DOE/EA-2086

Final Environmental Assessment of the Test Bed Initiative Demonstration

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ACRONYMS AND ABBREVIATIONS

AROD	Amended Record of Decision
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CST	crystalline silicotitanate
DFLAW	direct-feed low-activity waste
DOE	U.S. Department of Energy
DSSI	Diversified Scientific Services, Inc. (Perma-Fix)
DST	double-shell waste storage tank
DWPF	Defense Waste Processing Facility
EA	environmental assessment
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FMCSA	Federal Motor Carrier Safety Administration
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FWF	Federal Waste Facility
HLW	high-level radioactive waste
ICM	in-container mixer
ITPS	In-Tank Pretreatment System
IX	ion exchange
LAW	low-activity waste
LCF	latent cancer fatality
LDR	Land Disposal Restrictions
LLW	low-level radioactive waste
MEI	maximally exposed individual
MLLW	mixed low-level radioactive waste
mrem/yr	millirem per year
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NRC	U.S. Nuclear Regulatory Commission
OA	order of approval
ORP	Office of River Protection
PFNW	Perma-Fix Northwest
PUREX	Plutonium Uranium Extraction Plant
RCRA	*Resource Conservation and Recovery Act*
ROD	Record of Decision
SNF	spent nuclear fuel
SRS	Savannah River Site
SRS DWPF Recycle Wastewater Final EA	*Final Environmental Assessment for the Commercial Disposal of Defense Waste Processing Facility Recycle Wastewater from the Savannah River Site*
SST	single-shell waste storage tank
TDEC	Tennessee Department of Environment and Conservation
TRU	transuranic waste

TBI	Test Bed Initiative
TC&WM EIS	*Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*
U.S.C.	*United States Code*
USDOT	U.S. Department of Transportation
WAC	*Washington Administrative Code*
WCS	Waste Control Specialists LLC
WDOH	Washington Department of Health
WIR	waste incidental to reprocessing
WM PEIS	*Final Waste Management Programmatic Environmental Impact Statement*
WTP	Waste Treatment and Immobilization Plant

1 INTRODUCTION

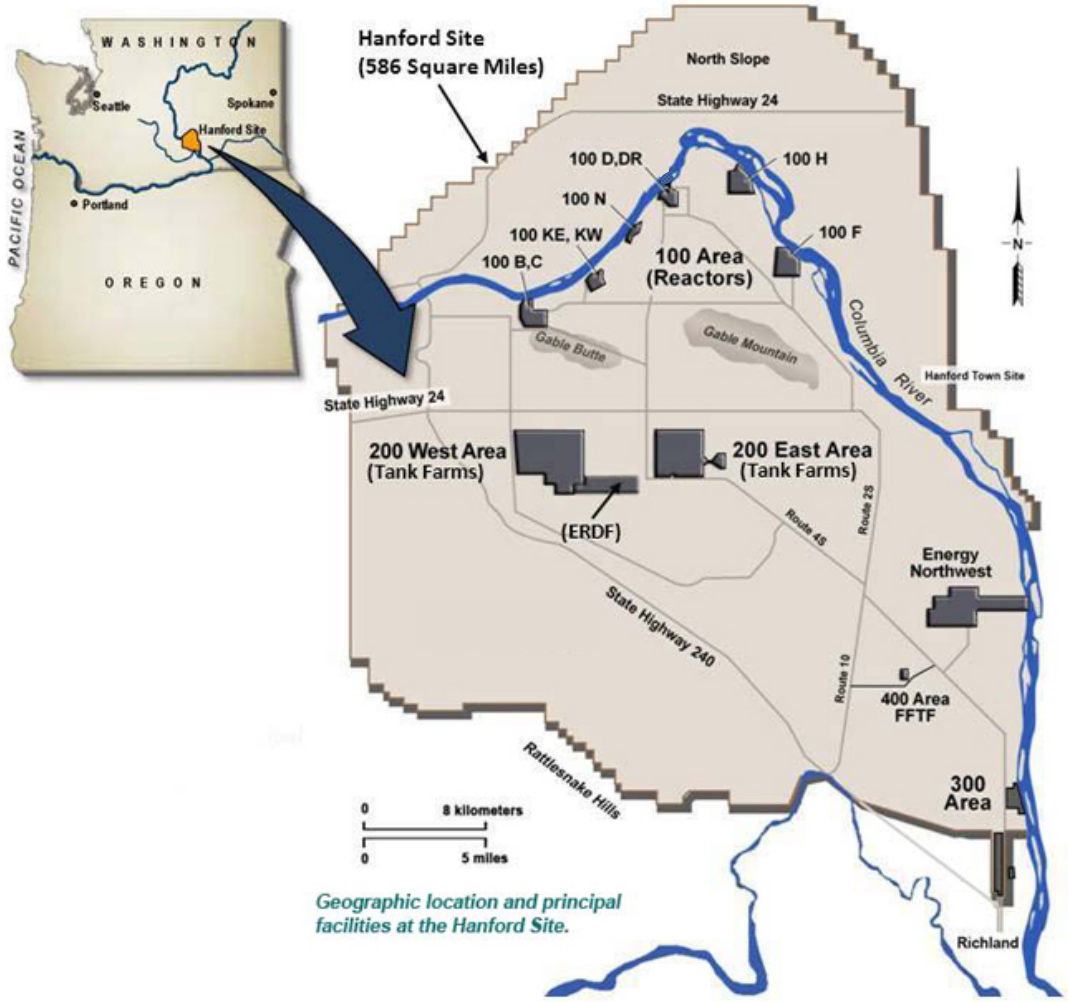
1.1 Introduction

The Hanford Site, located in southeast Washington (Figure 1-1), currently stores approximately 54.1 million gallons of mixed radioactive and chemically hazardous waste in underground storage tanks that must be managed (DOE 2020a).[1] In December 2012, the U.S. Department of Energy (DOE) issued the *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391; DOE 2012) (TC&WM EIS). In the TC&WM EIS, DOE analyzed 17 alternatives,[2] 11 of which involved retrieval, treatment, storage, and disposal of tank wastes, followed by the closure of the single-shell waste storage tanks (SSTs) on the Hanford Site. DOE issued its first Record of Decision (ROD) for the Final TC&WM EIS on December 13, 2013 (Volume 78 of the *Federal Register*, page 75913 [78 FR 75913]).[3] For the tank closure portion of the alternatives, which encompasses operations of the tank farm and Waste Treatment and Immobilization Plant (WTP), DOE announced that it would, among other things, treat tank waste, including pretreatment of tank waste with separation into low-activity waste (LAW) and high-level radioactive waste (HLW).[4]

In the 2013 ROD, DOE did not select a treatment method for all of the LAW; instead, DOE announced that it would be "beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies" (78 FR 75916). Consistent with the ROD, the proposed Test Bed Initiative (TBI) Demonstration would demonstrate, at an engineering scale, the feasibility of separation and pretreatment of LAW tank waste on site at the Hanford Site, followed by offsite treatment, solidification, and disposal at a commercial facility. A laboratory-scale test was completed in 2017 that involved the pretreatment of 3 gallons of Hanford liquid, low-activity test samples, followed by the treatment, stabilization, and disposal at commercial low-level radioactive waste (LLW) facilities (this is further described in Section 1.2.1 of this EA). DOE's Office of Environmental Management is proposing to proceed with the engineering-scale TBI Demonstration, which would separate and pretreat approximately 2,000 gallons of Hanford low-activity tank waste, which would then be treated and solidified (grouted) at an offsite, permitted, commercial facility and disposed of at an offsite, permitted and licensed, mixed low-level radioactive waste (MLLW) disposal facility.

In accordance with the *National Environmental Policy Act* (NEPA; Volume 42 of the *United States Code*, Section 4321 et seq. [42 U.S.C. § 4321 et seq.]), Council on Environmental Quality (CEQ) regulations implementing NEPA (Title 40 of the *Code of Federal Regulations* [CFR] Parts 1500–1508), and DOE's NEPA implementing procedures at 10 CFR Part 1021, DOE is

[1] The total tank waste volume will increase and decrease over time as waste is retrieved and/or water is evaporated or added during operations, e.g., sluicing to retrieve tank waste.
[2] The TC&WM EIS analyzed 11 tank closures alternatives, 3 waste management alternatives, and 3 Fast Flux Test Facility decommissioning alternatives.
[3] DOE issued an Amended ROD related to the management of cesium and strontium capsules on May 18, 2018 (83 FR 23270). DOE also issued an Amended ROD to address decisions related to the direct-feed low-activity waste (DFLAW) approach to operations at the WTP on January 28, 2019 (84 FR 424).
[4] For the complete list of activities covered in the ROD, see 78 FR 75918.



Geographic location and principal facilities at the Hanford Site.

Figure 1-1 Hanford Site Map

preparing this *Environmental Assessment of the Test Best Initiative Demonstration* (TBI Demonstration EA) to assess the potential environmental impacts of the Proposed Action of implementing the TBI Demonstration, including potential impacts of alternatives and the No Action Alternative. DOE will use the findings in this EA to determine whether to prepare an environmental impact statement (EIS). If the Proposed Action is determined to not have the potential to significantly affect the quality of the human environment, DOE will issue a Finding of No Significant Impact (FONSI) and will not prepare an EIS.

1.2 Background

Currently, the Hanford tank waste is managed as HLW mixed with hazardous chemicals. Retrievals and treatment of the Hanford tank waste are governed, in part, by a Consent Decree

issued in 2010 and its subsequent amendments.[5] The Consent Decree includes requirements for construction and initial operation of the WTP. The WTP, once operational, will vitrify HLW and some of the pretreated Hanford LAW in borosilicate glass. The WTP includes a facility to vitrify Hanford's HLW and a facility to vitrify LAW. Before vitrification, DOE plans to separate the tank waste into two streams: the HLW portion, which DOE estimates will contain more than 90 percent of the radioactivity but less than 10 percent of the volume, and the LAW portion, which is expected to contain less than 10 percent of the radioactivity and more than 90 percent of the volume (DOE 2020b). A portion of the LAW will be pretreated, and the resulting pretreated LAW will be immobilized (vitrified) in the WTP LAW Vitrification Facility. DOE has not decided on the supplemental treatment technology to be used to immobilize the remaining LAW and believes it beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. The proposed TBI Demonstration would demonstrate a potential supplemental LAW treatment option.

To begin treating waste as soon as practicable, DOE has developed a two-phased approach. Known as "direct-feed low-activity waste" (DFLAW), this approach will pretreat and send certain LAW to the WTP LAW Vitrification Facility. This approach will enable DOE to complete hot commissioning of the WTP LAW Vitrification Facility as required by the Consent Decree, as modified in 2022 (Order Modifying Amended Consent Decree, No. 2:08-CV-5085-RMP [July 18, 2022]). See Section 1.5 of this EA for a discussion of the DFLAW approach.

The Proposed Action would provide an engineering-scale demonstration of a separation, pretreatment, and immobilization approach. See Section 1.4 of this EA for a full discussion of the objectives to be achieved from the proposed TBI Demonstration.

1.2.1 TBI Laboratory-Scale Test – Test Samples of Treated, Low-Activity Waste from Hanford Tanks for Offsite Disposal

In 2016, DOE prepared a NEPA categorical exclusion (DOE/CX-00152; DOE 2016a) for a laboratory-scale test of TBI, which involved onsite pretreatment and offsite commercial treatment and disposal of a three-gallon volume of samples of low-activity tank waste. For this laboratory-scale test, DOE prepared a waste incidental to reprocessing (WIR) evaluation and WIR Determination, which demonstrated and determined that the waste was incidental to the reprocessing of spent nuclear fuel (SNF) and could be managed and disposed of as MLLW (DOE 2016b). In December 2017, DOE completed the laboratory-scale test. In the test, liquid waste, generated from a composite of several Hanford tank waste samples (consisting of decanted low-activity supernate), was filtered to remove solids and then processed through an ion exchange (IX) medium. The decanting, filtration, and IX process removed the key radionuclides (primarily cesium and strontium) from the samples of tank waste, resulting in residual liquids classified as MLLW. The liquid MLLW was then packaged and transported to Perma-Fix Northwest (PFNW), a permitted waste treatment facility near the Hanford Site. At PFNW, the MLLW was treated and stabilized in grout. The stabilized waste was disposed of at

[5] Consent decrees are judicial orders that contain a settlement agreement that is subject to retention of judicial jurisdiction. *Washington v. Dep't of Energy*, No: 08-5085-FVS (Oct. 25, 2010); *Washington v. Dep't of Energy*, No: 2:08-CV-5085-RMP (Mar. 11, 2016); *Washington v. Dep't of Energy*, No: 2:08-CV-5085-RMP (Apr. 12, 2016); *Washington v. Dep't of Energy*, No: 2:08-CV-5085-RMP (Oct. 12, 2018); *Washington v. Dep't of Energy*, No: 2:08-CV-5085-RMP (Dec. 10, 2020); and *Washington v. Dep't of Energy*, No: 2:08-CV-5085-RMP (July 18, 2022).

the permitted and licensed Waste Control Specialists LLC (WCS) Federal Waste Facility (FWF), near Andrews, Texas, on December 19, 2017 (DOE 2018a).

1.2.2 Waste Incidental to Reprocessing

DOE has prepared the *Final Waste Incidental to Reprocessing Evaluation for the Test Bed Initiative Demonstration* (Final WIR Evaluation) (DOE 2023a) in accordance with DOE Manual 435.1-1, *Radioactive Waste Management Manual.* The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW.[6] DOE prepared the Final WIR Evaluation after consulting with the U.S. Nuclear Regulatory Commission (NRC) and after considering comments from the NRC, stakeholders, states, tribal nations, and the public. Based on the Final WIR Evaluation, DOE may issue a potential WIR Determination. Chapter II.B.(2)(a) of DOE Manual 435.1-1 provides, in relevant part, that wastes are incidental to reprocessing that:

> "(1) Have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical;
>
> (2) Will be managed to meet safety requirements comparable to the performance objectives set out in 10 CFR 61, Subpart C, Performance Objectives; and
>
> (3) Are to be managed, pursuant to DOE authority under the *Atomic Energy Act of 1954*, as amended, and in accordance with the provisions of Chapter IV of this Manual [Manual 435.1-1], provided the waste will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste as set out in [NRC regulations at] 10 CFR 61.55, *Waste Classification*."

1.3 Purpose and Need for Agency Action

According to the provisions in the TC&WM EIS ROD, "DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies" (78 FR 75916) for a portion of the Hanford LAW. DOE proposes to conduct the TBI Demonstration to evaluate it as a potential supplemental treatment approach for a portion of the Hanford LAW that could augment and accelerate the tank waste mission. DOE needs to take action to accomplish the following near-term objectives (DOE 2019a):

- Demonstrate the capability to separate and pretreat approximately 2,000 gallons of low-activity supernate[7] from tank SY-101, using in-tank settling, followed by decanting, filtering, and IX media in an In-Tank Pretreatment System (ITPS);[8]

[6] If DOE issues a WIR Determination, then the pretreated LAW would be managed as LLW (MLLW), subject to the analysis and commitments in the Final WIR Evaluation and the WIR Determination. Such waste would be appropriately stored, transported, solidified, and disposed of as LLW.

[7] Supernate consists of low-activity liquid waste lying above precipitated saltcake in waste tank SY-101.

[8] The permit application submitted to the Washington State Department of Ecology in 2019 included the design of the ITPS, which this TBI Demonstration EA evaluates as part of the Proposed Action.

- Demonstrate IX performance to remove most of the cesium from the liquid waste stream;
- Verify the ability for the pretreated waste to meet the waste acceptance criteria for an offsite, commercial, permitted treatment facility and a permitted and licensed commercial disposal facility;
- Demonstrate the efficiency, cost-effectiveness, and feasibility for potential full-scale application; and
- Establish that all activities can be performed safely and will protect human health and the environment.

1.4 Proposed Action Evaluated in this Environmental Assessment

Under the proposed TBI Demonstration, DOE would separate and pretreat approximately 2,000 gallons of supernate tank waste from Hanford waste Tank 241-SY-101 (SY-101) through in-tank settling,[9] decanting, filtration, and IX media in an ITPS. Following pretreatment, DOE would characterize and, if appropriate, classify the waste as MLLW. DOE would have the waste treated and stabilized by grouting and then dispose of the immobilized waste form in an appropriately permitted and licensed commercial disposal facility. An overview of the proposed TBI Demonstration is summarized below in the sequence of activities (see DOE 2019a) and illustrated in Figure 1-2.

1. Separation and pretreatment of low-activity liquid waste (supernate) from Hanford waste tank SY-101, through in-tank settling, decanting, filtration, and IX media;

2. After in-tank settling, additional pretreatment would occur in the ITPS, entailing decanting (pumping to retrieve the supernate without disturbing the saltcake), filtration to filter solids, and use of IX media made of crystalline silicotitanate (CST) to capture and remove key radionuclides (including cesium);

3. Confirmation through laboratory analysis of the pretreated liquid to verify that the waste acceptance criteria of the permitted and licensed receiving facility would be met;

4. Transportation of the pretreated waste to an offsite, permitted treatment facility for waste treatment/stabilization using a chemical and cementitious (grouting) process; and

5. Transportation (for Alternatives 1 and 2) and disposal of the solid, stabilized waste at a permitted and licensed disposal facility.

[9] In-tank settling occurs both within waste tank SY-101 and prior to transfer of waste to tank SY-101. The sludge solids have been separated from the supernate in tank SY-101. This separation occurred prior to transfer of the LAW liquids from other tanks (S-112, SY-102, the 222-S Lab discharge tank, and catch tank UX-302-A) into waste tank SY-101.

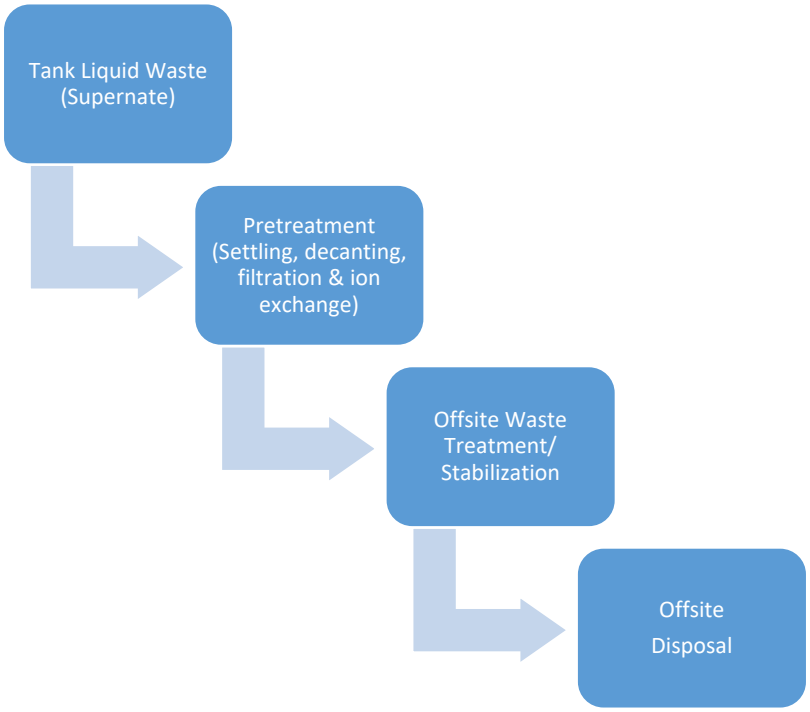


Figure 1-2 Test Bed Initiative Demonstration Overview

DOE has developed four alternatives for implementing the Proposed Action. Alternative 1 would utilize the commercial facility owned by Perma-Fix in Richland, Washington (PFNW), for the waste treatment and stabilization. Alternative 2 would utilize the commercial facility owned by Perma-Fix in Kingston, Tennessee (Diversified Scientific Services, Inc. [Perma-Fix DSSI]) for waste treatment and stabilization. Under Alternatives 1 and 2, the treated/stabilized MLLW would be transported and disposed of at either the WCS FWF near Andrews, Texas, or the Energy*Solutions*[10] disposal facility near Clive, Utah, depending on its LLW classification. Under Alternative 3, DOE would transport the liquid MLLW to the WCS facility near Andrews, Texas. WCS would treat, stabilize, and dispose of the waste. Under Alternative 4, DOE would transport the liquid MLLW to the Energy*Solutions* facility in Clive, Utah. Energy*Solutions* would treat, stabilize, and dispose of the waste. Chapter 2 of this EA contains a detailed description of each alternative, including the No Action Alternative.

Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review.

[10] Energy*Solutions* is only licensed for disposal of Class A LLW. Therefore, if the produced waste stream is Class B or Class C LLW, treatment and/or disposal at Energy*Solutions* would not be selected. As identified in Section 1.5.3 of the Final WIR Evaluation (DOE 2023), the pretreated and solidified tank SY-101 waste in the TBI Demonstration would be well below the NRC concentration limits for Class C LLW and would be expected to meet Class A LLW concentration limits set forth in 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Section 55, "Waste Classification."

1.5 National Environmental Policy Act Documents Related to the Proposed Action

This section identifies and discusses other NEPA documents that are potentially relevant to this EA. Decisions as a result of these other NEPA analyses have affected (or will affect) operations/activities related to Hanford tank waste management.

1. ***Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391; DOE 2012)**. The Final TC&WM EIS analyzed 17 action alternatives, 11 of which involved retrieval, treatment, storage, and disposal of tank wastes and closure of the SSTs. In the 2013 ROD (78 FR 75913), DOE announced that it intended to pursue Tank Closure Alternative 2B without supplemental treatment at WTP and without technetium-99 removal in the WTP Pretreatment facility (78 FR 75918).

   With regard to supplemental treatment for LAW, DOE stated the following in the 2013 ROD (78 FR 75916):

   > "DOE does not have a preferred alternative regarding supplemental treatment for LAW; DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. When DOE is ready to identify its preferred alternative regarding supplemental treatment for LAW, it will provide a notice of its preferred alternative in the *Federal Register*."

   As discussed in Section 2.2 of this EA, the No Action Alternative for this EA is based on the TC&WM EIS ROD.

2. ***Categorical Exclusion for the Treatability Test to Remove Solids and Cesium from Tank Waste* (DOE/CX-00152; DOE 2016a)**. On September 20, 2016, DOE issued this categorical exclusion for the laboratory-scale test of the TBI. DOE determined that the laboratory-scale test fit within the actions covered by categorical exclusion "B6.1 Cleanup Actions" (10 CFR Part 1021, Appendix B).

3. ***Supplement Analysis of the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391-SA-02; DOE 2019b)**. DOE prepared a supplement analysis related to DFLAW. The supplement analysis determined that implementing the DFLAW approach would not represent substantial changes to the proposal evaluated in the TC&WM EIS and that there were not significant new circumstances or information relevant to environmental concerns that would require preparation of a supplemental EIS. As discussed in Section 1.3 of this EA, the proposed TBI Demonstration, if implemented, would entail similar technology as the DFLAW approach and would not interfere with or delay the DFLAW approach. As a result of this supplement analysis, DOE published an Amended ROD to announce the decision to implement the DFLAW approach (84 FR 424; January 28, 2019).

4. ***Supplement Analysis of the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391-SA-03; DOE 2023b)**. DOE prepared a supplement analysis to evaluate a proposal to transport and treat certain solid and liquid secondary wastes at licensed and permitted commercial treatment facilities off the Hanford Site. DOE's proposal also included potential disposal of some of these secondary wastes (after treatment) off site at a licensed and permitted commercial disposal facility (i.e., WCS). The actions would be implemented on an interim basis until such time as an enhanced onsite treatment capability is available for DFLAW operations (estimated to be approximately 10 years).

   Based on the analysis in the SA, DOE determined that the proposal for secondary waste management does not represent a substantial change to the proposal evaluated in the TC&WM EIS or significant new circumstances or information relevant to environmental concerns that would require preparation of a supplemental EIS. DOE therefore determined that no further NEPA analysis was required. As a result, DOE published an Amended ROD to announce the decision to move forward with the proposal for secondary waste management (88 FR 6241; January 31, 2023).

   In parallel with preparation of the supplement analysis for management of secondary waste, DOE also prepared a WIR Evaluation and WIR Determination that determined that vitrified LAW and secondary wastes generated by, or derived from, such vitrification using the DFLAW approach are wastes that are incidental to the reprocessing of SNF, are not HLW, and are to be managed as LLW (88 FR 6245, January 31, 2023).

5. ***Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (WM PEIS) (DOE/EIS-0200; DOE 1997)**. In the 1990s, DOE anticipated a need for managing wastes at locations other than where the waste was generated. In order to address this need, DOE conducted analyses for management of radioactive and hazardous wastes, including LLW and MLLW. The WM PEIS analyzed the transportation of large volumes of LLW and MLLW across the country for treatment and disposal. This TBI Demonstration EA summarizes and incorporates by reference some of the analyses used to determine potential health and safety impacts from transportation of LLW and MLLW on the Nation's highways.

1.6 Scope of this Environmental Assessment and Organization

DOE has prepared this EA to assess the potential consequences of the Proposed Action on the human environment in accordance with CEQ regulations at 40 CFR Parts 1500−1508 and DOE NEPA implementing procedures at 10 CFR Part 1021. This EA:

- Describes the purpose and need for agency action, the Proposed Action, and the reasonable implementing alternatives analyzed (Chapters 1 and 2);
- Describes the existing environment and potential impacts of the Proposed Action (for each of the reasonable implementing alternatives) and the No Action alternative (Chapter 3);

- Identifies communications with tribes and agencies (Chapter 4);
- Presents a bibliographic listing of the references cited in this EA (Chapter 5); and
- Provides an analysis of relative transportation accident risk (Appendix A).

Certain aspects of the Proposed Action have a greater potential for creating adverse environmental impacts than others. CEQ regulations (40 CFR 1502.2) recommend discussing impacts "in proportion to their significance" so that those actions with greater potential effect can be discussed in greater detail in NEPA documents than those that have little potential for effect. For this reason, Section 3.2 of this EA presents the resource screening review that DOE used to determine which resources required more detailed analysis.

1.7 Public Involvement

In compliance with DOE's NEPA implementing procedures (10 CFR 1021.301(d)), DOE sent the draft EA to host states and host tribes of the Proposed Action. DOE also sent the draft EA to states and tribes that could be affected by the Proposed Action. Section 4 of this EA includes a list of states and tribes that received the draft EA. On August 17, 2021, DOE notified these parties of the availability of the draft EA for review and comment to evaluate DOE's Proposed Action to implement the TBI Demonstration. Specifically, DOE requested input on the completeness and factual accuracy of its analysis. DOE also requested the parties to provide any additional information that should be considered for inclusion in the final EA.

Also, in accordance with 10 CFR 1021.301(d), DOE established a 14-day comment period for host states and host tribes, which ran from August 21 to September 3, 2021, and also invited comment from the other notified parties. Appendix B to this EA contains reproduced comment documents (i.e., letters and e-mails) received during this period and DOE's response to each delineated comment within each document. Changes made to the draft EA in response to comments and internal reviews are indicated with a vertical line in the document margin.

2 DESCRIPTION OF TBI DEMONSTRATION AND OVERVIEW OF THE PROPOSED ACTION IMPLEMENTING ALTERNATIVES

2.1 Overview of the Proposed Action Implementing Alternatives

As discussed in Section 1.4, the Proposed Action is to pretreat approximately 2,000 gallons of low-activity supernate tank waste through settling, decanting, filtration, and IX. Once characterized and classified as MLLW, the waste would be treated and stabilized by grouting and disposed of in a permitted and licensed commercial MLLW disposal facility. As discussed in Sections 2.1.1 through 2.1.4, DOE has developed four alternatives for implementing this Proposed Action.

2.1.1 Alternative 1: Treatment at Perma-Fix Northwest (Richland, Washington)

Under Alternative 1, DOE would utilize a commercial facility (PFNW) in Richland, Washington, for the waste treatment/stabilization. Alternative 1 includes the following activities:

- Separate and pretreat approximately 2,000 gallons of supernate waste from waste tank SY-101 in the 200 West Area via in-tank settling, and a self-contained pump, filter, and IX column assembly to be inserted into an existing riser of waste tank SY-101. The pretreated tank waste would be transferred to six 375-gallon portable, double-wall, steel containers (referred to as process totes) to facilitate transportation to the treatment facility. Following pretreatment, the waste would be further characterized to verify that the waste meets all applicable requirements for shipment to and receipt by the commercial treatment facility. If the pretreated tank waste does not meet these requirements, the waste would be returned to the tank and would not be shipped for commercial treatment.
- Transport the resultant liquid MLLW to the PFNW facility in Richland.
- Treat and stabilize the liquid MLLW via chemical treatment and grouting to form a waste that meets the land disposal restrictions (LDRs) of the *Resource Conservation and Recovery Act* (RCRA) and the waste acceptance criteria of a permitted and licensed disposal facility operated by either WCS (Class A, Class B or Class C MLLW) or Energy*Solutions* (Class A MLLW).
- Transport the grouted waste in 55-gallon drums to the permitted and licensed disposal facility (estimated to require two truck shipments).[11]
- Dispose of the MLLW at the permitted and licensed commercial MLLW disposal facility.

[11] RPP-RPT-55960, *Supplemental Immobilization of Hanford Low-Activity Waste: Cast Stone Screening Tests* (WRPS 2013), covers a range of waste loadings expressed as water to dry mix (w/dm) ratio ranging from 0.4 to 0.6 by weight. For this analysis, the middle of the range at 0.5 was applied, which is estimated to yield about 1.7 cubic meters of grout for each cubic meter of liquid waste treated. Consequently, the resultant grouted MLLW would require approximately 62, 55-gallon drums and would weigh approximately 64,000 pounds. Note, the above-referenced solidified waste volume may be slightly different than the waste volume generated by the commercial treatment facility.

Figure 2-1 presents a block flow diagram of actions associated with Alternative 1. A detailed description of Alternative 1 follows.

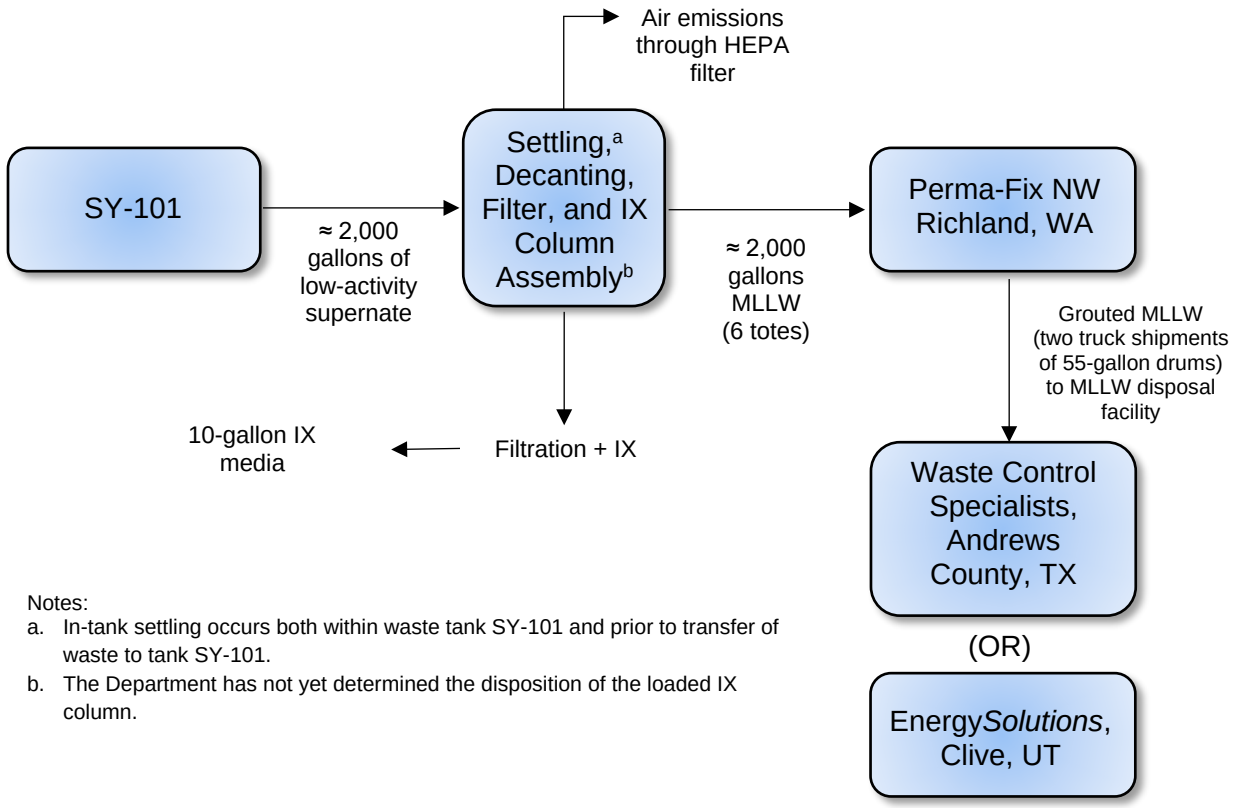


Figure 2-1 Block Flow Diagram of the Test Bed Initiative Demonstration, Alternative 1

The TBI Demonstration would pretreat approximately 2,000 gallons of supernate tank waste from waste tank SY-101. Waste tank SY-101, in the 200 West Area, was selected as the source for the proposed TBI Demonstration because of the following benefits (DOE 2019a):

- The tank contains ample supernate (e.g., the tank contains liquid).
- The tank is actively ventilated.
- The tank's waste chemistry and curie content are suitable for the ITPS approach and technology.
- The tank is located away from ongoing DFLAW operations.
- The tank could facilitate retrieval and treatment of 200 West Area tank waste, which would provide additional tank operating space in one of three double-shell tanks (DSTs) in the 200 West Area for receipt of wastes from the 222-S radiological laboratory. Other DSTs in the 200 West Area are at or near capacity.
- The tank is a DST, so the proposed TBI Demonstration would create 2,000 gallons of additional DST space.

Waste pretreatment would be achieved via in-tank settling, and an ITPS, which would consist of a self-contained pump to decant (remove) the supernate, a filter, and an IX column assembly to be inserted into an existing riser of waste tank SY-101. The ITPS operations would occur within the confines of waste tank SY-101. The ITPS pump intake would be located a suitable distance above the level of settled solids (saltcake) at the bottom of the tank to minimize the potential burden on the filter. The filter would remove suspended, undissolved solids from the supernate, and the IX column would remove additional key radionuclides (primarily cesium) from the liquid waste stream. The proposed TBI Demonstration would use non-elutable IX media that bind the cesium within the IX column.[12]

The ITPS would be a self-contained unit and, accordingly, all utilities and services required to operate the system would be provided with the system when it is delivered. Factory acceptance tests and post-installation/pre-operations tests would verify that the intended services operate seamlessly and perform their intended function. The ITPS would be operated on a short-term basis (estimated to be about nine days) (DOE 2019a).

After passing through the IX column, the resulting pretreated LAW initially would be pumped into a delay tote,[13] which would allow radiation surveys to be performed. Once radiation levels were verified, waste would be pumped from the delay tote to one of six 375-gallon process totes. These transfers would continue until up to six process totes were filled with nominally 333 gallons each. The transfers would be accomplished via a manually operated valve manifold, and the pretreated waste would be stored in the process totes until transported to the treatment facility. The batch limit for the proposed TBI Demonstration would be 350 gallons. The controller software would have a setpoint of approximately 333 gallons in the delay tote top hat transmitter that would cause a shutdown of the transfer pump when that volume is reached. A backup transmitter would also be installed with the same setpoint of approximately 333 gallons to prevent overfilling of the delay tote (DOE 2019a).

Based on grab sample data (WRPS 2020) and other information, DOE estimates that the 2,000 gallons of pretreated waste would contain approximately 1.8 curies of radiological material. The estimated content of each process tote would be one-sixth of this inventory, or 0.3 curie per container (an estimate of the container radionuclide inventory is provided in Appendix A). There would also be hazardous constituents in the decontaminated solution such as heavy metals and organics. The grab sample data identified two organics in the SY-101 tank sample: (1) benzyl butyl phthalate and (2) bis(2-ethylhexyl) phthalate. Additionally, the only other hazardous constituents in tank SY-101 that have measured concentrations above waste designation levels in *Washington Administrative Code* Title 173, Chapter 303, Section 090 (WAC 173-303-090), "Dangerous Waste Characteristics," are chromium and selenium. The concentration of benzyl butyl phthalate was measured at 570 micrograms per milliliter, and the measured concentration of bis(2-ethylhexyl) phthalate was 681 micrograms per milliliter. The concentration of chromium was measured at 95.8 micrograms per milliliter and the concentration of selenium was measured at 1.04 micrograms per milliliter (WRPS 2020). Waste must be treated for the toxicity characteristic. In addition, characteristic waste would not be land disposed until all the applicable

[12] Non-elutable means that the radionuclides cannot easily be separated from the IX media and the media would not be reused. The disposition path for the IX column has not yet been determined.
[13] The delay tote would be of similar design and qualification as the process totes.

treatment standards for the characteristics and any underlying hazardous constituents are met under the universal treatment standards.[14]

All of the aboveground components involved in the transfer or storage of the waste would be staged inside secondary containment to prevent spills or releases to the environment. A sample would be taken from each tote after the totes were filled to confirm compliance with the waste acceptance criteria and permit conditions for the treatment facility. DOE anticipates that the operation would take about nine days (WRPS 2019). Figure 2-2 presents a conceptual arrangement of the major components of the proposed TBI Demonstration.

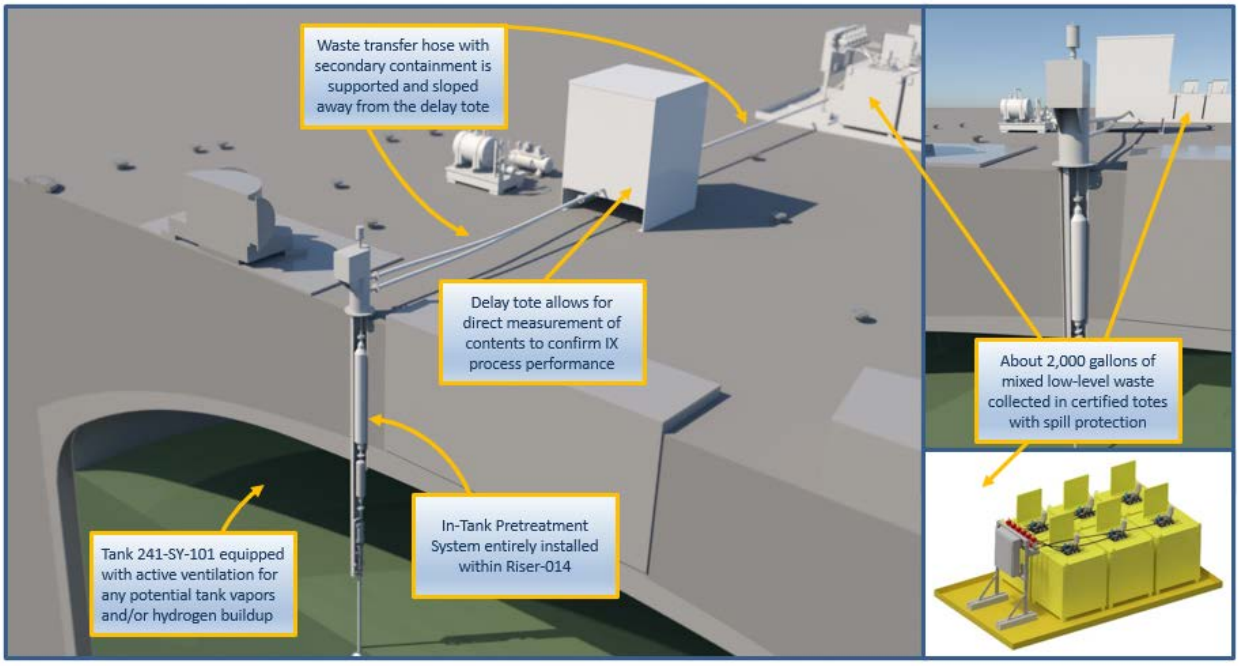


Figure 2-2 Conceptual Arrangement of Proposed TBI Demonstration Project Components (Source: DOE 2019a)

The process totes would be suitable for transportation in accordance with U.S. Department of Transportation (USDOT) requirements and would meet all applicable USDOT requirements under 49 CFR Subchapter C for transportation to an offsite permitted facility. The totes would be USDOT 7A Type A packages (49 CFR 178.350). Type A package documentation would be maintained in the operating record with the shipments of the waste (DOE 2019a). The transportation of the totes would include a Hazardous Waste Manifest (49 CFR 172.205) and would follow USDOT regulations and standard best management practices for transportation of hazardous materials. Appendix A of this EA provides information relevant to the transportation of the liquid waste and demonstrates that the sum of fractions for the expected radionuclides in a process tote would be 0.107, or approximately 10.7 percent of the inventory allowed in a Type A

[14] The Final WIR Evaluation referenced in Section 1.2.2 of this Final TBI EA refers to these potentially hazardous constituents as organics and inorganics.

package.[15] The approximate distance the single truck shipment would travel between the Hanford Site and PFNW is 26 miles, 1.2 miles of which are off of the Hanford Site.

After the liquid MLLW is transferred to PFNW, Perma-Fix would perform the following actions:

- Treatment and stabilization of the liquid MLLW using an in-container mixer (ICM) to form a grouted waste form that meets the RCRA LDR requirements and waste acceptance criteria of the permitted disposal facility operated by either WCS or Energy*Solutions*; and
- Transport of the grouted waste in 55-gallon drums to the permitted and licensed commercial MLLW disposal facility (estimated two truck shipments using approved transportation contractors). The approximate highway distance from PFNW to WCS in Andrews County, Texas, is 1,800 miles. The approximate highway distance from the Hanford Site to Energy*Solutions* in Clive, Utah, is 650 miles.

Operations at the PFNW facility in Richland are governed by radioactive material licenses issued by the State of Washington Department of Health (WDOH 2022a, 2022b) and a permit for treatment and storage of dangerous waste issued by the State of Washington Department of Ecology (Ecology) (Permit Number WAR 000010355).[16] The radioactive material licenses and permit authorize PFNW to possess and process radioactive material, including treatment and stabilization. The license also limits the quantity of radioactive material at the facility and describes operating requirements related to radiation monitoring, inventory control, waste receipt and shipment, recordkeeping, reporting, and environmental monitoring, among other things.

PFNW has completed numerous projects supporting the nuclear industries and has received waste from the Federal Government, reactor operators, medical facilities, and other waste brokers and processors. The PFNW facility uses several different methods to process MLLW and LLW, with the processing methods chosen according to waste volume and characteristics. For the proposed TBI Demonstration MLLW, the PFNW facility would utilize a non-thermal treatment and solidification process, as was done for the TBI laboratory-scale test.

Once treated and stabilized, PFNW would use approved transportation contractors to transport the waste in USDOT-approved 55-gallon drums to a permitted and licensed disposal facility operated either by WCS or Energy*Solutions*. DOE estimates that two truck shipments would be required to handle the approximately 62 waste drums. In fiscal year 2020, DOE's transportation contractors safely transported more than 3,200 hazardous materials shipments over 6 million

[15] Appendix A demonstrates that the transportation packages would contain Type A quantity (or less) of normal form Class 7 solid or liquid radioactive material, per package. Packages used for shipment of solids would be certified to meet the performance requirements of 49 CFR 173.465, "Type A packaging tests," and for liquids certified to meet 49 CFR 173.465 and 173.466, "Additional tests for Type A packagings designed for liquids and gases."

