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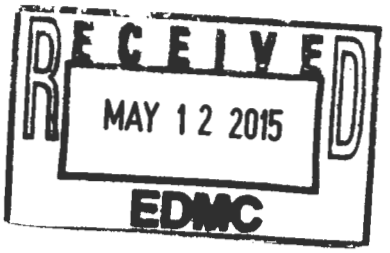
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

15-AMRP-0166
REISSUE

MAY 05 2015

Mr. D. A. Faulk, Program Manager
Office of Environmental Cleanup
Hanford Project Office
U.S. Environmental Protection Agency
309 Bradley Boulevard, Suite 115
Richland, Washington 99354



Dear Mr. Faulk:

REISSUE - TRANSMITTAL OF PROPOSED PLAN FOR AN AMENDMENT TO THE ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF) RECORD OF DECISION (ROD) TO ALLOW IN-TRENCH TREATMENT OF LAND DISPOSAL RESTRICTED (LDR) DEBRIS

This letter is being reissued to include the proposed plan (Attachment). The subject proposed plan is for an amendment to the ERDF ROD to grant a "greater risk to human health and the environment" waiver under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), that will allow the treatment of hazardous debris waste within the ERDF landfill. The basis for this amendment is to reduce the risk for physical injury and exposure to radioactive contamination and ionizing radiation for ERDF workers by performing long, large, and/or heavy hazardous waste items (LLHHWI) treatment in the trench. U.S. Environmental Protection Agency approval of the proposed plan is requested by May 18, 2015 to support the public comment period scheduled for May 19, 2015 – June 18, 2015.

This amendment does not seek a waiver from the required treatment or treatment method to meet Land Disposal Restriction requirements. LLHHWI treatment will be performed according to the regulations (macroencapsulation) and LLHHWI management will be within the double-lined trench to prevent hazardous constituent migration. A treatment location change from out-of-trench to in-trench is only proposed for LLHHWI; smaller-sized rubble, debris, and equipment that require macroencapsulation and fit into 15.3-m3 (2-yd3) roll-on/roll-off containers will continue to be treated outside the ERDF trench.

This subject has been discussed with David Einan of your staff. If you have any questions, please contact me, or your staff may contact Mark French, of my staff, at (509) 373-9863.

Sincerely,

Ray J. Corey, Assistant Manager
for the River and Plateau

AMRP:OCR

Attachment

cc w/attach:
J. F. Armatrout, WCH
D. R. Einan, EPA
J. A. Lerch, WCH
Administrative Record

Proposed Plan for an Amendment to the Environmental Restoration Disposal Facility Record of Decision, Hanford, Washington

U.S. Department of Energy, Richland Operations Office
U.S. Environmental Protection Agency
Washington State Department of Ecology

Public Comment Period
May 19, 2015 – June 18, 2015

How You Can Participate in this Decision-Making Process:

Read this Proposed Plan and review related documents in the Administrative Record.

Comment on this Proposed Plan by mail, e-mail, or fax on or before June 19, 2015.

Kristen Skopeck, U.S. Department of Energy, Richland Operations Office
P.O. Box 550, A7-75
Richland, WA 99352
Phone: 376-5803
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Email: kristen.skopeck@rl.doe.gov

See pages 16 and 17 for more information about public involvement and contact information.

Inside This Plan

Figure 1. The Environmental Restoration Disposal Facility (ERDF)

The U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the U.S. Department of Energy (DOE) (hereinafter referred to as the Tri-Parties) propose an amendment to the Environmental Restoration Disposal Facility Record of Decision (ERDF ROD) to improve worker safety while treating long, large, and/or heavy hazardous waste items (LLHHWI) for disposal at the Environmental Restoration Disposal Facility (ERDF) (Figure 1). This Proposed Plan summarizes the proposed changes to the ERDF ROD and seeks public and Tribal Nation input to help select an alternative for implementation. Comments will be accepted during the 30-day public comment period (see left sidebar on this page).

Following consideration of public and Tribal Nation input, DOE and EPA will issue a Record of Decision (ROD) Amendment identifying the alternative selected for implementation. The ROD Amendment will include a responsiveness summary that documents the comments received and responses to the comments.

INTRODUCTION

The Hanford Site Environmental Restoration Disposal Facility (ERDF) is a 4-km^2 (1.6-mi^2) engineered mixed waste disposal landfill with associated support facilities that is regulated by the U.S. Environmental Protection Agency (EPA) through a 1995 *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) ROD (with amendments) (EPA 1995, 1997, 1999, 2002, 2007, 2009). The landfill is located in an arid environment with an average of only 17.8 cm (7 in.) of rainfall annually and consists of multiple *Resource Conservation and Recovery Act of 1976* (RCRA)-compliant double-lined disposal trenches with a leachate collection system. ERDF began onsite disposal of waste from the Hanford Site cleanup mission in 1996. ERDF does not accept waste from any sources other than the Hanford Site. ERDF is a centerpiece of the Hanford Site cleanup mission with safe, compliant, and economic onsite disposal of more than 17 million tons of radioactive, hazardous, and mixed waste to date (about 900,000 tons annually). Waste treatment, including macroencapsulation of hazardous debris, began in 1997 with the first ROD Amendment (EPA 1997). More than 10,000 tons of hazardous debris has been macroencapsulated at ERDF instead of transporting it offsite for treatment.

The RCRA land disposal restriction (LDR) regulations prohibit placement of hazardous waste in a land disposal unit prior to completing treatment (see 40 *Code of Federal Regulations* (CFR) 268.7, "Land Disposal Restrictions"). The intent of this requirement is to diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste after disposal. In recent years, however, radioactively contaminated LLHHWI began arriving at ERDF for treatment and disposal; the requirement to handle and treat these awkward items outside the disposal trench and then move them into the trench for disposal increased worker risks. Waiving the current requirement to treat LLHHWI outside of the trench and allowing in-trench treatment will produce equivalent or better hazardous constituent macroencapsulation while substantially reducing the risks of physical injury and/or radioactive exposure for workers.

