			Area		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			Mass (weight)		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			Volume		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy			Energy		
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.948	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure			Force/Pressure		
pounds per square inch	6.895	kilopascals	kilopascals	0.14504	pounds per square inch

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

WASTE ENCAPSULATION AND STORAGE FACILITY INTERIM STATUS CLOSURE PLAN

This document describes the planned activities and performance standards for closing the Waste Encapsulation and Storage Facility (WESF). WESF is located within the 225B Facility in the 200 East Area on the Hanford Facility. Although this document is prepared based on Title 40 Code of Federal Regulations (CFR), Part 265, Subpart G requirements, closure of the storage unit will comply with Washington Administrative Code (WAC) 173-303-610 regulations pursuant to Section 5.3 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Action Plan (Ecology et al. 1996).

Because the intention is to clean close WESF, postclosure activities are not applicable to this interim status closure plan. To clean close the storage unit, it will be demonstrated that dangerous waste has not been left onsite at levels above the closure performance standard for removal and decontamination. If it is determined that clean closure is not possible or environmentally is impracticable, the interim status closure plan will be modified to address required postclosure activities.

WESF stores cesium and strontium encapsulated salts. The encapsulated salts are stored in the pool cells or process cells located within 225B Facility. The dangerous waste is contained within a double containment system to preclude spills to the environment. In the unlikely event that a waste spill does occur outside the capsules, operating methods and administrative controls require that waste spills be cleaned up promptly and completely, and a notation made in the operating record.

Because dangerous waste does not include source, special nuclear, and by-product material components of mixed waste, radionuclides are not within the scope of this documentation. The information on radionuclides is provided only for general knowledge.

1.0 SYSTEM DESCRIPTION

WESF includes process cells F and G, and pool cells 1 through 8 and 12 located within the 225B Facility. Storage currently occurs within pool cells 1, 3, 4, 5, 6, and 7, but capsules temporarily might be stored in pool cell 12 or moved into process cells F or G. Pool cells 2 and 8 currently are not configured for storage of capsules. Capsules can be moved into these pool cells if required after racks and heat exchangers have been added.

1.1 CAPSULE DESCRIPTION

Waste is stored in capsules consisting of stainless steel containers that constitute primary and secondary containment. There basically are three types of capsules in storage at WESF: standard cesium capsules, Type W cesium capsules, and standard strontium capsules.

The standard cesium capsule consists of a double capsule configuration of a capsule placed inside another. Both capsules are constructed of 316L stainless steel. The inner capsule dimensions are 5.7 centimeters (2.25 inches) in diameter by 50.1 centimeters (19.725 inches) long. The inner capsule has a nominal wall thickness of 0.24 centimeter (0.095 inch). The outer capsule is 6.7 centimeters (2.625 inches) in diameter by 52.8 centimeters (20.725 inches) long. The outer capsule has a nominal wall thickness of 0.28 centimeter (0.109 inch). There are a total of 1,312 standard cesium capsules in storage.

The Type W cesium capsule is a 316L stainless steel overpack used to contain standard cesium capsules that had swollen as a result of thermal cycling; cesium chloride that had been reconfigured into pencils; pellets; or Type 4 containers for use as irradiators; or the contents of capsules that had been cut up for examination purposes. The Type W capsule is 8.3 centimeters (3.25 inches) in diameter by 55.4 centimeters (21.8 inches) long. The capsule has a nominal wall thickness of 0.32 centimeter (0.13 inch). There are a total of 23 Type W capsules in storage.

Two types of material are used for the capsules to store the SrF_2 . Like the standard cesium capsule, the strontium capsule consists of a capsule within a capsule. The inner capsule is Hastelloy^{*} C-276. The outer capsule is 316L stainless steel. The inner capsule is 5.7 centimeters (2.25 inches) in diameter by 48.4 centimeters (19.05 inches) long. The outer capsule is 6.7 centimeters (2.625 inches) in diameter by 51.1 centimeters (20.1 inches) long. There are a total of 601 standard strontium capsules in storage.

