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
September 28, 2015 – October 28, 2015

How You Can Participate in this Decision-Making Process:

Read this proposed plan and review supporting information in the Administrative Record.

Comment on this proposed plan by mail, e-mail, or fax on or before October 28, 2015.

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See pages 14 and 15 for more information about public involvement and contact information.

Inside This Plan

Figure 1. The Environmental Restoration Disposal Facility (ERDF)

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) propose to amend the Environmental Restoration Disposal Facility (ERDF) Record of Decision (ROD) to waive a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) applicable or relevant and appropriate requirement (ARAR), pursuant to CERCLA Section 121(d)(4), because compliance with that requirement will result in greater risk to human health and the environment than alternative options.

The ARAR that DOE and EPA are proposing to waive is the *Resource Conservation and Recovery Act of 1976* (RCRA) and *Washington Administrative Code* (WAC) land disposal restriction (LDR) prohibition on placement of hazardous waste in a land disposal unit prior to completing required treatment. The waiver is being proposed for certain long, large, and/or heavy hazardous (LLHH) waste items identified in Attachment A. Under the waiver proposal, treatment would be conducted and completed after placement in ERDF (see Figure 1) in a manner that meets LDR treatment requirements and is protective of human health and the environment. Completing treatment outside ERDF and then placing the treated LLHH waste items in ERDF results in significant, avoidable additional risk to workers.

The Washington State Department of Ecology (Ecology) concurs with and supports the ARAR waiver proposal.

This proposed plan summarizes the proposed ARAR waiver and seeks public and Tribal Nation input on the proposal. Comments will be accepted during the 30-day public comment period (see left sidebar on page 1).

Following consideration of public and Tribal Nation input, DOE and EPA may issue a ROD amendment waiving the ARAR as indicated herein. The ROD amendment will include a responsiveness summary that documents the comments received and responses to significant comments.

The Hanford Site's ERDF is a 4-km^2 (1.6-mi^2) engineered mixed waste disposal landfill with associated support facilities that is regulated by the EPA through a 1995 CERCLA ROD (EPA 1995), as amended (EPA 1997, 1999, 2002, 2007, and 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 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 and 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).

This proposed plan presents a proposal for an additional amendment of the ERDF ROD that would waive an LDR ARAR to allow in-trench treatment of certain LLHH waste items in accordance with implementing controls to prevent releases and ensure protection of human health and the environment. This proposal does not include a waiver from the required treatment standards or treatment method. Treatment will be conducted to meet LDR treatment requirements after placement in ERDF, and the LLHH waste items will be managed within the double-lined trench while the treatment is being completed to prevent hazardous constituent migration. RCRA LDR treatment requirements are specified at 40 CFR 268.45. The LLHH waste items identified in Attachment A all meet the definition of debris at 40 CFR 268.2 and, as provided at 40 CFR 268.45, may meet LDR treatment requirements by macroencapsulation. Radioactive lead solids may also be treated by macroencapsulation as provided by 40 CFR 268.42.

The RCRA LDR regulations prohibit placement of hazardous waste debris in a land disposal unit prior to completing treatment (40 CFR 268.45). WAC 173-303-140(2)(a) incorporates 40 CFR 268.45 by reference.

In recent years, radioactively contaminated LLHH waste items that are too big to fit into 15.3-m^3 (20-yd^3) roll-on/roll-off containers, too hazardous to safely size reduce, and that pose radiation exposure risks to workers began arriving at ERDF for treatment and disposal. The requirement to handle and treat these awkward items outside the trench and then move them into the trench for disposal results in a "greater risk" to workers than would result from the proposed in-trench treatment proposal. Waiving the current requirement to treat LLHH waste items prior to placement in ERDF and allowing in-trench treatment will produce equivalent or better treatment while substantially reducing the risks of physical injury and/or radioactive exposure for workers.

This document was issued by EPA and DOE as part of their public participation responsibilities under Section 117(a) of CERCLA and 40 CFR 300.435(c)(2)(ii) of the "National Oil and Hazardous Substances Pollution Contingency Plan" (NCP). DOE is the lead agency, and EPA is the lead regulatory agency for the ERDF project. This proposed plan highlights key information regarding the proposed ARAR waiver. More detailed information and data regarding the waiver proposal are included in the Administrative Record, including the *ERDF Risk Reduction ARAR Waiver Proposal* (WCH-611).