This Proposed Plan presents a preferred alternative for an additional amendment of the ERDF ROD that would allow in-trench treatment of LLHHWI after implementing controls to prevent releases and ensure protection of human health and the environment. The basis for this amendment is to reduce risk for physical injury and exposure to radioactive contamination and ionizing radiation for ERDF workers by performing LLHHWI treatment in the trench. This amendment does not seek a waiver from the required treatment or treatment method – LLHHWI treatment will be according to the regulations (macroencapsulation) and LLHHWI management will be within the double-lined trench to prevent hazardous constituent migration. A treatment location change from out-of-trench to in-trench is only proposed for LLHHWI; smaller-sized rubble, debris, and equipment that require macroencapsulation and fit into 15.3-m^3 (20-yd^3) roll-on/roll-off containers will continue to be treated outside the ERDF trench.

This document was issued by the EPA and DOE as part of their public participation responsibilities under Section 117(a) of CERCLA and 40 CFR 300.430(f)(2), "Remedial Investigation/Feasibility Study and Selection of Remedy," of the "National Oil and Hazardous Substances Pollution Contingency Plan" (NCP). The DOE is the lead agency and EPA is the lead regulatory agency for the ERDF project. In addition to this Proposed Plan, the *ERDF Risk Reduction ARAR Waiver Proposal* (WCH 2015) is available in the Administrative Record. This second document serves as the basis of selecting the preferred alternative and includes information relevant to the original ERDF ROD and its subsequent amendments.

BACKGROUND

ERDF Features

The ERDF began operations in 1996 through a CERCLA ROD (as amended with EPA 1995, 1997, 1999, 2002, 2007, 2009) to address hazardous substances and hazardous wastes that may present imminent and substantial endangerment to public health, welfare, or the environment. The fundamental objective of the ERDF is to support

the timely removal and disposal of contaminants from various locations within the Hanford Site. Figure 2 shows the locations of the Hanford Site and the ERDF.

The ERDF has proven to be a cost-effective and protective means to dispose of Hanford Site remediation waste. Its location in the arid central plateau area of Hanford uniquely suits its mission. The location of ERDF places it at least 24 km (15 mi) from the Columbia River and 73 m (240 ft) above groundwater in an arid desert environment (average precipitation is 17.8 cm/yr [7 in./yr]). The low average precipitation reduces the potential for leachate generation within the ERDF. Disposal of contaminated material at the ERDF is the preferred remedy for solid waste excavated from numerous Hanford waste sites and facilities. The ERDF does not accept liquid waste for disposal.

As required by the ERDF ROD, its construction complies with a RCRA subtitle "C" equivalent, double-liner and double-leachate collection system to isolate the waste from the environment. Leachate treatment occurs at a Hanford facility with leachate residues returned to the ERDF for disposal. Air and groundwater monitoring are in accordance with applicable standards. Appropriate measures to protect facility workers and the public during ERDF operations include contamination and dust migration control plus personnel protection from industrial hazards. The protective measures comply with the *Occupational Safety and Health Act of 1970*; RCW 49.17, "Washington Industrial Safety and Health Act of 1973"; the NCP (40 CFR 300.150); and ERDF-specific safety requirements.

The variety of waste streams generated during Hanford Site remediation activities includes the two following broad categories of waste:

- Solid waste contaminated with low-level radioactivity and/or chemical contaminants; building rubble and debris from the decommission and decontamination of reactors, process plants, laboratories, and support and administrative buildings; and site infrastructure
- Ancillary Hanford Tank Farm equipment waste (e.g., pumps, probes, valve pits, and related hardware) removed from waste tanks that hold liquids and sludges from past-practice fuel processing activities.

Many of the Tank Farm waste-contacted ancillary equipment items are the LLHHWI that are the primary focus of this document.

LLHHWI Characteristics

The principal concern of this document is the LLHHWI that require macroencapsulation treatment to achieve LDR requirements prior to disposal. The LLHHWI include contaminated equipment from the Hanford Site tank farms (e.g., tank jumpers, pumps, instrument trees, sluices, water lances) and other Hanford Site industrial complex items (e.g., radioactive and chemical separation process equipment, hot cells, and gloveboxes). The LLHHWI are often radiologically contaminated and have beta or gamma radiation fields ranging from 100 mR/hour to 7 Rem/hour with internal beta/gamma and alpha contamination that can exceed 80 million disintegrations per minute (dpm) beta/gamma and 50,000 dpm alpha. The Tank Farm equipment/debris listed in WCH (2015) (Table 1-1 and Appendix A) has been in contact with hazardous and radioactive tank waste contamination.

In many instances, Hanford Site cleanup waste is "hazardous waste" under RCRA because it contains RCRA hazardous waste. Hazardous waste must meet specified treatment requirements known as the LDR standards prior to disposal in a unit such as the ERDF trench. These waste items are often radiologically contaminated, contain LDR metals (such as lead and chromium), and include listed waste (F001 through F005) with no appreciable volatile constituents.