[16] PFNW is currently in discussions with Ecology to renew PFNW's Dangerous Waste Regulations permit. Prior to sending MLLW from the TBI Demonstration to PFNW, DOE would verify that the 2,000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit. DOE has compared the projected radionuclide and chemical constituents of the TBI waste stream against the PFNW waste acceptance criteria and determined preliminarily that the current permit would allow the treatment and stabilization of the 2,000 gallons of pretreated MLLW.

miles with no USDOT recordable accidents.[17] DOE's transportation contractors and transportation contractors used by PFNW (or DSSI under Alternative 2) are expected to follow the same USDOT and NRC regulations for transporting the hazardous material.

Disposal of the treated and stabilized waste at the permitted and licensed disposal facility would be conducted in accordance with the disposal facility's permits and licenses (TCEQ 2023; UDEQ 2020a, 2020b).

Alternative 1 was identified because DOE has existing contracts with PFNW for radioactive waste and MLLW treatment, and the facility is the closest commercial, permitted treatment facility to the Hanford Site. Additionally, for disposal, WCS and Energy*Solutions* provide the only available commercial MLLW disposal options (see Section 2.3).

2.1.2 Alternative 2: Treatment at Perma-Fix DSSI Facility (Kingston, Tennessee)

Alternative 2 would involve the same waste pretreatment activities as Alternative 1. Following pretreatment and confirmation that the waste would meet the receiving facility's waste acceptance criteria and permit conditions, DOE would transport the six totes to Perma-Fix DSSI. The Perma-Fix DSSI facility is evaluated as a reasonable alternative since it is a permitted, commercial treatment facility that DOE could use for the Proposed Action, and it provides a range of potential transportation impacts that could be expected. Operations at DSSI would be conducted in accordance with the radioactive material license and the hazardous waste management permit issued by the State of Tennessee Department of Environment and Conservation (TDEC 2018, 2020, 2021). The license authorizes Perma-Fix DSSI to possess and process radioactive material, including treatment and stabilization. DSSI's hazardous waste management permit allows the facility to treat a maximum quantity of 40,416 gallons per day of MLLW. The approximate highway distance from the Hanford Site to Kingston, Tennessee, is 2,500 miles. The treatment in Tennessee would be accomplished using the same process as described for the PFNW facility under Alternative 1 to treat and stabilize the liquid MLLW in 55-gallon drums to meet the waste acceptance criteria for the permitted and licensed disposal facility. The distances from Perma-Fix DSSI in Kingston to WCS (Andrews County, Texas) and Energy*Solutions* (Clive, Utah) are 1,160 miles and 1,840 miles, respectively. Figure 2-3 presents a block flow diagram for actions associated with Alternative 2. Other than the location of the treatment facility, the processes associated with Alternative 2 are identical to those of Alternative 1.

[17] The following links provide background information on DOE's Office of Packaging and Transportation:
http://www.energy.gov/em/downloads/fact-sheet-packaging-and-transportation
https://www.energy.gov/em/packaging-and-transportation

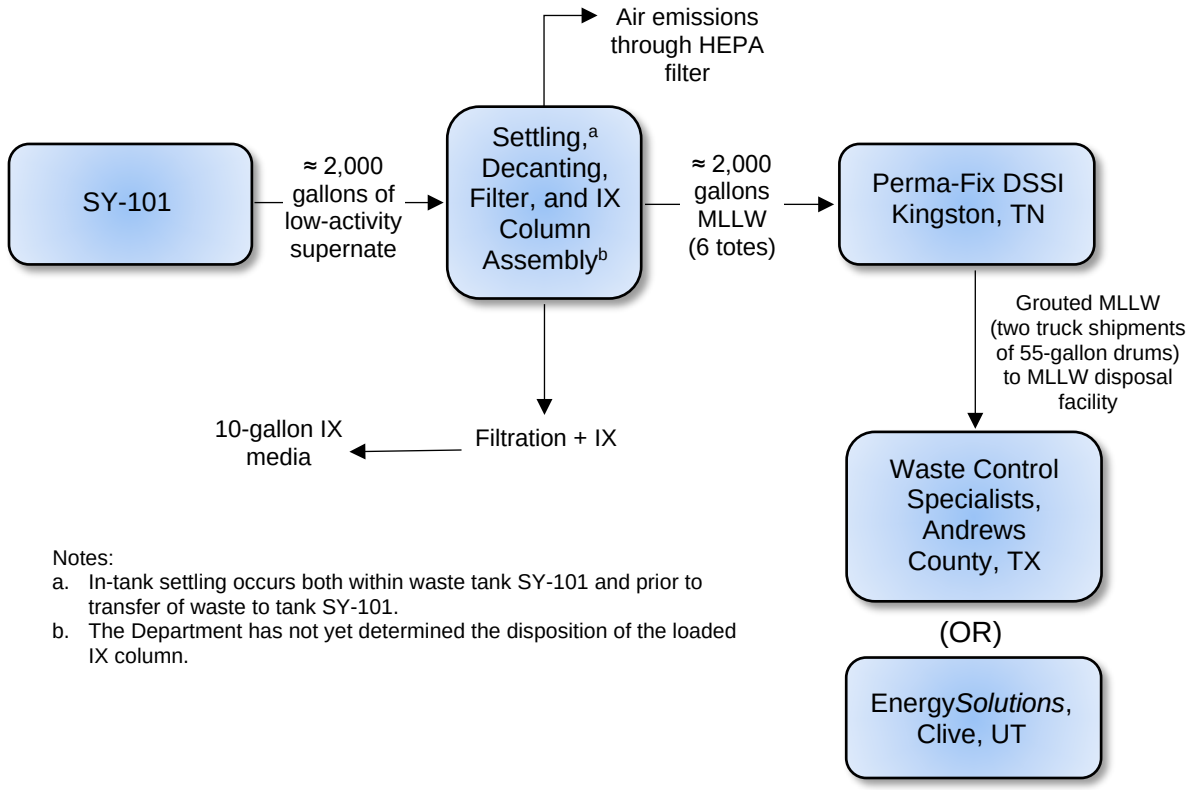


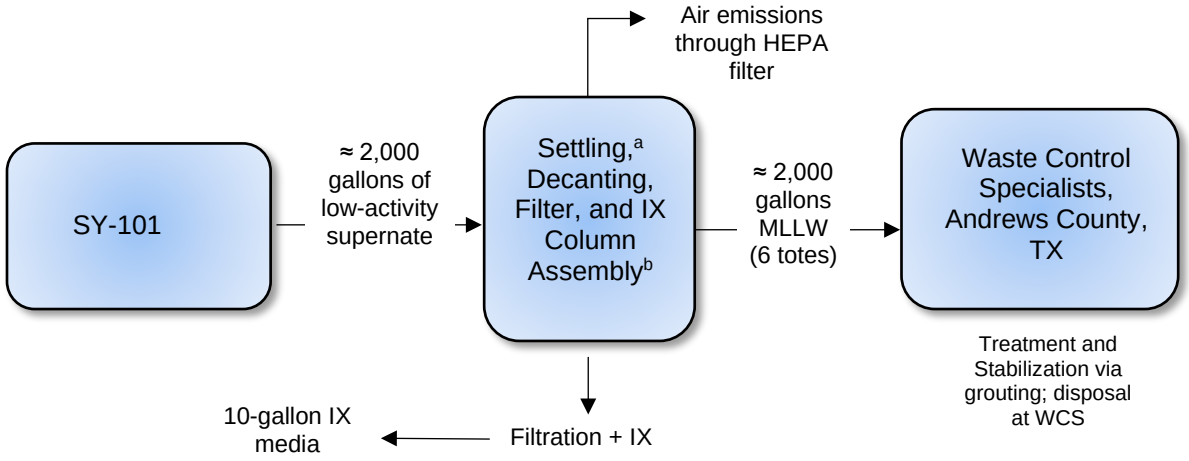
Figure 2-3 Block Flow Diagram of the Proposed Test Bed Initiative Demonstration, Alternative 2

2.1.3 Alternative 3: Treatment and Disposal at WCS (Andrews County, Texas)

Alternative 3 would involve the same waste pretreatment activities as Alternative 1. Following pretreatment and confirmation that the waste would meet the receiving facility's waste acceptance criteria and permit conditions, DOE would transport the process totes to the WCS facility in Andrews County, Texas. As reported in Alternative 1, the approximate highway distance between the Hanford Site and Andrews County, Texas, is 1,800 miles. After the liquid MLLW is transferred to WCS, the actions taken by WCS would include:

- Treatment and stabilization of the liquid MLLW to form a grouted waste form that meets the RCRA LDR requirements and waste acceptance criteria of the WCS FWF; and
- Disposal of the grouted waste at the WCS FWF.

WCS is permitted and licensed to accept liquid MLLW, treat and stabilize it, and dispose of the solidified Class A, Class B, or Class C MLLW at the FWF (TCEQ 2023). Figure 2-4 presents the block flow diagram for Alterative 3.



Notes:
a. In-tank settling occurs both within waste tank SY-101 and prior to transfer of waste to tank SY-101.
b. The Department has not yet determined the disposition of the loaded IX column.

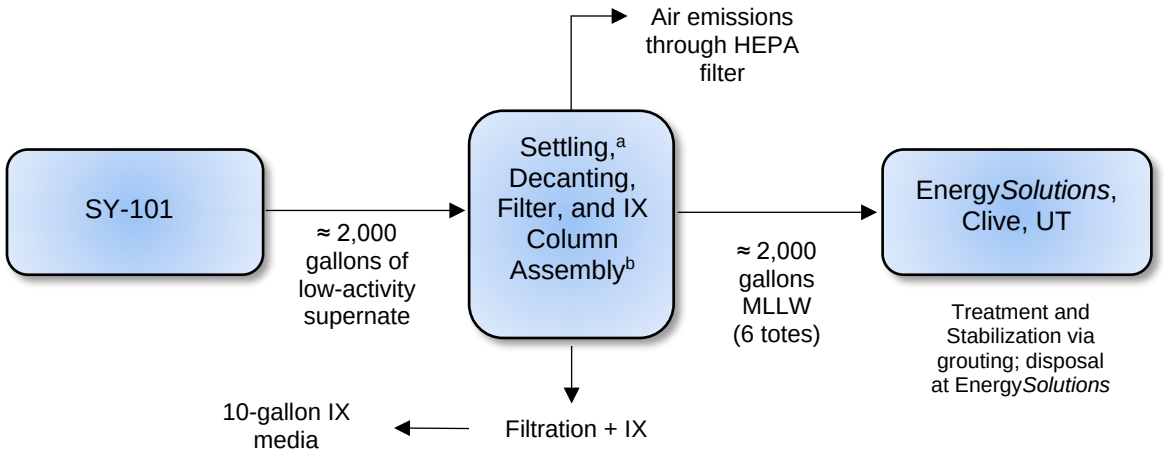
Figure 2-4 Block Flow Diagram of the Proposed Test Bed Initiative Demonstration, Alternative 3

2.1.4 Alternative 4: Treatment and Disposal at Energy*Solutions* (Clive, Utah)

Alternative 4 would involve the same waste pretreatment activities as Alternative 1. Following pretreatment and confirmation that the waste would meet the receiving facility's waste acceptance criteria and permit conditions, DOE would transport the process totes to the Energy*Solutions* facility in Clive, Utah. As reported in Alternative 1, the approximate highway distance between the Hanford Site and Clive, Utah, is 650 miles. After the liquid MLLW is transferred to Energy*Solutions*, the actions taken by Energy*Solutions* would include:

- Treatment and stabilization of the liquid MLLW to form a grouted waste form that meets the RCRA LDR requirements and waste acceptance criteria of the Energy*Solutions* permitted and licensed disposal facility; and
- Disposal of the grouted waste at the Energy*Solutions* permitted and licensed disposal facility.

Energy*Solutions* is licensed to accept Class A liquid MLLW, treat and stabilize it, and dispose of the solidified Class A MLLW at its facility (UDEQ 2020a, 2020b). Figure 2-5 presents the block flow diagram for Alterative 4.



Notes:
a. In-tank settling occurs both within waste tank SY-101 and prior to transfer of waste to tank SY-101.
b. The Department has not yet determined the disposition of the loaded IX column.

Figure 2-5 Block Flow Diagram of the Proposed Test Bed Initiative Demonstration, Alternative 4

Table 2-1 presents a high-level summary of the actions associated with Alternatives 1–4.

Table 2-1 Summary of Actions for Alternatives 1 through 4

Alternative	Pretreatment (settling, decanting, filtering and IX)	Waste Treatment/Stabilization	Offsite Disposal
1	SY-101 (Hanford)	PFNW (Richland, Washington)	WCS (Andrews County, Texas) or EnergySolutions (Clive, Utah)
2	SY-101 (Hanford)	Perma-Fix DSSI (Kingston, Tennessee)	WCS (Andrews County, Texas) or EnergySolutions (Clive, Utah)
3	SY-101 (Hanford)	WCS (Andrews County, Texas)	WCS (Andrews County, Texas)
4	SY-101 (Hanford)	EnergySolutions (Clive, Utah)	EnergySolutions (Clive, Utah)

2.2 No Action Alternative

Under the No Action Alternative, DOE would not conduct the proposed TBI Demonstration. Instead, DOE would maintain the status quo, which is represented by the continued management and retrieval of tank wastes, the eventual treatment and disposal of tank waste, and eventual closure of the tanks in accordance with the 2013 ROD, as amended. The 2013 ROD decided to implement most but not all of the components of Alternative 2B, as analyzed in the TC&WM EIS, but would not include any of the additive effects from the proposed TBI Demonstration.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

There are two additional commercial LLW disposal facilities in the United States—a facility in Barnwell, South Carolina, and the U.S. Ecology facility near Richland, Washington. These facilities were eliminated from detailed NEPA analysis because (1) they are available only for

members of the interstate compacts, in accordance with the *Low-Level Radioactive Waste Policy Amendments Act of 1985* (DOE does not dispose of waste in compact facilities),[18] and (2) these facilities are licensed for LLW only, that is, they are not permitted or licensed for MLLW.[19]

As stated in Section 1.3, DOE needs to verify the ability for the pretreated waste to meet the waste acceptance criteria for an offsite, commercial, licensed and permitted treatment facility and a permitted and licensed commercial disposal facility. Therefore, onsite disposal on the Hanford Site or disposal at other DOE sites would not satisfy the purpose and need.

Given that the process totes and drums of grouted MLLW are readily capable of being transported on a legal-weight truck and there is not active, direct rail access to the 200 East Area, this EA does not evaluate transportation of these materials via rail.

[18] The *Low-Level Radioactive Waste Policy Amendments Act of 1985* gives the states the responsibility for the disposal of LLW generated within their borders (except for certain waste generated by the Federal Government). The Act authorized the states to enter into compacts that would allow them to dispose of LLW at a common disposal facility.

[19] DOE does not utilize the Texas Compact facility at WCS, which also does not allow disposal of MLLW. Instead, DOE waste is disposed in the WCS FWF.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter includes an analysis of the existing environment and the potential environmental consequences or impacts that could result from the Proposed Action (for each of the reasonable implementing alternatives) and the No Action Alternative. The existing, or affected, environment is the result of past and present activities and provides the baseline from which to compare impacts from the Proposed Action.

Section 3.2 identifies the environmental resource areas that were considered and eliminated from detailed analysis. Sections 3.3 through 3.7 present a detailed analysis of the affected environment, potential environmental consequences, and any proposed mitigation measures (if any) for each of the resource areas.

Section 3.8 identifies reasonably foreseeable environmental trends and planned actions that could have cumulative impacts with the Proposed Action in the various regions of influence.

3.2 Resource Screening Review

Consistent with the CEQ and DOE NEPA regulations, implementing procedures, and guidance, the analysis in this EA focuses on those resource areas that are relevant to the Proposed Action, reasonable implementing alternatives, and their potential environmental impacts. As stated in the CEQ regulations (40 CFR 1502.2(b)):

> "Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues. As in a finding of no significant impact, there should be only enough discussion to show why more study is not warranted."

Table 3-1 presents the rationale for resource areas eliminated from detailed analysis in this EA. For the initial screening of potentially affected environmental resource areas, this EA considered actions that could occur on the Hanford Site, along the transportation route, at the commercial treatment locations, and at the commercial MLLW disposal facilities.

Table 3-1 Resource Areas Eliminated from Detailed Analysis

Resource Area Eliminated from Detailed Analysis	Rationale
Land Use	The Proposed Action would not involve any land disturbance activities and would not affect current land uses. The proposed TBI Demonstration activities in the 200 West Area would occur within the fenced area above waste tank SY-101. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility.
Visual Resources	The Proposed Action would involve the temporary installation of equipment and process totes within the fenced area around waste tank SY-101 and would not change the current visual characteristics. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility.

Resource Area Eliminated from Detailed Analysis	Rationale
Geology	The Proposed Action would not involve any land disturbance activities and would not impact geological resources. There would be no changes to existing facilities that would affect their ability to withstand a design-basis seismic event. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility.
Soil	The Proposed Action would not involve any land disturbance activities and thus would not impact soils. The process totes would be stationed within secondary containment to mitigate any possible spill scenarios. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility.
Water Resources (surface, groundwater, wetlands)	The Proposed Action would not require additional water use beyond the current baseline and would not produce effluents that could affect surface water, groundwater, or wetlands. The Hanford Site and commercial facilities have designs and procedures that protect against potential leaks and spills of radiological materials in off-normal conditions. The process totes would be stationed within secondary containment to mitigate any possible spill scenarios. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility and would not introduce any unique contaminants that are outside of its licensing basis. One potential benefit to water resources would be that approximately 2,000 gallons of tank waste would be removed from the system and no longer available to potentially affect surface or groundwater.
Cultural and Paleontological Resources	The Proposed Action would not involve any land disturbance activities and would not impact cultural or paleontological resources. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility.
Ecological Resources	The Proposed Action would not involve any land disturbance activities or disturb existing ecological habitats and would not result in impacts that could affect ecological resources. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility.
Noise	Beyond a minor increase in truck traffic for a very limited period, the Proposed Action would not introduce new noise sources and would not change background noise levels. Waste treatment, stabilization, and/or disposal at the commercial facilities would follow existing operations practices and not introduce any new noise sources.
Socioeconomics and Environmental Justice	The Proposed Action is a limited demonstration project and would not change Hanford Site or commercial workforce requirements and thus would not impact socioeconomic resources. There would be no disproportionately high and adverse impacts on minority or low-income populations. Transportation routes would be expected to follow the most efficient routes from Hanford to the MLLW treatment or disposal facilities and would maximize use of the U.S. Interstate highways. Because the Proposed Action would involve only one or two truck shipments, follow USDOT and NRC regulations regarding shipment of radiological materials, and be a small fraction of existing truck traffic on these highways, the transportation activities associated with the Proposed Action would not result in disproportionately high and adverse impacts on minority or low-income populations.
Infrastructure and Utilities	The Proposed Action would not result in any measurable infrastructure and utility changes compared to current conditions on the Hanford Site or the commercial facilities. The increase in truck traffic for the limited duration of the Proposed Action would be negligible.
Industrial Safety	The Proposed Action would not require additional workers or introduce new types of operations that would result in occupational injuries beyond those that have been identified as part of the existing environment.

As a result of the rationales presented in Table 3-1, this EA analyzes the following resource areas in detail: (1) air quality, (2) human health (normal operations), (3) human health (accidents and intentional destructive acts), (4) waste management, and (5) radiological transportation. Sections 3.3 through 3.7 present these analyses.

3.3 Air Quality

3.3.1 Affected Environment

Most of the Hanford Site is within the South-Central Washington Intrastate Air Quality Control Region No. 230, but a small portion of the site is in the Eastern Washington-Northern Idaho Interstate Air Quality Control Region No. 62. None of the areas within Hanford and the surrounding counties are designated as nonattainment areas with respect to National Ambient Air Quality Standards (NAAQS) for criteria air pollutants (40 CFR 81.348). The primary sources of criteria and toxic air pollutants on the Site include emissions from power generation and chemical processing. Other sources include vehicular emissions and construction, environmental remediation, and waste management activities. Detailed information on emissions of pollutants on the Hanford Site is discussed in the 2020 *Hanford Annual Site Environmental Report* (DOE 2021a).

The Hanford Site is subject to the air operating permit requirements in 40 CFR Part 70, "State Operating Permit Programs," and WAC 173-401, "Operating Permit Regulation." In coordination with WDOH and the Benton Clean Air Agency, Ecology issued Renewal 3 of the air operating permit for a period of five years, effective August 1, 2019 (DOE 2020a).

The Hanford Site air operating permit is a compilation of *Clean Air Act* requirements for both radioactive and criteria/toxic air pollutant emissions, including the radioactive air emissions license FF-01 issued by WDOH and Notice of Construction Approval Orders issued by Ecology (DOE 2020a). The permit entails emission and reporting requirements for various sources in the 200 Area.

The U.S. Environmental Protection Agency (EPA) requires state and local air pollution control agencies to submit emissions inventories for criteria pollutants to EPA's Emissions Inventory System. The EPA uses these submittals to build the National Emissions Inventory. Every year, facilities that have an air operating permit send their air emissions inventory to Ecology. Reporting toxic air pollutant compounds in the air emissions inventory is not required unless explicitly specified in project-specific Ecology air permit approval orders. One exception to this reporting exclusion is ammonia. Ammonia, included in the state list of toxic air pollutants but excluded from the federal list of hazardous air pollutants, is specifically requested in the federal and state reporting regulations. Hanford Site facilities use a combination of measurements and calculations to estimate emissions for the annual air emissions inventory report. Calculated emission estimates use published EPA formulae and emission factors. The annual emission inventory report organizes the emissions from across the Hanford Site into 19 reporting categories called "emission points." Each emission point can include data from a single source or multiple sources. The most significant source of emissions is combustion of fossil fuels diesel, gasoline, natural gas, and propane. Routine Hanford Site operations burn fossil fuels to produce

steam and provide a local source of light and electricity. The largest fraction of emissions and sources in 2021 were as follows:

- Oxides of nitrogen (51 tons); sitewide combustion of diesel fuel contributed 67 percent of this total;
- Carbon monoxide (22 tons); WTP boilers contributed 45 percent of this total;
- Volatile organic compounds (12 tons); the onsite gasoline vehicle fuel station contributed 39 percent of this total; and
- Ammonia (3 tons); the tanks storing mixed radioactive and hazardous waste in the tank farms contributed 97 percent of this total.

Table 3-2 is reproduced from the 2020 *Hanford Annual Site Environmental Report* (DOE 2021a) to summarize the reported Hanford Site emissions of nonradioactive air pollutants discharged to the atmosphere in 2020.

Table 3-2 Hanford Site Emissions of Nonradioactive Criteria and Toxic Air Pollutants in 2020

Constituent	2019 Releases	
	Pounds	Kilograms
Criteria and Toxic Air Pollutants		
Particulate matter–total[a]	1,747	792
Lead	0	0
Nitrogen oxides	28,448	12,902
Sulfur oxides	1,055	479
Carbon monoxide	16,906	7,622
Volatile organic compounds	12,998	5,895
Ammonia	4,976	2,257

a. Includes particulate matter with diameters that are generally 2.5 micrometers and smaller (e.g., $PM_{2.5}$) as well as particulate matter with diameters that are generally 10 micrometers and smaller (e.g., PM_{10}).

Source: DOE 2021a

The Hanford Site is subject to the air operating permit requirements in 40 CFR Part 70, "State Operating Permit Programs," and *Washington Administrative Code* Title 173, Chapter 480 (WAC 173-401), "Operating Permit Regulation." In coordination with WDOH and the Benton Clean Air Agency, the Washington State Department of Ecology (Ecology) issued Renewal 3 of the Air Operating Permit for a period of five years, effective August 1, 2019 (DOE 2020a).

The Hanford Site air operating permit is a compilation of *Clean Air Act* requirements for both radioactive and criteria/toxic air pollutant emissions, including the radioactive air emissions license FF-01 issued by WDOH and Notice of Construction Approval Orders issued by Ecology (DOE 2020a). It entails emission and reporting requirements for various sources in the 200 Area, including oil-fired boilers, large internal-combustion engines, tank exhausters, waste retrieval systems, rotary-mode core sampling systems, tank sluicing, emergency fire pump generators, the 200 Area Effluent Treatment Facility, tank waste retrieval, tank farm ventilation systems, storage of vented waste containers at the Central Waste Complex, the Waste Receiving and Processing Facility, Integrated Disposal Facility-East, the WTP, the T-Plant complex, and the Plutonium Finishing Plant.

There was a 73-percent reduction in greenhouse gas emissions for the Hanford Site in 2020 from the 2008 baseline and a 56.5-percent reduction in 2020 from the previous year; this reduction was due to a teleworking initiative for six months of 2020 in response to the Covid-19 pandemic. Greenhouse gas emissions in fiscal year 2021 were 14,738.2 metric tons of carbon dioxide equivalent (DOE 2021a).

Radioactive emission points are located on the Hanford Site in the 100, 200, 300, and 400 Areas. In the 200 Area, radioactive emissions were analyzed at 51 points in 2019, including the Plutonium Finishing Plant, T-Plant, B-Plant, Waste Encapsulation and Storage Facility, underground tanks storing HLW, 222-S Laboratory, and PUREX (DOE 2020a). The quantity of radionuclide air emissions reported in 2020 were similar in magnitude to those reported in 2019 (DOE 2021a).

Continuous monitoring is performed for radioactive airborne emissions from Hanford activities that have the potential to exceed 1 percent of the 10 millirem per year (mrem/yr) standard for offsite doses specified in 40 CFR Part 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities," and in WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," Section 040, "Ambient Standard." Overall, Hanford Site radioactive air emissions are controlled to sufficiently low levels to ensure the resultant exposure to any offsite individual remains well below 10 mrem/yr in accordance with 40 CFR 61.92 (DOE 2021a).

All sample results in 2020 showed very low radiological concentrations in air. All radionuclide concentrations were less than their respective EPA concentration values that would result in a dose of 10 mrem/yr from airborne radiological material. Gross alpha and gross beta concentrations in the air samples collected in 2020 from Hanford Site, perimeter, and nearby Hanford communities were comparable to each other and slightly higher than samples from the distant community. Concentrations in 2020 were comparable to concentrations recorded over the previous five years (DOE 2021a).

3.3.2 Environmental Consequences of the Action Alternatives

3.3.2.1 Alternative 1

For the proposed TBI Demonstration, DOE would pretreat approximately 2,000 gallons of waste from waste tank SY-101 via in-tank settling and the ITPS, which would consist of a self-contained pump, filter, and IX column assembly that would be inserted into an existing riser of the tank. Minimal air emissions would occur during this process since the filtration, IX, and pumping would be within the actively ventilated headspace of the tank. Waste chemical content and potential gas and vapor release would be evaluated as part of the work planning process to ensure that proper engineering and all applicable and relevant industrial hygiene controls are in place to protect workers and the environment prior to waste-disturbing activities being initiated.

DOE would follow the provisions of applicable air pollutant regulations and the air operating permit program during implementation of the Proposed Action. Preliminary air emission assessments suggest a toxic air permit would not be required under WAC 173-400, "General Regulations for Air Pollution Sources," or WAC 173-460, "Controls for New Sources of Toxic

Air Pollutants"; therefore, no action would be required under WAC 173-401. As radioactive air emission regulations in WAC 246-247, "Radiation Protection –Air Emissions," do not have a *de minimis* threshold, a WDOH one-time approval authorization is anticipated per WAC 246-247. A preliminary assessment of potential air pollutant emissions, based on the tank SY-101 headspace and ventilation system sample data, demonstrated that expected emissions would not exceed the WAC 173-400-110(5) exemption levels. The finalized assessment would be completed prior to implementation of the Proposed Action.

After passing through the IX column, the resulting solution initially would be pumped into a delay tote. Once radiation levels are confirmed to be within the required range, the resulting MLLW would be pumped from the delay tote to one of six 375-gallon process totes. Air displaced from the totes during filling would be vented through high-efficiency particulate air filters, which are more than 99.95 percent effective in capturing radionuclides. The resultant emissions would contain negligible concentrations of radionuclides, which would be validated by the final assessment mentioned in the previous paragraph. There would be minimal greenhouse gas emissions from the TBI Demonstration on the Hanford Site. The totes would be shipped from the Hanford Site to PFNW (approximately 26 miles) in a single truck shipment that would generate negligible air emissions.

As described in Section 2.1.1 of this EA, under Alternative 1, the liquid MLLW would be treated and stabilized at the PFNW facility using the ICM. Operations at PFNW would be conducted in accordance with its radioactive material licenses and dangerous waste permit (WDOH 2022a, 2022b). The treatment and stabilization process entails chemicals and other material, such as cement or polymeric-like materials, being added to the MLLW in a 55-gallon drum inside of the permitted and licensed facility. The mixing process uses a mixer blade attached to a vertical, telescoping shaft. A drum ventilation lid covers the drum during stabilization and mixing operations. After mixing, the drum is capped and set aside for curing (Perma-Fix 2018). The cured material is a treated, stable, solid form that would be confirmed to meet the RCRA LDR requirements and waste acceptance criteria of the eventual disposal facility.

The Mixed Waste Facility at PFNW operates under two orders of approval (OA) from the Benton Clean Air Agency (OA2008-0009 and OA2007-0009) (Perma-Fix 2018). The approximately 2,000 gallons of MLLW processed under the Proposed Action would not contribute to potential air impacts beyond those evaluated as part of the permits and licenses granted by the State of Washington.

The MLLW would then be transported to either the WCS FWF in Andrews County, Texas, or the Energy*Solutions* facility in Clive, Utah. The transportation of the 62 waste drums would require two truck shipments, whether to Andrews County, Texas, or Clive, Utah. Considering the 26-mile trip to PFNW and the two shipments to Texas, the increased contribution of vehicle emissions to the current affected environment would be negligible as demonstrated in Table 3-3.[20] These estimated emissions were derived using exhaust emission rates for heavy-duty diesel vehicles in the EPA's motor vehicle emissions simulator, MOVES3 (EPA 2020). The emissions from two truck shipments, which include an estimate of greenhouse gases (in carbon

[20] These analyses use the farthest distance for each alternative (e.g., in this case, the mileage to Texas instead of Utah).

dioxide equivalent), are extremely small in comparison to the annual emissions from heavy trucks on a national or even regional scale and would result in negligible effects on climate change. Disposal of the 62, 55-gallon drums at either facility would not generate any air emissions beyond those already expected from ongoing disposal operations.

Table 3-3 Estimated Emissions from Transportation under Alternative 1

Emissions (metric tons)				
CO	**NO_x**	**$PM_{2.5}$**	**THC**	**CO_2e**
4.71E-03	8.70E-03	1.45E-05	1.27E-04	6.07

CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in aerodynamic diameter; THC= total hydrocarbons; CO_2e = carbon dioxide equivalent

3.3.2.2 Alternative 2

The potential air quality impacts on the Hanford Site associated with the ITPS and process tote handling actions would be the same as under Alternative 1. Under Alternative 2, however, the process totes would be shipped from the Hanford Site to Perma-Fix DSSI in Kingston, Tennessee (approximately 2,500 miles).

As described in Section 2.1.2 of this EA, under Alternative 2 the liquid MLLW would be treated and stabilized at Perma-Fix DSSI. Operations at DSSI would be conducted in accordance with the radioactive material license and hazardous waste management permit issued by the State of Tennessee (TDEC 2018, 2020, 2021). Additionally, Perma-Fix DSSI would maintain compliance with its *Clean Air Act* Part 70 Operating Permit.[21] DSSI would be responsible for complying with all terms of its Part 70 Operating Permit, as well as obtaining any air quality construction permit and Part 70 Permit modifications necessary to comply with the *Tennessee Air Quality Act*, the Tennessee air pollution control regulations, and any applicable federal air requirements. The treatment and stabilization at DSSI would not contribute to potential air impacts beyond those evaluated as part of the permits and licenses granted by the State of Tennessee.

Approximately 62, 55-gallon waste drums would be generated and transported in two truck shipments from Perma-Fix DSSI to either WCS in Andrews County, Texas (a distance of approximately 1,160 miles), or Energy*Solutions* in Clive, Utah (a distance of approximately 1,840 miles). The emissions from the transportation associated with Alternative 2 (represented by one shipment from the Hanford Site to Tennessee and two shipments from Tennessee to Utah) would be negligible as demonstrated in Table 3-4. These estimated emissions, which include an estimate of greenhouse gases (in carbon dioxide equivalent), are extremely small in comparison to the annual emissions from heavy trucks on a national or even regional scale and would result in negligible effects on climate change. Disposal of the 62, 55-gallon drums at either facility would not generate any air emissions beyond those already expected from ongoing disposal operations.

[21] The Perma-Fix DSSI *Clean Air Act* Part 70 Operating Permit can be found online at https://dataviewers.tdec.tn.gov/pls/enf_reports/f?p=19031:34051:::34051:P34051_PERMIT_ID:68010

Table 3-4 Estimated Emissions from Transportation under Alternative 2

Emissions (metric tons)				
CO	**NO_x**	**$PM_{2.5}$**	**THC**	**CO_2e**
8.03E-03	1.48E-02	2.47E-05	2.16E-04	10.4

CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in aerodynamic diameter; THC= total hydrocarbons; CO_2e = carbon dioxide equivalent

3.3.2.3 Alternative 3

The potential air quality impacts on the Hanford Site associated with the ITPS and process tote handling actions would be the same as under Alternative 1. Under Alternative 3, however, the process totes would be shipped to the WCS facility near Andrews, Texas, for treatment, stabilization, and disposal in the FWF.

As described in Section 2.1.3 of this EA, treatment and stabilization of MLLW would occur at the WCS facility near Andrews, Texas. Treatment and stabilization operations at the WCS facility would be conducted in accordance with the radioactive material license issued by the State of Texas Commission on Environmental Quality (TCEQ 2023), which authorizes WCS to possess and process radioactive material, including treatment and stabilization of liquid radioactive wastes. The license allows WCS to possess up to 5.6 million curies of waste at the FWF.

The approximately 2,000 gallons of MLLW processed as part of the proposed TBI Demonstration would constitute a small fraction of the waste processed at the WCS facility annually (the wastes associated with the proposed TBI Demonstration would contain approximately 1.8 curies). The treatment, stabilization, and disposal at WCS would not contribute to potential air impacts beyond those evaluated as part of the permits and licenses granted by the State of Texas.

The emissions from the transportation associated with Alternative 3 (represented by one shipment from the Hanford Site to Texas) would be negligible as demonstrated in Table 3-5. These estimated emissions, which include an estimate of greenhouse gases (in carbon dioxide equivalent), are extremely small in comparison to the annual emissions from heavy trucks on a national or even regional scale and would result in negligible effects on climate change.

Table 3-5 Estimated Emissions from Transportation under Alternative 3

Emissions (metric tons)				
CO	**NO_x**	**$PM_{2.5}$**	**THC**	**CO_2e**
2.34E-03	4.32E-03	7.20E-06	6.30E-05	3.02

CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in aerodynamic diameter; THC= total hydrocarbons; CO_2e = carbon dioxide equivalent

3.3.2.4 Alternative 4

The potential air quality impacts on the Hanford Site associated with the ITPS and process tote handling actions would be the same as under Alternative 1. Under Alternative 4, however, the totes would be transferred to the Energy*Solutions* facility in Clive, Utah, for treatment, stabilization, and disposal.

As described in Section 2.1.4 of this EA, treatment and stabilization of MLLW (if determined to be Class A MLLW) would occur at the Energy*Solutions* facility in Clive, Utah. Treatment, stabilization, and disposal operations at the Energy*Solutions* facility would be conducted in accordance with the permit and license issued by the State of Utah (UDEQ 2020a, 2020b).

The approximately 2,000 gallons of MLLW processed as part of the proposed TBI Demonstration would constitute a small fraction of the waste processed at the Energy*Solutions* facility annually. The treatment, stabilization, and disposal at Energy*Solutions* would not contribute to potential air impacts beyond those evaluated as part of the permits and licenses granted by the State of Utah.

The emissions from the transportation associated with Alternative 4 (represented by one shipment from the Hanford Site to Utah) would be negligible as demonstrated in Table 3-6. These estimated emissions, which include an estimate of greenhouse gases (in carbon dioxide equivalent), are extremely small in comparison to the annual emissions from heavy trucks on a national or even regional scale and would result in negligible effects on climate change.

Table 3-6 Estimated Emissions from Transportation under Alternative 4

Emissions (metric tons)				
CO	**NO_x**	**$PM_{2.5}$**	**THC**	**CO_2e**
8.45E-04	1.56E-03	2.60E-06	2.28E-05	1.09

CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in aerodynamic diameter; THC= total hydrocarbons; CO_2e = carbon dioxide equivalent

3.3.3 No Action Alternative Impacts

Under the No Action Alternative, DOE would not conduct the proposed TBI Demonstration. Instead, DOE would maintain the status quo, which is represented by the continued management and retrieval of tank wastes, the eventual treatment and disposal of tank waste, and eventual closure of the tanks in accordance with the 2013 ROD, as amended. The 2013 ROD decided to implement most but not all of the components of Alternative 2B as analyzed in the TC&WM EIS. Potential impacts from air emissions under the No Action Alternative would be comparable to those presented for Alternative 2B in the TC&WM EIS but would not include any of the additive effects from the proposed TBI Demonstration. While the TC&WM EIS did not break out individual air quality impacts for storage of the 2,000 gallons of tank waste discussed in this EA, any impacts would be expected to be small compared to management of the full tank waste inventory.

3.4 Human Health—Normal Operations

3.4.1 Affected Environment

Table 3-7 shows major sources and national average levels of exposure to natural background radiation and other non-Hanford-related radiation sources to individuals. The national average annual dose from these sources is approximately 620 mrem. The national annual dose from natural background sources is approximately 310 mrem. This dose can vary depending on geographic location, individual buildings in the geographic area, or age, but is essentially all from cosmic or terrestrial sources. Another source of annual public exposure to radiation is from

medical exposure (approximately 300 mrem), including computed tomography, fluoroscopy, x-rays, and nuclear medicine for diagnosis and treatment. An additional source of exposures to the public is approximately 15 mrem from consumer products and other sources (e.g., nuclear power, security, and research) (NCRP 2009). All doses identified in Table 3-7 are unrelated to Hanford Site operations.

Table 3-7 Natural Background and Other Radiological Dose Unrelated to Hanford Operations

Source	Effective Dose Equivalent (mrem/year)[a]
Natural background radiation	310
Medical exposure	300
Consumer, industrial, and average	15

a. Averages for the United States.
Source: NCRP 2009

Releases of radionuclides to the environment from Hanford Site operations are a source of radiological exposure to members of the public in the vicinity of the Site. A hypothetical maximally exposed individual (MEI) is a person whose place of residence and lifestyle make it unlikely that any other member of the public would receive a higher radiation dose from Hanford Site operational releases. This person is assumed to be exposed to radionuclides in the air and on the ground from Hanford emissions, ingestion of food grown downwind from the Hanford Site and irrigated with water from the Columbia River downstream from the Hanford Site, ingestion of fish from the Columbia River, and exposure to radionuclides in the river and on the shoreline during recreation. The 2020 MEI dose of 0.20 mrem per year is greater than the 2019 MEI calculated dose of 0.16 mrem per year and less than the 2018 MEI calculated dose of 0.28 mrem per year (DOE 2021a). The difference between the 2020 and 2019 dose estimates is mostly attributable to differences in average wind direction and wind speed in the vicinity of the 300 Area, resulting in higher food ingestion and inhalation doses for the closest offsite receptor. The reported MEI dose is 0.2 percent of the 100 mrem annual public dose limit specified in DOE Order 458.1, "Radiation Protection of the Public and the Environment." Many different exposure pathways are included in the dose calculations, but inhalation and external exposure to radon isotopes and their radioactive progeny from 300 Area air emissions was the largest contributor. Collective dose was estimated for the entire population living within a 50-mile radius of the air emissions sources and also individuals obtaining drinking water from the Columbia River downstream of the Hanford Site. The collective dose in 2020 of 2.3 person-rem is on the higher end of collective doses calculated in the past several years. The increase from the collective dose of 1.4 person-rem in 2019 is likely attributable to different air dispersion patterns in 2020, resulting in higher modeled tritium air concentrations at the offsite location near the 300 Area. In summary, doses to the public from the greater Hanford Site operations fall well within the limits established in 40 CFR Part 61, Subpart H (10 mrem/yr from airborne sources) and DOE Order 458.1 (100 mrem/yr from all sources) and are much lower than those from natural background radiation (DOE 2021a).

The DOE Office of River Protection (ORP) is charged with the retrieval and treatment of Hanford Site waste and closure of the tank farms to protect the Columbia River. In 2019, workers supporting the DOE-ORP mission received an average dose of 36 mrem, which is less

than 6 percent of the average dose received from natural background and other radiological doses unrelated to Hanford operations. The collective dose to Hanford workers supporting the DOE-ORP mission was approximately 24 person-rem (DOE 2021b).

Treatment and/or disposal of the waste at a commercial facility would be conducted in accordance with the facility's environmental permits and/or operating license. The potential impacts at these commercial disposal facilities were considered as part of the permitting and licensing process for these sites.

3.4.2 Environmental Consequences of the Action Alternatives

3.4.2.1 Alternative 1

Under the proposed TBI Demonstration, DOE would pretreat approximately 2,000 gallons of supernate from tank SY-101 via in-tank settling and the ITPS.

Latent Cancer Fatality

A latent cancer fatality (LCF) is a death from a cancer that results from, and occurs an appreciable time after, exposure to ionizing radiation. Death from radiation-induced cancers can occur any time after the exposure. However, latent cancers generally occur from 1 year to many years after exposure. Using a conversion factor of 0.0006 LCF per rem of radiation exposure (ISCORS 2002), the result is the increased lifetime probability of developing a latent fatal cancer. For example, if a person received a dose of 0.033 rem, that person's risk of LCF from that dose over a lifetime would be 0.00002. This risk corresponds to 1 chance in 50,000 of an LCF during that person's lifetime. Because estimates of LCFs are statistical, the results often indicate less than 1 LCF for cases that involve low doses or small populations. For instance, if a population collectively received a dose of 500 person-rem, the number of potential LCFs would be 0.3.

Radiological doses to the public are typically a result of emissions of radionuclide to the atmosphere, discharge of effluents to water bodies, or direct radiation. Because there would be no radiological emissions or effluents associated with onsite activities for the Proposed Action, and no direct radiation dose off site, there would be no doses to the public.

Radiological doses to workers are based on the annual dose rate, duration of the field work, and the estimated number of workers. Fewer than approximately 40 workers would be involved in the operation, which would be expected to be completed in about nine days. Based on actual exposure data for 2019, the average dose to a Hanford worker supporting the DOE-ORP mission is approximately 0.7 mrem per week (or 36 millirem over 52 weeks, as stated above). Based on the similarity of the Proposed Action to existing ORP operations, doses to workers are expected to be similar to doses from existing operations. Consequently, for the Proposed Action, the average worker would be expected to receive a dose of approximately 1.26 mrem, and the total collective worker dose (total dose received by all personnel involved with the proposed TBI Demonstration over a period of nine days) would be approximately 50 person-mrem. Table 3-8 presents the latent cancer fatality (LCF) risk associated with these worker doses.