BACKGROUND AND SCOPE AND ROLE IN SITE CLEANUP

ERDF Features

ERDF began operations in 1996 through a CERCLA ROD (EPA 1995), which was amended in 1997, 1999, 2002, 2007, and 2009. The fundamental objective of ERDF is to support the timely removal and disposal of contaminants under CERCLA from various locations within the Hanford Site. Figure 2 shows the locations of the Hanford Site and ERDF. **The 1997 amendment allowed for "stabilization in containers and macroencapsulation"** at ERDF (with appropriate CERCLA documentation). This proposed ROD amendment will allow macroencapsulation of LLHH waste items that may not be in containers within the ERDF trench in accordance with the waiver.

Figure 2. Hanford Site Map

As required by the ERDF ROD, ERDF's construction complies with a RCRA subtitle "C" equivalent double-liner and double-leachate collection system requirements to isolate the waste from the environment. Treatment of ERDF leachate occurs at a Hanford facility with leachate residues returned to ERDF for disposal. Air and groundwater monitoring are required to follow applicable RCRA and WAC standards for a hazardous waste landfill. Appropriate measures to protect facility workers and the public during ERDF operations include contamination and dust migration control plus protection from industrial hazards.

Relationship to Current ERDF ROD and ROD Amendments

RCRA and the WAC regulate the generation, transportation, storage, treatment, and disposal of hazardous waste. Hazardous waste management regulations promulgated pursuant to RCRA are codified at 40 CFR 260 through 40 CFR 268. Washington State's dangerous waste program has been authorized pursuant to Section 3006 of RCRA, which is administered by Ecology. These state regulations are codified in WAC 173-303. The ERDF ROD, as amended, identifies RCRA and state dangerous waste regulations as ARARs. The substantive requirement of these rules must be satisfied when managing or disposing hazardous and dangerous waste at ERDF, unless waived as provided at CERCLA 121(e).

The RCRA and dangerous waste ARARs include 40 CFR 268 and WAC 173-303-140 LDR requirements. WAC 173-303-140 incorporates 40 CFR 268 requirements by reference for dangerous waste that is also a hazardous waste. The 40 CFR 268 substantive requirements apply to hazardous waste and dangerous waste received at ERDF for disposal.

The LLHH waste items identified in Attachment A that would be treated after placement in an ERDF trench if the ARAR waiver proposal is approved are both hazardous and dangerous waste. Those waste items are also debris as defined at 40 CFR 268.2(g). 40 CFR 268.45 provides that hazardous waste debris must be treated prior to land disposal. Land disposal is defined at 40 CFR 268.2 to mean placement in or on the land and, at WAC 173-303-140(3)(b), to include placement for disposal purposes in a landfill. Required treatment for hazardous waste debris may be satisfied by macroencapsulation, as specified at 40 CFR 268.45. Macroencapsulation must completely encapsulate the debris and must be resistant to degradation by the debris and its contaminants, and materials that it may come in contact with after placement.

In addition to waste that may be treated at ERDF in accordance with the 1997 ROD amendment, the 2007 ERDF ROD amendment provided for treatment and disposal at ERDF of certain equipment in storage at the Hanford Site. These amendments include the LLHH waste items that are the subject of this proposed ARAR waiver. The waiver would waive the requirement that treatment be completed prior to placement of LLHH waste items identified in Attachment A in an ERDF trench. Macroencapsulation meeting 40 CFR 268.45 requirements would be completed shortly after placement using a cementitious flood-grouting technique. The LLHH waste item is placed on supports in a pre-prepared bermed area and the cementitious grout is pumped into the pre-prepared area, encapsulating the waste item.

The waiver proposed will allow treatment after placement only if placement and subsequent treatment in an ERDF trench is conducted according to controls to prevent releases and ensure human health and environment protection (e.g., the use of berms, tarps) until the required treatment is complete. The ERDF design and operational requirements will not change. The protectiveness of ERDF disposal would be unaffected by the proposed waiver.

CERCLA Greater Risk ARAR Waiver

CERCLA Section 121(d)(4)(B) allows ARARs to be waived in situations where compliance with the requirement poses greater risk to human health and the environment than alternative options. In promulgating the CERCLA NCP (40 CFR 300), EPA identified three factors to be considered in evaluating application of this waiver:

1. Magnitude of adverse impacts. The risk posed or the likelihood of present or future risks from the remedy using the waiver should be significantly less than that posed by the compliant remedy posing the risk.
2. Duration of adverse impacts. The more long lasting the risks from the compliant remedy, the more this waiver becomes appropriate.
3. Reversibility of adverse impacts. This waiver is especially appropriate if the risks posed by meeting the ARAR could cause irreparable damage (55 FR 8748, March 8, 1990; 53 FR 51439, December 21, 1988).