1.2 DANGEROUS WASTE DESCRIPTION

The encapsulated salt contains chemical impurities from the fractionization process consisting of sodium, silicone, aluminum, calcium, magnesium, iron, lead, barium, rubidium, nickel, chromium, cadmium, and silver. Barium is generated continuously as a result of the cesium-137 decay chain. The salt designates as dangerous waste for the barium, cadmium, chromium, lead, and silver and carries the waste numbers D005, D006, D007, D008, D0011, and WT01 (DOE/RL-88-21). There are approximately 5,000 kilograms (11,023 pounds) of salt stored at WESF.

2.0 MAXIMUM EXTENT OF STORAGE

Process design capacities and storage locations are described in the WESF Part A, Form 3, permit application (DOE/RL-88-21).

3.0 CLOSURE PLAN

The following sections address performance standards, waste removal, and decontamination standards:

3.1 CLOSURE PERFORMANCE STANDARD

Clean closure of WESF will be accomplished by using the closure standard in WAC 173-303-630(10) as referenced by WAC 173-303-610(2)(b). The capsules containing mixed waste will be removed from the storage area. Remaining liners contaminated with mixed waste or mixed waste residues will be decontaminated. Decontamination of the process cells will be done for radiological reasons.

The clean closure performance standards for the storage areas will be confirmation that the container storage areas are not contaminated with mixed waste or mixed waste residues from storage unit operations. The process cells and pool cells will be considered clean after the cell and pool liners are verified to be free of dangerous waste contamination by meeting a visual performance standard according to an inspection checklist (Figure 1).

^{*} Hastelloy is a trade name of Haynes International, Inc., Kokomo, Indiana.

A detailed records search will be conducted to confirm that no spills of dangerous waste occurred in the pool cell area. For the process cells, a detailed records search will be conducted to verify that process spills were cleaned properly. After the records search, the container storage areas will be inspected. If inspection of the container storage areas does not indicate visible contamination, clean closure will be obtained. In the unlikely event that clean closure cannot be obtained, an extension of closure will be requested to coordinate closure of contaminated areas with decontamination and decommissioning of WESF.

3.2 CLOSURE ACTIVITIES

Closure activities will entail waste inventory removal, a visual inspection, and a records review to confirm no spills of dangerous waste occurred in the storage area. The storage unit will be closed in a manner that protects human health and the environment, and that minimizes or eliminates the escape of waste constituents to the ground, surface water, groundwater, or the atmosphere.

This closure plan provides for the following:

- Waste inventory removal
- Operating records review
- Visual Inspection
- Storage equipment decontamination and removal
- Certification that closure activities were completed in accordance with the approved closure plan.

WESF is located in processing areas extensively used in the past. It is known that spills of process materials occurred in these areas in the past, and that residues of such spills have migrated to the concrete under the cell liners. Closure of the permitted unit will not include removal of embedded pre-existing contamination in the process cells. A visual baseline inspection will be performed in process cells F and G before storing any capsules in these cells. Any pre-existing contamination that might exist in the flooring will be managed and removed as appropriate during decontamination and decommissioning of WESF.

Closure of the permitted unit will consist of actions discussed in the following sections.

3.2.1 Waste Inventory Removal

At the end of the storage period, the waste inventory in WESF will be removed and transferred to an appropriate permitted treatment, storage, and/or disposal unit.

3.2.2 Operating Records Review

An operating records review will be conducted and cognizant operations personnel interviewed to obtain an inventory and spill history for WESF. A spill history is necessary to help determine the need for and extent of decontamination activities necessary for clean closure. The records review will entail a review of all available records related to WESF. The records review will include operations log books, weekly inspection records, and a search for 'off-normal' event reports.

3.2.3 Visual Inspection of Container Storage Areas

After the records review, the storage areas will be inspected. If inspection does not indicate visible contamination other than that documented before WESF operation began, clean closure will be obtained. In the unlikely event that clean closure cannot be obtained, an extension of closure will be requested to coordinate closure of contaminated areas with decontamination and decommissioning of WESF.