Figure 2. Hanford Site Map

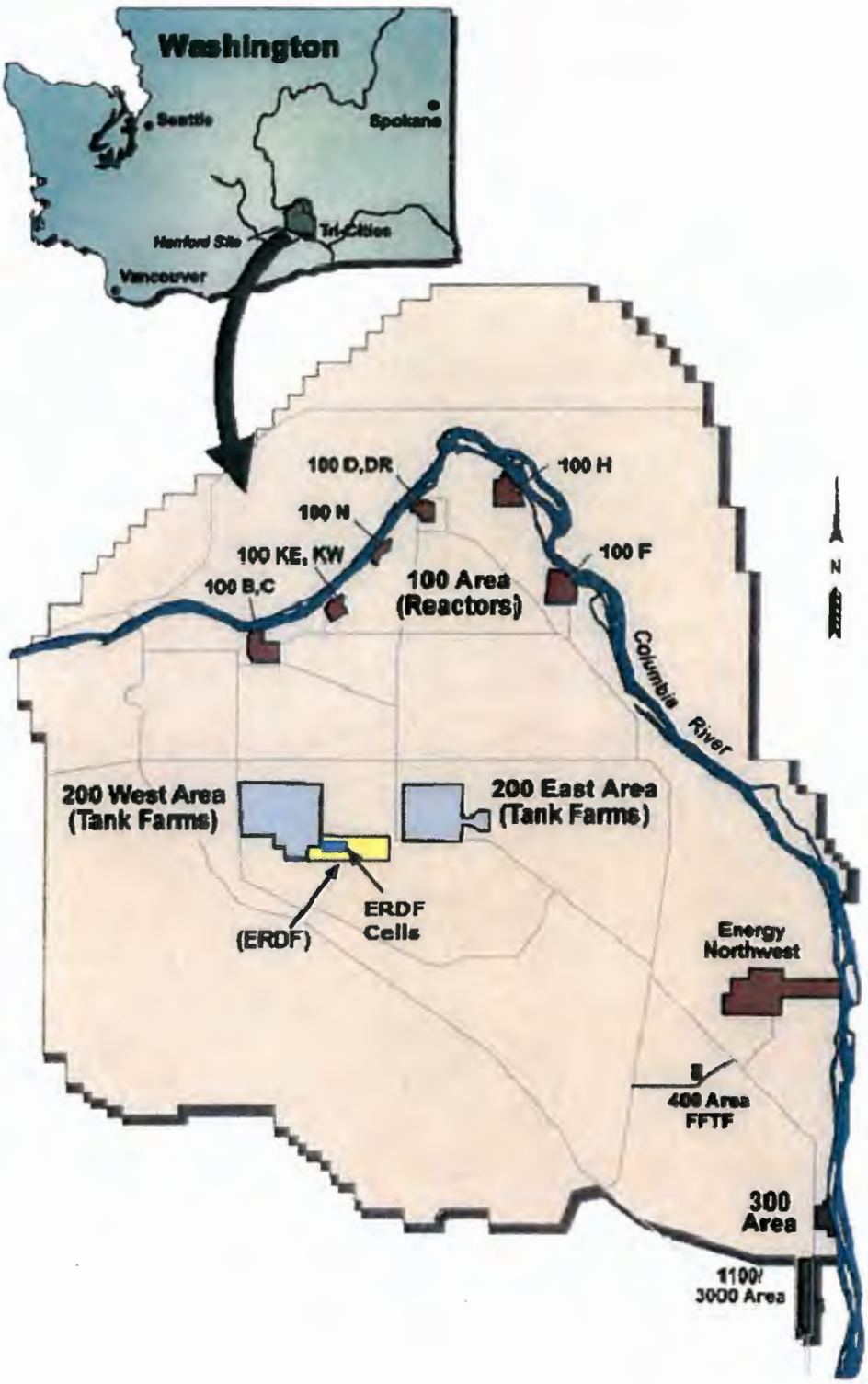
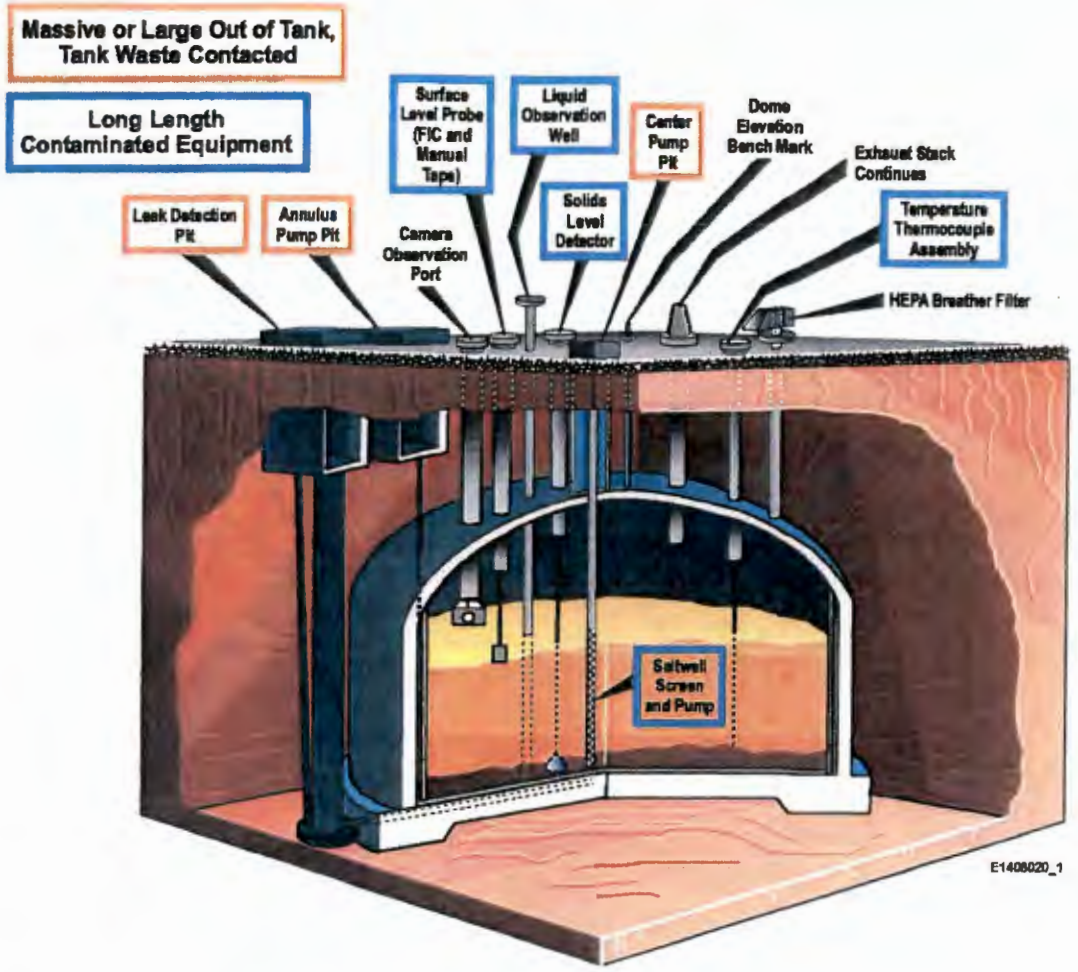