As EPA explained in the NCP proposed rule, this "greater risk" waiver could be used in situations where compliance with an ARAR resulted in greater risk to workers:

> Meeting an ARAR could 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 an excavation, use of this waiver might be appropriate (53 FR 51439).

LLHH WASTE ITEM CHARACTERISTICS

The LLHH waste items identified in Attachment A that are subject to RCRA LDR requirements include contaminated equipment from the Hanford Site tank farms (e.g., tank jumpers, pumps, instrument trees, sluices, and water lances; Figure 3) and other Hanford Site industrial complex items (e.g., radioactive equipment, chemical separation process equipment, hot cells, and gloveboxes). Many of these LLHH waste items are 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. These waste items often also contain LDR metals (such as lead and chromium) and include listed waste (F001 through F005) but with no appreciable volatile constituents (i.e., no vapors). The tank farm LLHH waste items described in Attachment A were in contact with hazardous and radioactive tank waste contamination. Approximately 1,000 LLHH waste items are expected for LDR treatment and disposal at ERDF over the next 20 years.

Tank-waste-contacted equipment is equipment that was located inside a tank and in contact with the tank waste. All of these items were custom made, and because naming conventions have not always been consistent for these items, multiple names for similar items are possible. "Tank waste" is the residual mix of chemicals and radionuclides left over from the processes used to dissolve irradiated reactor fuel elements and to remove and purify plutonium from the dissolved fuel. The process residues included acids, organic chemicals, and dissolved radioactive metals. Sodium hydroxide was added to all the tanks to neutralize the acids. This created a variety of salts and sludges in the tanks. Tank contents were further concentrated by removing much of the water present in the tanks. The result is a highly radioactive and concentrated mixture of sludges, salt cakes, and liquids. Every tank has a different mixture of chemicals and radionuclides. The LLHH waste items proposed for treatment in-trench are mixed hazardous debris that are:

1. Items that are too big to fit in and be treated within a standard 15.3-m^3 (20-yd^3) ERDF container (i.e., more than 6 m [19 ft] long, more than 2 m [7 ft] wide, and/or more than 1 m [3 ft] tall) and too hazardous to be safely size reduced; and are

2. Items with radiological contamination (see Table 1 for known external dose ranges) that results in additional direct worker exposure during the macroencapsulation conducted prior to placement in ERDF and could cause airborne radioactivity if an industrial accident caused the waste item packaging to breach or the item to break (potentially releasing internal contamination) during treatment or transport activities; and/or are items with nonuniform weight distributions that present issues with rigging, crane lifts, etc., that contribute to the potential for industrial accidents that could result in severe worker injuries.

Attachment A lists the typical LLHH waste items by the following waste item categories based on tank waste information and LLHH waste item descriptions.

Category 1—Long-Length Tank-Waste-Contacted Equipment: In-tank LLHH waste items that, because they contacted tank waste, should not be size reduced due to contamination levels on their inner and outer surfaces. This category includes in-tank monitoring equipment such as thermocouples, equipment trees, corrosion probes, dip tubes, and cone penetrometers. This category also includes in-tank transfer equipment used to redistribute waste within a tank and transfer waste between tanks such as pumps, sluicers, screens, water lances, and slurry distributors. These waste items are represented by the blue boxes on the tank cutaway illustration presented in Figure 3.