Table 3-8 Worker Radiological Risk from Normal Operations

Receptor	Dose for Project	Radiological Risk (LCF)[a]
Average worker	1.26 mrem	7.6×10^{-7}
Total workers	50 person-mrem	3.0×10^{-5}

a. The LCF risk is based on a dose-to-risk conversion factor of 6.0×10^{-4} per rem (NRCP 2009).

As noted in Section 2.1.1, under all of the alternatives, the disposition of the ITPS has not been determined. Regardless of the ultimate disposition path, DOE and WRPS would follow proper radiation protection planning protocols to minimize personnel exposure.

Under Alternative 1, the process totes would be shipped from the Hanford Site to PFNW in a single truck shipment. Section 3.7.2.1 of this EA presents the potential radiological impacts associated with this transport.

As described in Section 2.1.1 of this EA, treatment and stabilization of MLLW would occur at the PFNW facility. Operations at PFNW would be conducted in accordance with licenses and permits issued by the State of Washington. Because the approximately 2,000 gallons of MLLW processed under the proposed TBI Demonstration would be treated in accordance with the existing permits at PFNW, impacts to facility workers are not expected to change compared to existing operations. Because there would be no new or additional radiological emissions or effluents at PFNW beyond those evaluated as part of its permitting and licensing processes, and no direct radiation dose off site, there would be no additional doses to the public.

After stabilization, the 62, 55-gallon drums would be transported to either the WCS FWF near Andrews, Texas, or the Energy*Solutions* facility in Clive, Utah, for disposal. Section 3.7.2.1 of this EA presents the potential radiological impacts associated with this transport.

Disposal of the 62, 55-gallon drums at the WCS FWF or the Energy*Solutions* facility would not result in any notable increase in impacts beyond those already expected from ongoing LLW/MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the facility's permit or license.

3.4.2.2 Alternative 2

The potential impacts on the Hanford Site associated with the pretreatment and process tote handling actions would be the same as under Alternative 1. Under Alternative 2, however, the totes would be shipped from the Hanford Site to Perma-Fix DSSI in Kingston, Tennessee, for treatment and stabilization. Section 3.7.2.2 of this EA presents the potential radiological impacts associated with this transport.

As described in Section 2.1.2 of this EA, treatment and stabilization of MLLW would occur at the Perma-Fix DSSI facility. Operations at DSSI would be conducted in accordance with the radioactive material license and hazardous waste management permit issued by the State of Tennessee (TDEC 2018, 2020, 2021). Because the approximately 2,000 gallons of MLLW processed under the proposed TBI Demonstration would be treated in accordance with the existing permits at DSSI, impacts to facility workers are not expected to change compared to existing operations. Because there would be no new or additional radiological emissions or

effluents at the DSSI facility beyond those evaluated as part of its permitting and licensing processes, and no direct radiation dose off site, there would be no additional doses to the public.

Under Alternative 2, the 62, 55-gallon drums of immobilized MLLW would be transported to the WCS FWF or Energy*Solutions* facility for disposal. Section 3.7.2.2 addresses the potential radiological impacts associated with this transport.

Disposal of the 62, 55-gallon drums at the WCS FWF or the Energy*Solutions* facility would not result in any notable increase in impacts beyond those already expected from ongoing LLW/MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the respective facility's permit or license.

3.4.2.3 Alternative 3

The potential impacts on the Hanford Site associated with the pretreatment and process tote handling actions would be the same as under Alternative 1. Under Alternative 3, however, the totes would be shipped from the Hanford Site to the WCS facility near Andrews, Texas, for treatment, stabilization, and disposal. Section 3.7.2.3 of this EA presents the potential radiological impacts associated with this transport.

As described in Section 2.1.3 of this EA, treatment and stabilization of MLLW would occur at the WCS facility near Andrews, Texas. Operations at the WCS facility would be conducted in accordance with the radioactive material license issued by the State of Texas (TCEQ 2023). Because the approximately 2,000 gallons of MLLW processed under the proposed TBI Demonstration would be treated in accordance with the existing permits at WCS, impacts to facility workers are not expected to change from existing operations. Because there would be no new or additional radiological emissions or effluents at the WCS facility beyond those evaluated as part of its licensing process, and no direct radiation dose off site, there would be no additional doses to the public.

The treatment/stabilization process would generate approximately 62, 55-gallon waste drums. Disposal of the 62, 55-gallon drums at the WCS FWF would not result in any notable increase in impacts beyond those already expected from ongoing LLW/MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the WCS FWF license (TCEQ 2023).

3.4.2.4 Alternative 4

The potential impacts on the Hanford Site associated with the pretreatment and process tote handling actions would be the same as under Alternative 1. Under Alternative 4, however, the totes would be shipped from the Hanford Site to the Energy*Solutions* facility in Clive, Utah, for treatment, stabilization, and disposal. Section 3.7.2.4 of this EA presents potential radiological impacts associated with this transport.

As described in Section 2.1.4 of this EA, treatment and stabilization of MLLW would occur at the Energy*Solutions* facility in Clive, Utah. Operations at the Energy*Solutions* facility would be conducted in accordance with the permit and license issued by the State of Utah (UDEQ 2020a, 2020b). Because the approximately 2,000 gallons of MLLW processed under the proposed TBI

Demonstration would be treated in accordance with the existing permits at Energy*Solutions*, impacts to facility workers are not expected to change compared to existing operations. Because there would be no new or additional radiological emissions or effluents at the Energy*Solutions* facility beyond those evaluated as part of its permitting and licensing processes, and no direct radiation dose off site, there would be no additional doses to the public.

The treatment/stabilization process would generate approximately 62, 55-gallon waste drums. Disposal of the 62, 55-gallon drums at the Energy*Solutions* facility would not result in any notable increase in impacts beyond those already expected from ongoing LLW/MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the Energy*Solutions* license (UDEQ 2020a).

3.4.3 No Action Alternative Impacts

Under the No Action Alternative, DOE would not conduct the proposed TBI Demonstration. Instead, DOE would maintain the status quo, which is represented by the continued management and retrieval of tank wastes, the eventual treatment and disposal of tank waste, and eventual closure of the tanks in accordance with the 2013 ROD, as amended. The 2013 ROD decided to implement most but not all of the components of Alternative 2B as analyzed in the TC&WM EIS. Potential human health impacts under the No Action Alternative would be comparable to the impacts analyzed for Alternative 2B in the TC&WM EIS but would not include any of the additive effects from the proposed TBI Demonstration. While the TC&WM EIS did not break out individual human health impacts for storage of the 2,000 gallons of tank waste discussed in this EA, any impacts would be expected to be small compared to management of the full tank waste inventory.

3.5 Human Health—Accidents and Intentional Destructive Acts

3.5.1 Affected Environment

Since weapons material production ceased on the Hanford Site in 1987, there have been no nuclear-related accidents or accidental releases of hazardous or radioactive materials that caused significant injury or posed any significant threat to the offsite public. However, as described below, a number of incidents that had actual or potential health impacts on workers have occurred in the course of routine facility operations, decommissioning, and environmental remediation activities in and near the 200 Area (DOE 2012).

In July 2007, approximately 85 gallons of liquid waste from tank S-102 in the 200 West Area spilled on the ground from over-pressurization of a hose in a dilution line. In the hours and days following the spill, a number of Hanford workers identified odors, experienced symptoms or health effects, or expressed concerns about their potential exposure to the waste chemicals from the spill. Approximately 24 workers reported possible exposure to tank vapors from the spill. The worker health impacts could be attributed to other causes, so it is unclear whether the spill directly contributed to these health effects. Because of the low concentrations and short duration of the event, overexposure or chronic health impacts are unlikely. Consequences of the tank S-102 event could have been more severe if workers had been in the immediate vicinity of the

spill at the time of the release, and thus had been exposed to higher radiation or chemical vapor concentrations for a longer period (DOE 2012).

In 2016, during pressure testing of a piping system to be used for cooling water at the WTP, a 12-inch pipe unexpectedly separated at a joint and sprayed a pressurized stream of water that hit a worker, knocking the worker to the ground. The worker suffered two broken vertebrae and cuts on the head. The worker was on medical leave for 70 days before returning to work with temporary medical restrictions.

On May 9, 2017, a portion of the roof of the PUREX Storage Tunnel 1 collapsed. No workers were injured, and no release of contamination occurred (DOE 2020c). From October 3, 2017, to November 11, 2017, crews applied more than 4,400 cubic yards of engineered grout to stabilize Tunnel 1 (DOE 2017).

In nearly all of these cases, the worker health impacts were minimal or temporary. DOE maintains information concerning the above and other safety-related events on the Hanford Site and other sites in its Occurrence Reporting and Processing System.

3.5.2 Environmental Consequences of the Action Alternatives

3.5.2.1 Alternative 1

As part of the proposed TBI Demonstration, DOE would pretreat approximately 2,000 gallons of supernate from waste tank SY-101 via in-tank settling and the ITPS. The accident scenario with the highest probability would involve leaks from the temporary piping or totes associated with the ITPS. However, since the ITPS operations would be conducted within a secondary containment, potential health impacts of any such accidental leaks would be minimal. The TBI design includes the installation of a pressure-relief valve to protect against over-pressurization, which would be the primary cause of leaks or sprays of waste onto operations personnel. If a spray leak did occur, the primary health impact to workers would be associated with potential chemical sensitivities or burns since the liquid is caustic (WRPS 2019). Radiological impacts to onsite workers from this type of event would be small because of the low number of curies that would be contained in the pretreated waste. Neither the radiological nor nonradiological impacts would be life-threatening.

As reported in Section 2.1.1 of this EA, the pretreated waste would include organics (benzyl butyl phthalate and bis(2-ethylhexyl) phthalate) and heavy metals (chromium and selenium). The organics would not be an immediate hazard to personnel in the area of a potential release. According to the National Institutes of Health, benzyl butyl phthalate would cause irritation to the skin and eyes if persons were subject to prolonged contact (NIH 2022a). Similarly, inhalation of bis(2-ethylhexyl) phthalate can cause nausea and irritation of the nose and throat. Contact of liquid with eyes or skin causes irritation. Ingestion can cause abdominal cramps, nausea, and diarrhea (NIH 2022b).

The concentration of chromium was measured at 95.8 micrograms per milliliter and the concentration of selenium was measured at 1.04 micrograms per milliliter. According to the Agency for Toxic Substances and Disease Registry, there is no minimum risk level for chromium for acute inhalation, which would be the primary exposure pathway for a potential

accident, either on site or during transportation (ATSDR 2012). Chromium, in the oxidation state of VI, has the potential for long-term health and environmental consequences; however, chromium in the oxidation state of III has a National Institutes of Health recommended dietary allowance or adequate intake value of 35 microgram per day (NIH 2021a).[22] For accident risks, this EA assumes that all of the chromium is VI and that the accident would be cleaned up shortly after occurrence. The total inventory of chromium that could be involved in the 2,000 gallons of MLLW would be about 0.73 gram. Similarly, for selenium, the Agency for Toxic Substances and Disease Registry does not include a minimum risk level for acute inhalation dose (ATSDR 2003); however, the National Institutes of Health has a recommended dietary allowance of 55 micrograms per day (NIH 2021b). The total expected inventory of selenium in the 2,000 gallons of MLLW would be less than 8 grams. These amounts of hazardous constituents would not be expected to result in noticeable health or environmental impacts in the event of an accident.

Under Alternative 1, the totes containing liquid MLLW would be shipped from the Hanford Site to PFNW (approximately 26 miles) in a single truck shipment. Section 3.7.2.1 of this EA presents potential accidents and impacts associated with this transportation.

As described in Section 2.1.1 of this EA, treatment and stabilization of MLLW would occur at the PFNW facility. Operations at PFNW would be conducted in accordance with the radioactive material licenses and permits issued by the State of Washington and would not meaningfully increase the probability of an accident. Treatment and stabilization of the TBI MLLW at PFNW would not change the types of accidents that could occur at that facility or the potential impacts from accidents compared to existing operations.

Disposal of the 62, 55-gallon drums at the WCS FWF or the Energy*Solutions* facility would not change the types of accidents that could occur at either of those facilities or the potential impacts that could occur from ongoing MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the respective facility's permit or license (TCEQ 2023; UDEQ 2020a). Section 3.7.2.1 of this EA presents potential accidents and impacts associated with the transportation of the drums to the disposal facility.

3.5.2.2 Alternative 2

The potential impacts on the Hanford Site associated with accidents would be the same as discussed under Alternative 1. Under Alternative 2, however, the process totes would be transported to the Perma-Fix DSSI facility in Kingston, Tennessee, for treatment and stabilization.

As described in Section 2.1.2 of this EA, treatment and stabilization of MLLW would occur at the Perma-Fix DSSI facility. Operations at DSSI would be conducted in accordance with the radioactive material license and hazardous waste permit issued by the State of Tennessee (TDEC 2018, 2020, 2021) and would not meaningfully increase the probability of an accident. Treatment

[22] The National Institutes of Health has not determined a recommended dietary allowance for chromium, but it has identified an "adequate intake" value, which means that intake of chromium at this level is assumed to ensure nutritional adequacy; this is established when evidence is insufficient to develop a recommended dietary allowance.

and stabilization of the TBI MLLW at DSSI would not change the types of accidents that could occur at that facility or the potential impacts from accidents compared to existing operations.

Under Alternative 2, the 62, 55-gallon drums would be transported from DSSI to the WCS FWF near Andrews, Texas, or the Energy*Solutions* facility in Clive, Utah. Section 3.7.2.2 of this EA presents potential accidents and impacts associated with the transportation of the liquid MLLW from the Hanford Site to DSSI and the 55-gallon drums from DSSI to the disposal facility.

Disposal of the 62, 55-gallon drums at the WCS FWF or the Energy*Solutions* facility would not change the types of accidents that could occur at either of those facilities or the potential impacts that could occur from ongoing MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the respective facility's permit or license (TCEQ 2023; UDEQ 2020a).

3.5.2.3 Alternative 3

The potential impacts on the Hanford Site associated with accidents would be the same as discussed under Alternative 1. Under Alternative 3, however, the process totes containing liquid MLLW would be shipped from the Hanford Site to the WCS facility near Andrews, Texas, for treatment, stabilization, and disposal at the FWF. Section 3.7.2.3 of this EA presents potential accidents and impacts associated with this transportation.

As described in Section 2.1.3 of this EA, treatment and stabilization of MLLW would occur at the WCS facility near Andrews, Texas. Operations at the WCS facility would be conducted in accordance with the radioactive material license issued by the State of Texas (TCEQ 2023). The approximately 2,000 gallons of MLLW processed as part of the proposed TBI Demonstration would be treated in accordance with the existing permits at WCS and thus would not meaningfully increase the probability of an accident. Treatment and stabilization of the TBI MLLW at WCS would not change the types of accidents that could occur at that facility or the potential impacts from accidents compared to existing operations.

Disposal of the 62, 55-gallon drums at the WCS FWF would not change the types of accidents that could occur at that facility or the potential impacts that could occur from ongoing MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in the WCS' license (TCEQ 2023).

3.5.2.4 Alternative 4

The potential impacts on the Hanford Site associated with accidents would be the same as those expected under Alternative 1. Under Alternative 4, however, the process totes would be shipped from the Hanford Site to the Energy*Solutions* facility in Clive, Utah, for treatment, stabilization, and disposal. Section 3.7.2.4 of this EA presents potential accidents and impacts associated with this transportation.

As described in Section 2.1.4 of this EA, treatment and stabilization of the liquid MLLW would occur at the Energy*Solutions* facility in Clive, Utah. Operations at the Energy*Solutions* facility would be conducted in accordance with the radioactive material license issued by the State of Utah (UDEQ 2020a). The approximately 2,000 gallons of MLLW processed as part of the

proposed TBI Demonstration would be treated in accordance with the existing permits at the Energy*Solutions* facility and thus would not meaningfully increase the probability of an accident. Treatment and stabilization of the TBI MLLW at the Energy*Solutions* facility would not change the types of accidents that could occur at that facility or the potential impacts from accidents compared to existing operations.

Disposal of the 62, 55-gallon drums at the Energy*Solutions* facility would not change the types of accidents that could occur at that facility or the potential impacts that could occur from ongoing MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume stipulated in Energy*Solutions*' radioactive material license (UDEQ 2020a).

3.5.3 No Action Alternative Impacts

Under the No Action Alternative, DOE would not conduct the proposed TBI Demonstration. Instead, DOE would maintain the status quo, which is represented by the continued management and retrieval of tank wastes, the eventual treatment and disposal of tank waste, and eventual closure of the tanks in accordance with the 2013 ROD, as amended. The 2013 ROD decided to implement most but not all of the components of Alternative 2B of the TC&WM EIS. Potential impacts from accidents under the No Action Alternative would be comparable to those presented for Alternative 2B in the TC&WM EIS but would not include any of the additive effects from the proposed TBI Demonstration. While the TC&WM EIS did not specifically break out human health impacts from accidents associated with storage of the 2,000 gallons of tank waste discussed in this EA, any impacts would be expected to be similar to the consequences of accident scenarios identified for the full tank waste inventory.

3.5.4 Intentional Destructive Acts

Security at its facilities is a priority for DOE. Following the terrorist attacks of September 11, 2001, DOE has implemented measures to minimize the risk and consequences of potential terrorist attacks on its facilities and continues to identify and implement measures to defend and deter attacks. The safeguards applied to protecting the Hanford Site involve a dynamic process of enhancement to meet threats; these safeguards will evolve over time. DOE maintains a system of regulations, orders, programs, guidance, and training that form the basis for maintaining, updating, and testing site security to preclude and mitigate any postulated terrorist actions.

There is no accepted basis for determining the probability of intentional attacks at any site, or the nature or types of such attacks. In general, the potential consequences of intentional destructive acts are highly dependent on distance to the site boundary (for actions on DOE sites) and size of the surrounding population—the closer and higher the surrounding population, the higher the consequences. Especially for actions that involve transportation of radiological materials, the impacts from intentional destructive acts are largely based on the amount of material that could be released (i.e., the material at risk) in the event of such an act. Because the single shipment of liquid MLLW or two shipments of 55-gallon drums of grouted MLLW would only contain about 1.8 curies, they would not make an attractive target for intentional destructive acts; however, for the purpose of analysis, the potential impacts would be expected to be similar to those of the transportation accident scenarios (see Section 3.7 and Appendix A).

3.6 Waste Management

This section presents waste management activities for the proposed TBI Demonstration. This section also describes the management and disposal of any secondary waste streams resulting from the Proposed Action.

Transportation of wastes would include both liquid wastes (prior to treatment and stabilization) and solid wastes (post-stabilization, for the action alternatives) and would be conducted using standard, regulated, and approved truck transport of USDOT Type A packages. Under normal operations, there would be no additional waste generated from these transportation activities.

3.6.1 Affected Environment

3.6.1.1 Hanford Site

Waste management on the Hanford Site includes minimization, characterization, treatment, storage, transportation, and disposal of waste generated from DOE activities, including management of approximately 54.1 million gallons of waste stored underground in 149 SSTs and 28 DSTs and solid waste burial grounds (DOE 2020a). The tank waste is material left over from years of World War II and post-war production of nuclear materials. DOE manages the following types of waste on the Hanford Site: HLW, transuranic waste (TRU), mixed TRU, LLW, MLLW, hazardous waste, and nonhazardous waste. The underground storage tanks are grouped into 18 "farms" in the 200 Area. Solid waste management on the Hanford Site includes the treatment, storage, and disposal of solid waste at seven active facilities; liquid effluents are managed at four active facilities. All waste is managed using appropriate technologies in compliance with applicable federal, state, and local statutes and DOE Orders. Table 3-9 presents the quantities of solid waste generated on the Hanford Site between 2014 and 2020 (DOE 2021a).

Table 3-9 Solid Waste[a] Quantities Generated on the Hanford Site

Waste Category	2014	2015	2016	2017	2018	2019	2020
Mixed (tons)	140	657	609	452	523	571	389
Mixed (metric tons)	127	596	552	410	474	518	353
Radioactive (tons)	572	1550	665	828	2,680	658	645
Radioactive (metric tons)	519	1408	603	751	2,434	597	585

a. Solid waste includes containerized liquid waste.
Source: DOE 2021a

LLW is typically generated at the Hanford Site though the handling of radioactive materials, which may result in the contamination of various items and materials with LLW, such as protective clothing, plastic sheeting, gloves, paper, wood, analytical waste, contaminated equipment, contaminated soil, nuclear reactor hardware, nuclear fuel hardware, and spent deionizer resin from the purification of water in radioactive material storage basins.

MLLW has been generated at the Hanford Site from the operation, maintenance, and cleanout of reactors, chemical separation facilities, tank farms, and laboratories. MLLW on the Hanford Site contains the same types of contaminated materials as LLW, but also contains hazardous components such as lead and other heavy metals; solvents; paints; oils and other hazardous

organic materials; or components that exhibit characteristics of ignitability, corrosivity, toxicity, or reactivity as defined by state regulations (WAC 173-303). Some LLW on the Hanford Site contains polychlorinated biphenyls, which are regulated under the *Toxic Substances Control Act*. Such waste is managed much like mixed waste and is included in MLLW inventories and projections.

The Hanford Site does not have onsite treatment facilities for nonradioactive, hazardous RCRA Subtitle C waste. Such waste is shipped off site using USDOT-approved transporters for treatment, recycling, recovery, and disposal at RCRA-permitted commercial facilities.

Waste that is not hazardous (under federal regulations), dangerous (under state regulations), or radioactive is still subject to federal and state regulations and is often referred to as "municipal solid waste." Construction- or demolition-type waste, considered a subset of municipal solid waste, often consists of inert materials (e.g., cured concrete, used asphalt materials, masonry, ceramics, stainless steel) that do not generate leachate or emissions when disposed of or pose a threat to human health or the environment. Inert waste can be disposed of in inert landfills, which have fewer requirements than landfills that take all municipal solid waste. Since 1999, municipal solid waste generated on the Hanford Site has been disposed of at offsite municipal or commercial solid waste disposal facilities (DOE 2021a). This waste includes construction debris, office trash, cafeteria waste, furniture and appliances, and demolition debris.

Hanford facilities and equipment that would be affected by the Proposed Action consist of the integrated ITPS (containing a pump, pretreatment filters, and IX column) in waste tank SY-101, associated transfer lines, and delay tote and process tote staging areas.

Underground Storage Tanks

Tank wastes are stored in "farms" in a series of SSTs and DSTs. The DST system was constructed between 1968 and 1986 to store mixed waste generated on the Hanford Site. The DST system is operating under interim status standards specified in RCRA permit WA7890008967, issued by the State of Washington (Ecology 2022). The DST system storage capacity is approximately 32.6 million gallons of radioactive and chemical solid and liquid waste (29.1 million gallons in 200 East Area and 3.5 million gallons in 200 West Area) (WRPS 2021). DST space is being managed to store waste pending treatment by the WTP and includes emergency pumping space available at all times of 1.27 million gallons. As of February 28, 2021, there were approximately 25.7 million gallons of waste in the DSTs, of which 19.3 million gallons were supernate (WRPS 2021). As of February 28, 2021, waste tank SY-101 contained approximately 1.1 million gallons of total waste consisting of approximately 888,000 gallons and 223,000 gallons of supernate and saltcake, respectively (WRPS 2021).

The SY Tank Farm is in the 200 West Area and consists of three DSTs, each with a volume capacity of approximately 1.16 million gallons. The tank selected for the TBI Demonstration is waste tank SY-101. The surface area within the SY Tank Farm consists of soft sand and soil that would be surveyed for contamination prior to setting up the ITPS for waste pretreatment. The site is sufficiently level to provide for transfer line and tote staging area equipment with minimum grading or excavation.

Under the proposed TBI Demonstration, DOE would pretreat approximately 2,000 gallons of supernate from waste tank SY-101 via in-tank settling and the ITPS. The pretreated LAW would be moved through attached transfer piping to a delay tote for sampling and evaluation before being loaded into process totes for shipment off site for commercial treatment (solidification) and commercial disposal.

DOE has prepared a Final WIR Evaluation (DOE 2023a) in accordance with DOE Manual 435.1-1, *Radioactive Waste Management Manual*. Based on the Final WIR Evaluation, DOE may issue a WIR Determination, in which DOE may determine whether the waste processed under the proposed TBI Demonstration is incidental to the reprocessing of SNF, is non-HLW, and may be managed as LLW.

3.6.1.2 Perma-Fix Northwest—Richland, Washington

Located on 35 acres adjacent to the DOE Hanford Site, the PFNW facility manages and treats both LLW and MLLW at two discrete permitted and licensed operational areas so that wastes can be managed separately and distinctly. PFNW operates under two WDOH-issued licenses, WN-I0393-1 for LLW and WN-I0508-1 for MLLW (WDOH 2022a, 2022b), and RCRA permit WAR000010355 issued by the State of Washington. The licenses and permit authorize PFNW to possess and process radioactive material, including treatment and stabilization.

PFNW has completed numerous projects supporting the nuclear industry. The facility has received waste from the Federal Government, reactor operators, medical facilities, and other waste brokers and processors. PFNW uses several methods to process MLLW and LLW, choosing the processing methods according to waste volume and characteristics. For the Proposed Action, PFNW would utilize a non-thermal, chemical treatment and solidification process using grout, as was done for the low-activity test samples in 2017.

Under Alternative 1, PFNW would receive the liquid MLLW in totes from the Hanford Site, mix it with grout, containerize the resultant mixture in 62, 55-gallon drums, and transport the waste off site to the WCS FWF near Andrews, Texas, or Energy*Solutions* in Clive, Utah, depending on the resulting MLLW classification.

3.6.1.3 Perma-Fix DSSI Facility—Kingston, Tennessee

The Perma-Fix DSSI facility is located on an 80-acre parcel in Kingston, Tennessee, and is governed by radioactive materials license R-73014-H24 and hazardous waste permit TNHW-150 issued by the State of Tennessee (TDEC 2018, 2020, 2021). The license and permit authorize DSSI to possess and process radioactive material, including treatment and stabilization.

Perma-Fix DSSI has completed numerous projects supporting the nuclear industry. The facility has received waste from the Federal Government, reactor operators, medical facilities, and other waste brokers and processors. DSSI uses several methods to process MLLW and LLW, choosing the processing methods according to waste volume and characteristics. For the Proposed Action, DSSI would utilize a non-thermal solidification process using grout.

Under Alternative 2, Perma-Fix DSSI would receive the liquid MLLW in totes from the Hanford Site, mix it with grout, containerize the resultant mixture in 62, 55-gallon drums, and transport

the waste to the WCS FWF near Andrews, Texas, or Energy*Solutions* in Clive, Utah, depending on the resulting MLLW classification.

3.6.1.4 Commercial Offsite LLW/MLLW Disposal Sites

The WCS disposal facility near Andrews, Texas, is located just off U.S. Highway 385 about 40 miles northwest of Odessa, Texas, 32 miles west of Andrews, Texas, and 6 miles east of Eunice, New Mexico. The facility is on a semiarid, isolated, 1,338-acre parcel. The site is located on a 600-foot-thick nearly impermeable red-bed clay formation, a natural barrier that ensures safe and permanent disposal of radioactive waste. WCS is permitted and licensed by the State of Texas for near-surface disposal of Class A, Class B, and Class C LLW from Texas Compact waste generators and certain non-compact generators, as well as federal Class A, Class B, and Class C LLW and MLLW. Waste generated by federal entities, which includes DOE-owned or -generated LLW, is disposed of in the WCS FWF. All hazardous and radioactive waste in the WCS FWF is encapsulated in a robust liner and cover system, featuring a 7-foot-thick liner system that includes a 1-foot-thick layer of reinforced concrete, and a RCRA-compliant geosynthetic layer. The WCS FWF opened on June 6, 2013, with a licensed capacity of up to 26 million cubic feet and 5.6 million curies total. It is not to exceed 8.1 million cubic feet and 5.5 million curies of containerized Class A, Class B, and Class C LLW in disposal capacity through September 2024. WCS obtained a 15-year license for the facility, with provision for 10-year renewals.

The Energy*Solutions* disposal facility is west of the Cedar Mountains in Clive, Utah. Clive is located along Interstate-80, about 60 miles west of Salt Lake City. Waste is safely disposed of in engineered embankments, or cells, that are constructed approximately 12 feet below grade and built up to 38 feet above grade. Operational for nearly 30 years, the Energy*Solutions* disposal facility provides the nuclear industry and the Federal Government safe and compliant permanent disposal of radioactive waste. The Energy*Solutions* disposal facility is permitted and licensed by the State of Utah for the disposal of Class A LLW and Class A MLLW that meet specific waste acceptance criteria. Disposal of the treated/stabilized waste at the Energy*Solutions* site would be conducted in accordance with the facility's operating license (Radioactive Material License No. UT 2300249). The currently licensed waste disposal capacity is about 5.04 million cubic yards (136 million cubic feet). Treatment technologies include macro-encapsulation of radioactive lead solids and hazardous debris, stabilization of heavy metals, neutralization and solidification of contaminated liquids, thermal treatment of waste containing organic solvents, amalgamation of elemental mercury, and treatment of other unique waste streams.

3.6.2 Environmental Consequences of the Action Alternatives

3.6.2.1 Alternative 1

Based on the design, materials, and analytical sampling results of waste tank SY-101, the Proposed Action would not result in any incompatible material issues. A material compatibility assessment was performed to evaluate waste-contacting components in the proposed TBI Demonstration system to determine their compatibility with the supernate waste. DOE determined that there are no prohibited material, thermal compatibility, chemical compatibility,

or radiation compatibility issues for the system (DOE 2019a). Waste tank SY-101 was chosen based on a tank selection evaluation (see Section 2.1.1 of this EA).

There are several operating modes associated with the proposed TBI Demonstration, including startup, processing, off-normal, back-flushing, end-of-campaign, piping blowdown, and column blowdown/drying. The supernate pretreatment process consists of in-tank settling followed by two subsystems: (1) the ITPS assembly, which would include a pump, filter, and IX column and (2) aboveground equipment adjacent to waste tank SY-101, including transfer lines, delay tote, process totes, and secondary containment to protect the environment in the event of leaks.

Following in-tank settling, supernate would initially be pumped and filtered to remove solids and then run through the IX column where radionuclides (primarily cesium) would be captured within a CST media, which is non-elutable, inorganic material. Any waste solids removed during filtering would be contained within the ITPS filter. Any off-normal conditions (e.g., leaks) would be controlled through isolation of the supernate recirculation loop such that all waste materials would remain contained within the system. As part of the circulation system for the proposed TBI Demonstration, periodic back-flushing of the filter, valves, and lines using a sodium hydroxide solution would be done. The resultant secondary waste stream would be run back to the DST (waste tank SY-101). During end-of-campaign operations, the filter lines, valves, and the IX column would be back-flushed with sodium hydroxide and then water to minimize chemical hazards to workers. The flushed liquids would be routed back to the DST (waste tank SY-101). Finally, compressed air would be used for piping blowdown to the totes and for IX column blowdown and drying within the confines of waste tank SY-101. Column drying would take between three and four weeks to be complete. After the completion of the TBI Demonstration, aboveground pieces of equipment would be removed, and, although the DOE has not yet determined the disposition of the ITPS, disposition of the aboveground equipment and the ITPS is expected to be bounded by, or represent a negligible increase of the impacts analyzed in, the TC&WM EIS and the DFLAW Supplement Analysis.[23] DOE would prepare a radiological work plan to ensure that worker doses are kept to a minimum during the disposition of the ITPS. During this planning, DOE would develop the specific timeline associated with the mobilization, operations, and demobilization activities.

Disposition of secondary, radiological waste streams generated from the TBI Demonstration would be managed in accordance with the *Hanford Site Solid Waste Acceptance Criteria* (DOE 2020d), as amended. Any job control waste (e.g., personal protective clothing, gloves, booties) and the aboveground pieces of equipment would be packaged and disposed of directly at an onsite, permitted facility in accordance with the applicable waste acceptance criteria (DOE 2019a). Impacts would be minimal for the expected secondary wastes.

Under Alternative 1, the primary waste stream would begin with the pretreated MLLW produced from in-tank settling and the ITPS, continue with treatment and stabilization of the MLLW at PFNW utilizing a non-thermal, chemical treatment and solidification process using grout, as was done for the low-activity test samples in 2017, and end with disposal at a permitted and licensed

[23] The TC&WM EIS evaluated the environmental impacts for the following three key areas: (1) retrieval, treatment, and disposal of waste from 149 SSTs and 28 DSTs and closure of the SST system; (2) decommissioning of the Fast Flux Test Facility, a nuclear test reactor; and (3) disposal of Hanford's waste and other DOE sites' LLW and MLLW. The DFLAW Supplement Analysis analyzed the interim storage of IX columns (DOE 2019b).

MLLW disposal facility. The final treated, grouted, solid material would be contained in approximately 62, 55-gallon drums and shipped to a MLLW disposal facility. Disposal of the grouted waste at the MLLW disposal facility would be conducted in accordance with the receiving facility's operating license, hazardous waste permit, and waste acceptance criteria. Treatment and stabilization of MLLW at PFNW is a routine activity that would be allowed under its permit, and potential waste management impacts would be negligible.

Under Alternative 1, DOE would select one of two commercial facilities for waste disposal: the WCS FWF near Andrews, Texas, or the Energy*Solutions* facility in Clive, Utah. The WCS FWF can accept MLLW that meets the facility's waste acceptance criteria for disposal. WCS is permitted, licensed, and authorized to receive, treat, and dispose of Class A, Class B, and Class C LLW and MLLW. The WCS waste acceptance criteria document, *FWF Federal Generator Handbook* (WCS 2015), addresses operations and regulatory parameters, pre-shipment requirements, documentation, and transportation, and provides various forms including a waste profile sheet. The *WCS Waste Acceptance Plan* (WCS 2014) provides additional information related to the waste acceptance process, including waste form requirements and a description of the generator and waste approval processes. WCS's radioactive material license R04100 (TCEQ 2023) contains additional requirements related to waste disposal, including total waste volume limitations and total activity limitations for certain radionuclides. Land disposal of solid MLLW in 55-gallon drums is a routine activity at the WCS FWF and is allowed under the regulations. In addition, the volume of waste from the proposed TBI Demonstration that would be disposed of at the WCS FWF would represent a minor percentage of the facility's existing capacity. Therefore, waste management impacts at the WCS FWF are expected to be negligible.

The Energy*Solutions* facility in Clive, Utah, is permitted and licensed for the disposal of commercially treated and immobilized Class A LLW and MLLW that meet the facility's waste acceptance criteria (UDEQ 2020). Energy*Solutions* is permitted, licensed, and authorized to receive, treat, and dispose of Class A LLW and Class A MLLW. The design and operation of the Energy*Solutions* site would provide a long-term disposal solution with minimal need for active maintenance after closure. Energy*Solutions* uses an aboveground, engineered disposal cell. Land disposal of solid Class A MLLW in 55-gallon drums is a routine activity at the Energy*Solutions* facility and is allowed under regulations. In addition, the volume of waste from the proposed TBI Demonstration that would be disposed of at the facility would represent a minor percentage of the facility's existing capacity. Therefore, waste management impacts at the Energy*Solutions* facility in Clive, Utah, are expected to be negligible.

After the process totes have been emptied at the treatment facility, they would be treated as secondary waste and disposed of in accordance with the treatment facility's permitted processes for MLLW disposal. This is common to all alternatives.

3.6.2.2 Alternative 2

The potential impacts on the Hanford Site associated with the onsite activities would be the same as under Alternative 1. Under Alternative 2, however, the process totes would be transported to the Perma-Fix DSSI facility in Kingston, Tennessee, for treatment and stabilization.

As described in Section 2.1.2 of this EA, treatment and stabilization of MLLW would occur at the Perma-Fix DSSI facility. Operations at DSSI would be conducted in accordance with the

radioactive material license and hazardous waste permit issued by the State of Tennessee (TDEC 2018, 2020, 2021). Treatment and stabilization of MLLW at DSSI is a routine activity allowed under DSSI's license and hazardous waste permit, and potential waste management impacts are expected to be negligible (TDEC 2018, 2020, 2021).

Under Alternative 2, the 62, 55-gallon drums would be transported from DSSI to the WCS FWF near Andrews, Texas, or the Energy*Solutions* facility in Clive, Utah. Section 3.7.2.2 of this EA presents potential impacts associated with the transportation of the liquid MLLW from the Hanford Site to DSSI and the 55-gallon drums from DSSI to the disposal facility.

The potential waste management impacts of the disposal actions at either the WCS FWF or the Energy*Solutions* facility, depending on the resulting MLLW classification, would be the same as those described under Alternative 1.

3.6.2.3 Alternative 3

The potential impacts on the Hanford Site associated with waste management would be the same as under Alternative 1. Under Alternative 3, however, the totes containing liquid MLLW would be shipped from the Hanford Site to the WCS facility near Andrews, Texas, for treatment, stabilization, and disposal at the FWF.

Treatment and stabilization of MLLW at the WCS FWF is a routine activity allowed under the current license (TCEQ 2023), and potential waste management impacts would be negligible. Potential impacts associated with disposal would be the same as those discussed for Alternative 1.

3.6.2.4 Alternative 4

The potential impacts on the Hanford Site associated with waste management would be the same as under Alternative 1. Under Alternative 4, however, the totes containing liquid MLLW would be shipped from the Hanford Site to the Energy*Solutions* facility in Clive, Utah, for treatment, stabilization, and disposal.

Treatment and stabilization of MLLW at the Energy*Solutions* facility is a routine activity allowed under regulation (UDEQ 2020a, 2020b), and potential waste management impacts would be negligible. Potential impacts associated with disposal would be the same as those discussed for Alternative 1.

3.6.3 No Action Alternative Impacts

Under the No Action Alternative, DOE would not conduct the proposed TBI Demonstration and no additional secondary waste forms incidental to the proposed TBI Demonstration would be produced. Instead, DOE would maintain the status quo, which is represented by the continued management and retrieval of tank wastes, the eventual treatment and disposal of tank waste and eventual closure of the tanks in accordance with the 2013 ROD, as amended. The 2013 ROD decided to implement most but not all of the components of Alternative 2B as analyzed in the TC&WM EIS. Potential impacts from the proposed TBI Demonstration under the No Action Alternative would be comparable to those presented for Alternative 2B in the TC&WM EIS but

would not include any of the additive effects from the proposed TBI Demonstration. While the TC&WM EIS did not break out individual waste management impacts for storage of the 2,000 gallons of tank waste discussed in this EA, any impacts would be expected to be small compared to management of the full tank waste inventory.

3.7 Radiological Transportation

3.7.1 Affected Environment

Because only MLLW would be transported off the Hanford Site, this EA focuses on LLW transportation, which accounts for the radiological portion of the MLLW. Transportation of LLW (including MLLW) is strictly regulated. In accordance with 49 CFR Subchapter C, "Hazardous Materials Regulations," USDOT regulates packaging, labeling, preparation of shipping papers, handling, marking, and placarding of shipments and establishes standards for personnel as well as conveyance (e.g., truck and train) performance and maintenance (49 CFR 173.401). USDOT and the NRC set radioactive material packaging standards (10 CFR Part 71). In addition, DOE LLW shipments must comply with DOE requirements (DOE Orders 460.2B and 460.1D).

Proper packaging is a key element in transport safety. LLW must be packaged to protect workers, the public, and the environment during transport. Often, the same package is used for both transport and disposal. Selection of appropriate packaging is based on the level and form of radioactivity. The pretreated liquid and grouted waste from the proposed TBI Demonstration is expected to have low levels of radioactivity (e.g., radiation levels less than 0.5 mrem/hour on any external surface of the container).[24] For incident-free transportation, the potential radiological exposure of workers and the public is directly related to the external dose rates associated with the LLW packages.

Under the Proposed Action, the MLLW would be transported by truck. Vehicle and loads would be inspected by DOE (for shipments leaving the Hanford Site) and State inspectors (where required) before shipment. States may also inspect shipments to confirm regulatory compliance. The shipments would be expected to use the most direct routes that minimize radiological risk (DOE 1999). As shown in Figure 3-1, the waste shipments for the proposed TBI Demonstration would be transported over federal highways for the majority of the route (except for transportation to PFNW under Alternative 1, which would involve transportation off the Hanford Site for 1.2 miles to get to the PFNW facility).

Data from the Federal Motor Carrier Safety Administration (FMCSA) for 2017 indicate that large trucks are involved in 35.9 accidents per 100 million miles traveled (FMCSA 2019). DOE has an outstanding transportation safety record. In fiscal year 2020, DOE transportation contractors safely transported more than 3,200 hazardous materials shipments over 6 million

[24] The dose rate for transportation of stabilized MLLW from PFNW is estimated to be 0.01 mrem/hour because the treatment process results in increased waste form density and lower dose rates (ATG 1998). Because the process and materials used at DSSI would be the same as at PFNW, the dose rate for transportation of stabilized MLLW from DSSI is also expected to be 0.01 mrem/hour.

Figure 3-1 Federal Highway System with Approximate Locations of the Hanford Site, Energy*Solutions*, WCS, and Perma-Fix

miles with no USDOT recordable accidents.[25] DOE's transportation contractors and those contracted by PFNW or DSSI would follow the same USDOT and NRC regulations for transporting hazardous material. DOE has response systems in place in the event of an accident involving a shipment of MLLW. Further, DOE supports training and emergency planning through its Transportation Emergency Preparedness Program.[26] State, tribal, and local government officials respond to any such accident within their jurisdiction. DOE also responds to transport emergencies at the request of states and tribes. Radiological assistance program teams are available to provide field monitoring, sampling, decontamination, communications, and other related services. Technical assistance from the shipping site or appropriate DOE program is also available in the event of an accident (DOE 1999).

3.7.2 Environmental Consequences of the Action Alternatives

3.7.2.1 Alternative 1

Under Alternative 1, six process totes for a total of 2,000 gallons of liquid MLLW would be shipped from the Hanford Site to the PFNW facility (approximately 26 miles; 1.2 miles of which would be off the Hanford Site) in a single truck shipment. The totes would be suitable for transportation in accordance with USDOT requirements and would meet all appropriate USDOT requirements for the transport of the pretreated waste to an offsite permitted facility, in accordance with 49 CFR Subchapter C, "Hazardous Materials Regulations." The totes would be USDOT 7A Type A packages (49 CFR 178.350). As identified in Section 2.1.1, the estimated radionuclide inventory of the totes would be approximately 10.7 percent of that allowed in a Type A package (see also Appendix A).

DOE has analyzed the impacts of transporting LLW (including MLLW) in numerous NEPA documents. The WM PEIS includes a comprehensive analysis of LLW transportation impacts and found that transporting LLW (including MLLW) has the potential to affect the health of the truck crew and the public along the transportation route (DOE 1997). These health effects include both radiological and nonradiological impacts. The radiological impacts are the result of radiation received during normal operations and accidents in which the waste containers are assumed to fail. Nonradiological impacts could occur as a result of exposure to vehicle exhaust and physical injury from vehicle accidents. In the WM PEIS, DOE determined that the impacts of transporting approximately 25,000 shipments of LLW (over a distance of approximately 9 million miles) would be as follows (DOE 1997, Section 7.4.2):

- Less than 0.5 fatality from radiological doses to either the truck crews or the public along the transportation route;
- Less than 0.5 fatality from vehicle emissions; and
- One injury from traffic accidents.

[25] The following links provide background information on DOE's Office of Packaging and Transportation:
http://www.energy.gov/em/downloads/fact-sheet-packaging-and-transportation
https://www.energy.gov/em/packaging-and-transportation

[26] Information about DOE's Transportation Emergency Preparedness Program can be found at
https://www.teppinfo.com/

Consistent with the CEQ's instruction to discuss potential impacts "in proportion to their significance" (40 CFR 1502.2(b)), DOE determines the appropriate level of detail of impact analysis, including transportation impact analysis, on a case-by-case basis. This determination is based on the nature of the proposed action and the potential significance of potential impacts.