Figure 3. Hanford Site Tank Typical Hazardous Debris Waste Items



LLHHWI Treatment Issues

The remedy selected in the 1995 ERDF ROD identifies the RCRA LDR standards as applicable or relevant and appropriate requirements (ARARs) for ERDF operations, including 40 CFR 268,which specifies that treatment standards must be met before these wastes can be placed (land disposed) within a landfill. The 1995 ERDF ROD also identifies the Washington State dangerous waste regulations (Washington Administrative Code [WAC] 173-303, "Dangerous Waste Regulations") as ARARs for ERDF. WAC 173-303-140 contains the state LDRs, which, similar to the federal regulations in 40 CFR 268, also prohibits land disposal of waste prior to meeting treatment standards. A treatment location change from out-of-trench to in-trench is only proposed for LLHHWI; rubble, debris, equipment, etc. that require macroencapsulation and fit into 15.3-m^3 (20-yd^3) roll-on/roll-off containers will continue to be treated outside the trench.

Due to the nature of LLHHWI, macroencapsulation outside of the ERDF trench has proven to be costly, difficult to implement, and presents a greater risk to workers and the environment than the preferred treatment alternative (in the trench). Handling these items to perform out-of-trench treatment requires multiple crane lifts and manipulations. As illustrated in Table 1, outside-the-trench treatment poses a greater risk to human health and the environment because of the risk to workers from radiological contamination (especially if an accident should create an airborne release), increased radiological dose, and prolonged work in close proximity to heavy

equipment (e.g., cranes, forklifts) during handling and macroencapsulation. Outside the trench LDR treatment consists of LLHHWI macroencapsulation to immobilize and prevent contaminant migration to produce a treated item for transport into the ERDF trench for disposal.

LLHHWI macroencapsulation in an isolated ERDF trench area would result in a safer, more environmentally protective, easily implementable, and cost-effective approach. However, this preferred alternative requires a CERCLA waiver of the requirement for achieving applicable LDR treatment standards prior to transporting the waste into the disposal facility. The preferred alternative treatment would be protective of human health and the environment before and after treatment. This alternative would typically involve placing the LLHHWI on a concrete pad or concrete blocks prior to macroencapsulation. Only in cases where the LLHHWI contamination is contained internally (e.g., containerized waste or internally contaminated building components) would macroencapsulation involve locating LLHHWI on the ground.

No waiver has been granted to the ERDF from the LDR "placement" prohibition. Implementing the preferred alternative requires an ARAR waiver to allow in-trench treatment, contingent on employing ERDF operational measures to ensure protectiveness, prevent migration of contaminants away from the LLHHWI being treated, and eliminate any ambiguity regarding the acceptability of proposed practice.

DESCRIPTION OF ALTERNATIVES

The remedy selected in the 1995 ERDF ROD identifies the RCRA LDR standards as ARARs for operation of ERDF including 40 CFR 268, which specifies that treatment standards must be met ***before*** these wastes can be placed (land disposed) within the ERDF trench. The 1995 ERDF ROD also identifies the Washington State dangerous waste regulations (WAC 173-303) as ARARs for ERDF. WAC 173-303-140 contains the LDRs for Washington State, which, similar to the federal regulations in 40 CFR 268, also prohibits land disposal of waste ***prior*** to meeting treatment standards (EPA 1995). The following two alternatives were selected for evaluation against the CERCLA criteria.

Alternative 1: No Action (continued polymer treatment outside the ERDF trench): The treatment method currently used for tank farm LLHHWI consists of encapsulating or encasing the LLHHWI to immobilize and prevent the migration of LDR and/or radioactive contaminants. "Macroencapsulation" is the application of surface coating materials such as polymers (e.g., resins and plastics) or inert inorganic materials (e.g., cementitious grout) to reduce or eliminate surface exposure to potential leaching media. However, due to the nature of LLHHWI, which do not fit into 15.3-m^3 (20-yd^3) roll-on/roll-off containers and are too radiologically contaminated to safely size reduce, macroencapsulation has been performed outside the ERDF trench, using a polymer coating technology. Figure 4 shows a polymer coating application to an LLHHWI outside the ERDF trench.

Alternative 2: Cementitious Flood Grouting Treatment in the ERDF Trench: In the preferred alternative, untreated LLHHWI arrives at ERDF, is placed on blocks or a concrete pad (or on the ground where there is only internal contamination) in the trench, is flood grout encapsulated, and (after the grout has reached sufficient strength) covered with waste- or clean-soil (i.e., disposed). As needed, prior to encapsulation, temporary protection from rain, snow, or wind is provided by tarps and liquid run-on/run-off controls (e.g., berms or ditches) until the flood grouting treatment is complete. In-place LLHHWI flood grouting involves a single pour or multiple pours (depending on the overall size/shape of the item).

The following sections summarize the alternatives evaluation against the nine CERCLA criteria.