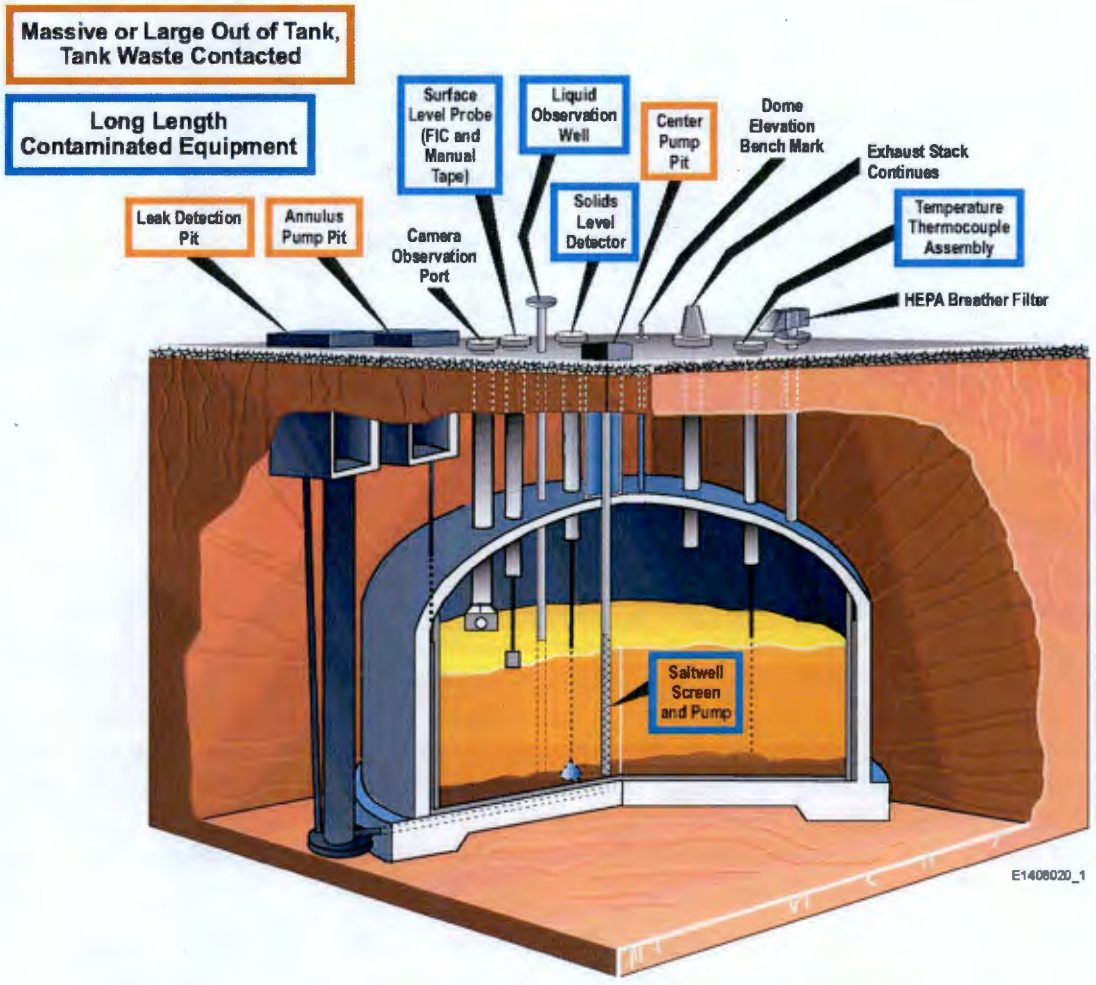


Figure 3. Hanford Site Tank Typical Hazardous Debris Waste Items

Category 2—Large Tank-Waste-Contacted Debris: Out-of-tank LLHH waste items (including tank lids) that, because they contacted tank waste (and therefore have high contamination levels), should not be size reduced. These items include pits, jumpers, pumps, equipment skids, top hats, cover blocks, cover plates, and other out-of-tank equipment used for tank-waste distribution. These waste items are represented by the red boxes on the tank cutaway illustration presented in Figure 3.

Category 3—Large Hot Cells: LLHH waste items also include hot cells (including large gloveboxes) used to isolate waste items and prevent airborne contamination. Hot cells are enclosed rooms or boxes that were used to handle radioactive items with such high dose levels, contamination levels, or both that workers had to manipulate them from outside the cell. These cells cannot be safely entered for decontamination or size-reduction tasks. Hazardous contents (aside from the radioactive contamination) may include lead, cadmium, asbestos, and F-listed hazardous wastes.

RISK SUMMARY

Due to the nature of the LLHH waste items in Attachment A, macroencapsulation outside of the ERDF trench presents a greater risk to workers and is more costly and difficult to implement than conducting the treatment after placement in the ERDF trench as provided in this proposal. Out-of-trench treatment requires multiple crane lifts and manipulations to encapsulate the debris. It requires multiple applications of surface coating materials such as polymers (e.g., resins and plastics; Figure 4). As illustrated in Table 1, this poses a greater risk to human health because of the risk to workers from radiological contamination (especially if an accident were to create an airborne release), increased radiological dose, and prolonged work in close proximity to heavy equipment (e.g., cranes, forklifts) during handling and macroencapsulation.