DOE analyses have consistently shown that the impacts of the transportation of radioactive materials are generally small and often overwhelmed by the nonradiological impacts of that same transportation. For DOE actions where only minimal impacts are expected from the transportation of radioactive materials, completely new quantitative analysis may not be necessary to assess the potential impacts of transporting radioactive materials or waste. Instead, DOE may use a simple screening analysis with appropriately conservative estimates to identify an upper bound on potential impacts, show whether potential impacts would be significant, and determine the need for further analysis.

Similar analyses (e.g., similar material, packaging, start points, and end points) may be incorporated by reference (40 CFR 1501.12) and used to develop an estimate for use in a screening analysis. Combining aspects of previously existing analysis and new analysis can help reduce duplicative effort and paperwork (40 CFR 1506.4).

The results of this screening approach can be used to determine if more substantial analysis is necessary. If the results of this analysis show that the potential risk is small or nonexistent, further analysis may not be helpful to decisionmakers or the public. Appendix A to this EA provides a derivation of transportation accident risk for the Proposed Action based on a conservative analysis prepared for an EA that evaluated disposition of Defense Waste Processing Facility (DWPF) recycle wastewater at the Savannah River Site (SRS). The *SRS DWPF Recycle Wastewater Final EA* (DOE 2020d) is being referenced for transportation analysis purposes only.

Transportation impacts depend primarily on the number of shipments and shipment miles (in addition to the affected population along the route). The single shipment of the TBI totes from the Hanford Site over a distance of approximately 26 miles to Richland would require less than one hour of transport. The radiation dose to the driver and/or crew in the truck and to the public along the route would be negligible.

According to the FMCSA, the probability that an accidental crash would occur during the 26-mile trip would be about 1 chance in 107,000 (FMCSA 2019). Type A packages must pass stringent tests and only 1 percent of those involved in accidents have failed; of those, only 39 percent have released their contents (NRC 2003). As shown in Appendix A to this EA, the estimated radiological risk for a severe transportation accident under Alternative 1 would be 7.83×10^{-9} LCF, or essentially zero.

The transport of 62, 55-gallon waste drums from PFNW would require two truck shipments, whether to Andrews County, Texas (1,800 miles) or Clive, Utah (650 miles). Considering the potential impacts identified in the WM PEIS to the public along the route for 25,000 shipments of LLW, the potential incident-free impacts to the public from the two shipments of immobilized MLLW under Alternative 1 would be negligible. Dose rate intensity decreases as a function of increased distance from the source. The ratio of dose rate intensity decreases by the square of the ratio of the increased distance. For instance, if the crew is about 10 feet from the package on the

bed of the truck, the expected dose rate to the crew from that package would be $1/9^{th}$ (11 percent) of the dose rate at 3.3 feet. Due to the low external dose rate for the immobilized waste form (0.01 mrem/hour), the 40-hour trip would result in less than 0.5 mrem to a driver or crew (3.0×10^{-7} LCF to a single driver and 6.0×10^{-7} LCF for a crew of two). This conservative value does not account for reductions in the dose rate from distance and truck shielding.

3.7.2.2 Alternative 2

Under Alternative 2, six totes with a total of 2,000 gallons of liquid MLLW would be shipped from the Hanford Site to the Perma-Fix DSSI facility in Kingston, Tennessee (approximately 2,450 miles), in a single truck shipment. The total transportation time is estimated at 50 hours.

As discussed in Section 3.7.1 of this EA, the estimated external dose rate for the process totes is less than 0.5 mrem/hour. The driver and backup driver (i.e., crew) would be the closest workers to the packages for any substantial length of time during the transport. Using the reduction of dose rate intensity described above, the expected dose rate to the crew would be no more than 0.06 mrem per hour during the time of transport from the Hanford Site to the Perma-Fix DSSI facility. This is still a conservative assumption because it takes no credit for any shielding, such as that provided by the truck cab, between the closest package and the crew.

Assuming the 50-hour duration for the single shipment, the total worker dose to a crew member would be 3 mrem. The total crew dose for the trip would be less than 6 person-mrem. The potential for an LCF associated with this level of radiation exposure is 3.6×10^{-5}.

According to the FMCSA, the probability that an accidental crash would occur during the 2,450-mile trip would be about 1 chance in 1,140 (FMCSA 2019). As shown in Appendix A to this EA, the estimated radiological risk for a severe transportation accident under Alternative 2 would be 1.65×10^{-6} LCF, or essentially zero.

The transport of the 62, 55-gallon waste drums from Kingston, Tennessee, would require two truck shipments, whether to Andrews County, Texas (1,160 miles) or Clive, Utah (1,840 miles). Consistent with the analysis for Alternative 1, the potential impacts to workers and the public of this transportation would be very small.

3.7.2.3 Alternative 3

Six totes with a total of 2,000 gallons of liquid MLLW shipped from the Hanford Site to the WCS facility near Andrews, Texas (1,800 miles) would require only a single truck shipment. Consistent with the analysis in Section 3.7.2.2, which analyzed the shipment of the liquid MLLW 2,450 miles to Kingston, Tennessee, transportation would result in very small impacts. As shown in Appendix A to this EA, the estimated radiological risk for a severe transportation accident under Alternative 3 would be 1.21×10^{-6} LCF, or essentially zero.

3.7.2.4 Alternative 4

Six totes with a total of 2,000 gallons of liquid MLLW shipped from the Hanford Site to the Energy*Solutions* facility in Clive, Utah (650 miles) would require only a single truck shipment. Consistent with the analysis in Section 3.7.2.2 and 3.7.2.3, transportation would result in very

small impacts. As shown in Appendix A to this EA, the estimated radiological risk for a severe transportation accident under Alternative 4 would be 4.36×10^{-7} LCF, or essentially zero.

3.7.3 No Action Alternative Impacts

Under the No Action Alternative, DOE would not conduct the proposed TBI Demonstration and no related offsite transportation of MLLW would occur. Instead, DOE would maintain the status quo, which is represented by the continued management and retrieval of tank wastes, the eventual treatment and disposal of tank waste and eventual closure of the tanks in accordance with the 2013 ROD, as amended.

3.8 Reasonably Foreseeable Environmental Trends and Planned Actions

This section describes the potential cumulative impacts that could occur from the Proposed Action when considered with reasonably foreseeable environmental trends and planned actions within the region of influence. The regions of influence for this EA include the Hanford Site; the Perma-Fix treatment facilities in Richland, Washington, and Kingston, Tennessee; and the MLLW disposal facilities at WCS in Andrews County, Texas, and Energy*Solutions* in Clive, Utah. Section 3.8.1 identifies the trends and actions for the regions of influence. Section 3.8.2 presents potential cumulative impacts related to these actions and the potential impacts from the Proposed Action, as described in Sections 3.3 through 3.7.

3.8.1 Trends and Actions Within the Regions of Influence

3.8.1.1 Hanford Site

The primary region of influence for the Proposed Action on the Hanford Site includes the 200 West Area around waste tank SY-101. The activities associated with the proposed TBI Demonstration would take place over a period of a few weeks and are assumed to occur in 2023. During that same timeframe, the following planned actions could occur in this region:

- Ongoing liquid waste management and tank closure activities at the Hanford Site;
- Commission and startup of DFLAW, including tank-side cesium removal; and
- Relocation of cesium and strontium capsules.

As identified in Sections 1.1. and 1.2, DOE has not decided on a supplemental LAW treatment technology. The proposed TBI Demonstration could provide a proof of concept for one potential technology that could be used.[28]

3.8.1.2 Perma-Fix Northwest

The primary region of influence for the Proposed Action at PFNW includes the immediate area surrounding the PFNW facility in Richland, Washington. Operations at PFNW are governed by radioactive material licenses issued by the State of Washington (WDOH 2022a, 2022b). PFNW

[28]The TC&WM EIS evaluated thermal (bulk vitrification and steam reforming) and non-thermal (cast stone) technologies for supplemental LAW treatment. DOE would prepare additional NEPA documentation prior to making a supplemental treatment decision for the LAW that is not immobilized at the LAW Vitrification Facility.

also operates under a permit for treatment and storage of dangerous waste. The reasonably foreseeable trends and planned actions at PFNW are primarily dependent on the renewal of the dangerous waste permit. During this renewal, Ecology would comply with the *Washington State Environmental Policy Act* and review potential impacts associated with the renewal action. As part of its normal operations, PFNW treats a variety of materials from the Hanford Site that are acceptable under its permit and licenses.

3.8.1.3 Perma-Fix DSSI

The primary region of influence for the Proposed Action at Perma-Fix DSSI includes the immediate area surrounding the DSSI facility in Kingston, Tennessee. Operations at DSSI are governed by radioactive material license and hazardous waste permit issued by the State of Tennessee (TDEC 2018, 2020, 2021). There are two reasonably foreseeable planned actions for the DSSI facility:

- Continued operation of the DSSI facility under the existing hazardous waste permit (TDEC 2018), including the ongoing hazardous waste permit renewal with the State of Tennessee (TDEC 2021); and
- Potential long-term management and storage of elemental mercury. On July 8, 2022, DOE and the EPA each published a Notice of Availability for the draft supplemental EIS that evaluates long-term management and storage of mercury at an existing Perma-Fix DSSI facility, among other site alternatives (DOE 2022; 87 FR 40830 and 87 FR 40838, respectively).

3.8.1.4 Waste Control Specialists

The primary region of influence for the Proposed Action at WCS in Andrews County, Texas, includes the FWF. WCS is licensed as a LLW/MLLW disposal facility by the State of Texas (TCEQ 2023). In addition to ongoing receipt and disposal of LLW and MLLW, the following potential actions could occur at this facility:

- Interim storage of commercial SNF. Interim Storage Partners, which includes WCS as a partner, applied to the NRC for a license to provide interim storage services for commercial SNF. The NRC published a Final EIS for that proposed action on August 6, 2021 (86 FR 43277) and issued the license for the commercial consolidated interim storage facility on September 13, 2021;[29] and
- Potential long-term management and storage of elemental mercury. DOE has previously evaluated the use of an existing building at WCS for long-term management and storage of elemental mercury. On July 8, 2022, DOE and EPA each published a Notice of Availability for the draft supplemental EIS that evaluates long-term management and storage of mercury at an existing facility at WCS, among other site alternatives (DOE 2022; 87 FR 40830 and 87 FR 40838, respectively).

[29] The licensing action is currently under a legal challenge by the State of Texas.

3.8.1.5 Energy*Solutions*

The primary region of influence for the Proposed Action at Energy*Solutions* includes the LLW/MLLW disposal site in Clive, Utah. Energy*Solutions* is licensed as a MLLW disposal facility by the State of Utah (UDEQ 2020a, 2020b). There are two reasonably foreseeable planned actions that could occur at this facility:

- Ongoing receipt and disposal of LLW and MLLW; and
- Potential development of a Federal Cell Facility. In April 2021, Energy*Solutions* submitted a license application to the State of Utah to allow permanent disposal of DOE concentrated depleted uranium (UDEQ 2021). The license application was re-submitted in July 2022 and found to be administratively complete and docketed in September 2022.[30]

3.8.2 Potential Cumulative Impacts

This section describes the potential cumulative impacts that could occur from the proposed TBI Demonstration when considered with reasonably foreseeable environmental trends and planned actions within the regions of influence. The five potential regions of influence potentially affected by the Proposed Action are addressed below.

3.8.2.1 Hanford Site

As noted in the previous section, the primary environmental trends and planned actions that would occur concurrently with the proposed TBI Demonstration include ongoing tank farm operations in the 200 East and West Areas, the commissioning and startup of DFLAW, and the relocation of the cesium and strontium capsules.

DOE addressed the potential impacts of these actions in the TC&WM EIS (DOE 2012) and in a supplement analysis for the DFLAW project (DOE 2019b) that evaluated the addition of a tank-side cesium removal process and addition of a concrete pad for storage of fully loaded IX columns (DOE 2019b).

The TC&WM EIS also evaluated potential supplemental LAW treatment technologies (see Section 1.2 of this EA) as an element of several alternatives.

Considering that the potential impacts of the Proposed Action (Sections 3.3 through 3.7) would be negligible to small, any impacts would not measurably contribute to the impacts analyzed in the TC&WM EIS for ongoing and planned actions on the Hanford Site.

3.8.2.2 Perma-Fix Northwest

The State of Washington evaluated potential impacts associated with operations of the PFNW facility prior to granting the radioactive material license and permit for storage and treatment of dangerous waste (WDOH 2022a, 2022b). As discussed in Sections 2.1.1 and 3.8.1.2, Ecology

[30] For more information, see https://deq.utah.gov/waste-management-and-radiation-control/federal-cell-license-application-energysolutions

and PFNW are in discussions regarding the renewal of PFNW's dangerous waste permit. As part of the renewal process, Ecology will evaluate the potential impacts of continued operations at PFNW. The treatment and stabilization of MLLW from the proposed TBI Demonstration would not incrementally add impacts beyond those Ecology is evaluating during the permit renewal.

Regardless of the specific waste streams proposed for treatment at PFNW over the coming years, whether from Hanford or other clients, PFNW operations would be in compliance with the facility's licenses and permits and would not present cumulative impacts beyond those evaluated as part of the State's permitting process.

3.8.2.3 Perma-Fix DSSI

The State of Tennessee evaluated potential impacts associated with operations of the Perma-Fix DSSI facility prior to granting the radioactive material license and hazardous waste permit (TDEC 2018, 2020). As discussed in Section 3.8.1.3, TDEC is processing a renewal of DSSI's hazardous waste permit. As part of the renewal process, TDEC will evaluate the potential impacts of continued operations at DSSI. The treatment and stabilization of MLLW from the proposed TBI Demonstration would not incrementally add impacts beyond those TDEC evaluated during the permit renewal.

The potential impacts of long-term management and storage of elemental mercury at Perma-Fix DSSI would involve the potential receipt and long-term management and storage of up to 7,000 metric tons of mercury from across the United States. The mercury would be stored in an existing, onsite, RCRA-permitted building that would not affect other DSSI operations. In accordance with the *Draft Long-Term Management and Storage of Elemental Mercury Supplemental EIS* (DOE 2022), the storage of this mercury at an existing facility would likely result in negligible to minor environmental impacts. The storage and management of mercury and the treatment and stabilization of MLLW would occur in different buildings and the only potential cumulative impact would be the additional shipments into and out of the facility. Considering that the proposed TBI Demonstration would add one truck shipment to DSSI and result in two truck shipments out of DSSI, the cumulative transportation impacts would be negligible.

3.8.2.4 Waste Control Specialists

Disposal of 62, 55-gallon drums in the WCS FWF would represent a very small percentage of the licensed capacity of the WCS LLW/MLLW disposal facilities. The State of Texas considered disposal of LLW and MLLW (up to 5.6 million curies) during licensing of the WCS LLW/MLLW disposal facility (TCEQ 2023).

The NRC evaluated the potential environmental impacts of an interim SNF storage facility at the WCS site.[31] The NRC determined that impacts for the proposed interim SNF storage facility would generally range from none to small, with potentially moderate socioeconomic benefits.

[31] Information regarding the NRC licensing process can be found at https://www.nrc.gov/waste/spent-fuel-storage/cis/waste-control-specialist.html

The SNF would be stored in a newly constructed consolidated interim storage facility licensed by NRC, which would not affect WCS LLW disposal capacity or the treatment of MLLW.

The potential impacts of long-term management and storage of elemental mercury at WCS would involve the potential receipt and storage of up to 7,000 metric tons of mercury from across the United States. The mercury would be stored in an existing, onsite, RCRA-permitted building that would not affect WCS LLW disposal capacity or the treatment of MLLW. In accordance with the *Draft Long-Term Management and Storage of Elemental Mercury Supplemental EIS* (DOE 2022), the storage of this mercury would result in negligible to minor environmental impacts at WCS.

Considering that the potential treatment and disposal of the proposed TBI Demonstration MLLW would be a small percentage of the licensed capacity at WCS and other reasonably foreseeable actions in the region would result in small or minor potential impacts across all resource areas, the Proposed Action would not measurably contribute to cumulative impacts in the WCS region of influence.

3.8.2.5 Energy*Solutions*

Treatment and disposal of the proposed TBI Demonstration MLLW within the Energy*Solutions* disposal facility would represent a very small percentage of the licensed capacity of that facility. The State of Utah considered these operations during permitting and licensing of the facility (UDEQ 2020a, 2020b).

UDEQ has not completed its evaluation of the Energy*Solutions* license application for the Federal Cell Facility for disposal of DOE concentrated depleted uranium. During this review, the State of Utah will consider potential impacts of both the existing licensed disposal capacity and that of the Federal Cell Facility.

Considering that the disposal of the proposed TBI Demonstration MLLW would be a small percentage of the licensed capacity at Energy*Solutions*, the Proposed Action would not measurably contribute to cumulative impacts in the Energy*Solutions* region of influence.

4 COMMUNICATIONS WITH TRIBES AND AGENCIES

Consultations with other agencies (e.g., State Historic Preservation Officers, U.S. Fish and Wildlife Service) were not required or undertaken in connection with this TBI Demonstration EA because none of the implementing alternatives of the Proposed Action would have the potential to impact cultural resources or historic properties, or be likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. On June 25, 2021, the following tribes and state agencies were notified of the preparation of this EA:

- Confederated Tribes of the Umatilla Indian Reservation
- Nez Perce Tribe
- Yakama Nation Tribe
- Wanapum Tribe
- Tennessee Department of Environment and Conservation
- Texas Commission on Environmental Quality
- State of Utah Public Lands Policy Coordination Office
- Oregon State Department of Energy
- Washington State Department of Ecology

As identified in Section 1.7 of this EA, DOE notified these tribes and state agencies about the availability of the draft EA for review.

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APPENDIX A:
DERIVATION OF RELATIVE TRANSPORTATION ACCIDENT RISK

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Appendix A: Derivation of Relative Transportation Accident Risk

Section 3.7.2.1 of this TBI Demonstration EA presents information from the analysis of potential transportation impacts presented in the 1997 WM PEIS (DOE 1997). That analysis evaluated the potential health risks of approximately 25,000 shipments of LLW. Because the Proposed Action in this TBI Demonstration EA would consist of 1–3 shipments of MLLW, DOE used a recent analysis as a relevant analog to evaluate the potential accident risks from this transportation. DOE issued the *SRS DWPF Recycle Wastewater Final EA* and FONSI in 2020 (DOE 2020). That EA evaluated the transportation, stabilization, and disposal of up to 10,000 gallons of stabilized (grouted) DWPF recycle wastewater from the SRS H-Area Tank Farm to the WCS facility in Andrews County, Texas, and/or the Energy*Solutions* facility in Clive, Utah. The *SRS DWPF Recycle Wastewater Final EA* evaluated alternatives similar to Alternatives 2, 3, and 4 in this TBI EA, in that some of the alternatives included shipping liquid MLLW over the Interstate highway system. In Appendix B to the *SRS DWPF Recycle Wastewater Final EA*, DOE prepared a conservative analysis of potential consequences of a severe transportation accident that assumed a release of liquid MLLW to the environment. The analysis that follows provides a representative assessment of the potential human health consequences associated with a severe transportation accident involving a single shipment of liquid MLLW as part of the proposed TBI Demonstration. The *SRS DWPF Recycle Wastewater Final EA* information used in this Appendix A is for transportation analysis reference only.

A.1 *Comparison of Potential Source Terms*

TBI Inventory

The Final WIR Evaluation (DOE 2023; Table 4-7) provides the estimated key radionuclide inventory (curies) in 2,000 gallons of waste tank SY-101 supernate after the supernate has been pretreated by in-tank settling, decanting, filtration, and IX in the ITPS. The total inventory of key radionuclides in the 2,000 gallons (after pretreatment) is approximately 1.8 curies. Table A-1 provides the estimated inventory of each of the six process totes, which represent about 0.3 curies per tote.[1] The A2 value is the radionuclide activity limit (per transportation package) from 10 CFR Part 71, Appendix A. There are specific A2 limits for each radionuclide. The right-hand column of Table A-1 provides the fraction of the A2 limit for each radionuclide contained in the process tote. This table assumes that the tote is at its maximum capacity (375 gallons). The sum of fractions at the bottom of the table indicates that the total loading of a process tote at maximum capacity would be about 10.7 percent of the allowable radionuclide loading for a USDOT Type A package. Note that the expected volume of each tote (333 gallons) is lower than the maximum capacity, meaning that the actual sum of fractions likely would be lower than that provided in the table.

[1] As specified in Section 2.1.1 of this EA, the process totes would be USDOT 7A Type A packages in accordance with 49 CFR 178.350.

Comparison of SRS DWPF Recycle Wastewater EA Inventory for Transportation Purposes

Table A-2 presents the estimated inventory of a single Type A package analyzed in the *SRS DWPF Recycle Wastewater Final EA* (DOE 2020, Appendix A). As a point of comparison, the analyzed volume of the Type A packages is 230 gallons. This is the inventory that was used in the analysis of potential consequences of a severe transportation accident. As indicated at the bottom of Table A-2, the sum of fractions for the SRS DWPF recycled wastewater was 72 percent of the allowable radionuclide loading for the proposed package. A summarization of the consequence analysis for the *DWPF Recycle Wastewater Final EA* is presented in Section A.2 below the tables.

Table A-1 Estimated Radionuclide Inventory of One Shipping Container Filled with 375 Gallons of TBI Demonstration MLLW in Liquid Form

Radionuclide	Ci	A2 (Ci)	Ci/A2
Hydrogen-3	7.82E-06	1.10E+03	7.11E-09
Carbon-14	6.52E-04	8.10E+01	8.05E-06
Cobalt-60	3.58E-03	1.10E+01	3.25E-04
Nickel-63	7.03E-04	8.10E+02	8.68E-07
Strontium-90	9.17E-03	8.10E+00	1.13E-03
Technetium-99	3.28E-02	2.40E+01	1.37E-03
Iodine-129	1.93E-05	0.00E+00	0
Cesium-137	2.50E-01	1.60E+01	1.56E-02
Neptunium-237	1.19E-06	5.40E-02	2.20E-05
Plutonium-238	7.23E-06	2.70E-02	2.68E-04
Plutonium-239/240	7.67E-05	2.70E-02	2.84E-03
Plutonium-241	9.38E-05	1.60E+00	5.86E-05
Plutonium-242	3.23E-06	2.70E-02	1.20E-04
Americium-241	2.17E-03	2.70E-02	8.04E-02
Americium-243	1.26E-04	2.70E-02	4.67E-03
Curium-242	3.08E-08	2.70E-01	1.14E-07
Curium-243/244	1.00E-07	2.70E-02	3.70E-06
Sum of Fractions			**0.107**

Sources: DOE 2023, Table 4-7; 10 CFR Part 71, Appendix A

Table A-2 Estimated Radionuclide Inventory of One Shipping Container Filled with 230 Gallons of DWPF Recycle Wastewater in Liquid Form

Radionuclide	Activity (Curies)	A2 (Ci)	Ci/A2
Americium-241	5.61E-06	2.70E-02	2.08E-04
Americium-242M	4.24E-08	2.70E-02	1.57E-06
Americium-243	1.22E-06	2.70E-02	4.52E-05
Carbon-14	6.31E-05	8.10E+01	7.79E-07
Curium-242	7.77E-07	2.70E-01	2.88E-06
Curium-243	3.55E-06	2.70E-02	1.31E-04
Curium-244	5.26E-05	5.40E-02	9.74E-04
Curium-245	2.90E-06	2.40E-02	1.21E-04
Curium-247	3.58E-06	2.70E-02	1.33E-04
Curium-248	4.75E-06	8.10E-03	5.86E-04

Radionuclide	Activity (Curies)	A2 (Ci)	Ci/A2
Cesium-137	1.14E+01	1.60E+01	7.13E-01
Iodine-129	9.53E-07	0.00E+00	0
Niobium-94	6.35E-07	1.90E+01	3.34E-08
Nickel 59	2.64E-05	0.00E+00	0
Nickel 63	3.01E-05	8.10E+02	3.72E-08
Neptunium-237	6.87E-06	5.40E-02	1.27E-04
Plutonium-238	4.75E-05	2.70E-02	1.76E-03
Plutonium-239	3.66E-05	2.70E-02	1.36E-03
Plutonium-240	3.66E-05	2.70E-02	1.36E-03
Plutonium-241	6.75E-05	1.60E+00	4.22E-05
Plutonium-242	3.72E-05	2.70E-02	1.38E-03
Plutonium-244	1.73E-07	2.70E-02	6.41E-06
Strontium-90	9.61E-03	8.10E+00	1.19E-03
Technetium-99	2.66E-03	2.40E+01	1.11E-04
Uranium-233	9.40E-05	1.60E-01	5.88E-04
Uranium-234	6.08E-05	1.60E-01	3.80E-04
Uranium-235	6.51E-08	0.00E+00	0
Uranium-236	6.31E-07	1.60E-01	3.95E-06
Uranium-238	1.46E-06	0.00E+00	0
Sum of Fractions			**0.722**

Sources: DOE 2020, Appendix B; 10 CFR Part 71, Appendix A

A.2 *Summarization of Impacts Analysis of SRS DWPF Recycle Wastewater for Comparison Purposes*

In the *SRS DWPF Recycle Wastewater Final EA* (DOE 2020, Appendix B), DOE performed a conservative analysis to estimate the potential impacts from the release of the liquid DWPF recycle wastewater to the atmosphere (exposure to downwind receptors) should a worst-case-type accident occur during transport. The severe accident considered in the consequence assessment was characterized by extreme mechanical (impact) and thermal (fire) forces. The accident represented any low-probability, high-consequence events that could lead to the release of the entire liquid cargo of one package to the environment. Therefore, accidents of this severity are expected to be extremely rare. However, the overall probability that such an accident could occur depends on the potential accident rates for such a severe accident and the shipping distance for each case.

Important for the purposes of risk assessment are the fraction of the released material that can be entrained in an aerosol (part of an airborne contaminant plume) and the fraction of the aerosolized material that is also respirable (of a size that can be inhaled into the lungs). These fractions depend on the physical form of the material. Compared to solid materials, liquid materials are relatively easy to release if the container is breached in an accident. Once released, the liquid waste could become aerosolized and dispersed downwind. Generally, aerosolized liquids are readily respirable (i.e., the respirable fraction is equal to one).

Because predicting the exact location of a severe transportation-related accident is impossible when estimating population impacts, separate accident consequences are calculated for accidents occurring in three population density zones: rural, suburban, and urban. Moreover, to address the

effects of the atmospheric conditions existing at the time of an accident, two atmospheric conditions were considered: neutral and stable.[2]

RISKIND (Yuan et al. 1995) is a model used to calculate the accident consequences for local populations and for the highest-exposed individual. The population dose includes the population within 50 miles of the accident site. The analysis considered the following exposure pathways:

- External exposure to the passing radioactive cloud (plume),
- External exposure to contaminated ground,
- Internal exposure from inhalation of airborne contaminants, and
- Internal exposure from the ingestion of contaminated food (rural zone only).

Although remedial activities after the accident (e.g., evacuation or ground cleanup) would reduce the consequences, these activities were not considered in the consequence assessment with one exception. In a rural zone, crops contaminated immediately after an accident were assumed to be removed and not considered for ingestion. However, no remediation measures were assumed for subsequent growing seasons in the long term.

The highest-exposed individual for severe transportation accidents would be located at the point that would have the highest concentration of hazardous material that would be accessible to the general public. This location was assumed to be 100 feet or farther from the release point at the location of highest air concentration. For purposes of the analysis, the location of the highest-exposed individual was estimated to be at a downwind distance of approximately 500 feet for neutral-weather conditions and approximately 1,000 feet for stable weather conditions.

The accident consequence assessment assumed that the entire contents of the Type A package would be released and aerosolized. For perspective, the release of a Type A container's entire contents could potentially occur approximately 0.4 percent of the time, given that a truck accident does occur, with about a 10-percent release of its contents estimated 1.6 percent of the time (NRC 1977). The aerosolized fraction of the released liquid contents under severe accident conditions could range from about 0.0001 to 0.1 (NRC 1998), depending on potential over-pressurization and/or explosive and thermal stresses that might result.

Table A-2 (above) lists the estimated radionuclide inventory released (assuming release of the full contents of the package); Table A-3 lists the resultant population doses over the short and long term under neutral and stable weather conditions for generic rural, suburban, and urban population zones. Table A-3 also provides a conservative estimate of the potential resultant LCFs that were presented in the *SRS DWPF Recycle Wastewater Final EA* (DOE 2020, Appendix B). The highest potential doses for an individual under neutral and stable weather conditions were estimated at 45 and 143 mrem, respectively. The associated chances of contracting a fatal cancer in that maximally exposed individual's lifetime is approximately 0.00003 and 0.00009. The

[2] Neutral-weather conditions constitute the most frequently occurring atmospheric stability condition in the United States. These conditions are represented by Pasquill stability Class D, with a wind speed of nine miles per hour in the air dispersion model used in this consequence assessment. Observations at National Weather Service surface meteorology stations at more than 300 U.S. locations indicate that on a yearly average, neutral conditions (Pasquill Classes C and D) occur about half (50%) of the time, stable conditions (Pasquill Classes E and F) occur about one-third (33%) of the time, and unstable conditions (Pasquill Classes A and B) occur about one-sixth (17%) of the time (Doty et al. 1976).

analysis in the *SRS DWPF Recycle Wastewater Final EA* conservatively assumed 100 percent of the release is aerosolized.

Table A-3 Potential Radiological Consequences to the Population from a Severe Transportation Accident Involving DWPF Recycle Wastewater[a]

Location	Neutral-Weather Conditions[b]		Stable Weather Conditions[b]	
	Short-Term[c]	Long-Term[c]	Short-Term	Long-term
Population Dose (person-rem)				
Rural	0.0534	592	0.0931	1,030
Suburban	6.40	1,360	11.2	2,360
Urban[d]	14.2	3,020	24.8	5,260
Dose Risk (LCF)[e]				
Rural	0.000032	0.36	0.000056	0.62
Suburban	0.0038	0.85	0.0067	1.4
Urban	0.0085	1.8	0.015	3.2

LCF = latent cancer fatality; km^2 = square kilometers.

a. National average population densities were used for the accident consequence assessment, corresponding to densities of 6 persons/km^2, 719 persons/km^2, and 1,600 persons/km^2 for rural, suburban, and urban zones, respectively. Potential impacts were estimated for the population within a 50-mile radius, assuming a uniform population density for each zone.

b. For the accident consequence assessment, doses were assessed under neutral atmospheric conditions (Pasquill Class D with winds at 9 miles per hour) and under stable conditions (Pasquill Class F with winds at 2.2 miles per hour). The results for neutral conditions represent the most likely consequences, given a severe accident occurs. The results for stable conditions represent weather in which the least amount of dilution is evident; the air has the highest concentrations of radioactive material, which leads to the highest doses.

c. Short-term consequences are from exposure within the first 2 hours of an accident, including plume passage. Long-term consequences are from exposure over a 50-year period following an accident without consideration for decontamination or cleanup efforts.

d. It is important to note that the urban population density generally applies to a relatively small, urbanized area; very few, if any, urban areas have a population density as high as 1,600 persons/km^2 extending as far as 50 miles (DOE 2002; Weiner et al. 2006). The urban population density corresponds to approximately 32 million people within the 50-mile radius—well in excess of the total populations along most of the routes considered in the assessment.

e. LCFs were calculated by multiplying the dose by the health risk conversion factor of 0.0006 fatal cancer per person-rem (ISCORS 2002).

In addition to identifying the radiological consequences of the hypothetical event, the *SRS DWPF Recycle Wastewater Final EA* identified the radiological risk by multiplying the potential consequences by the probability of a severe accident during the transportation campaign. Those probabilities were dependent on the number of shipments in the campaign and the distances involved. This TBI Demonstration EA applies the same technical approach in Section A.3.

A.3 *Scaling of Potential Consequences to the TBI Demonstration*

As shown in Tables A-1 and A-2, the ratios of radionuclide content of each Type A container and the A2 radionuclide activity limits from 10 CFR Part 71, Appendix A, are summarized as the sum of fractions. The A2 values provide a relative measure of the potential health impact of a transportation accident; the higher the health risk of a particular radionuclide, the lower the A2 radionuclide activity limit. As such, the estimated radiological health impacts of a severe transportation accident involving liquid MLLW from the TBI Demonstration can be estimated by scaling the RISKIND results from the *SRS DWPF Recycle Wastewater Final EA* (DOE 2020, Appendix A) by the ratio of the sum of fractions of Tables A-1 and A-2. The calculation is obtained by applying the following equation:

$$\mathbf{Conseq_{TBI} = Conseq_{DWPF} \times SOF_{TBI} \div SOF_{DWPF}}$$

Where:

- $Conseq_{TBI}$ represents the calculated consequences in Table A-4 for a severe accident for a variety of population densities and meteorological conditions;
- $Conseq_{DWPF}$ represents the estimated consequences (in person-rem) from Table A-3 for a variety of population densities and meteorological conditions;
- SOF_{TBI} represents the sum of fractions of the TBI liquid MLLW from Table A-1 (0.107); and
- SOF_{DWPF} represents the sum of fractions of the DWPF recycle wastewater from Table A-2 (0.722).

Applying the appropriate information to this equation yields potential radiological consequences, as shown in Table A-4. In addition, Table A-5 includes an assessment of radiological risk, which is obtained by multiplying the radiological consequence by the probability of an accident during the single shipment of liquid MLLW to a treatment facility.

Table A-4 Potential Radiological Consequences to the Population from a Severe Transportation Accident Involving TBI MLLW in Liquid Form[a]

Location	Neutral-Weather Conditions[b]		Stable Weather Conditions[b]	
	Short-Term[c]	Long-Term[c]	Short-Term	Long-term
Population Dose (person-rem)				
Rural	0.0079	87.7	0.014	152.6
Suburban	0.949	201.6	1.66	349.8
Urban[d]	2.10	448	3.68	779.5
Dose Risk (LCF)[e]				
Rural	4.75E-06	5.26E-02	8.28E-06	9.16E-02
Suburban	5.69E-04	1.21E-01	9.96E-04	2.10E-01
Urban	1.26E-03	2.69E-01	2.21E-03	4.68E-01

LCF = latent cancer fatality; km^2 = square kilometers.

a. National average population densities were used for the accident consequence assessment, corresponding to densities of 6 persons/km^2, 719 persons/km^2, and 1,600 persons/km^2 for rural, suburban, and urban zones, respectively. Potential impacts were estimated for the population within a 50-mile radius, assuming a uniform population density for each zone.

b. For the accident consequence assessment, doses were assessed under neutral atmospheric conditions (Pasquill Class D with winds at 9 miles per hour) and under stable conditions (Pasquill Class F with winds at 2.2 miles per hour). The results for neutral conditions represent the most likely consequences, given a severe accident occurs. The results for stable conditions represent weather in which the least amount of dilution is evident; the air has the highest concentrations of radioactive material, which leads to the highest doses.

c. Short-term consequences are from exposure within the first 2 hours of an accident, including plume passage. Long-term consequences are from exposure over a 50-year period following an accident without consideration for decontamination or cleanup efforts.

d. It is important to note that the urban population density generally applies to a relatively small, urbanized area; very few, if any, urban areas have a population density as high as 1,600 persons/km^2 extending as far as 50 miles (DOE 2002; Weiner et al. 2006). The urban population density corresponds to approximately 32 million people within the 50-mile radius—well in excess of the total populations along most of the routes considered in the assessment.

e. LCFs were calculated by multiplying the dose by the health risk conversion factor of 0.0006 fatal cancer per person-rem (ISCORS 2002).

Table A-5 Radiological Risk to the Population from a Severe Transportation Accident Involving TBI MLLW in Liquid Form[a]

	Population Dose	Consequence[b]	Probability[c]	Risk[d]
Alternative 1[e]	349.8 person-rem	2.10E-01 LCF	3.73E-08	7.83E-09 LCF
Alternative 2	779.5 person-rem	4.68E-01 LCF	3.52E-06	1.65E-06 LCF
Alternative 3	779.5 person-rem	4.68E-01 LCF	2.58E-06	1.21E-06 LCF
Alternative 4	779.5 person-rem	4.68E-01 LCF	9.32E-07	4.36E-07 LCF

LCF = latent cancer fatality.

a. For purposes of analysis, the dose, long-term consequence, probability, and risk values are based on the conservative assumption that all travel from the Hanford Site to the commercial treatment and/or disposal facility is through an urban environment under stable weather conditions.
b. LCF value based on Table A-4, "Stable Weather Conditions, Long-term Urban" cell.
c. Calculated by multiplying the probability that a crash would occur during transport—as reported in Section 3.7.2—by the probability of 0.4 percent (NRC 1977) that the entire contents of a Type A container would be released during the truck accident.
d. Risk equals consequence times probability.
e. There are no urban areas between the 200 West Area and the PFNW facility; therefore, the analysis conservatively uses the suburban population density for Alternative 1.

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APPENDIX B:
COMMENT RESPONSE DOCUMENT

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Appendix B: Comment Response Document

B.1 *Introduction*

Draft EA Public Comment Period

In compliance with DOE's NEPA implementing procedures (10 CFR 1021.301(d)), DOE sent the draft EA to host states and host tribes of the Proposed Action. DOE also sent the draft EA to states and tribes that could be affected by the Proposed Action. On August 17, 2021, DOE notified these parties of the availability of the draft EA for review and comment to evaluate DOE's Proposed Action to implement the TBI Demonstration. Specifically, DOE requested input on the completeness and factual accuracy of its analysis. DOE also requested the parties to provide any additional information that should be considered for inclusion in the final EA.

Also, in accordance with 10 CFR 1021.301(d), DOE established a 14-day comment period for host states and host tribes, which ran from August 21 to September 3, 2021, and also invited comment from the other notified parties. This appendix contains reproduced comment documents (i.e., letters and e-mails) received during this period and DOE's response to each delineated comment within each document. Any comment that resulted in a change to the draft EA provides the section number of the final EA with the modified/new text.

Comment Documents Received

In response to the letter to the states and tribes, DOE received eight unique comment documents from state, tribal, and special interest organizations, and two campaign letters (both containing comments similar to one or more of the eight unique comment documents) from more than 100 members of the public. Table B-1 lists the commenters and their affiliation, as applicable.

Table B-1 List of Commentors

Comment Document No.	Commentor
1	Gary Petersen, Northwest Energy Associates
2	Phil Rigdon, Yakama Nation
3	Bryan Davidson, Tennessee Department of Environmental Conservation
4	Maxwell Woods, Oregon Department of Energy
5	Gerry Pollet, Heart of America
6	Tom Carpenter, Hanford Challenge
7	David Bowen, Washington Department of Ecology
8	Anonymous
Campaign 1 (CL1)	Glen Andersen
	David Asia
	Susan Baker
	Merna Baker Blagg
	Derek Benedict
	Richard Bergner
	Bonnie Bledsoe
	Matthew Boguske
	Tika Bordelon
	Brian Brendel
	Jennifer Brown

Comment Document No.	Commentor
	Terri Brown
	Christopher Buckley
	Sherry Bupp
	Beth Call
	Jan Castle
	Lisa Ceazan
	Barry Chapman
	Cathryn Chudy
	Chris DeBruler
	Sharon Fasnacht
	Steven Fine
	Kevin Gallagher
	Marcy Gibbons
	Becky Glass
	Bob Goodwin
	Judith Green
	David Hall
	Sue Hartford
	Sylvia Haven
	Zann Jacobrown
	Lee and Steve LaCroix
	Todd Lagestee
	Tom Lux
	Susie MacGregor
	Tina McKim
	Betty McNiel
	Jeanne Mendoza
	Bonnie Miller
	Joseph Miller
	Nancy Morris
	Alan Ness
	Jessie Norris
	Ranell Nystrom
	Patricia Perron
	Susan Pitiger
	Jeanne Poirier
	Randall Potts
	William Rahe
	Virginia Ramey
	Gretchen Randolph
	Dennis Raymond
	Linda Marie Richards
	John Samaras
	Patricia Scott
	The Reverend Theresa Schmoker
	Dean Sigler
	Elaine Smith
	Ruchi Stair

Comment Document No.	Commentor
	Alice Swan
	Arun Toke
	McClure Tosch
	Carolyn Treadway
	Jordan Van Voast
	Laurie Van Scotter
	Elyette Weinstein
	Steve White
	Vaugh Zeitzwolf
Campaign 2 (CL2)	Glenna Cole Allee
	Antoinette Bonsignore
	Larry Brandt
	Miya Burke
	Kathleen Cain
	Tom Carpenter
	Chris Casarez
	Julianne Clark
	De la Torre III
	Randal Dick
	Diane Driscoll
	Richard Eatherly
	Laura Feldman
	Daniel Fievez
	Teresa Flaiz
	Joyce Follingstad
	Maradel Gale
	Steven Gary
	Laura Gerber
	Steven Gilbert
	Susan Gordon
	Pamela Howard
	Pia Jensen
	Yukiyo Kawano
	Dave King
	John Kriese
	Nathaie Kuroiwa-Lewis
	Craig McGlinchey
	Deanne Meek
	Katy Morrow
	Patricia Morton
	Judy Pigott
	Jeanne Poirier
	Matt Smith
	Albert Snow
	Patricia Townsend
	Randolph Urmston
	Victoria Vreeland
	Barbara Warren

Comment Response Process

DOE reviewed all comment documents received and delineated specific comments within the documents. Subject matter experts reviewed each comment and provided a written response for inclusion in this appendix and/or to modify text of this EA.

In parallel with the preparation of this final EA, DOE provided the opportunity for comments from states, tribal nations, stakeholders, and the public on its Draft WIR Evaluation. The 90-day comment period on the Draft WIR Evaluation ran from November 5, 2021, to February 2, 2022, and included a virtual public hearing on November 18, 2021 (86 FR 61200; November 5, 2021).

B.2 *Comments and DOE Responses*

The following pages contain reproduced comments from the eight unique comment documents and the two campaign letters and the associated DOE responses to each of the delineated comments. The comment documents (not including the campaign e-mails) are numbered as provided in Table B-1, and then sequentially to delineate each comment within a comment document. The comment documents were generally numbered in the order in which they were received by DOE.

Northwest Energy Associates

Comment 1-1:

The TBI Demonstration project should be expedited to the maximum extent possible by the DOE and Washington State Department of Ecology. Funding is in place, demonstration equipment has been fabricated and tested, and local elected officials, regional congressional members, and stakeholder support for the demonstration is strong. DOE and Ecology have procrastinated in their efforts relative to this demonstration project and we implore that you work together to resolve your differences and move forward expeditiously to validate if commercial treatment and out-of-state disposal of mixed low-level waste (MLLW) from Hanford tanks is a viable alternative to on-site waste treatment and disposal. It is vital that DOE and Ecology determine if the demonstration project can lead to a more effective cleanup approach that lowers environmental risk and financial liability. We support a safe, accelerated cleanup at Hanford and this demonstration project could pave the way for achieving that objective relative to the Hanford tank waste mission.

Response:

DOE acknowledges the comment.