Figure 4. Polymer Coating Application outside the ERDF Trench

CERCLA EVALUATION CRITERIA

CERCLA provides nine criteria for evaluating alternatives (Figure 5). These criteria fall into three categories. The first two criteria (overall protection of human health and the environment and compliance with ARARs) are *threshold* criteria and compliance with them is mandatory for further alternative consideration, although ARAR waivers may apply under certain circumstances (as proposed in Alternative 2). The next five criteria are *balancing* criteria and compare the technical and cost aspects of alternatives. The final two criteria (State and Community Acceptance) are *modifying* criteria. Modifications to decisions may apply based on state and public comments and concerns. A summary of the evaluation of alternatives is in the following section.

EVALUATION OF ALTERNATIVES

The following text evaluates the attributes and issues for Alternatives 1 and 2 against the nine CERCLA criteria. Table 2, at the end of this section, compares their grades for the threshold and balancing criteria evaluations.

1. Overall protection of human health and the environment

Both treatment alternatives are consistent with the remedial action objectives established in the ERDF ROD to prevent unacceptable direct exposure to waste, prevent unacceptable contaminant releases to air and groundwater, and minimize ecological impacts. However, as illustrated in Table 1, Alternative 2 provides more protection for ERDF workers than Alternative 1.

Figure 5. CERCLA Evaluation Criteria

Table 1. Risk Reduction Summary for In-Trench Treatment LLHHWI at ERDF

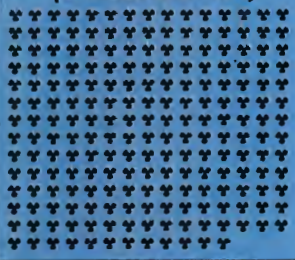
Worker Risk Considerations	Alternative 2: In-Trench Treatment (Waiver) *Flood Grout*	Alternative 1: Out-of-Trench Treatment *Poly Foam Coating*	Comments
Risk Reduction Factors *In-Trench treatment reduces risk based on number, proximity, time for workers involved in the treatment process.*			
Workers Required	4-6 	10-14 ***(2.5 times more workers)*** 	Additional workers required for out-of-trench treatment increases magnitude of events.
Worker Proximity (closest/average)	8 ft/12 ft 	1 ft/5 ft ***(2.4 to 8 times closer = 40 to 64 times more exposure)*** 	Industrial events involving suspended items can result in serious injury/death to workers in close proximity. Worker exposure decreases with distance (8 ft is 1/64th the exposure of 1 ft). ***Workers closer to the LLHHWI receive higher radiological exposure.***
Job Duration (hours; typical)	2.2 	9.5 ***(~4 times longer)*** 	Estimated time does not include LLHHWI storage prior to treatment or grout application. ***Workers spending more time near the LLHHWI receive higher radiological exposure.***
Radiological Exposure to Workers (factor) and Excess Cancer Risk	1x ***(1.7 to 3.5 X 10^{-5} risk)*** 	>200x ***(3.5 to 6.9 X 10^{-3} risk)*** 	Out-of-trench treatment puts workers close to LLHHWI for extended times, increasing exposure and excess cancer risk by a factor of >200. ***Workers receiving more radiological exposure have a greater chance of developing cancer. In-trench risk is within EPA's "acceptable" risk range (10^{-4} to 10^{-6}); the out-of-trench risk exceeds the "acceptable" range.***
Crane Lifts	1 	4-10 ***(4 to 10 times more lifts)*** 	Number of lifts/manipulating rotations depends on complexity of waste item. ***More lifts mean more chances for lift-related accidents to occur.***
Industrial Hygiene/PPE	No special PPE required for use of grout 	Powered air-purifying respirator and Level C PPE required for polymer spray 	PPE required to perform treatment out-of-trench adds physiological stress to workers (especially in warm weather).

Table 1. Risk Reduction Summary for In-Trench Treatment LLHHWI at ERDF

Worker Risk Considerations	Alternative 2: In-Trench Treatment (Waiver) *Flood Grout*	Alternative 1: Out-of-Trench Treatment *Poly Foam Coating*	Comments
Supporting Factors *In addition to reduced risk to workers, In-Trench treatment costs less, can be of better quality, and does not change treatment standard or final disposal location.*			
Durability of Treatment	Waste is not moved post-treatment 	Multiple lifts/transport prior to final placement could compromise macro 	Grout in-trench is more durable than polymer coating and is not subject to damage due to transport into the trench. One of 17 polymer coatings developed a crack, requiring re-treatment.
Additional Waste Generated	None 	Protective clothing, empty drums, equipment 	
Capital Cost/O&M Cost per year	**$0**	**$15M / $240K**	New construction of weatherproof facility would be required to perform out-of-trench treatment long-term.
Relative Cost (per item)	**$5,000**	**$15,000 - $30,000**	Excluding capital and operating cost for out-of-trench treatment.
Finished Product	***Macroencapsulated hazardous debris***	***Macroencapsulated hazardous debris***	All LLHHWI treatment completed before burial. Difference is treatment location.
Final Disposal Location	***Engineered ERDF trench***	***Engineered ERDF trench***	No change in final disposal location.

2. Compliance with ARARs

Alternative 1 is compliant with LDR treatment ARARs.

Table 1 illustrates the rationale for an Alternative 2 waiver from the 40 CFR 268 LDR requirements to treat LLHHWI outside the ERDF trench. The following text also discusses this rationale.

The waiver request basis concerns the greater risk for physical injury and exposure to radioactive contamination and ionizing radiation for ERDF workers performing treatment at the current compliant out-of-trench location. Additional handling and lifts of hazardous waste items, a greater number of workers involved, and closer proximity of involved workers to the LLHHWI pose greater risks compared to the proposed in-trench alternative. The preferred alternative does not seek a waiver from the required LDR treatment or treatment method – LLHHWI macroencapsulation according to the regulations and management within the ERDF trench will prevent migration of hazardous constituents. Only a change requested is to the treatment location from out-of-trench to in-trench. The final disposal condition and location for treated LLHHWI remains unchanged and protectiveness

of the remedy is unaffected. In addition to reducing ERDF worker risks of injury and exposure, in-trench treatment will cost less and not add any adverse impacts to the environment.