Figure 4. Polymer Coating Application Outside the ERDF Trench

Table 1. Risk Comparison Summary for Treatment of LLHH Items in Attachment A

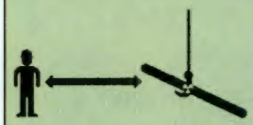
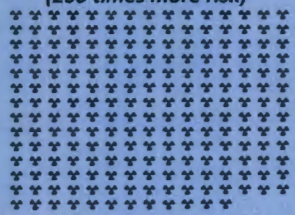
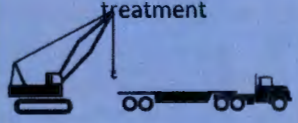
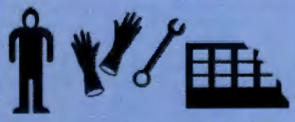
Worker Risk Considerations	In-Trench Treatment (ARAR Waiver) *Flood Grout*	Out-of-Trench Compliant Treatment *Polymer Coating*	Comments
Risk Reduction Factors *In-trench treatment reduces risk based on number, proximity, and time for workers involved in the treatment process.*			
Workers Required	4 	13 ***(3 times more workers)*** 	Additional workers required for out-of-trench treatment increases the number of workers at risk.
Worker Proximity (closest/average)	8 ft to12 ft 	1 ft to 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.. Workers will not need to be closer than 8 to 12 ft from suspended waste items. ***Workers closer to the LLHH waste items receive higher radiological exposure.*** Worker exposure decreases with distance (8 ft is 1/64th the exposure of 1 ft)
Job Duration (hours; typical)	2.2 	9.5 ***(~4 times longer)*** 	Estimated time just for treatment activity and does not include LLHH waste items storage prior to treatment. ***Workers spending more time near the LLHH waste items receive higher radiological exposure.***
Radiological Exposure to Workers and Excess Cancer Risk	1x ***(6.0 x 10^{-6} risk)*** 	200x ***(1.2 x 10^{-3} risk)*** ***(200 times more risk)*** 	Out-of-trench treatment puts workers close to LLHH waste items for extended times, increasing exposure and excess cancer risk by 200x in the course of a year. ***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.***

Table 1. Risk Comparison Summary for Treatment of LLHH Items in Attachment A

Worker Risk Considerations	In-Trench Treatment (ARAR Waiver) *Flood Grout*	Out-of-Trench Compliant Treatment *Polymer Coating*	Comments
Industrial Hygiene/Personal Protective Equipment (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).
Supporting Factors *In addition to reduced risk to workers, in-trench treatment fully meets treatment requirements, costs less, and can be of better quality.*			
Durability of Treatment	Waste is not moved post-treatment 	Multiple lifts/transport prior to final placement could compromise treatment 	Grout in-trench treatment is more durable than polymer coating and is not subject to damage due to transport into the trench. One of 17 polymer coatings conducted to-date on LLHH developed a crack, requiring retreatment.
Additional Waste Generated	None 	Contaminated Protective clothing, equipment, tools 	Workers will need less protective clothing, respiratory protection, supplies, and tools because they will not be in contact with, or near, radiologically contaminated waste items and will not use dangerous chemicals to apply polymers to waste items.
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 LLHH waste item treatment completed before burial. Difference is treatment location.
Final Disposal Location	***Engineered ERDF trench***	***Engineered ERDF trench***	No change in final disposal location or ERDF design and operating requirements.

CERCLA Section 121(d)(4)(B) allows ARARs to be waived where compliance with the requirement poses greater risk to human health and the environment than do other options. Treatment prior to placement in compliance with the LDR treatment requirements poses greater risks to workers than treating waste after placement, even after employing all practicable measures to minimize adverse impacts and risks to human health and the environment.