Comment 1-2:

We strongly support Alternative 1 as described in the EA for the initial 2,000-gallon demonstration. This EA alternative takes advantage of existing and permitted commercial facilities here in the Tri Cities for treatment and the use of existing and permitted out-of-state MLLW disposal facilities. This alternative was demonstrated by the EA not to significantly affect the quality of the human environment and would be safe for the workers and the public. It eliminates the need for additional capital expenditures, facilitates expeditious permitting and

utilizes the government and commercially trained and skilled work forces here in the Tri-Cities. We recommend that MLLW quantities greater than 2,000 gallons be commercially treated and stabilized before it is transported to an out-of-state disposal facility. The transport of significant volumes of MLLW liquids, although legal and permissible, results in a slightly higher risk to the environment.

Response:

As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Comment 1-3:

The commercial treatment and out-of-state disposal of MLLW from Hanford tanks has the potential to be a transformational approach to reducing the cost and accelerating the cleanup pace at Hanford. We encourage the DOE and Ecology to include this approach in their Holistic negotiations as a prime consideration for accelerating Hanford cleanup. To prepare, DOE should move expeditiously to ensure adequate systems, components, permits, and other provisions are established now to use the more simplified off-site commercial treatment and out-of-state disposal of MLLW as a supplemental alternative to vitrification for both the West and East area tank farms. These actions should include the following, as a minimum:

A. Installing a truck load-out station at AP-farm to transport MLLW resulting from the Tank-Side Cesium Removal (TSCR) pretreatment system to off-site commercial treatment and out-of-state disposal facilities

B. Installing a TSCR and tanker load-out station at SY-farm in the West Area

C. Considering construction of an on-site, dedicated haul road between the tank farm area to the southern boundary of the Hanford Site to reduce potential public exposure even further.

Response:

DOE acknowledges the comment and support for the Proposed Action and will continue to work closely with Ecology to facilitate cleanup of the Hanford Site. The recommended actions are outside of the scope of this EA.

Confederated Tribes and Bands of the Yakama Nation

Comment 2-1:

While the draft EA does a pretty thorough job detailing the process that will occur for the retrieval of the waste from the tank it does not describe the timeline to accomplish any of the work. This needs to be clarified in order for the reviewer to understand the proposed process better. In addition, the EA does not specify if all six totes of waste are to be shipped at one time or in phases, please clarify.

Response:

The TBI Demonstration is proposed to begin in 2023. This would depend on permitting approval by Ecology. The proposed schedule is discussed in Section 3.8.1.1, which states, "The activities associated with the proposed TBI Demonstration would take place over a period of a few weeks and are assumed to occur in 2023." Section 2.1.1 of this EA explains that the onsite operations are expected to last approximately nine days. As stated in Section 3.6.2.1, drying of the IX column would take three to four weeks during the end of the campaign.

As specified in Section 2.1.1, the process totes would be transported to the permitted, licensed, commercial treatment facility in a single shipment.

Comment 2-2:

The EA does not provide enough information to differentiate the potential impacts of the alternatives. Currently each treatment and disposal facility is treated as a black box that will accomplish the stated goals of the test bed initiative (TBI). This has made the only determining factor the amount of miles of road that is needed to transport the waste for treatment and then amount of miles of road that is needed to transport the stabilized waste to a disposal facility. While this is an important aspect more detail should be given in these areas:

a. *Treatment facility unloading, treatment, and shipment for disposal details*: There will be logistics differences for each alternative of the unloading, treatment, and ultimate shipment of stabilized waste to a disposal facility. Those processes and timelines that are unique to each alternative have potential risks and environmental impacts associated with them. The details on the timeline, logistics, and potential risks needed to be presented in the EA for each facility.

Response:

The logistics at the treatment and disposal facilities are dictated by their state licenses and permits. The state regulatory authorities have evaluated the processes associated with the unloading, treatment, and/or disposal of MLLW at these facilities. As identified in Section 1.4 of this EA, DOE would ensure that the waste meets the requirements of the facility before initiating the shipment. If the waste meets the requirements of the facility (e.g., waste acceptance criteria, treatment standards, volumes, etc.), there would be no additional impacts at the facility beyond those already approved as part of the licensing and permitting process.

As stated in response to Comment 2-1, DOE proposes to implement the TBI Demonstration in 2023.

Comment 2-3:

b. *Regulatory framework for each facility:* Currently there is no detail described for each facility that will treat and/or dispose of the waste. This is an important detail because if permit modifications will be required or changes to the implementation of the waste retrieval and shipment are needed to meet permit requirement those can cause potential environmental impacts. The Yakama Nation did a review of the Perma-Fix

Northwest Washington Department of Health Mixed Waste Permit and noted some potential items for consideration regard the total weight on the waste to shipped, amount of curies assumed to be in each tote, and impacts to normal operations. In addition, there is an overlay with Ecology's RCRA permit that needs to be considered. We did not have time to review the permits for the other facilities, but the EA should present that analysis.

Response:

The regulatory framework for the treatment and disposal facilities is dictated by their state licenses and permits. The state regulatory authorities have established requirements for operations at these facilities. As identified in Section 1.4 of this EA, DOE would ensure that the waste meets all of the requirements of the facility before initiating the shipment. If the waste meets the requirements of the facility (e.g., waste acceptance criteria, treatment standards, volumes), there would be no additional impacts at the facility beyond those already approved as part of the licensing and permitting process. As identified in Section 2.1.1, DOE has compared the projected radionuclide and chemical constituents of the TBI waste stream against the PFNW waste acceptance criteria and determined preliminarily that the current permit would allow the treatment and stabilization of the 2,000 gallons of pretreated MLLW.

Comment 2-4:

c. *Non-radiological constituents*: The EA cites the *Final Analytical Report for Tank 241-SY-101 TBI Grab Sampling 2018* document as the source of information on the assumed chemical make-up of the waste. This document is not available for download in the administrative record and is important for the reviewer to have to assess the risks and regulatory processes required for the non-radiological constituents. The document should be made available or even attached to the EA.

Response:

The cited reference document is included in the Administrative Record for this TBI EA and can be found at: https://www.hanford.gov/page.cfm/TestBedInitiative. DOE also made this reference publicly available during the public review of the Draft WIR Evaluation, which started on November 5, 2021.

Comment 2-5:

YN is in the process of completing a complete site TCP study. The effects of this project will need to be determined on known resources and once this work is completed. Transportation routes, potential for accidents, loading and unloading and timelines can all have impacts to cultural resources and should be considered. Permit modifications may need to also consider cultural resource impacts.

Response:

DOE acknowledges the Yakama Nation’s ongoing efforts to complete a site study of traditional cultural properties. This EA uses best available information to determine potential impacts.

Considering that implementation of the Proposed Action would not involve any land disturbance on the site and only one shipment from the site to a permitted commercial treatment and/or disposal facility, impacts to cultural resources are extremely unlikely.

Tennessee Department of Environment and Conservation (TDEC)

Comment 3-1:

Air Resources: The narrative mentions the need to comply with the radioactive material license and hazardous waste management permit issued by the State of Tennessee but fails to discuss the Perma-Fix DSSI Facility's Clean Air Act Part 70 Operating Permit and the need to comply with it (https://dataviewers.tdec.tn.gov/pls/enf_reports/f?p=19031:34051::::34051:P34051_PERMIT_ID:68010). DSSI will be responsible for complying with all terms of their Part 70 Operating Permit, as well as obtaining any Air Quality Construction Permit and Part 70 Permit Modifications necessary to comply with the Tennessee Air Quality Act, the Tennessee Air Pollution Control Regulations, and any applicable federal air requirements if Alternative 2 is chosen. TDEC encourages DOE to incorporate these considerations into the Final EA.

Response:

Section 3.3.2.2 of this EA has been revised to incorporate these requirements.

Comment 3-2:

There are safety issues regarding transportation of hazardous and radioactive material across Tennessee roadways for both incoming shipments to DSSI and outgoing shipments to either WCS in Texas or Energy Solutions in Utah for final disposal. Given the magnitude of transportation necessary to treat the waste in Tennessee, the most efficient alternatives would be those that utilize treatment and disposal locations that are in closer proximity to Hanford. TDEC encourages DOE to factor these considerations into selection of alternative

Response:

DOE understands that transportation impacts increase in proportion to the distance traveled and will factor these considerations into the selection of an implementing alternative.

Comment 3-3:

TDEC recommends that as the draft EA is finalized, the Final EA explicitly update and reflect that the appropriate permitting and capacity arrangements commensurate with the recommending action have been made and reviewed to sufficiently accommodate the proposed action.

Response:

This EA is only one of several regulatory documents that must be completed prior to implementation of the Proposed Action and, as such, it includes the best available information to support its evaluation of potential environmental impacts. DOE would follow its internal

procedures and contractual requirements to ensure that the radiological and/or hazardous waste would be verified to meet the waste acceptance criteria of the receiving facility prior to initiation of the shipment.

Oregon Department of Energy (ODOE)

Comment 4-1:

NEPA vs DOE Order 435.1 comment response requirements. The EA states that a separate public process will be followed for the Waste Incidental to Reprocessing evaluation associated with the TBI project, and that this process will include a comment opportunity for all stakeholders and the general public. Please provide additional information for this public involvement process, including the planned duration of the comment period and whether there will be any public informational meetings associated with the WIR evaluation. Public stakeholders are likely to be understandably concerned by the lack of a review and comment opportunity on this EA, and this in turn risks undermining public trust in DOE. Documenting additional information and commitments in the NEPA documentation may help to mitigate this risk.

Response:

DOE complied with the DOE NEPA implementing procedures for this EA (10 CFR 1021.301) by providing the host states and host tribes the opportunity to review the draft EA, and also provided this opportunity to potentially affected states and tribes. In response to this review, DOE received 118 comment documents from states, tribes, organizations, and individuals. Responses to these comments are addressed in this comment response appendix.

In parallel with the preparation of this final EA, DOE provided the opportunity for comments from states, tribal nations, stakeholders, and the public on its Draft WIR Evaluation. The 90-day comment period on the Draft WIR Evaluation ran from November 5, 2021, to February 2, 2022, and included a virtual public hearing on November 18, 2021 (86 FR 61200; November 5, 2021).

Comment 4-2:

What the proposed action fails to consider is, to us, one of the greatest risks - that in testing the legal and technical aspects of the Test Bed Initiative, DOE fails to convince its regulators, its stakeholders, and the public that it has performed a sufficient amount of treatment to turn high-level waste into low-level waste. The purpose and need of this action hinges on the hope that technetium-99 and iodine-129, the two key long-lived mobile radionuclides in Tank SY-101, must either not be present in the liquid, which our review of the Best Basis Inventory for that tank would suggest is unlikely, or be deemed impractical or unnecessary to remove. Assuming then that these key radionuclides will be present in the liquid extracted from the tank, the proposed action must then rely on a hope that the WIR process determines that they were removed to the maximum extent practical despite no action being taken or seemingly considered to remove them. Finally, this action relies on an assumption that the waste will be able to go to an off-site landfill that has high enough limits for those two radionuclides in its Waste Acceptance Criteria. If this “Test Bed” fails, or if stakeholders successfully argue that DOE has not appropriately classified this waste as non-HLW suitable for a shallow land disposal facility,

what effect has occurred as a result of the proposed action? Will the solidified tank waste be destined for a deep geologic repository that does not yet exist and may not accept a grouted waste form? Will it be left at Hanford as another orphan waste? The EA should consider these risks, evaluate their potential effects under NEPA, and perform such mitigating measures as are necessary to minimize the potential effects.

Response:

DOE prepared a Final WIR Evaluation in accordance with DOE Manual 435.1-1, *Radioactive Waste Management Manual*. The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW. DOE prepared the Final WIR Evaluation after consulting with the NRC and after considering comments from the NRC, stakeholders, states, tribal nations, and the public. Based on the Final WIR Evaluation, DOE may issue a WIR Determination.

With regard to the contributions of iodine-129 and technetium-99, Appendix A, Table A-1, of this EA provides the estimated inventory of each of these long-lived radionuclides in the 2,000 gallons associated with the Proposed Action. Based on a review of the waste acceptance criteria for WCS and Energy*Solutions*, DOE has a high degree of confidence that the stabilized waste form will meet the requirements for disposal as MLLW at both of these facilities. As such, DOE does not expect to generate an orphan waste or a waste that would require geologic disposal.

Comment 4-3:

The Purpose and Need section of the EA does not adequately explain why an in-tank pretreatment system form factor is the preferred method for the "front end" of the TBI Phase 2 demonstration. Please explain why other reasonable alternatives were not considered for providing pretreated liquid feed for grout treatment, such as the existing Tank Side Cesium Removal system. Are there trade-offs from a worker risk, cost, or waste management standpoint associated with the use of a novel in-tank system instead of a pre-existing TSCR system that has the capacity and capability to provide 2,000 gallons of feed for offsite treatment?

- Relevant reference from the DOE Citizen's Guide to NEPA: "The purpose and need statement explains to the reader why an agency action is necessary, and serves as the basis for identifying the reasonable alternatives that meet the purpose and need. . . The identification and evaluation of alternative ways of meeting the purpose and need of the proposed action is the heart of the NEPA analysis. The lead agency or agencies must, 'objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.'" (https://ceq.doe.gov/docs/get-involved/Citizens_Guide_Dec07.pdf)

Response:

The use of ITPS for the "front end" of the TBI Demonstration was identified in DOE's TBI Demonstration permit application submitted to Ecology in 2019 for a research, development, and demonstration permit. As part of the demonstration, a novel approach to pretreat the tank waste would be explored through the use of the ITPS. Safety and worker protection aspects may be

provided by the ITPS. The scope of the ITPS also allows for greater flexibility when incorporating within the engineering and nuclear safety programs of the Hanford tank farms. The ITPS is designed to handle smaller quantities of liquids. The tank-side cesium removal system, which is an element of the DFLAW approach for waste management, is designed to handle much larger volumes (i.e., greater than 7,000 gallons per day).

Comment 4-4:

Please provide greater specificity regarding the expected source term in the Tank SY-101 extracted liquid, including expected concentrations of all radionuclides and non-radiological hazardous constituents. What fraction of the estimated 1.8 curies remaining in the pretreated will be long-lived, mobile radionuclides? The presence of certain constituents would affect the environmental analysis in myriad ways, as discussed below.

Response:

Appendix A, Table A-1, of this EA provides the estimated radionuclide inventory of the liquid in each of the six process totes. Table 4-7 of the Final WIR Evaluation presents the radioactivity (in curies) of key radionuclides present in 2,000 gallons of supernate based on sample data published in *Final Analytical Report for Tank 241-SY-101 TBI Grab Sampling 2018* (RPP-RPT-61303). Key radionuclides are those radionuclides that, using a risk-informed approach, could contribute significantly to radiological risk to workers or members of the public. Of the 1.8 curies that comprise the key radionuclides, cesium-137, with a relatively short half-life of 30 years, is estimated to be 1.5 curies, which is approximately 83 percent of the total curies. The combined long-lived, mobile radionuclides technetium-99 and iodine-129 are estimated to be 0.2 curie, which is approximately 11 percent of the total curies. The estimated hazardous constituents in the tank SY-101 extracted liquids (supernate) are also based on the same grab sample report. As described in Sections 2.1 and 3.5.2 of this EA, the primary hazardous constituents in the pretreated waste include organics (benzyl butyl phthalate and bis(2-ethylhexyl) phthalate) and heavy metals (chromium and selenium). The potential health effects of these constituents were considered in Section 3.5.2. From a long-term perspective, as identified in Section 2.1.1, the waste would be treated to ensure compliance with RCRA LDRs and the waste acceptance criteria of the permitted and licensed disposal facility.

Comment 4-5:

Please specify how much flush water is expected to be added to Tank SY-101 during the Proposed Action. Please also describe how the Proposed Action would or would not affect the amount of space available in this tank.

Response:

Flush water would only be added to the tank during flushing of the filter and IX column, and the volume added would not notably contribute to the liquid volume of the tank or substantively affect the amount of space available in the tank.

Comment 4-6:

Please explain in greater detail how potential organic and non-radionuclide hazardous constituents in the extracted tank waste would be treated prior to disposal. Page 2-3 of the EA states in reference to the 2,000 gallons of tank liquid, "There would also be hazardous constituents in the decontaminated solution such as heavy metals and organics." The only treatment specified is grouting for immobilization of radionuclides. No treatment method for organics is specified in any alternative, yet page 2-4 states, "Treatment and stabilization of the liquid MLLW using an in-container mixer [will] form a waste that meets the RCRA LDR requirements and waste acceptance criteria of the permitted disposal facility operated by either WCS or EnergySolutions." The recent National Academy of Sciences study on Hanford Supplemental Low Activity Waste has made it clear that treatment of organics is in many cases a necessary precursor to grouting in order to meet RCRA land disposal restrictions, especially if organics are to be expected as described in the EA. We are concerned that this represents an incomplete analysis in the EA and likely an incomplete description of the alternatives. It would also fail to meet the Purpose and Need for Agency Action to verify the attainment of Waste Acceptance Criteria for an offsite commercial disposal facility and to establish that all activities will protect human health and the environment.

Response:

The treatment of hazardous materials would be accomplished through application of the processes included in the treatment facility's permits. As referenced in Section 2.1 of this EA and in the Final WIR Evaluation, DOE has a grab sample report that provides the concentrations of hazardous and radiological constituents as of 2018 (RPP-RPT-61303), which shows the presence of heavy metals and organics. Heavy metals are known to be effectively treated through stabilization technology. Treatment of organics would be addressed to ensure LDR requirements are met. The complete list of hazardous constituents would be provided on the waste shipment manifest to the treatment facility. The treatment facility would then be responsible for ensuring that the stabilized waste form would meet the waste acceptance criteria for the disposal facility. As long as the waste is acceptable to be processed within the constraints of the treatment facility's relevant permits, no impacts would be expected beyond those already evaluated during the permitting process by the state regulatory agency.

Comment 4-7:

Appendix A of the EA presents a transportation risk evaluation that focuses exclusively on radiological constituents in the waste. Given that hazardous constituents are reportedly expected to be in the waste liquid, please revise the transportation effects analysis to reflect the actual waste form to be transported under each alternative scenario. This assessment should also include the potential human health and environmental risks associated with a liquid spill in the event of an accident and the subsequent cost of a remediation action

Response:

As reported in Appendix A, Table A-5, of this EA, the probability that a single truck shipment of liquid MLLW would be in a severe enough accident that it would result in a release of its

contents ranges from beyond extremely unlikely (3.73×10^{-8} or once in 27 million) to extremely unlikely (2.58×10^{-6} or once in about 388,000). The purpose of the radiological analytical comparison in Appendix A is to quantitatively demonstrate the very low potential radiological accident risk. As identified in Section 3.5.2.1 of this EA, the hazardous constituents would represent a negligible hazard to workers and the public at the site of the accident.

Comment 4-8:

Please provide additional evaluation of potential seasonal variability in transportation risk as it relates to the anticipated shipping schedule, such as winter weather, and how DOE will plan for transportation shipments. Please also provide information related to the proposed shipping routes and potential schedules, with an expectation that the routes and schedules will be shared with the appropriate state agencies responsible for transportation safety planning. As is well-known, the I-84 transportation corridor in northeast Oregon between Umatilla and Union Counties can be particularly dangerous in winter and the freeway is occasionally shutdown due to snow, ice, and dense fog. Oregon would prefer to see solidified waste, not liquid, transported through our state.

Response:

As mentioned in response to Comment 4-7, the probability of an accident that releases the contents of a Type A package is either extremely unlikely or beyond extremely unlikely, depending on the alternative. The calculated probability considers the historical frequency of large truck crashes, which account for all weather conditions. Therefore, DOE expects that if the transportation activities occurred during good weather conditions, the probability of a severe accident would be less than presented in this EA.

DOE expects that the TBI Demonstration could occur in 2023. DOE would consider weather conditions before finalizing plans for implementation of the ITPS and the transportation of the shipments to the permitted treatment facility and disposal facility. DOE would follow all applicable USDOT and DOE requirements, including any required notification to the applicable states prior to initiating the shipment.

DOE acknowledges the commenter's preference for Alternative 1.

Comment 4-9:

The EA does not specify a final disposition pathway for the ion exchange column to be used in the TBI Demonstration or the potential infrastructure and equipment that could be necessary to extract the highly radioactive spent ion exchange resin from its container for ultimate dispositioning. Please provide greater detail regarding the potential future effects of creating a single, uniquely contained waste form and how its management would be distinct from that for the ion exchange columns planned to be generated during operation of the TSCR system.

Response:

As stated in Section 3.6.2.1 of this EA and in the Final WIR Evaluation, DOE has not yet determined the disposition of the ITPS, including the IX column. Disposition of the aboveground equipment and the ITPS is expected to be bounded by, or represent a negligible increase of the

impacts analyzed in, the TC&WM EIS and the DFLAW Supplement Analysis. The DFLAW Supplement Analysis demonstrated that the potential storage of tank-side cesium removal IX columns on a pad in the 200 East Area would not constitute a significant change to the proposed action evaluated in the TC&WM EIS. Those columns, which could hold from 25,000 curies to 150,000 curies each, would be notably larger than the IX column that is proposed as part of the ITPS, which would be expected to contain approximately 150 curies of cesium-137. If the TBI Demonstration IX column ends up following the same disposition path as planned for the tank-side cesium removal columns, it eventually would be sent to the WTP for vitrification.

Comment 4-10:

Page 2-3 of the EA states, "The proposed TBI Demonstration would use non-elutable IX media that permanently bind the cesium to the IX media [emphasis added]." The assertion of permanence in this sentence is an unsupported statement. A similar statement is made on page 3-20. Please support, revise, or delete.

Response:

In both instances (Sections 2.1.1 and 3.6.2.1 in this EA), "permanently" has been deleted. In Section 2.1.1, the accompanying footnote has been modified to accurately reflect the definition of non-elutable as follows: "Non-elutable means that the radionuclides cannot easily be separated from the IX media and the media would not be reused."

Comment 4-11:

Page 2-3 appears to indicate that a single sample would be analyzed for all six totes of extracted liquid waste. What is the basis for selecting the number of samples to be representative of the waste stream, and how does this relate to the waste verification requirements of the receiving facilities? Please provide additional detail

Response:

DOE is planning to sample all six totes to confirm compliance with the waste acceptance criteria and permit conditions for the treatment facility. Section 2.1.1 has been revised to reflect this clarification.

Comment 4-12:

Page 3-10 states, "Because there would be no measurable radiological emissions or effluents at PFNW, and no direct radiation dose off site, there would be no additional doses to the public [emphasis added]." The assertion of no measurable radiological emissions is an unsupported statement. Please support, revise, or delete

Response:

Operations at PFNW, including unloading, treatment, and loading of a shipment bound for disposal, would be governed by their radioactive materials license, toxic air pollutants permit issued by Benton Clean Air Agency, and dangerous waste permit issued by the State of

Washington. Therefore, under normal operations, there would be no new or additional radiological emissions or effluents occurring at PFNW under the Proposed Action beyond impacts that have already been evaluated as part of the State permitting and licensing processes. Section 3.4.2.1 in this EA has been revised to reflect this clarification.

Comment 4-13:

The EA does not discuss the final dispositioning of the solids filter that is integrated in the ITPS arm. The final loading of Cesium-137-laden IX material fines onto the filter is uncertain. Similarly, it is unlikely, yet unknown, to what degree the filter might become laden by solids containing radionuclides of interest for long-term risk. In order to facilitate classification of this waste source and to demonstrate that the filter meets the WAC of a receiving disposal facility, it will be necessary to accurately estimate the concentration of radionuclides entrained on the filter. Please discuss the potential human health or environmental effects associated with the proper characterization and disposal of this waste term, including how this waste verification process will be conducted safely and adequately for legal disposal.

Response:

See response to Comment 4-9 because the solids filter would be integral to the ITPS. Tank farm operations routinely estimate remaining tank waste in equipment pulled from DSTs. Routine practices such as flushing and spraying with water address as-low-as-reasonably-achievable principles for exposure to workers and supports compliance with the waste acceptance criteria for the receiving facility.

Comment 4-14:

The schedule and duration of the proposed action is unclear based on the descriptions in the EA. Page 2-3 states that the operation is expected to take about nine days, but page 3-21 describes a period of three to four weeks to air dry the ITPS IX column following completion of pumping. The time required for mobilization and demobilization also appear to not be reflected. Please clarify and provide a complete accounting of the expected duration of activities on site.

Response:

The TBI Demonstration is proposed to be implemented in 2023 after permitting by Ecology. Barring unforeseen delays and events, the current estimated schedule of activities is as follows:

- Onsite activities for installation would be expected to last about 6 to 8 weeks.
- As explained in Section 2.1.1 of this EA, the actual operation of the ITPS and filling of the process totes would be expected to last about nine days.
- Once complete and laboratory analysis verifies that the pretreated liquid would meet the waste acceptance criteria of the permitted and licensed receiving facility, the totes would be shipped to the selected treatment facility.
- Meanwhile, DOE would begin the end-of-campaign activities, which, as specified in Section 3.6.2.1 of this EA, would include several activities, the longest of which would require roughly 3 to 4 weeks.

DOE would prepare a radiological work plan to ensure that worker doses are kept to a minimum (as low as reasonably achievable). During this planning, DOE would develop the specific timeline associated with the mobilization, operations, and demobilization activities.

Comment 4-15:

The EA does not describe the process, requirements, or potential human health or environmental effects associated with the decommissioning of the ITPS, including safe extraction of the ion exchange cartridge from the ITPS arm. We note that a public presentation displays images of a shielded ground-level structure and tool intended for this purpose, but it is not described or discussed in the EA.

- Please include in the description of alternatives the process and equipment associated with safe removal of the CST IX cartridge from the ITPS arm and other ITPS decommissioning activities.
- Please include in the description of alternatives the process for extracting the ITPS solids filter should it be necessary to accomplish in order to meet waste acceptance criteria for ultimate disposal of the ITPS arm.

Response:

See response to Comment 4-9. DOE has not determined a disposition path for the ITPS, including the CST IX cartridge and the solids filter. Disposition of the aboveground equipment and the ITPS is expected to be bounded by, or represent a negligible increase of the impacts analyzed in, the TC&WM EIS and the DFLAW Supplement Analysis. Section 3.4.2.1 of this EA has been revised to indicate that regardless of the ultimate disposition path, DOE and WRPS would follow proper radiation protection planning protocols to minimize personnel exposure.

Comment 4-16:

The EA asserts that average dose to a worker supporting the DOE-ORP mission is 0.7 mrem/week, but it does not state whether this average includes workers who are not actively operating within the tank farms (e.g., working in an office). Please confirm whether the dose projection accounts for at-tank worker activities and revise the comparison to the Proposed Action as appropriate, and please also include a minimum and maximum dose, as appropriate

Response:

The average worker dose includes only those workers who have dosimetry and does not typically include those personnel that solely work in an office environment. It also includes workers that work in high-radiation areas. Therefore, the historical value used in the analysis is a reasonable approximation of what personnel would be expected to receive. Additionally, of the 40 estimated workers, many would receive much less than the average dose, while some might receive doses higher than the estimated average. As mentioned in response to Comment 4-14, DOE would prepare a radiological work plan to ensure that worker doses are kept to a minimum. DOE is confident that the estimated collective worker doses presented in Table 3-8 of this EA are representative of the expected doses from the TBI Demonstration.

DOE Standard 1098-2008, Radiological Control, recommends that the annual individual worker dose does not exceed 2,000 mrem, unless explicitly authorized by DOE management (e.g., for emergency situations), and that the dose generally be controlled at a level below 500 millirem per year.

Comment 4-17:

The EA further asserts that the average DOE-ORP dose is applicable to the Proposed Action because it is similar to existing ORP operations. The removal of the IX cartridge from the ITPS arm appears to be distinct from "normal tank farm operations" used as the basis for estimating the worker dose associated with the TBI project. It also represents a novel at-tank activity not addressed in the TCWMEIS or the DFLAW Supplement Analysis. Please revise the dose assessment in the EA to acknowledge the novel challenges and requirements associated with ITPS decommissioning, including removal of the IX cartridge and potential removal of the integrated ITPS solids filter, should it require removal for additional treatment and disposal

Response:

As discussed in response to Comment 4-16, many of the estimated 40 personnel involved in the TBI Demonstration would receive less than the estimated average dose. Additionally, while some personnel may receive higher doses for short periods of time, they would not receive these doses consistently for nine days. The decommissioning of the ITPS is not a unique activity. Tank farm workers frequently work to remove pumps and other contaminated equipment from tanks containing liquid tank waste. Management and removal of spent IX columns from tank-side cesium removal is also a normal operation of the Hanford tank farms. These would be similar activities and would be planned in advance to ensure that worker doses are kept as low as reasonably achievable. DOE is confident that the estimated collective worker doses presented in Table 3-8 of this EA are representative of the expected doses from the TBI Demonstration.

Comment 4-18:

The Hanford Site map provided in Figure 1-1 is old and poor quality. Please replace with a more current higher quality figure.

Response:

Figure 1-1 has been replaced.

Comment 4-19:

Please provide estimates of the greenhouse gas emission tradeoffs associated with each alternative, including the no action alternative and the carbon footprint of the grouting process.

Response:

The largest contribution to greenhouse gas emissions for each of the alternatives would be the transportation shipments of the liquid MLLW (one shipment) and the stabilized MLLW in waste drums (two shipments each for Alternatives 1 and 2). The estimated greenhouse gas emissions

for these alternatives are provided in Tables 3-3 through 3-6 in this EA and range from 3.01 tons of carbon dioxide equivalent to 10.4 tons of carbon dioxide equivalent. These potential emissions represent small impacts and would not be a discriminator among alternatives. The grouting process would occur at one of the four commercial treatment facilities under their existing permits. The carbon footprint of those permitted facilities is included with their permitting actions.

Under the No Action Alternative, DOE would not conduct the TBI Demonstration; therefore, the greenhouse gas associated with the transportation activities would not occur. However, the 2,000 gallons of tank waste would eventually be managed for disposal, which would likely generate greenhouse gas emissions, either through the treatment and stabilization or the transportation to a disposal location. The impacts of the No Action Alternative would be a small subset of the impacts presented in the TC&WM EIS for Alternative 2B.

Comment 4-20:

Please clarify how the long-term impacts of offsite disposal are addressed by NEPA documents for the two proposed disposal facilities. If no NEPA documentation exists for these facilities, please explain how the full impacts of this proposed action are covered by a NEPA analysis.

Response:

As explained in Section 3.4.2.1 of this EA, disposal of the 62, 55-gallon drums at the WCS FWF or the Energy*Solutions* facility would not result in any notable increase in impacts beyond those already occurring as a result of existing, ongoing LLW/MLLW disposal operations because the waste would meet the existing waste acceptance criteria and would be within the volume or curie limits stipulated in the facility's permit or license.

Heart of America Northwest

Comment 5-1:

On behalf of our thousands of members across the Northwest from Spokane to Seattle, from Tri-Cities downriver to Portland, ***Heart of America Northwest urges***:

- USDOE and Ecology to proceed without further delays to deploy and test the removal of waste from the leaking High Level Nuclear Waste Tank B-109 using the equipment, methodologies, adjacent offsite treatment and offsite disposal described in the TBI EA as Alternative 1, and also publicly referred to as the "SAFE Alternative."

Response:

The TBI Demonstration EA scope is limited to approximately 2,000 gallons of tank waste from tank SY-101 only. This is an engineering-scale demonstration of a possible supplemental treatment technology that could potentially be used to treat LAW contained within the tank farms, assuming the demonstration is successful. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

DOE and Ecology agreed on an action plan for managing the waste in tank B-109 in August 2022. While ITPS could be a part of the eventual strategy if this demonstration is deemed successful, tank B-109 does not contain a large percentage of supernate. The ITPS technology is not considered an effective treatment option for tanks with little to no supernate.

Comment 5-2:

USDOE and Ecology acknowledge that actions taken to respond to the on-going leak of waste from Tank B-109 are exempt from NEPA and SEPA. This includes use of the "SAFE treatment alternative" which uses the in-tank pretreatment system described in the TBI EA to remove leakable liquids from B-109 with the treatment of the waste and disposal using the methodologies and facilities described in EA Alternative 1. (This applies as a CERCLA response action and for an order of Ecology to follow the federal and state hazardous waste laws' [RCRA and HWMA] requirements to empty leakable waste from a leaking tank immediately or as soon as feasible).

Response:

DOE acknowledges the comment. See response to Comment 5-1.

Comment 5-3:

USDOE to adopt Alterative 1 of the EA – utilize the adjacent existing commercial treatment capabilities at Perma-Fix NW to treat 2,000 gallons of supernate liquid waste from tanks after removing of the "key radionuclides" using in-tank pretreatment.

- Alternative 1 recognizes that reducing the transport of untreated liquid MLLW wastes (after key radionuclides are removed) reduces potential accidents and related environmental, health and socioeconomic impacts (especially to communities of color, including Tribal members on reservations through which wastes would be transported).
    - As we discuss below in specific comments, the socioeconomic impact and environmental justice section should recognize that any accident risks during transportation will likely be borne by communities that already suffer disparate and disproportionate health, pollution and other effects due to location of transport corridors through these communities (and Reservations).

Response:

DOE acknowledges the preference for Alternative 1. See response to Comment 5-13 for a discussion of the relative risk of the various alternatives.

No environmental justice or socioeconomic adverse impacts were identified in association with making, at most, 1 to 3 discrete, fully USDOT-compliant waste shipments using existing roadways in accordance with their constructed design and intended purpose.

DOE also acknowledges that even though the transportation impacts of all the alternatives were deemed small, Alternative 1 does further minimize the potential risks to human health from transportation.

Comment 5-4:

USDOE (and Ecology in adoption of the EA for SEPA purposes) to acknowledge in the final EA that there are likely potential significant environmental **benefits** from use of the processes and treatment methodologies with offsite disposal of waste described in the EA if the demonstration phase of the TBI is successful. An EA should describe likely potential environmental benefits (which are "impacts" or can be viewed as "mitigation" measures of potentially significant adverse environmental impacts from existing plans [no action alternative]). **Those likely benefits** if the test / demonstration that 2000 gallons can be removed from tanks, have Cesium and other key radionuclides removed via in-tank pretreatment, be treated to meet RCRA LDR and waste acceptance standards for offsite disposal **include**:

- Greatly reducing the total quantities of glassified and secondary waste from Hanford tanks needing to be disposed onsite. The onsite landfill (IDF landfill) cannot accommodate all the wastes from Hanford's tank farms and processing facilities without contaminating Hanford's groundwater. Thus, if significant quantities of the lower radionuclide waste from tanks can be disposed offsite there are major positive impacts for Hanford's groundwater, preventing exposures of Tribal members with Treaty rights to resource use on the Hanford Central Plateau, and for protecting the Columbia River.
- As described in Alternative 1, the offsite disposal site in West Texas has no drinkable groundwater to put at risk – which is a tremendous environmental and health benefit compared to disposal at Hanford.
- Preventing more High-Level Nuclear Waste from leaking from Hanford's tanks to the soil and inevitably contaminating groundwater. Hanford's groundwater is a major natural resource and also needs to be protected for future use as a drinking water and irrigation resources. Contamination in Hanford's groundwater flows to the Columbia River. The TBI / SAFE treatment alternative offers the potential to protect Hanford groundwater and the Columbia River from current and future High-Level Nuclear Waste tank leaks.
- If demonstrated to be successful in meeting treatment and disposal standards, the TBI or SAFE Alternative would create an option for USDOE to dramatically speed up treatment for the 40 to 60 percent of tank wastes for which the EA acknowledges USDOE currently lacks treatment capacity for 40 to 60 percent of the "Low Activity Waste" (LAW) from Hanford's tanks. LAW comprises 90% of the tank waste by volume. It will cost billions of dollars to build a second LAW facility and take decades. The SAFE Alternative (if demonstrating on B-109) or TBI Demonstration, if successful, will create an option that would speed up treatment (while DFLAW proceeds to vitrify 40 to 60 percent of the LAW waste) and SAVE billions of dollars with an estimated cost of retrieval, treatment and disposal that is 1/50th the cost per gallon compared to DFLAW. The environmental benefits from removing waste from tanks before more wastes leak is incalculably high. The whole point of the billions being spent on DFLAW and WTP is to process tank wastes to prevent their leaking into the environment. With every passing year, the

likelihood of additional leaks and the size of leaks increase. **NEPA (and SEPA) require that the TBI EA present these environmental benefits to decision makers and the public.**

Response:

DOE acknowledges the benefits of the TBI technology as an engineering-scale supplemental treatment technology demonstration that could lead to further long-term benefits in managing the LAW tank waste at the Hanford Site. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review." Long-term benefits would be addressed in that future NEPA document.

Comment 5-5:

The EA (and Ecology adoption of the EA) should describe the environmental benefits and potential positive impacts (or mitigations of potential adverse effects under existing plans) from the Test Bed Initiative and use of the same techniques, facilities and offsite disposal for Tank B-109 (the SAFE Alternative).

Response:

See responses to Comments 5-1 and 5-4.

Comment 5-6:

USDOE to specifically adopt in the EA and published record of decision that the Waste Incidental to Reprocessing (WIR) determination will occur after in-tank pretreatment removes "key radionuclides to the maximum extent that is technically and economically practical" pursuant to DOE Order 435.1 and waste is sampled; and, prior to transport from the Hanford site to be treated.

Response:

None of the proposed alternatives in this EA would be implemented prior to issuance of a FONSI and WIR Determination.

Prior to shipping the waste from the Hanford Site, DOE would perform any required sampling to ensure compliance with applicable permits and regulations, including applicable USDOT requirements, as needed to ensure compliant receipt by the receiving facility.

Comment 5-7:

USDOE and regulators are required by RCRA, CERCLA, HWMA and MTCA to remove leakable supernate and interstitial liquids from the currently leaking High Level Nuclear Waste Tank B-109 or other leaking tanks. The "SAFE Alternative" would use the same equipment1 – already procured – and the same treatment and disposal described in the TBI EA Alternative 1 to remove leakable liquid from B-109. This would have immediate positive environmental benefits

and mitigate the known harmful adverse impacts from continued inaction allowing B-109 to keep leaking.

Response:

See response to Comment 5-1.

Comment 5-8:

Use of the same equipment, facilities and methods are “connected” or “related actions” which would be appropriate to consider under normal circumstances within the scope of this EA. It would be beneficial to consider if there are any potential impacts outside of those which this EA analyzes for removal and treatment of waste from SY-101. However, if removal and treatment of waste from B-109 or any other leaking tank is undertaken as part of, or utilizing the same / similar steps and treatment as TBI, **it is not required that the removal and treatment await NEPA analysis because USDOE should be undertaking to remove and treat the waste from a leaking tank as a "time critical removal action" and an action required by the federal RCRA and Washington's HWMA and MTCA.** CERCLA exempts time critical removal actions from NEPA reviews. Actions taken in response to an Ecology order to respond to a release, including an order to follow the legal requirements to remove leakable liquids from a leaking tank and to remove it from service, are also exempt from SEPA. When there is an imminent and substantial risk due to an on-going release into the environment, neither a full RIFS (or RCRA evaluation) or NEPA / SEPA analysis is required. Undertaking the NEPA or SEPA review would delay the required action to abate the environmental harm from the release and prevent further releases.

In sum, USDOE and Ecology should be immediately removing leakable liquids from the leaking Tank B-109 using the available equipment, methods and facilities described in the TBI EA Alternative 1 and referred to as the “SAFE Alternative” for leaking tanks and B-109. That **immediate action to prevent further leakage and abate the harm from the leak does not need to wait for an EA to be completed**.

However, there is no reason not to include a discussion in the TBI EA of the positive environmental benefits from use of the SAFE Treatment Alternative for reducing leakage from Tank B-109. Indeed, because it is an obvious “connected” or “related” action, a discussion of the positive environmental benefits / impacts is required. NEPA requires consideration of “connected” or related actions. 40 CFR 1508.25 (a)(1).

NEPA also requires consideration of cumulative effects. TBI and SAFE involve the same equipment and steps taken on the same type of wastes from Hanford tanks, and would lead to use of the same technology, methods and facilities on the same tank wastes in the future if the first demonstration is successful. The only difference is whether the waste used in the demonstration is from a currently leaking tank in order to prevent immediate, substantial and imminent harm or from Tank SY-101 in order to prevent future releases. They are not only “connected,” but also involve “cumulative” effects that are required to be considered in the same EA (or EIS).

Response:

See response to Comment 5-1.

The ongoing remediation of the 200 West Area operable unit is considered part of the affected environment for this EA and therefore was not included separately in the analysis of potential cumulative impacts.

Comment 5-9:

Footnote 10, Page 2-3 should recognize that USDOE has determined that similar non-elutable Cesium removal Ion Exchange (IX) resin from the Tank Side Cesium Removal program will be vitrified as HLW. The EA and NEPA documentation for that decision should be cited and the EA should discuss potential environmental benefits from treating the Cesium IX in the same manner as the DFLAW Cesium IX columns. This EA should compare the quantity of Cesium contaminated IX resin from this action (2000 gallon test of TBI) with the approved Tank Side Cesium removal project's Cs IX columns which will be vitrified.

Response:

The footnote is used to define the term “non-elutable” to the reader. Section 3.6.2.1 of this EA identifies that disposition of the aboveground equipment and the ITPS is expected to be bounded by, or represent a negligible increase of the impacts analyzed in, the TC&WM EIS and the DFLAW Supplement Analysis. The DFLAW Supplement Analysis demonstrated that the potential storage of tank-side cesium removal IX columns on a pad in the 200 East Area would not constitute a significant change to the proposed action evaluated in the TC&WM EIS. Those columns, which could hold from 25,000 curies to 150,000 curies each, would be notably larger than the IX column that is proposed as part of the ITPS, which would be expected to contain approximately 150 curies of cesium-137. If the TBI Demonstration IX column ends up following the same disposition path as planned for the tank-side cesium removal columns, it would eventually be sent to the WTP for vitrification.

Comment 5-10:

Page 2-4 first sentence mistakenly states that the distance a truck shipment "would travel between the Hanford Site and PFNW is 26 miles." We believe this should say the total distance from Tank SY-101 to PFNW would be 26 miles, with only the final 1.2 miles off of the Hanford Site.

The distance from the Hanford Site to Perma-Fix NW is 1.2 miles. The distances to other alternate treatment facilities are 650, 1840 and 2500 miles. Because TBI is a “demonstration” project, it is appropriate to include demonstration of mitigation measures to reduce the potential for an accident while transporting untreated liquid waste. Alternative 1 involves only two truck shipments of liquid waste during the demonstration, but the connected future action would involve many more. While Alternative 1 is definitively the alternative with the least potential for transportation accidents, **the EA should still include discussion of mitigation measures**.

Response:

Section 2.1.1 of this EA has been modified to clarify that 1.2 miles of the 26-mile distance to PFNW is off the Hanford Site.

Section 2.1.1 has also been revised to identify that best management practices and regulatory requirements would be used during the transportation of radiological materials. As these practices and requirements are an element of the Proposed Action, DOE does not consider them "mitigation measures" in this EA.

The comment mentions "...two truck shipments of liquid waste." Under the Proposed Action, there would be a single shipment of 6 process totes to the treatment facility.

As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Comment 5-11:

Appropriate mitigation measures would be to only ship waste from the tank farms to PFNW when traffic is lightest, weather conditions are favorable, and an escort is available for the 25 miles onsite and the 1.2 miles offsite. Obviously, far greater mitigation measures would be needed for transport between 650 to 2500 miles, and the EA must discuss that the simple mitigation measures available for a 1.2 miles trip offsite would not be available for Alternatives 2-4.

Response:

Section 2.1.1 has been revised to identify that best management practices and regulatory requirements would be used during the transportation of radiological materials to PFNW. The transportation activities would follow the USDOT requirements regardless of the length of the shipment.