CERCLA Section 121(d) (4) (B) allows waivers for otherwise ARARs in situations where compliance with the requirement poses greater risk to human health and the environment than alternative options. In promulgating the CERCLA NCP, EPA identified the following three factors for evaluating waiver applications:

a. **Magnitude of adverse impacts:** The risks posed or the likelihood of present or future risks posed by the Alternative 2 (using the waiver) should be less than those posed by the totally compliant remedy posing the risk (Alternative 1).

b. **Duration of adverse impacts:** The more long lasting the risks from the totally compliant remedy (Alternative 1), the more this waiver becomes appropriate for Alternative 2.

c. **Reversibility of adverse impacts:** This waiver is especially appropriate if the risks posed by meeting the ARAR (Alternative 1) could cause irreparable damage (55 *Federal Register* [FR] 8748, March 8, 1990, and *53 FR* 51439, December 21, 1988).

As EPA explained in the NCP proposed rule (and adopted in the final NCP), this "greater risk" waiver may apply in situations where compliance with a requirement resulted in greater risk to workers. "Meeting an ARAR could also pose greater risks to workers or residents. For example, excavation of a particularly toxic, volatile, or explosive waste to meet an ARAR could pose high, short-term risks. If protective measures were not practicable for such excavation, use of this waiver might be appropriate" (*53 FR 51439*).

The compliant process of treatment prior to placement involves multiple lifts and rotational manipulation of the LLHHWI. An industrial accident involving a suspended waste item could result in irreparable impacts to ERDF workers including serious injuries or death. ERDF workers also have more exposure to radioactive materials and accumulate more radioactive dose, with attendant increase in excess cancer risk during the current treatment process. A simpler and safer in-trench treatment process uses fewer workers for a shorter period and positioned at a greater distance from the LLHHWI. These factors lead to less exposure to radioactive waste and lower accumulated dose (dose increases as distance decreases and time increases). They also decrease the likelihood of industrial accident and injury. Therefore, in-trench treatment results in a reduction of the risk of irreparable impacts to workers while resulting in the same treatment endpoint (Table 1).

3. Long-term effectiveness and permanence

The cementitious grout processes used in Alternative 2 provides greater compressive strength and is expected to outperform the polymer coatings used in Alternative 1. Repeated inspections are required to ensure the viability of the polymer coatings, included when the treated LLHHWI is placed in an ERDF trench for disposal. Historically, coating repairs were required for about 50% of the LLHHWI to ensure complete encapsulation. Also, it is expected that certain LLHHWI will be too large and difficult to handle (for example the 241-C-05B Tank Farm "Heel Pit" that is 6 feet wide, 12 feet long, 9 feet tall, weighs 78,000 pounds, and has an uncertain center-of-gravity) for the polymer coating to be successful.

Alternative 2 outperforms Alternative 1 because flood-grouting LLHHWI "in-place" inside an ERDF trench requires no post-treatment handling that could compromise macroencapsulation viability. Alternative 2 offers the best overall performance for long-term effectiveness and permanence.

4. Reduction of toxicity, mobility, or volume through treatment

Alternatives 1 and 2 perform equally in the overall reduction of toxicity and mobility of contamination through treatment. Both alternatives increase the volume of the LLHHWI due to the encapsulation process, but the slight volume difference between these two options is minor. Alternative 2 outperforms Alternative 1 because flood-grouting LLHHWI inside an ERDF trench requires no post-treatment handling that could compromise

macroencapsulation viability. In addition, cementitious grout provides a greater compressive strength than the polymer coatings used in Alternative 1.

Alternative 2 would provide the best overall performance for the reduction of toxicity, mobility, and volume.

5. Short-term effectiveness

Alternative 1 requires temporary LLHHWI storage prior to treatment. In Alternative 2, LLHHWI storage prior to treatment is not required; transport would be directly into the ERDF trench for macroencapsulation in a pre-prepared, bermed location, thereby requiring less overall time for LLHHWI treatment. The simple nature of the Alternative 2 operation allows LLHHWI processing to take place very soon after offloading in the trench, reducing potential LLHHWI exposure to weather and biological vectors.

The polymer coatings used in Alternative 1 have less short-term effectiveness than the Alternative 2 cementitious grout for the following reasons:

- They are relatively fragile (compared to cementitious grout)
- They are sensitive to moisture (e.g., dew or condensation on the waste affects polymer adhesion)
- There is potential for airborne radioactive releases due to coating failures during lifting and placement activities (to date, about 50% of the coated LLHHWI required touch-up or repair prior to final disposal).

Alternative 1 involves increased handling of radioactive materials, a greater number of lifts, and an increased exposure of the ERDF workers to radioactive materials. This results in increased worker exposure to ionizing radiation, radioactive contamination, increased worker fall hazards, increased exposure to falling objects due to additional crane lifts, and industrial hygiene hazards from encapsulation chemicals. Polymer coatings place workers in contact with harsh chemicals that require high levels of respiratory and skin protection. Application of the coatings puts workers in close proximity to radioactive materials, increasing the ionizing radiation dose they receive as well as increasing the possibility of personnel contamination. Alternative 2 minimizes handling to a single off-loading operation where workers can maintain a safe distance from the LLHHWI, nearly eliminating the personnel handling and radiation exposure hazards identified for Alternative 1.