Treatment Prior to Placement in Compliance with the LDR Treatment Requirements

The out-of-trench method currently used to treat tank farm LLHH waste items prior to placement complies with LDR treatment requirements by completely encapsulating the LLHH waste items through the application of a surface coating using a polymer coating technology. Figure 4 shows the application of a polymer coating to an LLHH waste item outside the ERDF trench. The out-of-trench method requires at least nine operations compared to the in-trench alternative. These additional steps increase worker exposure to radiological and industrial hazards:

1. Transporting the item to the ERDF LLHH waste item staging area
2. Performing additional close-up radiological surveys
3. Performing 4 to 10 crane lifts of the item during the polymer application
4. Spraying four or more coatings
5. Inspecting the coatings and touching up the coating after each application
6. Reloading the item onto a truck for transport into the trench
7. Inspecting the coating and touching up the coating
8. Performing one last crane lift to offload the encapsulated LLHH waste item in the trench
9. Inspecting the final coating (Note: This inspection can lead to additional coating touch-up).

Risk Factors: As illustrated in Table 1, this ARAR-compliant treatment process requires 3 times more workers and 4 to 10 times more crane lifts (including rotational manipulation of the LLHH waste items) than the proposed in-trench waiver proposal. While practicable preventive measures (proper crane selection for job, operator and support personnel training, machinery and gear inspections, rigging inspections, etc.) are followed during crane lifts, an industrial accident involving a suspended LLHH waste item could result in irreparable impacts to ERDF workers, including serious injuries or death. As also illustrated in Table 1, ERDF workers have 200 times more exposure to radioactive materials and accumulate more radioactive dose, with increases in excess cancer risk, during the current out-of-trench treatment process.

ARAR Waiver Proposal to Conduct Cementitious Flood-Grouting Treatment in the ERDF Trench

Under the alternative ARAR waiver proposal, an untreated LLHH waste item arrives at ERDF, is placed on a prepared area in the trench, is flood-grout macroencapsulated, and after the grout has reached sufficient strength, is covered with waste or clean soil. This treatment is superior to polymer coating macroencapsulation because the waste items will not be moved post-treatment and because of the higher ultimate strength of the cured grout. Contingent on seasonal local weather conditions 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 LLHH waste item cementitious flood grouting involves a single pour or multiple pours (depending on the overall size/shape of the item). Implementation of this alternative would require a waiver from the requirement to treat LLHH waste items prior to placement in the ERDF trench. The in-trench cementitious flood-grouting treatment requires only four operations:

1. Preparing a location (stand-off and berm) to receive the LLHH waste item
2. Transporting the LLHH waste item directly into the ERDF trench
3. Performing one crane lift to unload and set the LLHH waste item in the prepared location
4. Pouring cementitious grout from a truck or grout pump to encapsulate the LLHH waste item.

Risk Factors: This simpler and safer in-trench treatment process uses fewer workers for a shorter period, and the workers are positioned at a greater distance from the LLHH waste items during treatment. These factors lead to

less exposure to radioactive waste and lower accumulated dose (dose increases as distance decreases and time increases). This approach also decreases the likelihood of an industrial accident and injury because handling of LLHH waste items is reduced to a single crane lift and workers are not required to spend time in close proximity to them. The in-trench treatment proposed results in a reduction of the risk of irreparable impacts to workers while resulting in the same treatment result, and employs control measures to ensure the approach remains protective of human health and the environment. Table 1 illustrates the additional risks posed to workers with compliant treatment prior to placement. Appendix B of the *ERDF Risk Reduction ARAR Waiver Proposal* (WCH-611), available in the Administrative Record, provides a comparison of the risks associated with LDR-compliant treatment and the ARAR waiver alternative in more detail.

EPA identified three factors for consideration in evaluating whether compliance with an ARAR will result in greater risk to worker health than alternative actions (53 FR 51439 and 55 FR 8748). A summary of DOE's and EPA's assessment of those factors follows.

Magnitude of adverse impacts

The in-trench waiver affords a much safer and simpler method of treatment yielding the same, or better, macroencapsulation of LLHH waste items than the current out-of-trench method.