Comment 5-12:

Section 3.7.1 transportation impacts states that "only MLLW would be transported off the Hanford site." This should be accompanied by a note that the Waste Incidental to Reprocessing (WIR) determination would be applied to the waste after key radionuclides are removed, per DOE Order 435.1, rather than after treatment and solidification. Otherwise, this statement would not be accurate as the waste transported would still be HLW.

Response:

Section 1.2.2 describes the WIR Evaluation. The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW. DOE prepared the Final WIR Evaluation after consulting with the NRC and after considering comments from the NRC, stakeholders, states, tribal nations, and the

public. Based on the Final WIR Evaluation, DOE may issue a WIR Determination. After a WIR Determination, the waste would be appropriately stored, transported, solidified, and disposed of as LLW.

Comment 5-13:

Those potential adverse impacts from accidents (which go far beyond latent cancer fatalities) will be borne disproportionately by communities and peoples already suffering from disparately high pollution from the same transportation corridors, reduced access to health care, higher incidences of disease and are farthest from environmental justice. The EA should recognize this and mitigate environmental injustice impacts by choosing the alternative which minimizes transportation of untreated liquid wastes during the demonstration, recognizing that a successful demonstration may lead to a "connected action" of many more shipments.

The bottom line is simple: reducing transportation miles for liquid waste prior to treatment reduces the potential for accidents and numerous impacts that will flow from accidents.

Response:

As reported in Table A-5 in Appendix A of this EA, the probability that a single truck shipment of liquid MLLW would be in a severe enough accident that the contents of a process tote would be released to the environment, ranges from beyond extremely unlikely (3.73×10^{-8} or once in 27 million) to extremely unlikely (2.58×10^{-6} or once in about 388,000), dependent upon the distance traveled. The risk of consequences (e.g., human health, socioeconomic) is extremely low. Therefore, there would be no disproportionately high and adverse impacts (health risks) to a low-income or minority population along the transportation route. See response to Comment 5-3 for a discussion of potential environmental justice impacts associated with transportation for the four alternatives.

DOE acknowledges the commenter's preference for Alternative 1 to minimize the transportation distance.

Comment 5-14:

USDOE should not have eliminated "Water Resources" and "Socio-Economics and Environmental Justice" from Analysis (Table 3-1):

The EA should not eliminate "water resources" from further analysis (Table 3-1, page 3- 2), in Section 3.5.3 (No Action). Rather, the EA should describe the potential positive environmental impacts in regard to water resources at the Hanford site from successful deployment of the TBI methodology and treatment:

a) reducing total quantity of post-treated tank wastes requiring disposal in the Hanford IDF landfill. Recent analyses, including by the NRC for the Waste incidental to Reprocessing (WIR) evaluation of DFLAW waste disposal notes that a large portion of secondary wastes would be disposed on site with potentially significant impacts to groundwater; and,

b) the great positive environmental benefit of using the TBI methods to prevent further leakage from already leaking High level Waste tanks such as B-109.

Response:

Table 3-1 has been modified to include a statement that the Proposed Action could have potential benefits to water resources. Table 3-1 states the following for water resources, "The Proposed Action would not require additional water use beyond the current baseline and would not produce effluents that could affect surface water, groundwater, or wetlands. The Hanford Site and commercial facilities have designs and procedures that protect against potential leaks and spills of radiological materials in off-normal conditions. The process totes would be stationed within secondary containment to mitigate any possible spill scenarios. Waste treatment, stabilization, and/or disposal would occur within the existing licensed footprint of the commercial facility and would not introduce any unique contaminants that are outside of its licensing basis. One potential benefit to water resources would be that 2,000 gallons of tank waste would be removed from the system and no longer available to potentially affect surface or groundwater."

Additionally, for socioeconomics and environmental justice, Table 3-1 states, "The Proposed Action is a limited demonstration project and would not change Hanford Site or commercial workforce requirements and thus would not impact socioeconomic resources. There would be no disproportionately high and adverse impacts on minority or low-income populations. Transportation routes would follow the most efficient routes from Hanford to the MLLW treatment or disposal facilities and would maximize use of the U.S. Interstate highways. Because the Proposed Action would involve only one or two truck shipments, follow USDOT and NRC regulations regarding shipment of radiological materials, and be a small fraction of existing truck traffic on these highways, the transportation activities associated with the Proposed Action would not result in disproportionately high and adverse impacts on minority or low-income populations."

As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review." Long-term benefits would be addressed in that future NEPA document.

Comment 5-15:

Use of the same methodology, treatment and disposal path for leaking tanks such as B-109 offers immediate and clear environmental benefits. If TBI testing succeeds it will demonstrate that this same methodology can be used for leaking tanks. And, use of the same technology and methods has been proposed for B-109 and is a related action. The potential environmental benefit compared to harm from unabated tank leakage under USDOE's current no-action plans for B-109 leakage must be included. NEPA EAs must include mitigation measures to prevent potential environmental impacts. Emptying leakable liquids from Tank B-109 using the same methods described in this TBI EA would be a very significant mitigation measure for on-going harm from a large leak of High Level nuclear Waste from Tank B-109 (which has leaked up to 4.5 gallons a day).

Response:

See response to Comment 5-1.

Comment 5-16:

The potential adverse impacts from accidents (which go far beyond latent cancer fatalities), discussed at length above, will be borne disproportionately by communities and peoples already suffering from disparately high pollution from the same transportation corridors, reduced access to health care, higher incidences of disease and are farthest from environmental justice.

The EA should recognize this and mitigate environmental injustice impacts by choosing the alternative which minimizes transportation of untreated liquid wastes during the demonstration, recognizing that a successful demonstration may lead to a "connected action" of many more shipments.

The likeliest harms from transportation accidents are in corridors that disproportionately impact low income and communities of people of color (including on Tribal Reservations in rural areas). Increased transport of liquid – rather than solid wastes – does have serious potential impacts which can be mitigated or almost entirely avoided by choosing Alternative 1, with only 26 miles of liquid trucked prior to treatment and solidification (only 1.2 miles of which are offsite), rather than 650 to 2500 miles on public roads under the other alternatives.

The EA should not dismiss environmental justice impacts from the proposal and connected actions. The EA should discuss the environmental justice issues resulting from disparate risks of transporting untreated liquid wastes (as opposed to solidified post treatment wastes enroute to disposal) and recommend Alternative 1 which almost entirely eliminates the risk of these impacts.

Response:

See responses to Comments 5-3 and 5-13. DOE acknowledges the commenter's preference for Alternative 1.

Comment 5-17:

Section 3.5.3 No Action should include a comparison showing benefits from TBI compared to existing plans or other long-term alternatives that USDOE is considering: There is an on-going release / accident leaking High Level Nuclear Waste from Tank B-109. This EA is required to report in the EA on the benefits from use of the same TBI technology and methods as a mitigation measure with significant environmental benefits. This includes prevention of thousands of gallons of leakable interstitial liquid from leaking from B-109 on top of the 3,100 gallons reported by USDOE – and which we have documented is likely two to three times greater. Every gallon of HLW in the soil column increases environmental harm and creates long-term impacts to groundwater. USDOE cannot remove all contamination from tank leaks which reach groundwater, even if USDOE were to somehow operate pump and treat facilities for the next thousand years.

Rather than eliminating "water resources" from further analysis (Table 3-1, page 3-2), in Section 3.5.3 (No Action) the EA should describe the potential positive environmental impacts in regard to water resources at the Hanford site from successful deployment of the TBI methodology and treatment: a) reducing total quantity of post-treated tank wastes requiring disposal in the Hanford IDF landfill. Recent analyses, including by the NRC for the Waste incidental to Reprocessing (WIR) evaluation of DFLAW waste disposal notes that a large portion of secondary wastes would be disposed on site with potentially significant impacts to groundwater; and, b) the great positive environmental benefit of using the TBI methods to prevent further leakage from already leaking High level Waste tanks such as B-109.

The No Action Alternative must include the environmental benefits that will not be realized if TBI is not implemented; if the test does not succeed in producing treated, solidified wastes that can be disposed offsite; or, if the TBI In-Tank Pretreatment System and use of totes is not deployed to remove leakable liquids from tanks that are leaking, such as B-109.

Use of the same methodology, treatment and disposal path for leaking tanks such as B-109 offers immediate and clear environmental benefits. If TBI testing succeeds it will demonstrate that this same methodology can be used for leaking tanks. And, use of the same technology and methods has been proposed for B-109 and is a connected or related action. The potential environmental benefit compared to harm from unabated tank leakage under USDOE's current no-action plans for B-109 leakage must be included. NEPA EAs must include mitigation measures to prevent potential environmental impacts. Emptying leakable liquids from Tank B- 109 using the same methods described in this TBI EA would be a very significant mitigation measure for on-going harm from a large leak of High Level nuclear Waste from Tank B-109 (which has leaked up to 4.5 gallons a day).

Response:

See responses to Comments 5-1 and 5-14.

Comment 5-18:

Table 3-7 "Natural Background and Other Radiological Dose Unrelated to Hanford Operations" misleadingly and incorrectly reports the Effective Dose Equivalent from natural background radiation as 310 mrem per year. Because the table header refers explicitly to Hanford, the natural background radiation of approximately 90 mrem/year should be reported here, not the average for the US (which includes high radon geologic areas and high elevation areas – neither of which are relevant for Hanford).

The discussion of dose to workers (36 mrem/year average reported in this section) inappropriately compares the increased exposure of 36 mrem to the 310 mrem/year US average rather than the much more significant increase of over 33% in exposure compared to what the average worker received from natural sources living in the mid-Columbia.

Response:

DOE's NEPA documents typically use the nationwide average for natural background radiation dose (e.g., the TC&WM EIS), as there is wide variability in the average, even within a specific region. Table 3-7 indicates that these radiological doses are "unrelated to Hanford."

The 36 mrem value is the average dose to an Office of River Protection radiation worker during calendar year 2019. It is not improper to put that figure into context by comparing it to a national average for background radiation. As shown in Table 3-8, the average worker supporting the TBI Demonstration would be expected to receive less than 2 mrem.

Comment 5-19:

Washington Ecology included discussion of an unrelated and dissimilar project involving treatment of brine from DFLAW in its August 27, 2021, letter regarding this EA and the NEPA and SEPA analysis of the Test Bed Initiative (letter 21-NWP-140). This is an entirely separate project and the two should not cloud each other. Ecology provided no discussion of how the projects are related (other than the same commercial treatment facility treating the wastes) or why it raised this project in the same letter. We disagree with Ecology in regard to a need for public meetings on this EA for the demonstration of retrieval and treatment of 2000 gallons of waste. As the largest public membership group (and the group which generates the majority of people commenting at Hanford cleanup meetings or submitting comments), we have said holding public meetings on this EA prior to results from the demonstration being known makes no sense to us (a view shared by others as well). The point of the demonstration project which is the subject of this EA is to obtain information on whether the elements of the proposed project work safely and if the treated waste will meet applicable standards. Sharing results of the demonstration project in public meetings or via other communications may be appropriate. We do not see what can be gained by holding one or more meetings prior to the demonstration.

Ecology's suggestion for a public meeting on the TBI EA is rather inexplicable as a priority when Ecology and USDOE have failed to discuss planning for public meetings and forums to discuss the leak from Tank B-109. The leak from B-109 is a tremendous public concern.

As discussed above, the same equipment for retrieval, the same offsite treatment and disposal as proposed for TBI in this EA could be used to immediately respond and abate the impacts from Tank B-109's on-going leak. An EA is not required prior to responding to a leaking tank. A public meeting on B-109 with discussion of the TBI based method to remove and treat leakable liquids would be well received and relevant for public understanding of TBI as well as the options for removing liquid from a leaking tank. The current priority for public meetings is to discuss the leak from B-109.

Response:

DOE acknowledges the comment. No public meeting is planned for this EA. See response to Comment 5-1 relative to tank 241-B-109.

Hanford Challenge

Comment 6-1:

We therefore request that the DOE –

1. Consider our preliminary comments on the completeness, factual accuracy, and additional information for consideration in the draft EA.
2. Establish a public comment period of at least 60 days on the draft Phase 2 TBI EA.
3. Hold a public hearing on the draft Phase 2 TBI draft EA.
4. Conduct a full Environmental Impact Statement (EIS).

Response:

DOE has considered the comments provided on the draft EA in preparation of this final EA. The additional comments are addressed below in the sections where specific details about the comments are provided.

Comment 6-2:

Hanford Challenge is concerned about implications these tests could have on the future of tank waste treatment and disposal at Hanford. The research and information we have access to suggests that a grouted waste form is ultimately less protective of human and environmental health than glass. DOE itself has reached this conclusion in past reports, as documented in Hanford Challenge's recent report, *Why Grout Failed at Hanford*, which we incorporate into this comment. While we understand that the Test Bed Initiative is focused on offsite treatment, the information from the tests could prove to be a foundation for future disposal of grouted waste at Hanford. The 2,000 gallon test needs more public involvement to ensure it is not fast-tracked in ways that negatively impact the future of tank waste treatment and disposal and the mission to immobilize tank waste in glass. We are also concerned that the Phase 2 draft EA may be used as a blueprint for the Phase 3 Test Bed Initiative EA, and therefore needs to be updated with consideration for the scale-up.

Response:

There is no "Phase 3" planned for TBI. This potential was announced several years ago; however, at this point, DOE proposes to complete the TBI engineering-scale demonstration and, depending on the results, would evaluate a range of potential supplemental treatment technologies for that portion of the LAW that is not currently covered by a Record of Decision. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Grouted waste has been proven to be highly effective in stabilizing MLLW. Grout is a proven safe and effective technology that continues to be used by DOE and other national and international parties to stabilize radioactive wastes, including certain tank wastes, for disposal. Use of stabilization agents for this purpose is consistent with the NRC's *Concentration Averaging and Encapsulation Branch Technical Position, Revision 1* (https://www.nrc.gov/docs/ML1225/ML12254B065.pdf), which allows mixing of nonradioactive

constituents with radioactive waste (e.g., solidification, encapsulation, or additives used in thermal processing), provided the mixing has a purpose other than reducing the waste classification, such as waste stabilization or process control. Furthermore, the addition of stabilization agents to the waste prior to disposal is often necessary to meet the NRC requirements in 10 CFR 61.56, "Waste Characteristics" (e.g., to ensure stability of the waste form).

DOE complied with the DOE NEPA implementing procedures for this EA (10 CFR 1021.301) by providing the host states and host tribes the opportunity to review the draft EA, and also provided this opportunity to potentially affected states and tribes. In response to this review, DOE received 118 comment documents from states, tribes, organizations, and individuals. Responses to these comments are addressed in this comment response appendix.

Comment 6-3:

Hold a 60-day public comment period on the Phase 2 TBI Draft EA.

The request for comments should go beyond seeking comments from agencies and tribes. The public should be given the opportunity to comment with adequate review time and a public hearing. Treating 2,000 gallons of tank waste and sending it offsite to be grouted and disposed sets precedent for the planned scale-up in Phase 3 to 500,000 gallons, and may be in play in future decisions about supplemental low-activity tank waste treatment. The public should have a chance to review the options under consideration and share formal comments for agency consideration.

The public hearing should include information about the Phase 2 TBI draft EA including the entire Test Bed Initiative Plan scale-up to Phase 3 and how it fits into plans for Supplemental Low Activity Waste decisions. Allow participants to make formal comments at the meeting.

The draft Environmental Assessment (EA) proposes the use of a local facility called Perma-Fix NW as a treatment location for the tank waste in Alternative 1. Perma-Fix NW has off-gas stacks and groundwater within the Richland city limits, where residential communities are potentially impacted from releases. Public comment opportunity was invited in an EA for transport and treatment of wastewater from Savannah River (See Federal Register Vol.84, No. 111, June 10, 2019, page 26847.) A public comment period, along with a public hearing, should be a part of this EA, and the period for comment should be at least 60 days.

Response:

DOE complied with the DOE NEPA implementing procedures for this EA (10 CFR 1021.301) by providing the host states and host tribes the opportunity to review the draft EA, and also provided this opportunity to potentially affected states and tribes. In response to this review, DOE received 118 comment documents from states, tribes, organizations, and individuals. Responses to these comments are addressed in this comment response appendix. A public hearing is not required for an EA under 10 CFR Part 1021.

There is no "Phase 3" planned for TBI. This potential was announced several years ago; however, at this point, DOE proposes to complete the TBI engineering-scale demonstration and,

depending on the results, would evaluate a range of potential supplemental treatment technologies for that portion of LAW that is not currently covered by a Record of Decision. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Operations at PFNW have been evaluated by the State of Washington during the licensing and permitting processes. As long as the liquid MLLW is acceptable to be processed within the constraints of the PFNW's dangerous waste permit, then no additional environmental impacts would be expected beyond those evaluated during the permitting process.

Comment 6-4:

Perma-Fix NW is not a facility that should be under consideration for the Test Bed Initiative.

Perma-Fix Northwest is at the center of the Department of Energy's "Test Bed Initiative," a proposal launched in 2016 to explore the feasibility of treating liquids from Hanford's underground high-level waste (HLW) tanks by removing cesium and mixing the liquid tank waste with grout for offsite disposal. After initial in-tank pretreatment (cesium-ion exchange and filtration) the liquids would be classified by DOE as Mixed Low Level Wastes (MLLW) which the U.S. Nuclear Regulatory Commission (NRC) says may be highly radioactive and contain long-lived radionuclides. According to the NRC, this waste (LAW feed), which constitutes about 80% of the total volume in Hanford's HLW tanks:

> "has high radiation levels requiring handling within shielded structures. Three envelopes of LAW have been defined: Envelope A is standard, Envelope B contains higher levels of cesium, and Envelope C contains higher levels of strontium and TRU … . LAW would come from the liquid phases of the DSTs and from solids washing operations … LAW is still HLW and DOE identifies the solid phases as HLW, defined as Envelope D .... Envelope D contains cesium, strontium, and TRUs as the radionuclides. Metal oxides, hydroxides, nitrates, phosphates, and aluminates constitute the bulk of the chemical species."

The Test Bed Initiative operates on a three phase plan to pretreat liquid tank wastes, known as supernate, from Hanford's double-shell waste tanks, send the pre-treated liquid waste to an offsite treatment facility to be mixed with cement (grout) and dispose the grouted waste offsite at a commercial low-level radioactive waste disposal site. In 2017, Phase 1 of this initiative was demonstrated using Perma-Fix Northwest as its offsite treatment facility. It involved a composite of approximately 3 gallons of wastes from six of Hanford's high-level waste tanks. The waste was pretreated, mixed with grout at the Perma-Fix Northwest facility and then shipped to the Waste Control Specialists (WCS) disposal site in Andrews, Texas. WCS has less restrictive waste acceptance criteria as compared to what is expected for onsite landfill disposal at other sites. Neither Waste Control Specialists, nor Hanford has analyzed whether grouted waste from pretreated high-level waste tanks meets the Waste Acceptance Criteria for disposal at Waste Control Specialists.

The practice of treating Hanford's low-level and plutonium-containing wastes at Perma-Fix Northwest, a commercial facility in Richland, WA, should end.

Perma-Fix Northwest is a commercial Low-Level Waste (LLW) and Mixed Low-Level Radioactive Waste (MLLW) treatment and storage facility approved, permitted or licensed for operation by the Environmental Protection Agency (EPA) Region 10, the Washington State Department of Ecology, and the Washington State Department of Health under their respective authorities. Perma-Fix Northwest is located on 35 acres in an urban area in the City of Richland and near the Department of Energy's (DOE) Hanford Nuclear Site.

Continued offsite shipping, storage and treatment of plutonium-containing nuclear wastes from Hanford to surrounding residential communities creates avoidable health, safety and security risks. According to the EPA, in 2010 over 32,000 people lived within 5 miles of Perma-Fix Northwest. Richland residents are at risk from the radioactive and hazardous materials transported over public roads between Hanford and Perma-Fix Northwest.

According to the State of Washington and federal regulators, Perma-Fix Northwest in Richland exceeded onsite soil contamination limits, improperly stored radioactive and other hazardous wastes, handled wastes resulting in leakage of plutonium and significant workplace contamination, failed to notify regulators of known violations, and exposed several employees to radiation. Perma-Fix Northwest was also fined a total of $551,891 from 2008 to 2019 by the U.S. Environmental Protection Agency and the Washington Department of Ecology for hazardous waste violations.

Hanford Challenge's November 2020 investigation, *Risky Business at Perma-Fix Northwest,* uncovered a disturbing history of accidents, violations, findings, and non-compliances that raise serious questions about whether Perma-Fix should be allowed to continue treating dangerous Hanford waste. Cost-savings is only one aspect to consider when deciding where and how to clean up Hanford's dangerous waste, but cost savings should never be the sole consideration.

Response:

PFNW is one of four permitted and licensed, commercial alternatives being evaluated in this EA for offsite treatment of MLLW. As shown in this EA, these facilities could treat the 2,000 gallons of MLLW within their facilities as a small percentage of their normal capacity without additional environmental impacts beyond those that were considered during the permitting and licensing processes by their regulators.

In parallel with this EA, DOE prepared a Final WIR Evaluation in accordance with DOE Manual 435.1-1, *Radioactive Waste Management Manual.* The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW. DOE prepared the Final WIR Evaluation after consulting with the NRC and after considering comments from the NRC, stakeholders, states, tribal nations, and the public. Based on the Final WIR Evaluation, DOE may issue a WIR Determination. See response to Comment 7-2 relative to LAW and MLLW terminology.

There is no "Phase 3" planned for TBI. This potential was announced several years ago; however, at this point, DOE proposes to complete the TBI engineering-scale demonstration and, depending on the results, would evaluate a range of potential supplemental treatment technologies for that portion of LAW that is not currently covered by a Record of Decision. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

DOE would use liquid sampling to verify that the proposed shipment would meet the waste acceptance criteria for the treatment facility. After, treatment, the treatment facility would sample the grouted waste form to verify that the grouted waste form would meet the disposal facility waste acceptance criteria. Based on a review of the waste acceptance criteria for WCS and Energy*Solutions*, DOE has high confidence that the stabilized waste form will meet the requirements for disposal as MLLW.

DOE is not the regulatory authority over operations of PFNW. PFNW has licenses and permits issued by the State of Washington and is currently permitted to accept MLLW. As long as the liquid MLLW is acceptable to be processed within the constraints of the PFNW's dangerous waste permit, then no additional environmental impacts would be expected beyond those evaluated during the permitting process.

Comment 6-5:

Revitalize treatment capacity on the Hanford site to perform waste treatment functions currently performed by Perma-Fix Northwest

Hanford Challenge has concluded that it would be safer to expand the treatment capacity at the Hanford Site instead of sending waste for treatment at Perma-Fix Northwest. Treatment of waste on the Hanford Site provides the best environment for compliance with safety standards, clear and coordinated regulatory oversight, transparency, and accountability.

Hanford Challenge recommends that the Department of Energy revitalize its internal capacity at Hanford to perform the waste treatment functions that it is currently sending to Perma-Fix Northwest. There are many reasons why Hanford should treat its own waste onsite rather than at Perma-Fix Northwest. Hanford is a more suitable location for treatment due to a higher level of transparency and accountability, remote location further away from populated areas, further from the groundwater, ability to avoid the risky practice of transporting thousands of cubic meters of dangerous waste on public roadways, and a workforce that is highly trained, qualified, and certified.

Response:

DOE acknowledges the comment and the preference that DOE treat its MLLW on site; however, as discussed in Section 2.3 of this EA, "There are no existing, permitted facilities on the Hanford Site for grouted tank waste." Additionally, one of the purposes of the Proposed Action is to demonstrate that the pretreated waste can be treated, stabilized, and disposed of at offsite, permitted and licensed, commercial facilities.

Comment 6-6:

Revise the draft EA to include on-site treatment as an alternative.

By only considering treatment of pretreated waste at offsite facilities, the information contained in the draft EA is incomplete. Detailed information about how the offsite facilities plan to safely grout the treated tank waste liquids is missing and should be required in the draft EA and resulting EIS.

We understand that the TBI EA for Phase 2 only considers treatment of 2,000 gallons, however we are concerned that conclusions drawn from analysis of Phase 2 alternatives will be incomplete without an alternative that considers an onsite treatment facility. There are major issues with using Perma-Fix Northwest that are exacerbated in the Phase 3's scale-up scenario, that won't show up as clearly in the Phase 2 EA.

Phase 3 would expand to production scale to grout 300,000 to 500,000 gallons of soluble radioactive tank wastes over an 18-month period. At DOE's Phase 3 production scale, the Perma-Fix Northwest facility would generate as many as 16,364 55-gallon drums at a rate of about one drum filled every 45 minutes. In 2018, Perma-Fix Northwest proposed a similar plan.

A review of TBI's Phase 3 done in 2018 by federal and contractor experts at Hanford, questioned "whether Perma-Fix has the physical capacity and personnel required to handle the volume of waste which will be generated." It would "require a 55 gallon drum to be produced roughly every 45 minutes." After the drums are filled nearly 1,000 would have to remain in lag storage each month at the site for about 30 days, so that the grout can be cured to ensure its compressive strength before transport. The transportation logistics for a waste volume this large have not been worked out. It's quite possible that the large waste volumes of about 1,000 drums per month, could create a transportation bottleneck resulting in a large backlog of stored grouted waste drums sitting at the Perma-Fix Northwest site.

Response:

The potential for onsite treatment of the liquid MLLW from the TBI Demonstration is addressed in response to Comment 6-5. The potential for a "Phase 3" and the reliance on the licenses and permits for the treatment facilities are discussed in response to Comment 6-4.

Section 3.4.2.1 states that operations at PFNW would be conducted in accordance with licenses and permits issued by the State of Washington. Because the approximately 2,000 gallons of MLLW processed under the proposed TBI Demonstration would be treated in accordance with the existing permits at PFNW, impacts to facility workers are not expected to change compared to existing operations. Because there would be no new or additional radiological emissions or effluents at PFNW beyond those evaluated as part of its permitting and licensing processes, and no direct radiation dose off site, there would be no additional doses to the public.

The comment mentions the need for an EIS. In accordance with the CEQ NEPA regulations (40 CFR 1501.5), "An agency shall prepare an environmental assessment for a proposed action that is not likely to have significant effects." None of the proposed alternatives in this EA would be implemented prior to issuance of a FONSI and WIR Determination.

Comment 6-7:

Perma-Fix NW is operating under a temporary permit and has been since 2009.

The draft EA states that DOE is relying on a future permit for any tank waste treatment at PFNW in Richland: "PFNW is currently *in discussions with Ecology to renew PFNW's Dangerous Waste Regulations permit. After the permit renewal, DOE would verify that the 2,000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit."*

Perma-Fix NW does not have a reasonable expectation that a new permit will be issued to include Hanford tank waste for a test bed initiative in the near future. The permit is dependent on the issuance of a State Environmental Protection Act (SEPA) analysis, a draft of which has not been issued as of this date. Perma-Fix NW itself characterizes as "uncertain" as to the date for treating the 2,000 gallons of TBI waste to the Securities and Exchange Commission in their June 30, 2021 Form 10-Q Quarterly Report for the period ending June 30, 2021.

Response:

Footnote 15 in Section 2.1.1 of this EA has been updated. While PFNW is currently in discussions with Ecology regarding the renewal of its permit, PFNW is currently operating under Permit Number WAR 000010355. DOE has compared the projected radionuclide and chemical constituents of the TBI waste stream against the PFNW waste acceptance criteria and determined preliminarily that the current permit would allow the treatment and stabilization of the 2,000 gallons of pretreated MLLW. Therefore, the phrase, "after the permit renewal..." has been deleted.

Comment 6-8:

Update history and information about hazardous waste components of SY-101 waste in the EA and potential impacts on grout integrity.

Tank SY-101 is estimated to contain 892,000 gallons of supernate liquids and 223,000 gallons of salt cake. As of 2013 it was estimated to contain about 705,000 curies of radioactivity, of which about 75% is from Cs-137. The salt cake in this tank contains retained hydrogen gas, which poses a hazard if released as a result of the addition of water to dissolve the salt.

In 2007, a report by Pacific Northwest National Laboratory (PNNL) describes the history of this tank as follows:

> "From 1990 through 1993, SY-101's flammable gas troubles were acknowledged as the highest priority safety issue in the entire DOE complex. Uncontrolled crust growth demanded another high-priority remedial effort from 1998 through April 2000. The direct cost of the bubbles, toils, and troubles was high. Overall, the price of dealing with the real and imagined hazards in SY-101 may have reached $250 million. The indirect cost was also high."

Removing radioactive cesium elements is not enough to guarantee the integrity of the grout. There are also several chemicals in the SY-101 tank liquids that can cause deterioration of the

cement used in grout. According to the Portland Cement Association, "chlorides and nitrates of ammonium, magnesium, aluminum, and iron all cause concrete deterioration, with those of ammonium producing the most damage." All of these elements are present in Hanford's tank waste and it raises an important question as to whether Perma-Fix Northwest will have to control them to ensure the integrity of its grout.

Tank SY-101 has one of the largest Total Organic Carbon (TOC) loads of Hanford's HLW tanks. Nearly 150 volatile organic compounds have been measured in retained gas emanating from the slurry in this tank. At 46,900 kg, this quantity of organic compounds poses a significant challenge without potentially complex pretreatment prior to grouting in order to comply with RCRA land disposal restrictions.

Response:

As reported in Section 3.6.1 of this EA, "As of February 28, 2021, waste tank SY-101 contained approximately 1.1 million gallons of total waste consisting of approximately 888,000 gallons and 223,000 gallons of supernate and saltcake, respectively." The latest best-basis inventory for tank SY-101 shows that the tank contains approximately 286,000 curies of key radionuclides with about 86,700 curies being in the supernate, 99.5 percent of which is cesium-137.

During the operation of the ITPS, the majority of the cesium would be removed from the liquid waste and the total amount of radioactivity in the pretreated liquid waste would be about 1.8 curies, as reported in Appendix A of this EA.

The TBI Demonstration would involve processing less than 1 percent of the supernate in tank SY-101 (2,000 gallons out of 223,000 gallons). Less than 10 percent of the total organic carbon in tank SY-101 is associated with the supernate phase. The most recent sample results (as documented in the Final WIR Determination) indicate a maximum total organic carbon concentration in the supernate of 963 mg/L or just under 1 g/L total organic carbon. Tests have been conducted with both simulated Hanford LAW and liquid secondary wastes containing up to 16 g/L total organic carbon immobilized in cementitious waste forms. Results showed no deleterious effects on curing properties, and the final waste forms easily met LDR requirements as measured via EPA Method 1311, *Toxicity Characteristic Leaching Procedure*.

Comment 6-9:

Groundwater risks need to be evaluated.

The fact that discussion of grout treatment at facilities like Perma-Fix Northwest does not include or evaluate the relative risks to groundwater, air, and local populations makes this draft EA incomplete. The Perma-Fix NW Annual Environment Report for 2020 states that "the area water table varies from approximately 10 feet at the west well to 21 feet at the east well." Contrast this with the hundreds of feet to the water table in the Hanford 200 Areas. A spill during the handling or transportation of wastes at PFNW would quickly contaminate water that flows towards intakes and wells used by the City of Richland for drinking and irrigation. There is a history of Perma-Fix NW experiencing losses of contamination control at the facility.

Response:

DOE is not the regulatory authority over operations of PFNW. PFNW has licenses and permits issued by the State of Washington. As long as the liquid MLLW is acceptable to be processed within the constraints of the PFNW's dangerous waste permit, then no additional environmental impacts would be expected beyond those evaluated during the permitting process.

Comment 6-10:

Tank vapor issues, including more accurate information on worker health and safety risks, and data on chemical constituents in the waste, need to be included.

Tank SY-101 was a "burping" gas-producing tank, containing a variety of organic and inorganic compounds. Tank vapor releases pose a threat to both workers and the public nearby the Perma-Fix NW facility. Incredibly, the DOE characterizes vapor risks for workers in the EA as minimal or temporary. This statement belies the long history of vapor exposures at Hanford and is demonstrative of the DOE's dismissive attitude towards the health and safety of workers.

This statement come on the heels of a just-released report from the Washington State Department of Commerce that conducted a survey of some 1,600 Hanford workers who reported that 57% of those surveyed had been exposed to toxic vapors.

- Nearly a third, 32%, reported they had long-term exposure to hazardous materials at the nuclear reservation, rather than exposure during a single incident. The survey was conducted by the Hanford Healthy Energy Workers Board. The board was created by the Legislature and directed to survey workers and then provide recommendations to better meet the health care needs of Hanford workers.
- Over 21% of those surveyed said they had illnesses due to a short-term exposure to hazardous materials at Hanford. In addition, 28% said they had illnesses from long-term exposure to hazardous materials at Hanford.

The EA does not contain information on the chemical constituents present in the waste. This is the kind of data that an environmental analysis must contain.

Response:

Tank SY-101 was remediated in 1999 and 2000 through a series of waste transfers and subsequent water dissolution of the waste. As a result, headspace gas samples showed hydrogen and nitrous oxide had dropped to being at or below instrument detection limits (about 5 ppm). Section 3.3.2.1 of this EA has been revised to include the following statement, "Waste chemical content and potential gas and vapor release would be evaluated as part of the work planning process to ensure that proper engineering and all applicable and relevant industrial hygiene controls are in place to protect workers and the environment prior to waste-disturbing activities being initiated."

Comment 6-11:

The DOE EA does not perform any kind of cumulative impact analysis of the operations at Perma-Fix NW.

The DOE EA states that the 2,000 gallon treatment project would be a "small" fraction of the total capacity at Perma-Fix NW and elsewhere. The EA should evaluate the cumulative impact of the waste forecast for treatment at Perma-Fix NW, per DOE's "emwims.org" web page. The sum of all the waste to be sent to PFNW is not only large by any standard, but is expected to grow even larger in the near future.

The volume and degree of radiologically-contaminated and high hazard waste DOE plans to send to Perma-Fix Northwest over the next 45 years should be considered against the additional waste DOE may send to Perma-Fix NW for treatment. The EA should assess the cumulative human and environmental risks to the surrounding residential communities and workers. According to DOE projections, Perma-Fix NW is planning to accept and treat more than 43,000 cubic meters of mixed and low level radioactive wastes from Hanford and other sites between now and 2066. This will include toxic lead, cadmium, and mercury; pyrophoric depleted uranium metal, organic liquids, Waste Treatment Plant (WTP) wastes, contaminated equipment, radioactive lead wastes, transuranic wastes, contaminated pumps, Direct-Feed Low-Activity Waste (DFLAW) residuals, contaminated devices, and transfer lines. This also includes more than 600 cubic meters of radioactive wastes in packages larger than 10 cubic meters and with contact activity above 200 mRem per hour which will require remote handling. Some wastes, such as 473 cubic meters of spent resin (possibly for Cs-137 removal) will have unknown activity.

The magnitude of dangerous radioactive and non-radioactive hazardous waste envisioned to be processed by DOE at Perma-Fix Northwest over the next 45 years, if realized, could well exceed the current regulatory capabilities of Washington State and the EPA to ensure safety of workers and the public.

Response:

DOE presented a cumulative impacts analysis of reasonably foreseeable environmental trends and planned actions at PFNW in Sections 3.8.1.2 and 3.8.2.2. The expected duration of the Proposed Action at PFNW would be a few weeks. See the response to Comment 6-2 for the potential for a follow-on "Phase 3." Section 3.8.2.2 of this EA has been revised to include the following statement, "Regardless of the specific waste streams proposed for treatment at PFNW over the coming years, whether from Hanford or other clients, PFNW operations would be in compliance with the facility's licenses and permits and would not present cumulative impacts beyond those evaluated as part of the State's permitting process."

Washington Department of Ecology

Comment 7-1:

Public participation

Ecology Letters 19-NWP-064 and 21-NWP-140 addressed the need for public involvement in this Environmental Assessment (EA). Specifically, the U.S. Department of Energy (DOE) rules require DOE to "make its NEPA documents available to other Federal agencies, states, local governments, American Indian tribes, interested groups, and the general public, in accordance with 40 CFR 1506.6, except as provided in § 1021.340 of this part." 10 C.F.R. § 1021.301(a).

NEPA regulations require agencies to "[s]olicit appropriate information from the public." 40 C.F.R. § 1506.6(d). "The Ninth Circuit has interpreted NEPA's regulations to mean that the public must be given an opportunity to comment on draft EAs and draft EISs." *Ocean Mammal Institute v. Gates*, 546 F.Supp.2d 960, 972 (2008) (citing *Citizens for Better Forestry v. U.S. Dept. of Agriculture*, 341 F.3d 961, 970 (9th Cir.2003)).

Ecology again encourages DOE to publish a Federal Register notice to announce the availability of a draft EA with a 30-day public comment period and public meeting, after incorporating changes to the draft EA based on comments received during the 14-day agency review period. Ecology also encourages DOE to utilize the Hanford Public Involvement Plan for Phases 2 and 3 of DOE's Test Bed Initiative (TBI).

Response:

DOE complied with the DOE NEPA implementing procedures for this EA (10 CFR 1021.301) by providing the host states and host tribes the opportunity to review the draft EA, and also provided this opportunity to potentially affected states and tribes. In response to this review, DOE received 118 comment documents from states, tribes, organizations, and individuals. Responses to these comments are addressed in this comment response appendix.

To clarify, there is no "Phase 3" planned for TBI. While the potential of Phase 3 was announced several years ago, at this point, DOE proposes to complete the TBI engineering-scale demonstration. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Comment 7-2:

Inaccurate and inconsistent use of the terms LAW and MLLW

Section 1.1 (Pg. 1-1), refers to pretreated tank waste as "low-activity waste (LAW) and high-level radioactive waste (HLW)." See also pages 1-3, 1-4, 1-7. The second sentence of Section 1.2.1 (Pg. 1-3) acknowledges that waste subject to a Waste Incidental to Reprocessing (WIR) determination "could be managed and disposed of as MLLW." See also Section 1.2.2 (waste subject to a WIR Determination "may be managed under DOE's authority as MLLW."). The text then shifts to referring to the waste as MLLW, not only for disposal purposes, but for treatment purposes as well. (For example, Pg. 1-3, "classified as MLLW"; Pg. 1-4, "Following pretreatment, DOE would characterize and, if appropriate, classify the waste as MLLW").

We encourage the use of consistent and accurate terminology throughout the EA. Specifically, refer to the low-activity fraction of tank waste (including pretreated tank waste) as LAW to distinguish it from MLLW for RCRA treatment purposes. Note that using the term LAW is

consistent with the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site (draft EA page 1-7).

Response:

DOE has reviewed this EA to ensure the proper use of terminology for LAW, LLW, and MLLW. LAW is a term that Hanford has used to describe tank waste from which key radionuclides have been removed. LAW can only be referred to and managed as MLLW after a WIR Determination has been made.

The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW. DOE prepared the Final WIR Evaluation after consulting with the NRC and after considering comments from the NRC, stakeholders, states, tribal nations, and the public. Based on the Final WIR Evaluation, DOE may issue a WIR Determination.

Comment 7-3:

HLVIT LDR Treatment Standard

Note that DOE's radiological waste classification process under DOE Order 435.1 is separate and distinct from the RCRA Land Disposal Restriction (LDR) requirements. The Order 435.1 WIR process is governed by internal DOE orders pursuant to its AEA authority, and does not affect any RCRA provisions. DOE acknowledged this concept in DOE Order 435.1 Implementation Guide (rescinded in 2021 associated with administrative changes to DOE Order 435.1):

> "A treatability variance (40 CFR 268.44) and/or determination of equivalent treatment (40 CFR 268.42(b)) may be necessary to fully comply with the LDR standards if a DOE site elects to use a technology other than vitrification, the BDAT, of [sic] if it is impractical to comply with all the standards applicable to individual waste codes."
>
> In other words, waste subject to a WIR determination can be disposed of as MLLW for Atomic Energy Act and Nuclear Waste Policy Act purposes (i.e., disposed in a location other than a deep geologic repository), however, a WIR determination alone does not affect any RCRA regulatory requirements. Under RCRA, waste codes and treatment standards attach at the point of generation. Thus, the HLVIT LDR treatment standard attached to Hanford tank wastes at the point of generation and remains applicable unless and until one of the following factions occur:
>
> (1) the waste is vitrified in accordance with the HLVIT standard prior to land disposal;
>
> (2) the regulatory authority for the disposal site issues a site-specific treatability variance under 40 CFR 268.44(h) (plus treatment to satisfy LDR standards for any other waste codes other than D002 and D004-D011);

(3) EPA issues a determination of equivalent treatment under 40 CFR 268.42(b) (i.e., treatment to some other method can be approved through a determination of equivalent treatment with respect to the HLVIT treatment standard plus treatment for any other waste codes other than D002 and D004-D011);

or

(4) EPA approves a no-migration petition for the disposal site under 40 CFR 268.6.

There is no new point of generation after pretreatment because the LDR treatment standard of vitrification (HLVIT) has already attached to the waste and pretreatment does not meet the HLVIT treatment standard. Thus, the change in treatability group principle does not apply after pretreatment.

Include a description of how DOE intends to address the RCRA LDR treatment standard of HLVIT, which attached to the tank waste at the point of generation (see above comment). Specifically, given that this draft EA is premised on the HLVIT treatment standard not being met, describe how DOE plans to obtain a site-specific treatability variance, a determination of equivalent treatment, or a no-migration variance.

Response:

The TBI Demonstration EA has been prepared to evaluate the potential environmental effects of using a small liquid portion of the tank wastes (approximately 2,000 gallons) to examine the viability of an alternative treatment path for a portion of the tank wastes.

DOE prepared a Final WIR Evaluation in accordance with DOE Manual 435.1-1, *Radioactive Waste Management Manual.* The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW. DOE prepared the Final WIR Evaluation after consulting with the NRC and after considering comments from the NRC, stakeholders, states, tribal nations, and the public. Based on the Final WIR Evaluation, DOE may issue a WIR Determination. The pretreated LAW would be MLLW for the purposes of RCRA LDR treatment standards. Thus, the HLVIT treatment standard for HLW does not apply to such MLLW.

The HLVIT LDR treatment code is appropriate for instances where the waste is HLW, requiring a treated product matrix that is glass. In instances where pretreatment of tank supernate results in separation of HLW and LLW fractions, the appropriate LDR treatment standards for the LLW fraction are those appliable to other MLLW streams. As identified in Section 1.4 of this EA, an integral part of the Proposed Action is the confirmation that the pretreated liquid would meet the waste acceptance criteria of the permitted and licensed receiving facility.