3.2.4 Process Equipment Decontamination and/or Removal

Manipulators in the process cells will be decontaminated (as necessary), removed, and either reused or properly disposed. Supporting equipment in the storage pools such as racks, tongs, heat exchanger, pump, etc., would have the potential to become contaminated in the event of a leaking container. Documentation of the spills and cleanup actions would have been placed in the unit operating record.

Before closure of the storage unit, the operating record will be reviewed for indications of contamination remaining in supporting equipment. Equipment containing residual contamination could be decontaminated for reuse or could be removed, designated, and disposed as waste during the stabilization and transition of WESF. Decontamination procedures might consist of wiping, or washing as possible, to remove any waste or waste residues and the decontamination standard will be a visual inspection and comparison to pre-operations description. Decontamination will be documented on a decontamination and inspection checklist. All decontamination waste will be designated and managed appropriately.

3.2.5 Structure Decontamination

The waste will be in a solid state during storage in the container storage areas. Therefore, potential spills are not expected to penetrate into the liners of the pool cells during operation of the permitted unit. In the unlikely event that clean closure cannot be obtained, an extension of closure will be requested to coordinate closure of contaminated areas with decontamination and decommissioning of WESF.

3.2.6 Closure Certification

Within 60 days of completing the closure activities, a certification of closure will be signed by the owner/operator and an independent registered professional engineer (PE). The PE certification of closure will cover only the portions of WESF covered by the proposed closure activities. The PE certification will occur on disposition of decontamination generated waste and completion of closure activities. The PE will provide a signed statement that meets the applicable requirements of WAC 173-303-610(6), certifying that the closure activities were performed in accordance with the technical specifications of the approved closure plan. A copy of the PE certification will be transmitted to Washington State Department of Ecology (Ecology) and placed in the Administrative Record.

4.0 SCHEDULE FOR CLOSURE

Initiation of closure of WESF is expected to occur at completion of the transfer of the final capsule from the storage pool to the designated onsite disposal unit. Capsule transfers are scheduled to begin in 2013 and be completed by the end of September 2017. Completion of closure will be timed to coincide with the overall stabilization and transition of WESF. In the unlikely event that clean closure cannot be obtained, an extension of closure will be requested to coordinate closure of contaminated areas with

1 decontamination and decommissioning of WESF. Completion of closure might not be possible within
2 180 days after receipt of the final volume of waste in the unit per WAC 173-303-610(4)(b).
3

4 When a closure date is established for the permitted unit, the need for a revised closure plan and schedule
5 will be evaluated, including any additional closure activities required for clean closure. If closure plan
6 revisions are necessary to achieve clean closure, a revised schedule will be proposed. For partial closure
7 of the permitted unit, Ecology will be notified in writing that partial closure activities are beginning. The
8 written notification will indicate which portions of the storage unit will be closed.
9

10 5.0 REFERENCES

11

12 DOE/RL-88-21, *Hanford Facility Dangerous Waste Part A, Permit Application*, Vol. 1-3,
13 U.S. Department of Energy, Richland, Operations Office, Richland, Washington, updated
14 periodically.
15

16 Ecology, EPA, and DOE/RL, 1996, *Hanford Federal Facility Agreement and Consent Order*,
17 Washington State Department of Ecology, U. S. Environmental Protection Agency, and
18 U.S. Department of Energy, Richland Operations Office, Olympia, Washington, amended
19 periodically.
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Waste Encapsulation and Storage Facility Inspection Criteria.

(This checklist is intended to document a 'clean closure performance standard' for cell and pool cell liners.)

Decontamination Method (N/A if not performed): _____

Parameters (check appropriate parameters):

- ☐ Propellant
- ☐ Solid media (e.g., shot, grit, beads)
- ☐ Surfactant(s)
- ☐ Detergents
- ☐ Grinding/striking media (e.g., wheels, piston heads).

The decontamination of the liners in WESF was completed as specified.

Title

Signature

Date

Visual Performance Standard:

The identified material(s) have been inspected visually and have no obvious visual signs of potential dangerous waste contamination, except for waste staining, consisting of light shadows, slight streaks, or minor discolorations.

Authorized Representative:

Signature

Date

Figure 1. Inspection Criteria.

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