- A comparison (Table 1) of radiological exposure factors between compliant treatment before placement and the proposed method (treating in the trench pursant to the proposed ARAR waiver) demonstrates that out-of-trench treatment of each of the LLHH item in Attachment A exposes workers to 200 times more radiological dose than the proposed in-trench alternative.
    - Data collected from treating 17 LLHH items prior to placement in ERDF were used to determine the exposure factors of number of workers, distance, and time (WCH-611, Appendix B) for out-of-trench treatment. The 200/300/400 Area industrial complex LLHH waste items in Attachment A have similar characteristics when compared to the 17 LLHH waste items treated outside ERDF (i.e., too big to fit in an ERDF container, too hazardous to be safely size reduced, and nonuniform weight distributions that present issues with crane lifts). Although the LLHH waste items represent a small portion of the total waste disposed in ERDF (estimated to be less than 0.4%), they account for a significant portion of the potential dose received by ERDF workers during waste treatment and disposal.
- As indicated in Table 1, out-of-trench treatment puts 3 times more workers in much closer proximity to LLHH waste items that require 4 to 10 times more crane lifts than in-trench treatment. More workers, closer proximity to radiation, and more crane lifts increase the possibility of an industrial accident during out-of-trench treatment compared to in-trench treatment. An industrial accident involving a suspended waste item during the treatment process could result in serious injuries/death to ERDF workers in the vicinity.
- The risk factors have not been determined for heavy, bulky items (such as the heel pit, which is 1.8 m [6 ft] wide, 2.7 m [9 ft] tall, and weighs 78,000 lb, with an uncertain center of gravity) that have not been treated yet. The physical danger related to these LLHH waste items is much greater due to their increased mass and their unknown and difficult-to-determine centers of gravity, making multiple out-of-trench manipulation for treatment more hazardous, even accounting for the practicable safety measures previously stated, than the single, in-trench lift that would result with the waiver approval.
- The potential for encapsulation damage while moving the treated LLHH waste items into the ERDF trench, resulting in polymer coating rework, would be reduced to zero because in-trench cementitious flood grouting is a more reliable and durable treatment option than the polymer coating method and would be expected to work every time. The added reliability and durability of cementitious flood grouting would increase confidence in LLHH waste item macroencapsulation compared to the polymer coating method.

In summary, the significant worker risk reduction expected by performing LDR treatment in-trench supports approval of the proposed waiver when considering the increased possibility of a severe industrial accident from 4 to 10 times more LLHH waste item crane lifts and worker exposure to 200 times more radiation. Also, the increased number of workers that would be in close proximity to LLHH waste items (3 times more), the increased duration of the work process (4 times longer), and the potential long-lasting and irreparable impacts associated with performing the treatment out-of-trench support approval of the proposed waiver. Finally, cementitious flood grouting is a more reliable and durable treatment option than the polymer coating method.

Duration of adverse impacts

The more long lasting the worker risks from compliant treatment prior to placement, compared to the proposed approach, the more appropriate the proposed LDR treatment waiver becomes.

Compliant, out-of-trench macroencapsulation processing of the LLHH items will increase the potential for serious worker injury over the next 20 years it is expected to take to treat the LLHH waste items. An industrial accident involving a waste item suspended from a crane during the treatment process could result in serious irreversible injuries to ERDF workers in the vicinity. In addition, the dose from exposure to radioactive waste is a function of the distance and time spent near the item (dose increases as distance decreases and time increases). The potential for serious physical injuries, combined with increased potential for cancer due to greater dose absorbed by workers, represents long-lasting potential impacts.

Approximately 1,000 LLHH waste items are expected for treatment over the next 20 years, and the proposed in-trench treatment alternative will greatly reduce the potential risk for adverse impacts associated with the outside-the-trench treatment process. The significant reduction of worker risk expected with in-trench treatment at ERDF supports approval of the proposed waiver when considering the duration of the effects of an industrial accident with potential for serious injury/death and exposure to radiation (Table 1 and WCH-611, Appendix B).

Reversibility of adverse impacts

The greater risk ARAR waiver is especially appropriate if the risks posed by meeting the ARAR could cause irreparable damage (55 FR 8748, March 8, 1990, and 53 FR 51439, December 21, 1988).

To date, more than 17 LLHH waste items have been treated outside the trench using the polymer coating macroencapsulation alternative. However, approximately 1,000 LLHH waste items are expected for treatment at ERDF over the next 20 years. The proposed in-trench treatment will reduce worker exposure and excess cancer risk by 200 times compared to the outside-the-trench treatment (1.2×10^{-3} out-of-trench versus 6.0×10^{-6} in-trench) in the course of a year. Also, for in-trench treatment fewer workers are required to manipulate the LLHH waste items and fewer crane lifts are required, so the possibility of an industrial accident causing severe irreversible injuries is reduced. Therefore, due to the improved conditions during in-trench treatment, irreparable damages for workers would be reduced for the following reasons:

- The reduced number of workers exposed to LLHH waste item radioactivity and the reduced duration of the workers' exposure will lower their risk for developing cancer, which could be an irreversible worker impact.
- The reduced number of workers required to manipulate the LLHH waste items during the proposed treatment alternative will reduce their risk for physical injuries during rigging, crane operation, and LLHH waste item placement. Physical injuries suffered during these tasks could result in irreversible worker impacts.