Alternative 1 treatment of the LLHHWI before placement in ERDF results in increased handling and exposure by workers to high dose radiological and hazardous components. For out-of-trench treatment (Alternative 1) there is an estimated 20-fold increase in radiological dose exposure to workers compared to in-trench treatment (Alternative 2). More highly contaminated LLHHWI will require treatment at ERDF in the future, causing increased worker exposure with the continued implementation of out-of-trench treatment (Alternative 1).

Alternative 2 offers the best overall performance for short-term effectiveness.

6. Implementability

Both treatment alternatives are implementable.

The out-of-trench polymer coating process (Alternative 1) has been used to macroencapsulate LLHHWI since 2012. However, when compared to the in-trench flood grouting process (Alternative 2), it has more risk to workers through more handling activities, higher radiological dose accumulation when working close to the LLHHWI, and increased potential for industrial accidents (e.g., multiple crane lifts, overhead items, wearing respiratory protection, exposure to harsh chemicals). In addition, seasonal treatment delays result for Alternative 1 during wet conditions (dew or condensation on the waste affects polymer adhesion).

Alternative 2 requires no facilities or process location development outside the trench. A minor amount of preparation time (2 to 4 hours per item) is adequate to build the bermed placement areas inside the trench.

Minimal seasonal weather-related treatment delays would result for Alternative 2 (wet conditions do not affect treatment). However, implementing Alternative 2 requires an LDR waiver, so implementation of this alternative cannot begin unless the waiver approval process succeeds.

Alternative 2 offers the best overall performance for implementability, assuming the LDR waiver approval.

7. Cost

Based on the treatment costs expected, Alternative 1 (storage/work areas, polymer costs, and more labor hours) would be more expensive than Alternative 2 (berm development and grout costs).

Alternative 2 offers the best overall performance for cost.

8. State acceptance

The Washington State Department of Ecology supports Alternative 2.

9. Community acceptance

Community acceptance will be determined based on comments received during the public comment period. Modifications to the proposed actions may be made based on public comments.

Table 2. Comparative Analysis Summary for Alternatives

	Threshold Criteria		Balancing Criteria				
	Overall Protection of Human Health and the Environment	Compliance with ARARs or a Waiver Justified	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume through Treatment	Short-Term Effectiveness	Implementability	Cost
Alternative 1 Current process of polymer application outside the trench	Yes	Yes	Excellent[a]	Acceptable[b]	Poor[c]	Poor	Acceptable
Alternative 2 Waiver approved: flood grouting inside the trench	Yes	Yes	Excellent	Excellent	Excellent	Excellent	Excellent

[a] Excellent - Performs very well relative to the other alternative.
[b] Acceptable - Performs moderately well relative to the other alternative.
[c] Poor - Performs poorly relative to the other alternative.

PREFERRED ALTERNATIVE

Based on the evaluation of alternatives, DOE and EPA selected Alternative 2, *Flood Grouting Treatment in the ERDF Trench*, as the Preferred Alternative. This alternative would amend the ERDF ROD to grant a CERCLA ARAR waiver allowing hazardous debris subject to LDR requirements for treatment within the ERDF trench rather than outside the trench, as would otherwise be required by 40 CFR 268 and WAC 173-303-140. The Tri-Parties believe that in-trench treatment, with provisions to ensure LLHHWI protection prior-to and during treatment with no LLHHWI disposal until treatment is complete, would reduce ERDF worker risk, achieve enhanced performance compared to the current polymer coating practice, cost less, and provide more overall protection for human health and the environment.

COMMUNITY PARTICIPATION

Public input is a key element in the decision-making process. Tribal Nations and the public are encouraged to read and provide comments on any of the alternatives presented in this Proposed Plan, including the preferred alternatives. The public comment period for this Proposed Plan extends from May 19, 2015, through June 18, 2015. Comments on the preferred alternatives, other alternatives, or any element of this Proposed Plan will be accepted until June 18, 2015. Please send comments to:

Kristen Skopeck, U.S. Department of Energy, Richland Operations Office

Mail: P.O. Box 550, A7-75
Richland, WA 99352
Phone: (509) 376-5803
Fax: (509) 376-1563
E-mail: kristen.skopeck@rl.doe.gov

Emerald Laija, U.S. Environmental Protection Agency

Mail: Hanford Project Office
825 Jadwin Ave.
Suite 210
Richland, WA 99352
Phone: (509) 376-4919
Fax: (509) 376-2396
E-mail: laija.emerald@epa.gov

To request a meeting in your area, please contact Dave Einan by xxx date.

After the public comment period, the DOE and EPA consider the comments regarding the Proposed Plan and information gathered during the comment period and select an alternative for implementation. Preferred alternative modification or selection of another alternative is possible based on public input. The DOE and EPA will then prepare a CERCLA ROD Amendment. This ROD Amendment will identify the chosen alternative (i.e., remedy). A responsiveness summary containing agency responses to the comments received during the public comment period will be made available with the ROD Amendment.

Location of Public Information Repositories

Hanford Public Information Repository Locations

Administrative Record and Public Information Repository:
2440 Stevens Center Place,
Room 1101, Richland, WA
Phone: (509) 376-2530
Web site address:
http://www2.hanford.gov/arpir/

Portland
Portland State University
Branford Price and Millar Library
1875 SW Park Avenue
Portland, OR
(503) 725-4542
Map: http://www.pdx.edu/map.html

Seattle
University of Washington
Suzzallo Library
Government Publications Division
Seattle, WA
(206) 543-9157
Map: http://tinyurl.com/m8ebj

Richland
U.S. Department of Energy Public Reading Room
Washington State University, Tri-Cities
2770 Crimson Way, Richland, WA
Consolidated Information Center, Room 101-L
(509) 372-7443
Map: http://reading-room.labworks.org/Directions.aspx

Spokane
Gonzaga University
Foley Center
East 502 Boone Avenue, Spokane, WA
(509) 313-6110
Map: http://tinyurl.com/2c6bpm