Comment 7-4:

There are numerous comments from Ecology that solely address changing MLLW to LAW. These include locations at the following:

p. 1-3; Section 1.2.1	p. 1-5; Section 1.4	p.1-6; Section 1.4
p. 2-1; Section 2	p. 2-1; Section 2.1.1	p. 2-2; Section 2.1.1, Fig, 2-1
p. 2-2; Section 2.1.1, Fig, 2-2	p. 2-4; Section 2.1.1	p. 2-6; Section 2.1.3
p. 2-6; Section 2.1.4	p. 2-7; Figures 2-3 and 2-4	p. 2-8; Figure 2-5
p. 2-9; Section 2.3	p. 3-2; Table 3-1	p. 3-5; Section 3.3.2.1
p. 3-6; Section 3.3.2.1	p. 3-6; Section 3.3.2.2	p. 3-7; Section 3.3.2.3
p. 3-8; Section 3.3.2.4	p. 3-10; Section 3.4.2.1	p. 3-11; Section 3.4.2.2
p. 3-11; Section 3.4.2.3	p. 3-12; Section 3.4.2.4	p. 3-14; Section 3.5.2.1
p. 3-14; Section 3.5.2.2	p. 3-15; Section 3.5.2.2	p. 3-15; Section 3.5.2.3
p. 3-15; Section 3.5.2.4	p. 3-16; Section 3.5.4	p. 3-19; Section 3.6.1.2
p. 3-19; Section 3.6.1.3	p. 3-21; Section 3.6.2.1	p. 3-22; Section 3.6.2.2
p. 3-22; Section 3.6.2.3	p. 3-23; Section 3.6.2.3	p. 3-23; Section 3.6.2.4
p. 3-23; Section 3.7.1	p. 3-24; Section 3.7.1	p. 3-26; Section 3.7.2.1
p. 3-28; Section 3.7.2.1	p. 3-28; Section 3.7.2.2	p. 3-28; Section 3.7.2.3
p. 3-29; Section 3.7.2.4	p. 3-29; Section 3.7.3	p. 3-32; Section 3.8.2.2
p. 3-32; Section 3.8.2.3	p. 3-32; Section 3.8.2.4	p. 3-33; Section 3.8.2.4
p. 3-33; Section 3.8.2.5	p. A-2; Table A-1	p. A-5; Section A-5
p. A-6; Section A-3	p. A-6; Table A-4	p. A-6; Table A-5

Response:

Per the response to Comment 7-2, this EA accurately reflects pretreated waste in the process totes as MLLW.

Comment 7-5:

Page 1-5; Section 1.4.

Revise text as follows for accuracy: "Transportation (to a destination depending on the alternative) and disposal of the solid, stabilized waste at a permitted and licensed facility for disposal." As worded, sentence can be interpreted to mean that transportation would not occur under some alternatives. Revised language clarifies that different alternatives have different disposal locations.

Response:

The statement referred to by the commenter refers only to the transportation of the treated and stabilized MLLW from a treatment facility to a disposal facility. This is a true statement because under Alternatives 3 and 4, the MLLW would be treated and stabilized at the disposal facility (WCS or Energy*Solutions*) and not require additional transportation. Clarifying revisions were made to Section 1.4 of this EA.

Comment 7-6:

Pg. 1-6, Section 1.4, footnote 8

Provide a description of the disposal pathway in the event the waste stream is classified as greater than Class C.

Response:

As identified in Sections 1.5.3 and 6.0 of the Final WIR Evaluation, the pretreated and solidified tank SY-101 waste in the TBI Demonstration would be well below the NRC concentration limits for Class C LLW and would be expected to meet Class A LLW concentration limits set forth in 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Section 55, "Waste Classification." Additionally, even if the cesium-137 were not removed from the 2,000 gallons of tank waste, the initial concentrations of all key radionuclides are well below the NRC Class C concentration limits. Therefore, it is not feasible for the stabilized MLLW from the TBI Demonstration to be greater than Class C.

Comment 7-7:

Pg. 2-1; Section 2.1.1

Include in the above (third bullet point) a description of the type of RCRA variance DOE intends to pursue to meet RCRA LDR treatment standards.

Response:

As discussed in the response to Comments 7-2 and 7-3, the waste would be classified as MLLW for treatment and disposal.

Comment 7-8:

Page 2-3, Section 2.1.1

The use of a non-elutable IX media would have different impacts than an elutable resin. The decision to use a non-elutable resin may have the greatest potential impact of any aspect of this proposal. We suggest that the EA discuss the difference in impacts.

The last sentence in the third full paragraph refers to "heavy metals and organics" but doesn't describe the relative hazards of those constituents. Compare this lack of detail to the precise description of radiological content (e.g., "0.3 curies per container"). We suggest adding more detail about the heavy metals and organics.

Response:

The use of a non-elutable IX media for the TBI Demonstration was identified in DOE's TBI Demonstration application submitted to Ecology in 2019 for a research, development, and demonstration permit. It is consistent with the approach used for the use of a tank-side cesium removal to support DFLAW. Section 3.6.2.1 of this EA identifies that disposition of the IX column is expected to be bounded by, or represent a negligible increase of the impacts as analyzed in, the TC&WM EIS and the DFLAW Supplement Analysis (DOE/EIS-0391-SA-02). The DFLAW Supplement Analysis demonstrated that the potential storage of tank-side cesium removal IX columns (which were also non-elutable) on a pad in the 200 East Area would not constitute a significant change to the proposed action evaluated in the TC&WM EIS. Those columns, which could hold from 25,000 curies to 150,000 curies each, would be notably larger

than the IX column that is proposed as part of the ITPS, which would be expected to contain approximately 150 curies of cesium-137. If the TBI Demonstration IX column ends up following the same disposition path as planned for the tank-side cesium removal columns, it would eventually be sent to the WTP for vitrification.

Section 2.1 of this EA has been updated to provide more detail on the hazardous constituents in the TBI waste. The treatment of hazardous materials would be accomplished through application of the processes included in the treatment facility's permits. As referenced in Section 2.1 of this EA and in the Final WIR Evaluation, DOE has a grab sample report from the upper layer of waste in tank SY-101 that provides the concentrations of dangerous and radiological constituents as of 2018. As described in Section 2.1 of this EA, the primary hazardous constituents in the pretreated waste include organics (benzyl butyl phthalate and bis(2-ethylhexyl) phthalate) and heavy metals (chromium and selenium). The potential health effects of these constituents were considered in Section 3.5.2. From a long-term perspective, as identified in Section 2.1.1, the waste would be treated to ensure compliance with RCRA LDRs and the waste acceptance criteria of the permitted and licensed disposal facility.

Comment 7-9:

Pages 2-3 through 2-4

Transportation to PFNW is discussed, but the steps of unloading the waste is skipped. Waste loading/unloading is a significant step with potential for accidents to cause releases, so we suggest adding discussion of that step. We note that page 2-3 the EA describes the loading of the waste at Hanford in more detail than is given to the unloading at PFNW.

Response:

Operations at PFNW, including unloading, treatment, and loading of a shipment bound for disposal, would be governed by their radioactive materials license, toxic air pollutants permit issued by Benton Clean Air Agency, and dangerous waste permit issued by the State of Washington. As long as the waste is acceptable to be processed within the constraints of the PFNW's license and permits, no new or additional adverse impacts would be expected beyond those already evaluated and accounted for during the State's permitting process.

Comment 7-10:

Page 2-4, Section 2.1.1

Describe the type of RCRA variance DOE intends to pursue to meet RCRA LDR treatment standards.

Response:

As discussed in the response to Comments 7-2 and 7-3, the waste would be classified as MLLW for treatment and disposal.

Comment 7-11:

Page 3-24 through 3-26

The text on Page 3-24 states "As shown in Figure 3-1, the waste shipments for the proposed TBI Demonstration would be transported over federal highways for the majority of the route." This omits discussion of LAW transported from Hanford over publicly-accessible roads located on US DOE property, then onto City of Richland streets. It omits discussion of treated waste transported over city streets until, presumably, transport would continue on I-182 and I-82. Then the text on Page 3-26 about emergency response is generic, not specific. The responsibility for emergency response to a transportation accident may change as waste is transported from Hanford over publicly-accessible roads located on US DOE property, then onto City of Richland streets. We request added text to clarify the responsibility and capability for emergency response at each of these 3 stages (DOE property, City of Richland streets, and the Interstate highways) within Washington State.

Response:

The entire waste transportation process, from start to finish (i.e., onsite at Hanford, from Hanford to the selected treatment facility, from the treatment facility to a disposal facility, if applicable) would be done in accordance with applicable USDOT regulations.

If an accident were to occur during transport, emergency services responsible for the applicable location of the event would respond in accordance with applicable state and federal regulations; the same as they would for any accident that occurs on a public roadway within their area of assigned responsibility. Emergency services personnel, even those located off the Hanford Site that do not work for DOE, are trained per applicable regulations on how to respond to a large variety of accidents, including those that may involve the transport of mixed, radiological, or hazardous waste.

No unique or special circumstances are involved in making this singular, discrete shipment that would trigger a corresponding unusual adverse impact beyond the normal, standard impacts that can potentially occur with any hazardous or mixed waste shipment being made on a public roadway. The reasonable and expected potential adverse impacts associated with the transportation of the waste on public roadways are already accounted for in Section 3.7 of this EA.

Comment 7-12:

Page 2-5, Section 2.1.1, 1st paragraph

The third sentence in the first paragraph reads, "The radioactive material licenses authorize PFNW to possess and process radioactive material, including treatment and stabilization." This sentence can be interpreted incorrectly that only DOH's license would allow treatment of TBI phase 2 waste, which is "mixed radioactive and chemically hazardous waste". Treatment of mixed waste at PFNW is regulated under a Dangerous Waste Regulations (DWR) permit. See Page 2-5 ("PFNW also operates under a permit for treatment and storage of dangerous waste (Permit Number WAR 000010355).") PFNW's DWR permit does not currently allow for

treatment of hazardous waste to which the HLVIT treatment standard has attached. As discussed above, a RCRA variance or determination of equivalent treatment would be required before PFNW could accept LAW for stabilization.

Section 3.3.2.1 (pg. 3-5) in the last sentence also reads; "…the liquid MLLW would be treated and stabilized at the PFNW facility using the ICM. Operations at PFNW would be conducted in accordance with its radioactive material licenses (WDOH 2022a, 2022b)". PFNW's DWR permit addresses the permitted use of the ICM.

The above two quoted sentences are misleading and inconsistent with the last sentence of the first paragraph in Section 3.6.1.2, that reads; "The licenses *and permit* authorize PFNW to possess and process radioactive material, including treatment and stabilization." (Emphasis added.) Ecology agrees with this sentence.

Please revise the sentences in Section 2.1.1 and Section 3.3.2.1 to refer to the DWR permit for accuracy and consistency throughout the document.

Response:

The sentence referenced in the comment in Section 2.1.1 of this EA has been revised to indicate that the radioactive materials licenses **and** the dangerous waste permit are both required for implementation of Alternative 1.

See response to Comment 7-3 for why the HLVIT is not applicable.

Section 3.3.2.1 in this EA has been revised to reflect that the dangerous waste permit addresses use of the ICM. DOE would complete the waste acceptance process for PFNW to be able to accept the waste for treatment.

Comment 7-13:

Page 2-5, Section 2.1.1, 3rd paragraph

The first sentence states "Once treated and stabilized, PFNW would transport the waste . . . ."

The third sentence states "In fiscal year 2020, DOE's transportation contractors safely transported more than 3,200 hazardous materials shipments over 6 million miles with no USDOT recordable accidents."

The fourth sentence refers to "DOE's transportation contractors and transportation contractors used by PFNW . . .." Page 3-26 refers to transportation by contractors to PFNW, and later indicates that PFNW would use DOE transportation. Update the EA with a more precise and consistent description of waste transportation.

The second sentence reads, "DOE estimates that two truck shipments would be required to handle the approximately 62 waste drums". Update the EA to include the disposition pathway for the six process totes, including whether they will be decontaminated at PFNW and then sent back to the Hanford Site for reuse or sent to the disposal site with the 62 waste drums. Also address

whether there are other secondary wastes generated that will be sent for disposal with the 62 waste drums

Response:

Section 2.1.1 of this EA has been revised to clarify that transportation contractors are used by both DOE and PFNW. After the process totes have been emptied at the treatment facility, they would be treated as secondary waste and disposed of in accordance with the treatment facility's permitted processes for MLLW disposal. DOE does not anticipate that this disposal would require any additional waste shipments.

Comment 7-14:

Page 2-5, Section 2.1.1, footnote 13

Revise text as follows: "PFNW The current estimate for issuance of the PFNW Dangerous Waste Regulations permit renewal is October 2023 is currently in discussions with Ecology to renew PFNW's Dangerous Waste Regulations permit. After the permit renewal, DOE would verify with Ecology that the 2,000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit."

Response:

The footnote in Section 2.1.1 of this EA that refers to PFNW's dangerous waste permit has been revised in the final EA. While PFNW is currently in discussions with Ecology regarding the renewal of its permit, PFNW is currently operating under Permit Number WAR 000010355. DOE has compared the projected radionuclide and chemical constituents of the TBI waste stream against the PFNW waste acceptance criteria and determined preliminarily that the current permit would allow the treatment and stabilization of the 2,000 gallons of pretreated MLLW. Therefore, the phrase, "after the permit renewal..." has been deleted.

Comment 7-15

Page 2-6. Section 2.1.3

Describe how WCS is licensed to accept LAW.

Response:

See response to Comments 7-2 and 7-3.

Comment 7-16:

Page 2-6. Section 2.1.3

Describe how EnergySolutions is licensed to accept LAW

Response:

See response to Comments 7-2 and 7-3.

Comment 7-17:

Section 3.3

2020 inventory values have already been provided to Ecology and could be included or substituted for 2019 values.

Response:

The referenced inventory values came from the publicly available Annual Site Environmental Report for 2020 (DOE/RL-2021-15). The 2020 values from the Annual Site Inventory Report issued in September 2021 have been included in Section 3.3.2 of this EA.

Comment 7-18:

Page 3-3, Section 3.3.2.1, Paragraph 3

Incorrect citation to AOP regulations (Title 173, Chapter 401—not Chapter 480)

Response:

The citation has been corrected in Section 3.3.1 of this EA.

Comment 7-19:

Page 3-3, Section 3.3.2.1

There is no reference to the applicable requirements of WAC 173-400, such as 173-400-040 (General standards for maximum emissions), 173-400-075 (Emission standards for sources emitting hazardous air pollutants), 173-400-105 (Records, monitoring, and reporting), 173-400-110 (New source review for sources and portable sources)

In particular, there is no mention of the need for NOC Approval Orders for any activities not already incorporated into the AOP or whether the TBI activities meet the requirements of current Approval Orders for 241-SY and the exhausters.

Response:

DOE would follow the provisions of applicable air pollutant regulations and the air operating permit program during implementation of the Proposed Action. Preliminary air emission assessments suggest a toxic air permit is not required under WAC 173-400 or WAC 173-460; therefore, no action is required under WAC 173-401. As radioactive air emission regulations in WAC 246-247 do not have a *de minimis* threshold, a Washington State Department of Health one-time approval authorization is anticipated per WAC 246-247. Section 3.3.2.1 of this EA has been updated with this information.

Comment 7-20:

Page 3-4, Table 3-2

The provided table is incomplete for the site and not representative of emissions from DSTs. Currently, potential to emit from the tanks alone includes more than 100 TAPs, not including other significant on-site TAPs such as diesel exhaust particulate matter from engines. Additionally, the 2019 emission inventory doesn't represent the significant increase in emissions expected when DFLAW/WTP actually begins to operate. Even though TAP emissions are significantly less than the criteria pollutant emissions listed in Table 3-2, including just ammonia makes it appear that this is the only TAP of concern for Hanford and the DSTs.

Table 3-2, or an additional table, should include a more complete list of expected TAP emissions. If inventory values are presented, discussion should address that Hanford has generally not reported most TAPs and the justification for their omission on the inventory.

Response:

Section 3.3.1, which includes Table 3-2, has been revised to reflect information from the Annual Site Environmental Report that describes the annual reporting of criteria pollutants and toxic air pollutants. A preliminary assessment of potential air pollutant emissions, based on the tank SY-101 headspace and ventilation system sample data, demonstrated that expected emissions would not exceed the WAC 173-400-110(5) exemption levels. The finalized assessment would be completed prior to implementation of the Proposed Action. Section 3.3.2.1 of this EA has been updated with this information.

Comment 7-21:

Page 3-5, Section 3.3.2.1, Paragraph 1

There is no mention as to whether the exhauster will continue to run during insertion of ITPS to maintain negative pressure in the tank, or of potential changes in emission from this step. Emissions, including VOC and other criteria pollutants, should be addressed for this step

Response:

See response to Comment 7-19 regarding air pollutant emissions. It is anticipated that construction activities associated with this action would not impact exhauster operations for Tank 241-SY in its normal operating configuration. The exhauster operations would not be affected because the ITPS would be installed in a different riser.

Comment 7-22:

Page 3-5, Section 3.3.2.1

"No air emissions would occur during this process since the filtration, IX, and pumping would be within the actively ventilated headspace of the tank."

- The tanks are constantly emitting and agitation of tank waste tends to release vapors from the waste. The discussion should address emissions from the tanks during TBI compared to what is authorized in current Approval Orders and the Air Operating Permit.

- Current Approval Orders may be based upon the site boundary, rather than the current ambient air boundary identified in the "Memorandum of Agreement Between the U.S. Department of Energy Richland Operations Office and office of River Protection and the Washington State Department of Ecology Regarding the Hanford Ambient Air Boundary," signed July 22, 2020.

Response:

See response to Comment 7-19 regarding air pollutant emissions.

Comment 7-23:

Page 3-5, Section 3.3.2.1

"Air displaced from the totes during filling would be vented through high-efficiency particulate air filters, which are more than 99.95 percent effective in capturing radionuclides. The resultant emissions would contain negligible concentrations of radionuclides."

- How is "negligible concentrations of radionuclides" defined?

- There is no mention whatsoever of the criteria and/or toxic air pollutants that would be emitted during this displacement, which apparently would be unabated except for particulate matter (no mention of any treatment or control other than HEPA filters for the rad emissions).

Response:

See response to Comment 7-19 regarding air pollutant emissions. A one-time approval authorization is anticipated under WAC 246-247 for radioactive air emissions. Section 3.3.2.1 of this EA has been updated with this information.

Comment 7-24:

Page 3-5, Section 3.3.2.1

Potential emissions from the backwashing, drying, and equipment removal/disposal processes are not addressed. The process could potentially be referenced to elsewhere in the document, such as Section 3.6.2.1, but there should be a discussion as to what is known about whether equipment will be ventilated through the tank and an exhauster, isolated from the tank, or otherwise handled for these steps. Resultant emissions, including VOC and other criteria pollutants, should be addressed for this step.

Response:

The Tank 241-SY exhauster system would be operating under normal configurations during the equipment demobilization and removal. Caustic flushes, water flushes, and air purges of the treatment column and delay tote would be flushed directly into the DST. The demobilization process would constitute a small air infiltration into the DST while negative pressure is maintained by the 241-SY exhauster. No increases of volatile organic compounds or other emissions from the 241-SY exhauster during this process are anticipated.

Comment 7-25:

Page 3-5, Section 3.3.2.1

"Operations at PFNW would be conducted in accordance with its radioactive material licenses."

- There is no mention of the BCAA permit for criteria and toxic air pollutant emissions from PFNW.

Response:

Section 3.3.2.1 of this EA has been modified to include reference to the Benton Clean Air Agency Order of Approvals for PFNW.

Comment 7-26:

Page 3-5, Section 3.3.2.1

In the last paragraph, describe the type of RCRA variance DOE intends to pursue to meet RCRA LDR treatment standards.

Include a discussion on emission impact of heavy metals and organics (i.e., volatile organics) during the waste transfer from delay tote to process totes.

The 3rd sentence in the last paragraph reads, "the treatment and stabilization process entails chemicals and other material, such as cement or polymeric-like materials, being added to the MLLW in a bulk mixer inside of the permitted and licensed facility and transferred to a disposal container to cure."

This sentence is misleading as it could be interpreted as there might be another treatment unit besides ICM. In addition, in the treatment with ICM, a 55-gallon drum serves as both the mixing vessel and the final disposal containers for the waste being treated in this process. Adding reagents to the LAW, mixing, curing, and disposal all takes place in the same 55-gallon drum. Revise the sentence to include a more accurate description of the treatment and stabilization process at PFNW.

Response:

As discussed in the response to Comments 7-2 and 7-3, the waste would be classified as MLLW for treatment and disposal. DOE will complete the waste acceptance process with PFNW as required to support PFNW's acceptance of the waste for treatment.

See response to Comment 7-19 regarding air pollutant emissions.

Section 3.3.2.1 in this EA has been revised to reflect current operations of the ICM.

Comment 7-27:

Page 3-6, Section 3.3.2.1

"The approximately 2,000 gallons of MLLW processed under the Proposed Action would account for less than 1 percent of the annual treatment capacity of the ICM equipment at PFNW and would therefore not contribute to potential air impacts beyond those evaluated as part of the permits and licenses granted by the State of Washington."

- This conclusory statement is not supported by any narrative description of the analysis that supports it. If the TBI waste can, and will be, accepted under current permits without increasing potential to emit this is a different situation than TBI being an additional new material added under the physical capacity of PFNW.

- This should be modified to recognize BCAA as the air permitting authority for PFNW.

Response:

PFNW operates under two Order of Approvals from the Benton Clean Air Agency (OA2008-0009 and OA2007-0009). Section 3.3.2.1 in this EA has been modified to recognize Benton Clean Air Agency as the air permitting authority. DOE would complete the waste acceptance process with PFNW as required to support PFNW acceptance of the waste for treatment. This EA has also been modified to remove the specific percentages of annual treatment capacity, as this information may incorrectly imply that DOE is adding to existing capacity.

Comment 7-28:

Page 3-17 through 3-18, Section 3.6.1.1

It is misleading to focus on LLW and MLLW without any description of HLW and DOE Order 435.1-1. As stated on Page 1-2, "Hanford tank waste is managed as HLW mixed with hazardous chemicals." Provide a description of HLW and the Waste Incidental to Reprocessing process applicable at Hanford, including that waste subject to a WIR determination can be managed and disposed of as MLLW under DOE's authority, but is not MLLW for RCRA LDR treatment purposes

Response:

See response to Comments 7-2 and 7-3. Section 1.2.2 of this EA adequately describes the relationship between the WIR Evaluation and the TBI Demonstration Proposed Action evaluated in this EA.

Comment 7-29:

Page 3-21, Section 3.6.2.1

Revise text as follows for accuracy: "Under Alternative 1, the primary waste stream would begin with the pretreated ~~MLLW~~LAW produced from in-tank settling and the ITPS, continue with treatment and stabilization of the ~~MLLW~~LAW at PFNW utilizing a non-thermal, chemical treatment and solidification process using grout, as was done for the TBI low-activity test samples in 2017, and end with disposal at a permitted and licensed MLLW disposal facility. The final treated, grouted, solid material would be contained in approximately 62, 55-gallon drums and shipped to a MLLW disposal facility.

Disposal of the grouted waste at the MLLW disposal facility would be conducted in accordance with the receiving facility's operating license, hazardous waste permit, and waste acceptance criteria. This will be the first ~~T~~ttreatment and stabilization of ~~the~~ ~~MLLW~~LAW at PFNW. ~~is a routine activity~~ After the permit renewal, DOE would verify with Ecology that this activity would be allowed under its permit."

Describe how potential waste management impacts would be negligible if that language is retained

Response:

See response to Comments 7-2 and 7-3 regarding the applicability of the terms "LAW" and "MLLW". PFNW has a permit to treat and stabilize MLLW at its Richland facility. This is not an original or unique process.

Operations at PFNW, including unloading, treatment, and loading of a shipment bound for disposal, would be governed by their radioactive materials license, toxic air pollutants permit issued by Benton Clean Air Agency, and dangerous waste permit issued by the State of Washington. As long as the waste is acceptable to be processed within the constraints of PFNW's license and permits, no new or additional adverse impacts would be expected beyond those already evaluated during the State's permitting process.

Comment 7-30:

Page 3-23, Section 3.6.2.3

Explain how treatment and stabilization of LAW at WCS FWF is a routine activity.

Page 3-23, Section 3.6.2.4

Explain how treatment and stabilization of LAW at EnergySolutions is a routine activity

Response:

See response to Comments 7-2 and 7-3. Both of these facilities, WCS and Energy*Solutions*, are already authorized to and actively treat and stabilize MLLW under their existing permits.

Comment 7-31:

Page 3-28, Section 3.7.2.1

Describe how LAW equates to MLLW for transportation purposes

Response:

See response to Comments 7-2 and 7-3.

Comment 7-32:

Page 3-32, Section 3.8.2.2

Revise text as follows for accuracy: "The treatment and stabilization of ~~MLLW~~LAW from the proposed TBI Demonstration ~~w~~could ~~not~~ incrementally add impacts beyond those Ecology is evaluating during the permit renewal."

Response:

See response to Comments 7-2 and 7-3. As long as the waste is acceptable to be processed within the constraints of PFNW's license and permits, then no new or additional adverse impacts would be expected beyond those already evaluated during the State's permitting process. Therefore, no change was made to this EA.

Anonymous Comment Mailed from Spokane, Washington

Comment 8-1:

The public should have been invited to comment and should have been given a longer-review time.

DOE's letter did not seek public input, yet facilities considered for treatment have off-gas stacks and groundwater within the Richland city limits, close to environmentally sensitive businesses and residences. Please note that DOE solicited public comment in an EA for transport, and treatment of wastewater from Savannah River (See Federal Register Vol. 84, No. 111, June 10, 2019, page 26847.) For Savannah River wastewater demonstration tests, the public was invited to submit comments, but for actual Hanford Tank Waste, the public has been ignored. This is an inconsistency. A public review period would have been appropriate. Also, a **14-**day review period in the current pandemic environment, ending the Friday before Labor Day, is inadequate for completeness of comments.

Response:

DOE complied with the DOE NEPA implementing procedures for this EA (10 CFR 1021.301) by providing the host states and host tribes the opportunity to review the draft EA, and also provided this opportunity to potentially affected states and tribes. In response to that review, DOE received 118 comment documents from states, tribes, organizations, and individuals. Responses to these comments are addressed in this comment response appendix.

In parallel with the preparation of this final EA, DOE provided the opportunity for comments from states, tribal nations, stakeholders, and the public on its Draft WIR Evaluation. The 90-day comment period on the Draft WIR Evaluation ran from November 5, 2021, to February 2, 2022 and included a virtual public hearing on November 18, 2021 (86 FR 61200; November 5, 2021).

Public comment for an EA is not a requirement under 10 CFR Part 1021.

Comment 8-2:

Additional Details were omitted from the Factsheet

Letter 21-ECD-002148 stated that its attached Fact Sheet would provide additional details about the comment period and ways to provide input. Contrary to this statement, the attached one-page Fact Sheet is entirely silent on the comment period or additional details for providing input, including any means for requesting public comment

Response:

DOE acknowledges that transmittal letter 21-ECD-002148 had a sentence that did read as if additional details about the agency comment period and methods for providing input could be found in the attached fact sheet. The requested comment information was instead directly contained within the body of the letter. The necessary information for agencies and tribes to submit comments was still provided within 21-ECD-002148. No actions are therefore required in response to this comment.

Comment 8-3:

The **EA is Inconsistent Regarding Use of Existing, Permitted Facilities**

Page 2-8 of the EA states that "There are ***no existing, permitted facilities*** on the Hanford Site for grouted tank waste: therefore, onsite disposal was **not considered** a reasonable alternative."

Contrary to the rejection of this line of inquiry, the EA states that DOE is relying on a **future permit** for any tank waste treatment at PFNW in Richland: According to the EA *"PFNW* is *currently in discussions with Ecology to renew PFNW's Dangerous Waste Regulations permit. After the permit renewal, DOE would verify that the* 2*, 000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit."*

In addition, the EA states that the Tennessee Department of Environment and Conservation Perma-Fix DSSI facility is *processing a renewal* of Perma-Fix DSSI's hazardous waste permit.

As part of the renewal process, TDEC will evaluate the potential impacts of continued operations at DSSl. As a result, Perma-Fix DSSI does not have a valid permit for Hanford tank waste either.

PFNW does not have an existing, permitted facility to receive this waste. To be consistent, PFNW should also "not be considered" a reasonable alternative. The same condition applies to PFNW-DSSI. The same rules should apply to off-site, commercial vendors as to onsite disposal facilities for non-approved waste.

Notably, PFNW itself does not have a reasonable expectation that a new permit will be issued to include Hanford tank waste for a test bed initiative. In **July 2020**, at the PFNW annual shareholder's meeting, the company presentation stated that PFNW "anticipated" receiving the·2,000 gallons test bed initiative ("LLW-Off-Site Phase 2") waste, expecting the waste to arrive "within the next nine months." [By Apri1 2021, and this after a couple of prior delays]. A later investor presentation, from July 2021 tells investors the "Perma-Fix team still anticipates receipt of 2,000 gallons in early 2022 (this time many months later)." The delays indicate trouble with PFNW's permitting process. Indeed - PFNW was more gloomy in talking to the Securities and Exchange Commission in their June 30, 2021 Form 10-Q Quarterly Report for the period ending June 30, 2021, stating that corporate milestones for treating the 2,000 gallons and the associated payouts were now "uncertain**."**

Just as in the case of no disposal approval of grout in the IDF, DOE should not "bet" on future regulatory action for PFNW; for which no public comment has even begun, starting with the revision to the out-of-date EIS. Conversely, DOE should evaluate on- site grouting and disposal to IDF or ERDF to maintain consistency. The recent addition of a grout module to ETF for grouting WTP effluent-derived brine shows it can be done.

Response:

PFNW is one of four permitted and licensed, commercial alternatives being evaluated in this EA for offsite treatment of MLLW. As shown in this EA, the facilities evaluated could treat the 2,000 gallons of MLLW within their facilities without additional environmental impacts beyond those that were considered during the respective permitting and licensing processes performed by applicable regulators. The fact that PFNW and Perma-Fix DSSI are in discussions for a permit renewal does not invalidate their existing permits. Both facilities are currently operating under their State-issued permits.

The footnote in Section 2.1.1 that refers to PFNW's dangerous waste permit has been revised in this final EA. While PFNW is currently in discussions with Ecology regarding the renewal of their permit, PFNW is currently operating under Permit Number WAR 000010355. DOE has compared the projected radionuclide and chemical constituents of the TBI waste stream against the PFNW waste acceptance criteria and determined preliminarily that the current permit would allow the treatment and stabilization of the 2,000 gallons of pretreated MLLW. Therefore, the phrase, "after the permit renewal..." has been deleted.

DSSI's current permit allows for treatment of the proposed TBI waste stream. The renewal is still under review at the time of this final EA but is not expected to affect the ability of DSSI to perform stabilization of the TBI MLLW.

With regard to an onsite treatment option, as identified in Section 1.3 of this EA, one of the near-term objectives of the TBI Demonstration is to, "Verify the ability for the pretreated waste to meet the waste acceptance criteria for an offsite, commercial, permitted treatment facility and a permitted and licensed commercial disposal facility." As such, DOE has not analyzed an onsite facility to stabilize and dispose of these liquid wastes.

Comment 8-4:

The PFNW EIS is Out of Date, further undermining optimistic assumptions

The PFNW EIS results were based on a "historical average" of waste receipts at its predecessor ATG facility, which are entirely out of date. The EIS was issued in February 1998 and has not been changed, while the parade of wastes treated has increased. The public has not been able to see the draft EIS in progress, and there have been years of delays. There is no way to evaluate scope.

Response:

DOE is not the regulatory authority, owner, or operator of PFNW. PFNW has licenses and permits issued by the State of Washington. As long as the waste being sent by DOE is acceptable to be received and processed within the constraints of PFNW's dangerous waste permit, then no additional adverse environmental impacts would be expected beyond those that were evaluated during PFNW's permitting process.

Comment 8-5:

Having a Permit is Not a basis for Limiting Inventory or Risk at PFNW

Even if the permits were valid, instead of providing confidence to the public, as is assumed in the EA, the PFNW permits do not actually limit inventories or risks. The report by Hanford Challenge shows that the Washington Department of Health continuously issues variances for PFNW to exceed permit limits. Similarly, the Washington Department of Ecology has issued permissions for treatment demonstrations that are outside the EIS scope,

Response:

See response to Comment 8-4.

Comment 8-6:

Risk From Distance to Groundwater during Grouting is omitted

The discussion of grout treatment at the facilities does not address the relative risks to groundwater, air, and local populations. For example, the PFNW Annual Environment Report for 2020 states that "the area water table varies from approximately 10 feet at the west well to 21 feet at the east well." Contrast this with the hundreds of feet to the water table in the Hanford 200 Areas. A spill during opening/processing at PFNW would instantly contaminate water that flows towards intakes and wells used by the City of Richland for drinking and irrigation. PFNW has

experienced losses of contamination control at the facility in spite of secondary containment as documented in NRC event reports. PFNW response to events are not always prompt; as documented Hanford Challenge's independent report. The existence of secondary containment was not verified in the EA, nor was there an evaluation of its integrity and risk, versus the risk avoided by not opening containers just above the water table. The safety hierarchy requires "safe by design" first, before engineered features/administrative controls – and way above the water table is better as a control/layer of protection. What are the distances to ground water in the 200 Areas? At Oak Ridge? in Utah? In Texas?

Response:

DOE is not the regulatory authority, owner, or operator of any of the commercial treatment facilities evaluated in this EA. Each of the analyzed facilities has a license and permit issued by the responsible state. Each state regulatory body would have considered the distance to groundwater and the potential for spills of radiological and/or hazardous materials when evaluating the facility's application for a license. As long as the pretreated TBI waste is acceptable to be received and processed within the constraints of the receiving facility's license and/or permit, then no additional adverse environmental impacts would be expected beyond those already evaluated and accounted for during the permitting process.

Comment 8-7:

Risks from Tank 241-SY-lOl Vapors are Ignored

The EA identifies tank waste vapors as a hazard, but does not specifically characterize vapors from SY-101 waste. SY-101 was a "burping" gas-producing tank, containing a variety of organic and inorganic compounds. Gas is still being generated, but is not trapped as before due to dilution with water to reduce the viscosity. How will each treatment facility deal with vapor exposures? Releases of tank vapors near the public will be new risks. The EA states that for vapors "in nearly all" cases, worker health impacts were minimal or temporary. What about the impacts that were not minimal or temporary? What is the distance from stacks to the public at each treatment facility? The 2020 PFNW Environmental Report (Figure 1.1) shows the "Crystal Water" company is right next door to PFNW, and the Central Washington Corn Processors are just to the south. Many Richland residents would be averse to tank waste vapors being introduced by DOE. Further, the tables in the EA do not provide information on the chemical constituents present in the waste. No comparison is made to drinking water standards so that the public can understand the nature of the risk-from a spill or stack release.

Response:

See the response to Comment 6-10. In addition, tank waste vapors would not be generated from MLLW that has been filtered and pretreated to remove key radionuclides during the proposed TBI Demonstration. Therefore, there is no reason to expect that vapors would be released from the process totes while at PFNW.

The treatment of hazardous materials would be accomplished through application of the processes included in the treatment facility's permits. As referenced in Section 2.1 of this EA and in the Final WIR Evaluation, DOE has a grab sample report that provides the concentrations

of hazardous and radiological constituents as of 2018. The complete, final list of hazardous constituents would be provided on the waste shipment manifest to the treatment facility as required for compliance with applicable waste acceptance requirements. The treatment facility would be responsible for ensuring that the stabilized waste form would meet its waste acceptance criteria for its facility in accordance with its license and permit.

Comment 8-8:

The **EA has Disparate text about experience at PFNW potentially associated with Lobbying**

Page 2-5 of the EA states that PFNW is "conveniently located" and PFNW and PermaFix DSSI "have completed numerous projects supporting the nuclear industries and has received waste from the Federal Government." Similar language for Waste Control Specialists and Energy Solutions is absent. What objective data were used to support these special statements for Perma-Fix? Of note is that not all PFNW "completed" projects were completed well. In addition, Securities and Exchange Commission. documentation shows that at least one lobbyist/consultant has been incentivized since 2017 to ensure the waste goes to PFNW. I believe Mr. Ferguson (described below) has published a number of letters and articles in the Tri-City Herald supporting the TBI at Perma-Fix in Richland. Was DOE lobbied to include optimistic language in this EA? Performance of a full EIS might help to ensure that consistent information is used across all facilities.

From the US Securities and Exchange Commission:

> *The Company granted a NQSO [non-qualified stock option] to Robert Ferguson on July 27, 2017 from the Company's 2017 Stock Option Plan ("2017Plan") for the purchase of up to 100,000 shares of the Company's Common Stock ("Ferguson Stock Option") in connection with his work as a consultant to the Company's* ***Test Bed Initiative ("TBI")*** *at our Perma-Fix Northwest Richland, Inc. ("PFNWR ") facility at an exercise price of $3.65 per share, which was the fair market value of the Company's Common Stock on the date of grant. The term of the Ferguson Stock Option is seven years from the grant date.*
>
> *The vesting of the Ferguson Stock Option is subject to the achievement of three separate milestones by certain dates.* ***The 10,000·options under the first milestone were exercised by Robert Ferguson in 2018.*** *[this was for the first three gallons treated] The vesting date for the second and third milestones for the purchase of up to 30,000 and 60,000 shares of the Company's Common Stock was previously extended 10 December 31, 2021 and December31, 2022, respectively. The Company has not recognized compensation costs (fair value of approximately $262,000 at June 30, 202]) for the. remaining 90,000 Ferguson Stock Option under the remaining two milestones since achievement of the performance obligation under each of the two remaining milestones is uncertain at June 30, 2021. All other terms of the Ferguson Stock Option remain unchanged.*

Response:

The use of "conveniently located" in Section 2.1.1 of this EA was intended to describe why each of the alternatives was selected for evaluation. It was not intended to indicate a preference. Section 2.1.1 has been revised to state that PFNW is the closest commercial, permitted treatment facility to the Hanford Site. Additionally, Section 2.1.2 states that DSSI, "is a permitted, commercial treatment facility that DOE could use for the Proposed Action if other facilities were not available and to provide a range of potential transportation impacts that could be expected." DOE has prepared several recent EAs that evaluate the use of treatment and/or disposal services at WCS and Energy*Solutions*. The use of any of these commercial vendors would follow DOE procurement guidelines and requirements.

The comment mentions the need for an EIS. In accordance with 10 CFR 1021.321 and CEQ's NEPA regulations (40 CFR 1501.5), "An agency shall prepare an environmental assessment for a proposed action that is not likely to have significant effects." None of the proposed alternatives in this EA would be implemented prior to issuance of a FONSI and WIR Determination.

The details of the Ferguson Stock Option are outside the scope of this EA. DOE's decision between alternatives would consider several factors including potential environmental impacts (including transportation), costs, permitting, and schedule.

Comment 8-9:

The EA is Silent on Grouted Waste Performance from the Three Gallon Test

This EA proposes sending more grouted waste to land disposal but no data are given for the performance of the first 3 gallons treated. Was there a control batch? How has the 3 gallons held·up? How is the grouted waste handled in the performance assessments for each of the disposal sites? How much of the waste is assumed to be retained in the grout in each of the disposal site the performance assessments? What about grouts in the IDF? There is no reason to continue if the performance is not acceptable. Can't grouts with nitrate salts in them dry out and fall apart, with a result of being no better than if mixed with soil? What has happened in this case? How does the SY-101 waste differ from the 3-gallon demonstration test? How can you make a decision with this information absent?

Response:

As stated in Section 1.2.1 of this EA, the laboratory-scale test included a 3-gallon collection of archived tank waste samples that were already in storage at the 222-S laboratory. The sample waste used in the 3-gallon test was not from tank SY-101; it was a composite of tank waste from tanks 241-AN-101, 241-AN-106, 241-AP-105, 241-AP-106, 241-AP-107, and 241-AY-101. As described in DOE/CX-00152 and the applicable Final WIR Evaluation, this 3-gallon sample was processed (pretreated) by 222-S, stabilized at PFNW, and then shipped to WCS for disposal. The intent of the laboratory-scale test was to determine if the 222-S pretreatment process being tested could successfully remove solids and cesium from the tank waste samples. The results of the 3-gallon test informed, but are not the same as, the ITPS process described in this EA.

Before waste can be accepted at the WCS FWF, it must be demonstrated to meet the facility's waste acceptance criteria. Once waste is disposed of at the WCS FWF, it is not removed for further evaluation. Environmental monitoring and surveillance of the WCS FWF is conducted by the licensee in accordance with its license requirements to ensure the facility continues to meet performance objectives for protection of human health and the environment. In addition, the WCS FWF inventory must be tracked closely by the licensee and the waste inventory must be incorporated into the Performance Assessment Maintenance Plan and evaluated to ensure that the performance objectives will continue to be met during land disposal facility operations. The licensee is required to conduct an updated performance assessment, consistent with the Performance Assessment Maintenance Plan, and provide the updated performance assessment to the regulatory authority for review to demonstrate that performance objectives will be met.

See Sections 8 (Waste Tracking), 89 (Performance Assessment update) and 158 (Env. Surveillance) of WCS license: https://www.tceq.texas.gov/downloads/permitting/radioactive-materials/licensing/license-r04100-amend-38.pdf.

As described in this EA, the TBI Demonstration would use an ITPS to pretreat (decanting, settling, filtering, and ion exchange) 2,000 gallons of supernate from tank SY-101. This engineering-scale demonstration could then be used to inform future supplemental treatment planning decisions for LAW. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Comment 8-10:

The EA does not Distinguish Federal Transportation Contractors from Subcontractors

Page 2-5 of the EA does not distinguish between DOE transportation contractors and subcontractors used by PFNW and other vendors. There could be quite a difference in safety and performance, yet this was not evaluated. Subcontractors have had a number of transportation problems; including receipt of leaking containers. Alternatives 3 and 4 cut out the subcontracted transporters.

Response:

As stated in Section 2.1.1 of this EA, DOE would use a professional transportation contractor to transport the pretreated waste to the selected treatment facility. For Alternatives 1 and 2, the treatment facility would then engage their own professional transportation contractor to transport the treated waste to the selected disposal facility. As the commenter has noted, Alternatives 3 and 4 would involve less overall transportation, as the pretreated waste would be treated and disposed of at the same receiving facility.

All transportation contractors, whether hired by DOE or a treatment facility, would be professional transporters required to follow USDOT regulations appliable to the waste being transported.

Comment 8-11:

Grouted Tank Waste is Disposed at Hanford

Page 2-9 of the EA states that there are no existing, permitted facilities on the Hanford Site for grouted tank waste. This appears to be an oversimplification. Lots of grouted tank waste is disposed at Hanford, including equipment and waste contaminated with tank waste that has been grouted. Again - this is reasonable alternative, given the volume of already disposed piping, pumps, and other grouted items disposed.

Response:

DOE has not disposed of grouted tank waste on site to date. Secondary solid waste that has contacted tank waste, such as in-tank equipment or hose-in-hose transfer lines, has been grouted and disposed of on site in accordance with applicable WIR determinations and the Site's permits. Onsite disposal options were not evaluated in this EA or included as an alternative because the purpose and need of the Proposed Action is to verify the ability for the pretreated waste to meet the waste acceptance criteria for an offsite, commercial, permitted treatment facility and a permitted and licensed commercial disposal facility..

Comment 8-12:

The Hanford Air Operating Permit Excludes PFNW

Page 3-4 of the EA describes Hanford's air operating permit reports, but does not mention that the PFNW stacks, which handle mostly DOE waste, were taken out of those reports, so the public has no easy access to information about what happens there. Data from the vicinity of PFNW, including prior releases and spills, should be added.

Response:

Section 3.3.1 in this EA describes the affected environment at the Hanford Site and provides data on releases that occurred in 2020, which are documented in the 2020 Annual Site Environmental Report (DOE/RL-2021-15). The Benton County Clean Air Agency is the regulator for air emissions from the PFNW facility. As long as constituents in the waste being treated at PFNW fall within its waste analysis plan, then no new or additional adverse impacts are expected, as emissions would stay within PFNW's existing air approval licenses.