PROPOSED ARAR WAIVER

Based on the information available, and after considering the magnitude, duration, and reversibility of adverse impacts, DOE and EPA propose to amend the ERDF ROD to grant a limited CERCLA ARAR waiver. The waiver will allow LLHH waste items, like those identified in Attachment A, to be treated to meet LDR requirements after placement in ERDF in accordance with specified controls to ensure protection of worker health until treatment is complete. The Tri-Parties believe that in-trench treatment, with provisions for controls prior to and during treatment, would reduce worker risk, achieve enhanced performance compared to the current polymer coating practice, and cost less, and therefore provide more overall protection for human health and the environment. In addition to the Tri-Parties (i.e., DOE, EPA, and Ecology), the Hanford Advisory Board, a nonpartisan group that represents diverse interests that are affected by Hanford Site cleanup issues, has also expressed support of in-trench treatment in a letter (HAB 2014).

Additional input from the public and Tribal Nations is requested during the 30-day review period of this proposed plan. Following consideration of public and Tribal input, EPA and DOE will decide whether to proceed with a ROD amendment as proposed to waive the LDR ARAR requirement that treatment be completed before placement in ERDF. The proposal could change after considering public and Tribal comments.

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 the proposal presented in this proposed plan. Additional information on this proposal is available in the Administrative Record and Public Information Repositories.

The public comment period for this proposed plan extends from September 28, 2015, through October 28, 2015. Comments on the proposal will be accepted until October 28, 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

To request a meeting in your area, please contact Kristen Skopeck by October 14.

After the public comment period, DOE and EPA will consider the comments regarding the proposed plan and make a decision on the proposal. Modification of the proposal is possible based on public input. If the decision is to proceed with a ROD amendment, DOE and EPA will then prepare a CERCLA ROD amendment. This ROD amendment will identify how the ROD is being amended. 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
Einan.David@epa.gov
(509) 376-3883

ADMINISTRATIVE RECORD

The Administrative Record for this proposal, as well as the Administrative Records for all Hanford cleanup decisions, is available at http://pdw.hanford.gov/arpir/ and 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 pertinent documents 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

Definitions for technical terms and other specialized text in this proposed plan 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 siting 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 cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state environmental or facility siting law that, 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.

***Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA):** Also known as "Superfund," the federal government's program to clean up uncontrolled hazardous waste sites.

Proposed plan: 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 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):** A federal law that establishes the requirements for the generation, storage, treatment, and disposal of hazardous waste.

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.

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, 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.

HAB, 2014, "In-Trench Macroencapsulation of Waste at ERDF," letter to D. Shoop, U.S. Department of Energy, Richland Operations Office, and D. Faulk, U.S. Environmental Protection Agency, from S. Hudson, Chair, Hanford Advisory Board, Richland, Washington, November 6.

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

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

WCH, 2015, *ERDF Risk Reduction ARAR Waiver Proposal*, WCH-611, Rev. 1, Washington Closure Hanford, Richland, Washington.

Attachment A

Typical Long, Large, and/or Heavy Hazardous (LLHH) Waste Items to be Macroencapsulated in ERDF Sorted by Waste Category

Category 1: Long-Length Tank-Waste-Contacted Equipment	Category 2: Large Tank-Waste-Contacted Debris	Category 3: Large Hot Cells (Including Large Gloveboxes)
Dip tubes	C-105 Heel pit	324 Building hot cells (300 Area)
Thermocouples	Various pits (e.g. valve, jumper, leak detection, pump, and transfer)	Plutonium Finishing Plant hot cells and gloveboxes
Thermocouple risers	Cover blocks/plates	
Salt Well Screens and Pumps	Rigid jumpers	
Slurry pumps	Top hats	
Salt well pump risers	Tank lids	
Slurry distributors	Equipment skids	
Supernate pumps		
Cone penetrometers		
Sluicers		
Mars units		
Various in-tank pumps		
Slurry distributors		
Water lances		
Surface level probes		
Liquid observation wells		
Solids level detectors		
Risers for Instrumentation		
Radiation hardened cameras		
Equipment trees		
Corrosion probes		