POINTS OF CONTACT

U.S. Department of Energy Representative
Kristen Skopeck
Richland Operations Office
(509) 376-5803
FAX (509) 376-1563

U.S. Environmental Protection Agency Representative (Region 10)
David Einan
Project Manager
David.Einan@epa.gov
(509) 376-3883

ADMINISTRATIVE RECORD

The public is encouraged to review the documents and all information for prior decisions at the operable units (OU) and ERDF. The Administrative Record file, which contains the information used to select the proposed ERDF design and OU remedial actions, is available at the following locations:

U.S. Department of Energy,
Richland Operations Office
Administrative Record Center
2440 Stevens Center Place
Richland, Washington 99352

U.S. Environmental Protection Agency
Region 10
Superfund Record Center
1200 Sixth Avenue, Suite 900
Park Place Building
Mail Stop: HW-074
Seattle, Washington 98101

Washington State Department of Ecology
NWP Resource Room
3100 Port of Benton Blvd
Richland, Washington 99354

PUBLIC INFORMATION REPOSITORIES

All documents in the regulatory packages are available for review at the Hanford Tri-Party Agreement Public Information Repositories:

University of Washington
Suzzallo Library
Government Publications
P.O. Box 352900
Seattle, Washington 98195
(206) 543-0242

Gonzaga University
Foley Center
East 502 Boone Avenue
Spokane, Washington 99258
(509) 313-5931

Portland State University
Branford Price Millar Library
Science and Engineering Floor
1875 SW Park Avenue
Portland, Oregon 97201
(503) 725-5874

Washington State University, Tri-Cities
U.S. DOE Reading Room, Room 101-L
2770 Crimson Way
Richland, Washington 99352
(509) 372-7443

GLOSSARY

The first use of technical terms and other specialized text in this Proposed Plan are in bold. Definitions for these terms and specialized text are as follows:

Administrative Record – The files containing the documents used to select a response action at a CERCLA remedial action site. Locations where the Administrative Record for the ERDF ROD and Amendments are maintained and available to the public for review in this Proposed Plan.

Applicable or relevant and appropriate requirements (ARARs) –

- "Applicable" requirements are cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under federal, state environmental, or facility sitting law. ARARs are specifically based on Federal or state laws that address hazardous substances, pollutants, contaminants, response actions, locations, or other circumstances at CERCLA sites.

- "Relevant and appropriate" requirements are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state environmental or facility sitting law which, while not "applicable" at a CERCLA site or that address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site

As Low As is Reasonably Achievable (ALARA) – An approach to manage and control radiation exposures (both individual and collective) to the work force and the general public to as low as is reasonably achievable, taking into account social, technical, economic, practical, and public policy considerations. ALARA is not a dose limit but a process with the objective of attaining doses as far below the applicable limits as is reasonably achievable.

CERCLA – *CERCLA* is also known as "Superfund," the federal government's program to clean up uncontrolled hazardous waste sites. This acronym stands for the ***Comprehensive Environmental Response, Compensation, and Liability Act of 1980***, as amended.

Cost-effective remedy – According to the Superfund National Contingency Plan, Section 300.430(f)(l)(ii)(D), cost-effective remedies have costs that are proportional to their overall effectiveness. The *cost effectiveness* of a remedial alternative is determined by evaluating its long-term effectiveness and permanence; its reduction in toxicity, mobility, and volume through treatment; and its short-term effectiveness.

Environmental Restoration Disposal Facility (ERDF) – The Hanford Site's disposal facility for most waste and contaminated environmental media (contingent upon meeting the ERDF waste acceptance criteria) generated under CERCLA response actions.

Explanation of Significant Difference (ESD) – A CERCLA decision document prepared when there has been a significant change in cost, performance, or cost of a remedy selected in a Record of Decision (ROD). The significant change to the remedy may result from new information.

Operable unit (OU) – Term for a number of activities conducted during CERCLA site cleanup. A typical operable unit would be removal of drums and tanks from the surface of a site.

Proposed Plan – A Proposed Plan is a CERCLA document that briefly describes the plans for implementing cleanup alternatives. Proposed Plans typically include site background information, summaries of cleanup alternative evaluations, and a preferred remedial action alternative.

Record of Decision (ROD) – A ROD is a CERCLA public document that identifies which cleanup alternative(s) will be used at National Priorities List sites.

***Resource Conservation and Recovery Act of 1976* (RCRA)** – RCRA is a federal law that establishes the requirements for the generation, storage, treatment, and disposal of hazardous waste.

Waste sites – Waste sites are locations that are contaminated (or potentially contaminated) with hazardous materials due to past actions and/or operations. Contamination may be present in environmental media (e.g., soil or groundwater), structures, or waste (e.g., debris).

REFERENCES

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*, as amended.

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, as amended.

53 FR 51439, "National Oil and Hazardous Substances Pollution Contingency Plan; Proposed Rule," *Federal Register*.

55 FR 8748, "National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule," *Federal Register*.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601, et seq.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 Vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=81.

EPA, 1995, *Record of Decision: U.S. DOE Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1996, *U.S. DOE Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington – Explanation of Significant Difference (ESD)*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1997, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington; Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1999, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington; Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2002, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington; Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2007, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington; Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2009, *U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington; Amended Record of Decision, Decision Summary and Responsiveness Summary*, U.S. Environmental Protection Agency, Washington, D.C.

Occupational Safety and Health Act of 1970, 29 U.S.C. 651, et seq.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq., as amended.

RCW 49.17, "Washington Industrial Safety and Health Act of 1973, *Revised Code of Washington*, as amended.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WCH, 2015, *ERDF Risk Reduction ARAR Waiver Proposal,* WCH-611, Rev. 0, Washington Closure Hanford, Richland, Washington.