Comment 8-13:

The EA does not Recognize the Full Extent of Potential PFNW Operations

Section 3 of the EA calls out that the 2,000 gallon treatment project would be a "small" fraction of the total capacity at PFNW and elsewhere. Yet no quantitative data are provided. The cumulative impact of proposed operations at PFNW includes all sorts of wastes. The EA should evaluate the cumulative impact of the waste forecast for treatment at PFNW, per DOE's "emwims.org" web page. The sum of all the waste to be sent to PFNW could be beyond the

acceptable, per the future, unpublished PFNW revised EIS. This information should be called out in detail in the "reasonably foreseeable" trends section on Page 3-29

Response:

Under 40 CFR 1502.15, CEQ requires an EIS to identify reasonably foreseeable environmental trends and planned actions for the region of influence. This EA does identify trends and planned actions in the regions of influence in order to fully evaluate potential impacts. Sections 3.8.1.2 and 3.8.2.2 of this EA presents a cumulative impacts analysis of reasonably foreseeable environmental trends and planned actions at PFNW. The expected duration of the Proposed Action at PFNW is anticipated to last just a few weeks.

Comment 8-14:

The EA makes Optimistic Assumptions

The EA states on page 3-21 that "treatment and stabilization of the MLLW at PFNW is a routine activity that would be allowed under its permit, and potential waste management impacts would be negligible." On what basis is this statement made? More lobbying? The Hanford Challenge report shows that no waste is "routine" at PFNW. Even the permit process for the In Container Mixer was fraught with errors and non-compliances. Please look at the State of Washington Department of Ecology Dangerous Waste Violation Settlement Agreement and Agreed Order No. 13808, (In the Matter of Expedited Enforcement Action for Perma-Fix Northwest, Richland, Inc.), which states:

> *"PFNW accepted an excess of 50 MW containers during a 12-month time period for treatment in the in-container mixer. PFNW failed to comply with their permit conditions when the facility accepted waste tor which it had no treatment capability. During this time frame, the facility removed the existing permitted in-container mixer and requested a permit modification for a new in-container mixer and a temporary authorization for its immediate use. A demonstration was provided to Ecology and USEPA staff of this in-container mixer's capabilities. The demonstration of the mixer was not successful, and Ecology denied the temporary authorization and Ecology permit writers instructed PFNW to cease acceptance of waste for the in-container mixer line of treatment. It appears that acceptance of MW for treatment in this line continued. "*

As a result, compliant, routine operations cannot be assumed for this EA. There are no normal operations.

Response:

See response to Comment 8-4.

Campaign Letter #1

Comment CL1-1:

I ask that the proposed Test Bed Initiative (TBI) and "SAFE Alternative" move ahead quickly to demonstrate if 2000 gallons of leakable liquid waste can be removed from Hanford's High-Level Waste Tanks and be successfully treated and disposed offsite.

Response:

DOE acknowledges the commenter's preference for proceeding with the Proposed Action.

Comment CL1-2:

USDOE should act quickly to determine whether the Test Bed Initiative / "SAFE treatment alternative can successfully treat and dispose of waste **off of the Hanford site** and away from the Columbia River. It should be moved to a location where it will never contaminate ground or surface waters.

Response:

DOE acknowledges the commenter's preference for proceeding with the Proposed Action.

Comment CL1-3:

Hanford's tank B-109 has been leaking for two years or more without any action. If the equipment and techniques for TBI work, then USDOE and Washington Ecology could quickly use the same methods to remove leakable waste from B-109 and stop it from leaking.

Response:

The scope of the TBI Demonstration is limited to 2,000 gallons of tank waste from tank SY-101 only. This is an engineering-scale demonstration of a possible supplemental treatment technology that could potentially be used to treat LAW contained within the tank farms, assuming the demonstration is successful. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

DOE is developing an action plan for managing the waste in tank B-109. While ITPS could be a part of the eventual strategy if this demonstration is deemed successful, tank B-109 does not contain a large percentage of supernate. The ITPS technology is not considered an effective treatment option for tanks with little to no supernate.

Comment CL1-4:

I support Alternative #1 in the TBI-EA. The demonstration should use a permitted treatment facility that is just one mile from the Hanford site to reduce transportation impacts, not the alternatives that are 650 to 2500 miles away. USDOE should include an environmental justice analysis of trucking the untreated waste.

Response:

DOE acknowledges the preference for Alternative 1. As reported in Appendix A, Table A-5, of this EA, the probability that a single truck shipment of liquid MLLW would be in a severe enough accident that it would result in a release of its contents, ranges from beyond extremely unlikely (3.73×10^{-8} or once in 27 million) to extremely unlikely (2.58×10^{-6} or once in about 388,000), dependent upon the distance traveled. The risk of consequences (e.g., human health, socioeconomic) is extremely low. Therefore, there is an extremely low likelihood of incurring disproportionately high and adverse impacts to a low-income or minority population along the transportation route.

No environmental justice adverse impacts were identified in association with making, at most, one to three discrete, fully USDOT-compliant waste shipments using existing roadways in accordance with their constructed design and intended purpose.

DOE also acknowledges that even though the transportation impacts of all the alternatives were deemed small, Alternative 1 does further minimize the potential risks to human health.

Comment CL1-5:

The Environmental Assessment (EA) should include a discussion of the substantial benefits if the 2,000 gallon test is successful as a new option to remove leakable liquid waste from Hanford tanks and permanently remove waste from Hanford.

Response:

Table 3-1 of this EA has been modified to include a statement that the Proposed Action could have potential benefits to water resources. Table 3-1 now includes the following statement, "One potential benefit to water resources would be that approximately 2,000 gallons of tank waste would be removed from the system and no longer available to potentially affect surface or groundwater."

Comment CL1-6:

It makes no sense to wait decades and spend a billion dollars for USDOE to build its own treatment facility for these particular liquid tank wastes when a permitted facility is one mile away. If TBI is demonstrated to work, USDOE should move quickly to remove more leakable liquid wastes and have the waste treated and disposed offsite.

Response:

DOE has not proposed to build an onsite facility to stabilize these liquid wastes. As identified in Section 1.3 of this EA, one of the near-term objectives of the TBI Demonstration is to, "Verify the ability for the pretreated waste to meet the waste acceptance criteria for an offsite, commercial, permitted treatment facility and a permitted and licensed commercial disposal facility."

DOE acknowledges the commenter's preference for proceeding with the Proposed Action.

Campaign Letter #2

Comment CL2-1:

I am writing to ask DOE to open up the Phase Two Test Bed Initiative Environmental Assessment (EA) for formal public comment. Treating 2,000 gallons of tank waste and sending it offsite to be grouted and disposed of sets precedent for the planned scale up in Phase 3 to 500,000 gallons. The public should have a chance to review the options under consideration and share formal comments for agency consideration.

Though it is being framed as a small test, conclusions and assumptions from the Environmental Assessment will inform future work and have bigger impacts in a 500,000-gallon Phase 3 scale-up.

Response:

DOE complied with the DOE NEPA implementing procedures for this EA (10 CFR 1021.301) by providing the host states and host tribes the opportunity to review the draft EA, and also provided this opportunity to potentially affected states and tribes. In response to this review, DOE received 118 comment documents from states, tribes, organizations, and individuals. Responses to these comments are addressed in this comment response appendix.

In parallel with the preparation of this final EA, DOE provided the opportunity for comments from states, tribal nations, stakeholders, and the public on its Draft WIR Evaluation. The 90-day comment period on the Draft WIR Evaluation ran from November 5, 2021, to February 2, 2022 and included a virtual public hearing on November 18, 2021 (86 FR 61200; November 5, 2021).

To clarify, there is no "Phase 3" planned for TBI. While the potential of Phase 3 was announced several years ago, at this point, DOE proposes to complete the TBI engineering-scale demonstration. As identified in Section 1.4 of this EA, "Any proposal to pretreat, stabilize, and dispose of more than approximately 2,000 gallons of supernate tank waste would be evaluated in a separate NEPA review."

Comment CL2-2:

It is important to me that extra precautions are taken for any action related to tank waste treatment and disposal. Worker health and safety risks from high-radiation levels, toxic chemical vapors, and the non-radioactive hazardous components of the waste are not sufficiently addressed in the EA.

Response:

DOE would implement the Proposed Action in accordance with as-low-as-reasonably-achievable principles and other health and safety guidelines and requirements to ensure the continued safety of the workers and offsite public. Sections 3.4 and 3.5 of this EA evaluate potential public and worker safety impacts from normal operations and accidents and intentional destructive acts, respectively. These operations would not be performed in a high-radiation environment, as the

total radiological content of the approximately 2,000 gallons of MLLW would be approximately 1.8 curies, as reported in Section 2.1.1 of this EA.

Waste chemical content and potential gas and vapor release would be evaluated as part of the work planning process to ensure that proper engineering and all applicable and relevant industrial hygiene controls are in place to protect workers and the environment prior to initiation of waste-disturbing activities.

As referenced in Section 2.1 of this EA and in the Final WIR Evaluation, DOE has a grab sample report from the upper layer of waste in tank SY-101 that provides the concentrations of dangerous and radiological constituents as of 2018. The primary hazardous constituents in the pretreated waste include organics (benzyl butyl phthalate and bis(2-ethylhexyl) phthalate) and heavy metals (chromium and selenium). The potential health effects of these constituents were considered in Section 3.5.2. From a long-term perspective, as identified in Section 2.1.1, the waste would be treated to ensure compliance with RCRA LDRs and the waste acceptance criteria of the permitted and licensed disposal facility.

Comment CL2-3:

I am concerned about worker, public, and environmental safety risks from treating Hanford waste at Perma-Fix Northwest in Richland, WA. There is insufficient information in the EA about offsite treatment. An onsite treatment alternative should be added for inclusion in the final EA.

Response:

Operations at PFNW, including unloading, treatment, and loading of a shipment bound for disposal, would be governed by their radioactive materials license, toxic air pollutants permit issued by Benton Clean Air Agency, and dangerous waste permit issued by the State of Washington. As long as the waste is acceptable to be processed within the constraints of PFNW's license and permits, no new or additional adverse impacts would be expected beyond those already evaluated and accounted for during the State's permitting process.

As identified in Section 1.3 of this EA, one of the near-term objectives of the TBI Demonstration is to, "Verify the ability for the pretreated waste to meet the waste acceptance criteria for an offsite, commercial, permitted treatment facility and a permitted and licensed commercial disposal facility." As such, DOE has not analyzed an onsite facility to stabilize and dispose of these liquid wastes.

Comment CL2-4:

I am aware that a 120-day public comment period is planned for the next step in the Phase 2 process for the draft Waste Incidental to Reprocessing Evaluation comment period. I think the public should have a chance to weigh in now on the Environmental Assessment.

Response:

See response to Comment CL2-1. The Final WIR Evaluation shows that approximately 2,000 gallons of separated, pretreated, and solidified LAW under the proposed TBI Demonstration would be waste incidental to the reprocessing of SNF, would be non-HLW, and may be managed as LLW. DOE prepared the Final WIR Evaluation after consulting with the NRC and after considering comments from the NRC, stakeholders, states, tribal nations, and the public.

Comment CL2-5:

Please consider the following comments:

1. Open up the TBI EA for a 60 day formal public comment period.
2. Hold a public hearing to share information about the Phase 2 TBI EA, including the entire Test Bed Initiative Plan scale up to Phase 3 and how it fits into plans for Supplemental Low Activity Waste decisions. Allow participants to make formal comments at the meeting.
3. Include more information about the hazardous components of the tank waste liquids, including a more accurate assessment of worker risks from exposure to toxic chemical vapors.
4. Do not send waste to Perma-Fix Northwest for treatment. Include an onsite treatment alternative in the EA.
5. Conduct a full Environmental Impact Statement (EIS) on the Test Bed Initiative.

Response:

See the response to Comment CL2-1 regarding a public comment period for this EA and any additional "Phase 3" for TBI. There is no requirement in DOE's NEPA implementing procedures (10 CFR Part 1021) for a public hearing for an EA.

See the response to Comment CL2-2 regarding an assessment of worker risks associated with the Proposed Action.

DOE acknowledges the commenter's objection to Alternative 1 evaluated in this EA. See the response to Comment CL2-3 regarding an onsite treatment alternative.

In accordance with 10 CFR 1021.321 and CEQ's NEPA regulations (40 CFR 1501.5), "An agency shall prepare an environmental assessment for a proposed action that is not likely to have significant effects." None of the proposed alternatives in this EA would be implemented prior to issuance of a FONSI and WIR Determination.

B.3 *Comment Documents*

This section contains the comment document images marked to show the delineated comments. The original comment documents are included as part of the project Administrative Record.

CLEAN UP HANFORD
NOW
Northwest Energy Associates
A nonprofit corporation dedicated to accelerating Hanford cleanup
www.cleanuphanfordnow.org

August 31, 2021

NEPA Document Manager
TBI Draft EA
U.S. Department of Energy
P.O. Box 550, Mailstop H5-20
Richland, Washington 99352

Reference: 21-ECD-002148 NOTICE OF AGENCY REVIEW PERIOD, dated August 17, 2021
Subject: Comments on the Draft Environmental Assessment (EA) of the Test Bed Initiative (TBI) Demonstration

The Northwest Energy Associates thanks the U.S. Department of Energy (DOE) for moving forward with the TBI demonstration project and conducting the EA as identified in the reference. On behalf of our members and constituents, we provide the following comments for your consideration and action:

1-1 1. The TBI demonstration project should be expedited to the maximum extent possible by the DOE and Washington State Department of Ecology. Funding is in place, demonstration equipment has been fabricated and tested, and local elected officials, regional congressional members, and stakeholder support for the demonstration is strong. DOE and Ecology have procrastinated in their efforts relative to this demonstration project and we implore that you work together to resolve your differences and move forward expeditiously to validate if commercial treatment and out-of-state disposal of mixed low-level waste (MLLW) from Hanford tanks is a viable alternative to on-site waste treatment and disposal. It is vital that DOE and Ecology determine if the demonstration project can lead to a more effective cleanup approach that lowers environmental risk and financial liability. We support a safe, accelerated cleanup at Hanford and this demonstration project could pave the way for achieving that objective relative to the Hanford tank waste mission.

1-2 2. We strongly support Alternative 1 as described in the EA for the initial 2,000-gallon demonstration. This EA alternative takes advantage of existing and permitted commercial facilities here in the Tri Cities for treatment and the use of existing and permitted out-of-state MLLW disposal facilities. This alternative was demonstrated by the EA not to significantly affect the quality of the human environment and would be

1-2 contd

safe for the workers and the public. It eliminates the need for additional capital expenditures, facilitates expeditious permitting and utilizes the government and commercially trained and skilled work forces here in the Tri-Cities. We recommend that MLLW quantities greater than 2,000 gallons be commercially treated and stabilized before it is transported to an out-of-state disposal facility. The transport of significant volumes of MLLW liquids, although legal and permissible, results in a slightly higher risk to the environment.

1-3

3. The commercial treatment and out-of-state disposal of MLLW from Hanford tanks has the potential to be a transformational approach to reducing the cost and accelerating the cleanup pace at Hanford. We encourage the DOE and Ecology to include this approach in their Holistic negotiations as a prime consideration for accelerating Hanford cleanup. To prepare, DOE should move expeditiously to ensure adequate systems, components, permits, and other provisions are established now to use the more simplified off-site commercial treatment and out-of-state disposal of MLLW as a supplemental alternative to vitrification for both the West and East area tank farms. These actions should include the following, as a minimum:

   A. Installing a truck load-out station at AP-farm to transport MLLW resulting from the Tank-Side Cesium Removal (TSCR) pretreatment system to off-site commercial treatment and out-of-state disposal facilities

   B. Installing a TSCR and tanker load-out station at SY-farm in the West Area

   C. Considering construction of an on-site, dedicated haul road between the tank farm area to the southern boundary of the Hanford Site to reduce potential public exposure even further.

On behalf of Northwest Energy Associates, we thank DOE for the opportunity to comment on the reference TBI EA and look forward to you moving forward expeditiously with completion of this demonstration project.

Please feel free to contact me if you have questions.

Respectfully

Gary Petersen
President
Northwest Energy Associates
Richland, WA 99352

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

September 1, 2021

Brian T. Vance
Manager
Richland Operations Office
Department of Energy
PO Box 550
Richland, WA 99352

Re: Test Bed Initiative NEPA Agency Review

Dear Mr. Vance:

Thank you for the opportunity to comment on the draft environmental assessment (EA) for the test bed initiative (TBI) at the Hanford site. As you are aware, the area where the Hanford site is located is sacred to the Yakama Nation and the cleanup of the site is paramount to my people. We have questions and concerns that DOE should consider before finalizing this EA and proceeding to its implementation.

Overall we feel that the draft EA lacks sufficient detail to make a comparison between the alternatives. In our review of the document the major differentiating factor between the alternatives is the distance of road between Hanford, the treatment location, and its ultimate disposal location. While this is an obvious factor to consider the lack of details between current operating abilities and regulatory structure for each treatment and disposal facility is a major omission. Please see the attached technical comments for details to consider in the EA and your decision making process.

While our comments on this phase of the TBI are technical in nature the next phase has the potential to have serious impacts on Yakama Nation resources. We expect a much more collaborative discussion on the development of that project so any impacts can be considered early in the process.

Thank you for your efforts on this matter and I look forward to more discussions on all of the important cleanup work at the Hanford site. If you have any questions please have your staff contact McClure Tosch at mtosch@ynerwm.com or 509-895-4866.

Thank you,

Phil Rigdon, DNR Superintendent
Yakama Nation

Cc: Glyn Trenchard, DOE
Karen Lutz, DOE
Dave Einan, EPA
John Price, Ecology
Laurene Contreras, YN

Attachment: Yakama Nation Technical Comments on the Draft Environmental Assessment for the Test Bed Initiative dated August 17, 2021

Yakama Nation Technical Comments on the Draft Environmental Assessment for the Test Bed Initiative dated August 17, 2021

1. While the draft EA does a pretty thorough job detailing the process that will occur for the retrieval of the waste from the tank it does not describe the timeline to accomplish any of the work. This needs to be clarified in order for the reviewer to understand the proposed process better. In addition, the EA does not specify if all six totes of waste are to be shipped at one time or in phases, please clarify. 2-1

2. The EA does not provide enough information to differentiate the potential impacts of the alternatives. Currently each treatment and disposal facility is treated as a black box that will accomplish the stated goals of the test bed initiative (TBI). This has made the only determining factor the amount of miles of road that is needed to transport the waste for treatment and then amount of miles of road that is needed to transport the stabilized waste to a disposal facility. While this is an important aspect more detail should be given in these areas: 2-2
    a. **Treatment facility unloading, treatment, and shipment for disposal details:** There will be logistics differences for each alternative of the unloading, treatment, and ultimate shipment of stabilized waste to a disposal facility. Those processes and timelines that are unique to each alternative have potential risks and environmental impacts associated with them. The details on the timeline, logistics, and potential risks needed to be presented in the EA for each facility.
    b. **Regulatory framework for each facility:** Currently there is no detail described for each facility that will treat and/or dispose of the waste. This is an important detail because if permit modifications will be required or changes to the implementation of the waste retrieval and shipment are needed to meet permit requirement those can cause potential environmental impacts. The Yakama Nation did a review of the Permafix Northwest Washington Department of Health Mixed Waste Permit and noted some potential items for consideration regard the total weight on the waste to shipped, amount of curies assumed to be in each tote, and impacts to normal operations. In addition there is an overlay with Ecology's RCRA permit that needs to be considered. We did not have time to review the permits for the other facilities but the EA should present that analysis. 2-3
    c. **Non-radiological constituents:** The EA cites the, *Final Analytical Report for Tank 241-SY-101 TBI Grab Sampling 2018.* Document as the source of information on the assumed chemical make-up of the waste. This document is not available for download in the administrative record and is important for the reviewer to have to assess the risks and regulatory processes required for the non-radiological constituents. The document should be made available or even attached to the EA. 2-4

3. YN is in the process of completing a complete site TCP study. The effects of this project will need to be determined on known resources and once this work is completed. Transportation routes, potential for accidents, loading and unloading and timelines can all have impacts to cultural resources and should be considered. Permit modifications may need to also consider cultural resource impacts. 2-5

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

DAVID W. SALYERS, P.E.
COMMISSIONER

BILL LEE
GOVERNOR

September 3, 2021

Via Electronic Mail to TBI-EA@rl.gov
NEPA Document Manager
TBI Draft EA
U.S. Department of Energy
P.O. Box 550, Mailstop H5-20
Richland, Washington 99352

Dear Mr. Vance:
The Tennessee Department of Environment and Conservation (TDEC) appreciates the opportunity to provide comments on the U.S. Department of Energy (DOE) draft *Environmental Assessment (EA) of the Test Bed Initiative Demonstration* (TBI Demonstration EA). DOE has developed the TBI Demonstration EA to assess the potential environmental impacts of its proposal to proceed with an engineering-scale, TBI Demonstration, which would separate and pretreat approximately 2,000 gallons of low-activity tank waste currently stored in DOE's Hanford Site located in southeast Washington, which would then be treated and solidified (grouted) at an offsite, permitted, commercial facility and disposed of at an offsite, permitted and licensed, mixed low-level radioactive waste (MLLW) disposal facility. DOE has developed four alternatives for implementing this proposed action, all of which are considered within the draft EA:

- Alternative 1: Treatment at Perma-Fix Northwest (Richland, Washington)
- Alternative 2: Treatment at Perma-Fix Diversified Scientific Services, Inc. (DSSI) Facility (Kingston, Tennessee)
- Alternative 3: Treatment and Disposal at Waste Control Specialists LLC (WCS) (Andrews County, Texas)
- Alternative 4: Treatment and Disposal at Energy Solutions (Clive, Utah)

TDEC is the environmental and natural resource regulatory agency in Tennessee with delegated responsibility from the U.S. Environmental Protection Agency (EPA) to regulate sources of air pollution; solid and hazardous waste; radiological health issues; underground storage tanks; and water resources. TDEC's comments are made in the context of proposed Alternative 2, as it is the only alternative that would have environmental and other impacts within Tennessee. TDEC's comments do not address any environmental and other impacts of the proposed alternatives within other states.

TDEC has reviewed the Draft EA and has the following comments regarding the proposed action and its alternatives:

Air Resources

3-1 The narrative mentions the need to comply with the radioactive material license and hazardous waste management permit issued by the State of Tennessee but fails to discuss the Perma-Fix DSSI Facility's Clean Air Act Part 70

3-1 contd

Operating Permit[1] and the need to comply with it. DSSI will be responsible for complying with all terms of their Part 70 Operating Permit, as well as obtaining any Air Quality Construction Permit and Part 70 Permit Modifications necessary to comply with the Tennessee Air Quality Act, the Tennessee Air Pollution Control Regulations, and any applicable federal air requirements if Alternative 2 is chosen. TDEC encourages DOE to incorporate these considerations into the Final EA.

Radiological Health

3-2

There are safety issues regarding transportation of hazardous and radioactive material across Tennessee roadways for both incoming shipments to DSSI and outgoing shipments to either WCS in Texas or Energy Solutions in Utah for final disposal. Given the magnitude of transportation necessary to treat the waste in Tennessee, the most efficient alternatives would be those that utilize treatment and disposal locations that are in closer proximity to Hanford. TDEC encourages DOE to factor these considerations into selection of alternative.

Solid Waste

3-3

TDEC recommends that as the Draft EA is finalized, the Final EA explicitly update and reflect that the appropriate permitting and capacity arrangements commensurate with the recommending action have been made and reviewed to sufficiently accommodate the proposed action

Additionally, TDEC has provided information relating to solid and hazardous waste compliance and enforcement history for the Perma-Fix DSSI facility as Attachment 1 to this letter.[2]

TDEC appreciates the opportunity to comment on this Draft EA. Please note that these comments are not indicative of approval or disapproval of the proposed action or its alternatives, nor should they be interpreted as an indication regarding future permitting decisions by TDEC. Please contact me should you have any questions regarding these comments.

Sincerely,

Bryan Davidson | Policy Analyst
Office of Policy and Sustainable Practices, TDEC
William R. Snodgrass Tennessee Tower
312 Rosa L Parks Ave, 2nd Floor
Nashville, TN 37243
Email: Bryan.Davidson@tn.gov
Phone: 615-741-9178

[1] Also known as a Title V permit ; for more information see - https://dataviewers.tdec.tn.gov/pls/enf_reports/f?p=19031:34051:::::34051:P34051_PERMIT_ID:68010

[2] If you have any additional questions, please contact Benjamin Almassi, Environmental Consultant with Division of Solid Waste Management Enforcement & Compliance by email at Benjamin.Almassi@tn.gov or by phone at 615-837-5349.

Attachment 1

Perma-Fix DSSI Compliance and Enforcement Information

With respect to review of any permitted/compliance/enforcement solid or hazardous waste related issues within the site location specified, Perma-Fix DSSI, a subsidiary of Perma-Fix Environmental Services, is permitted to store and treat hazardous and low-level radioactive mixed wastes in accordance with permit number TNHW-150. The facility is licensed by the Division of Radiological Health (DRH) to process low-level radioactive materials and low-level radioactive process used-oil (largely from nuclear power-plants). Under terms of the permit and licenses, most of the combustible mixed hazardous waste is burned for energy recovery. In November 2008, DSSI received additional authorization to process and treat mixed PCB waste; combustion of mixed PCB waste commenced in June of 2009.

Pertaining to hazardous waste generator status, the facility's EPA installation Number is TND982109142, and it is a permitted hazardous waste treatment storage and disposal facility (TSDF), Large quantity generator (LQG), Universal waste small quantity handler (SQH), Used oil generator (UOG), Used oil processor (UOP), and Mixed-waste incinerator. Federal and state records date back to as early as 1988. In its most recent history[3] a compliance agreement was made and entered into by and between the TDEC, DSWM, and Perma-Fix DSSI on March 11, 2019, which set forth mutual understandings and agreements among the parties to address the storage of hazardous and mixed wastes at the Perma-Fix DSSI facility, past one year without an acceptable proof of compliance with Ten. Comp. R. & Regs. 0400-12-01-.10(4)(a)3. On July 2, 2020, TDEC's Division of Solid Waste Management (DSWM) acknowledged the facility's April 1, 2020, request for an extension to continue the processing of mercury contaminated MLLW, to comply with applicable land disposal restrictions. This request was made in accordance with Paragraph 20 "Good Cause" of the Compliance Agreement HWM17-0056. The DSWM extended the processing completion date to December 31, 2021, with all other conditions of this compliance agreement remaining unchanged.

Of importance, since November 2008, a Memorandum of Understanding (MOU) has been effective between the EPA Regional Administration and Commissioner of the TDEC. The MOU is applicable to DSSI as long as it engages in the management of previously described mixed waste, and both the EPA and TDEC agree that each will share with the other all permit and license information involving the facility including operational changes, conditions necessitating corrective action or enforcement, any changes to permits or license issued by TDEC or EPA, and any increase in mixed waste streams or storage or capacity to store that exceeds allowable license and/or permit conditions and/or endangers public health and the environment.

Multiple modifications have been submitted to the DSWM with the past few years. On April 28, 2021, the facility submitted its TNHW-150 Part A and B Permit Renewal Application to the DSWM. It is currently under review.

Most recently, on June 17, 2021, the DSWM conducted a compliance evaluation inspection (CEI) at Perma-Fix DSSI. Of note, certain containers of mercury-contaminated wastes were observed that had been stored for more than one year; these were part of a contingent of mercury-contaminated mixed waste that continue to remain under the active compliance agreement with the DSWM. However, in addition to the mercury-contaminated wastes, 100 containers of radioactive-contaminated lithium waste had been stored in excess of one year at the time of the inspection, in part because they could not be processed until a minor modification to the Title V air permit was approved. Six additional containers stored on site will have exceeded the one-year limit before the end of August.

Documents pertaining to past inspections, enforcement (NOVs), agreements between parties such as the MOU, are all available upon request.

---

[3]See Detailed Facility Report | ECHO | US EPA *https://echo.epa.gov/detailed-facility-report?fid=110000372622*

Oregon
Kate Brown, Governor

OREGON DEPARTMENT OF ENERGY

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September 3, 2021

Glyn Trenchard
Assistant Manager for Safety and Environment
US Department of Energy, Richland Operations Office

Sent via email: Glyn.Trenchard@rl.gov; TBI-EA@rl.gov

Dear Glyn Trenchard,

We appreciate this opportunity to provide agency comments on the Environmental Assessment for the Hanford Test Bed Initiative Phase 2 proposed action. The Phase 1 action in 2017 represented the first time the Department of Energy had successfully treated and disposed of three gallons of Hanford tank waste in an offsite disposal facility in a cementitious solidified form. Phase 2 proposes to increase the project to an engineering-scale demonstration and continue to test the legal, policy, and technical aspects of the concept. A future Phase 3 action would grow the concept even further, attempting to prove the viability of production-scale tank waste processing for offsite grout disposal.

Oregon has not previously issued public statements regarding the Test Bed Initiative. However, Oregon has been heavily involved in the ongoing National Academy of Sciences study looking at Supplemental Low Activity Waste treatment options, of which offsite disposal similar to the Test Bed Initiative is one potentially promising alternative. Oregon and other states along the transport routes also have a role to play in logistical support of safe transportation for off-site disposal.

Low activity tank waste still contains some of the more difficult to manage long-lived radionuclides, and disposing of that waste out of the region, away from the Columbia River, is an idea to which few in the Pacific Northwest would object. We also recognize and appreciate the Department of Energy's position that disposal of low activity waste in a grouted form could help to make the big picture tank waste treatment mission more feasible given the site's funding constraints. However, it is important to note that the TBI proposal is occurring within a larger context of how Hanford's many different types of presumed high-level waste may be credibly and legally classified as legal for disposal in a shallow environment. We still see this as an unsettled issue that needs to be resolved between USDOE and its partners and stakeholders in the cleanup mission – including Oregon. We also believe there to be multiple risks and uncertainties to manage before making long-term policy decisions and steering investments towards a plan that would assume large-scale offsite disposal of grouted Hanford tank waste.

The Test Bed Initiative could lead to an important approach in the larger mission, and we cautiously support DOE's efforts to prove out the technologies, logistics, and acceptability of the approach – provided that all applicable regulatory agencies approve the proposal. We look forward to talking with DOE and others about how to fit TBI within the bigger picture of Hanford waste treatment and disposal.

As a matter of process, Oregon would have preferred that DOE solicit public comments on the Environmental Assessment, and that the comment period be extended for at least 30 days. While we understand that DOE is planning to open a future public comment opportunity specifically on the TBI Waste Incidental to Reprocessing (WIR) evaluation, the NEPA process and the EA document itself are likely to be more familiar and accessible to the general public than the WIR. The TBI project is an important initiative for the residents of Oregon, and also the residents along the transportation corridor and presumably near the proposed disposal locations in Texas or Utah. As a matter of transparency and openness in government decision-making, Oregon supports allowing the public a sufficient opportunity to provide meaningful input to DOE. In the absence of a public comment opportunity on the EA, DOE should consider a strong information campaign related to the public comment opportunity on the WIR, such as public meetings and an easy to navigate website, to allow the public to be educated on the project, process and the WIR document so that they may better be able to understand and comment appropriately and effectively.

Our technical accuracy and completeness comments follow. If you have any questions or would like to further discuss the content of this letter, please contact Jeff Burright, ODOE Radioactive Waste Remediation Specialist: jeff.burright@energy.oregon.gov or 503-856-2597.

Sincerely,

Maxwell Woods
Assistant Director for Nuclear Safety and Emergency Preparedness
Oregon Department of Energy
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Oregon Hanford Cleanup Board

Oregon Department of Energy Technical Accuracy and Completeness Comments

- NEPA vs DOE Order 435.1 comment response requirements. The EA states that a separate public process will be followed for the Waste Incidental to Reprocessing evaluation associated with the TBI project, and that this process will include a comment opportunity for all stakeholders and the general public. Please provide additional information for this public involvement process, including the planned duration of the comment period and whether there will be any public informational meetings associated with the WIR evaluation. Public stakeholders are likely to be understandably concerned by the lack of a review and comment opportunity on this EA, and this in turn risks undermining public trust in DOE. Documenting additional information and commitments in the NEPA documentation may help to mitigate this risk.

4-1

- What the proposed action fails to consider is, to us, one of the greatest risks - that in testing the legal and technical aspects of the Test Bed Initiative, DOE fails to convince its regulators, its stakeholders, and the public that it has performed a sufficient amount of treatment to turn high-level waste into low-level waste. The purpose and need of this action hinges on the hope that technetium-99 and iodine-129, the two key long-lived mobile radionuclides in Tank SY-101, must either not be present in the liquid, which our review of the Best Basis Inventory for that tank would suggest is unlikely,[1] or be deemed impractical or unnecessary to remove. Assuming then that these key radionuclides will be present in the liquid extracted from the tank, the proposed action must then rely on a hope that the WIR process determines that they were removed to the maximum extent practical despite no action being taken or seemingly considered to remove them. Finally, this action relies on an assumption that the waste will be able to go to an off-site landfill that has high enough limits for those two radionuclides in its Waste Acceptance Criteria. If this "Test Bed" fails, or if stakeholders successfully argue that DOE has not appropriately classified this waste as non-HLW suitable for a shallow land disposal facility, what effect has occurred as a result of the proposed action? Will the solidified tank waste be destined for a deep geologic repository that does not yet exist and may not accept a grouted waste form? Will it be left at Hanford as another orphan waste? The EA should consider these risks, evaluate their potential effects under NEPA, and perform such mitigating measures as are necessary to minimize the potential effects.

4-2

- The Purpose and Need section of the EA does not adequately explain why an in-tank pretreatment system form factor is the preferred method for the "front end" of the TBI Phase 2 demonstration. Please explain why other reasonable alternatives were not considered for providing pretreated liquid feed for grout treatment, such as the existing Tank Side Cesium Removal system. Are there trade-offs from a worker risk, cost, or waste management standpoint associated with the use of a novel in-tank system instead of a pre-existing TSCR system that has the capacity and capability to provide 2,000 gallons of feed for offsite treatment?

4-3

    - Relevant reference from the DOE Citizen's Guide to NEPA: "The purpose and need statement explains to the reader why an agency action is necessary, and serves as the basis for identifying the reasonable alternatives that meet the purpose and need. . . The

[1] From phoenix.pnnl.gov, the Best Basis Inventory for SY-101 estimates 63.3 Ci of Tc-99 are present in 2.8 million liters of upper layer supernatant, which equates to 2.2E-5 Curies or 22 million picoCuries per liter. The iodine-129 concentration in the upper layer supernatant is estimated to be 24,000 picoCuries per liter.

4-3 Contd

identification and evaluation of alternative ways of meeting the purpose and need of the proposed action is the heart of the NEPA analysis. The lead agency or agencies must, 'objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.'" (https://ceq.doe.gov/docs/get-involved/Citizens_Guide_Dec07.pdf)

4-4

- Please provide greater specificity regarding the expected source term in the Tank SY-101 extracted liquid, including expected concentrations of all radionuclides and non-radiological hazardous constituents. What fraction of the estimated 1.8 curies remaining in the pretreated will be long-lived, mobile radionuclides? The presence of certain constituents would affect the environmental analysis in myriad ways, as discussed below.

4-5

- Please specify how much flush water is expected to be added to Tank SY-101 during the Proposed Action. Please also describe how the Proposed Action would or would not affect the amount of space available in this tank.

4-6

- Please explain in greater detail how potential organic and non-radionuclide hazardous constituents in the extracted tank waste would be treated prior to disposal. Page 2-3 of the EA states in reference to the 2,000 gallons of tank liquid, "There would also be hazardous constituents in the decontaminated solution such as heavy metals and organics." The only treatment specified is grouting for immobilization of radionuclides. No treatment method for organics is specified in any alternative, yet page 2-4 states, "Treatment and stabilization of the liquid MLLW using an in-container mixer [will] form a waste that meets the RCRA LDR requirements and waste acceptance criteria of the permitted disposal facility operated by either WCS or EnergySolutions." The recent National Academy of Sciences study on Hanford Supplemental Low Activity Waste has made it clear that treatment of organics is in many cases a necessary precursor to grouting in order to meet RCRA land disposal restrictions, especially if organics are to be expected as described in the EA. We are concerned that this represents an incomplete analysis in the EA and likely an incomplete description of the alternatives. It would also fail to meet the Purpose and Need for Agency Action to verify the attainment of Waste Acceptance Criteria for an offsite commercial disposal facility and to establish that all activities will protect human health and the environment.

4-7

- Appendix A of the EA presents a transportation risk evaluation that focuses exclusively on radiological constituents in the waste. Given that hazardous constituents are reportedly expected to be in the waste liquid, please revise the transportation effects analysis to reflect the actual waste form to be transported under each alternative scenario. This assessment should also include the potential human health and environmental risks associated with a liquid spill in the event of an accident and the subsequent cost of a remediation action.

4-8

- Please provide additional evaluation of potential seasonal variability in transportation risk as it relates to the anticipated shipping schedule, such as winter weather, and how DOE will plan for transportation shipments. Please also provide information related to the proposed shipping routes and potential schedules, with an expectation that the routes and schedules will be shared with the appropriate state agencies responsible for transportation safety planning. As is well-known, the I-84 transportation corridor in northeast Oregon between Umatilla and Union Counties can be particularly dangerous in winter and the freeway is occasionally shutdown due

4-8 Contd to snow, ice, and dense fog. Oregon would prefer to see solidified waste, not liquid, transported through our state.

- 4-9 The EA does not specify a final disposition pathway for the ion exchange column to be used in the TBI demonstration or the potential infrastructure and equipment that could be necessary to extract the highly-radioactive spent ion exchange resin from its container for ultimate dispositioning. Please provide greater detail regarding the potential future effects of creating a single, uniquely contained waste form and how its management would be distinct from that for the ion exchange columns planned to be generated during operation of the TSCR system.
- 4-10 Page 2-3 of the EA states, "The proposed TBI Demonstration would use non-elutable IX media that permanently bind the cesium to the IX media [emphasis added]." The assertion of permanence in this sentence is an unsupported statement. A similar statement is made on page 3-20. Please support, revise, or delete.
- 4-11 Page 2-3 appears to indicate that a single sample would be analyzed for all six totes of extracted liquid waste. What is the basis for selecting the number of samples to be representative of the waste stream, and how does this relate to the waste verification requirements of the receiving facilities? Please provide additional detail.
- 4-12 Page 3-10 states, "Because there would be no measurable radiological emissions or effluents at PFNW, and no direct radiation dose off site, there would be no additional doses to the public [emphasis added]." The assertion of no measurable radiological emissions is an unsupported statement. Please support, revise, or delete.
- 4-13 The EA does not discuss the final dispositioning of the solids filter that is integrated in the ITPS arm. The final loading of Cesium-137-laden IX material fines onto the filter is uncertain. Similarly, it is unlikely, yet unknown, to what degree the filter might become laden by solids containing radionuclides of interest for long-term risk. In order to facilitate classification of this waste source and to demonstrate that the filter meets the WAC of a receiving disposal facility, it will be necessary to accurately estimate the concentration of radionuclides entrained on the filter. Please discuss the potential human health or environmental effects associated with the proper characterization and disposal of this waste term, including how this waste verification process will be conducted safely and adequately for legal disposal.
- 4-14 The schedule and duration of the proposed action is unclear based on the descriptions in the EA. Page 2-3 states that the operation is expected to take about nine days, but page 3-21 describes a period of three to four weeks to air dry the ITPS IX column following completion of pumping. The time required for mobilization and demobilization also appear to not be reflected. Please clarify and provide a complete accounting of the expected duration of activities on site.
- 4-15 The EA does not describe the process, requirements, or potential human health or environmental effects associated with the decommissioning of the ITPS, including safe extraction of the ion exchange cartridge from the ITPS arm. We note that a public presentation displays images of a shielded ground-level structure and tool intended for this purpose, but it is not described or discussed in the EA.[2]

[2] https://doeresearch.fiu.edu/Reports/FIU%20Research%20Review%20-%20Project%204%20-%20DOE%20Fellow%20Jason%20Soto.pdf

4-15 Contd

- Please include in the description of alternatives the process and equipment associated with safe removal of the CST IX cartridge from the ITPS arm and other ITPS decommissioning activities.
- Please include in the description of alternatives the process for extracting the ITPS solids filter should it be necessary to accomplish in order to meet waste acceptance criteria for ultimate disposal of the ITPS arm.

4-16

- The EA asserts that average dose to a worker supporting the DOE-ORP mission is 0.7 mrem/week, but it does not state whether this average includes workers who are not actively operating within the tank farms (e.g., working in an office). Please confirm whether the dose projection accounts for at-tank worker activities and revise the comparison to the Proposed Action as appropriate, and please also include a minimum and maximum dose, as appropriate.

4-17

- The EA further asserts that the average DOE-ORP dose is applicable to the Proposed Action because it is similar to existing ORP operations. The removal of the IX cartridge from the ITPS arm appears to be distinct from "normal tank farm operations" used as the basis for estimating the worker dose associated with the TBI project. It also represents a novel at-tank activity not addressed in the TCWMEIS or the DFLAW Supplement Analysis. Please revise the dose assessment in the EA to acknowledge the novel challenges and requirements associated with ITPS decommissioning, including removal of the IX cartridge and potential removal of the integrated ITPS solids filter, should it require removal for additional treatment and disposal.

4-18

- The Hanford Site map provided in Figure 1-1 is old and poor quality. Please replace with a more current higher quality figure.

4-19

- Please provide estimates of the greenhouse gas emission tradeoffs associated with each alternative, including the no action alternative and the carbon footprint of the grouting process.

4-20

- Please clarify how the long-term impacts of offsite disposal are addressed by NEPA documents for the two proposed disposal facilities. If no NEPA documentation exists for these facilities, please explain how the full impacts of this proposed action are covered by a NEPA analysis.

Heart of America Northwest

"The public's voice for Hanford Cleanup"

Comments on Test Bed Initiative (TBI) Demonstration Environmental Assessment (EA) [DOE/EA-2086] **for 2,000 gallon test removal of waste from High-Level Nuclear Waste tanks with offsite treatment and disposal as LLW following removal of key radionuclides**

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office@hoanw.org / gerry@hoanw.org

Submitted September 2, 2021 To: TBI-EA@rl.gov

On behalf of our thousands of members across the Northwest from Spokane to Seattle, from Tri-Cities downriver to Portland, ***Heart of America Northwest urges***:

5-1
- USDOE and Ecology to proceed without further delays to deploy and test the removal of waste from the leaking High Level Nuclear Waste Tank B-109 using the equipment, methodologies, adjacent offsite treatment and offsite disposal described in the TBI EA as Alternative 1, and also publicly referred to as the "SAFE Alternative."

5-2
- USDOE and Ecology acknowledge that actions taken to respond to the on-going leak of waste from Tank B-109 are exempt from NEPA and SEPA. This includes use of the "SAFE treatment alternative" which uses the in-tank pretreatment system described in the TBI EA to remove leakable liquids from B-109 with the treatment of the waste and disposal using the methodologies and facilities described in EA Alternative 1. (This applies as a CERCLA response action and for an order of Ecology to follow the federal and state hazardous waste laws' [RCRA and HWMA] requirements to empty leakable waste from a leaking tank immediately or as soon as feasible).

5-3
- USDOE to adopt Alterative 1 of the EA – utilize the adjacent existing commercial treatment capabilities at Perma-Fix NW to treat 2,000 gallons of supernate liquid waste from tanks after removing of the "key radionuclides" using in-tank pretreatment.
    - Alternative 1 recognizes that reducing the transport of untreated liquid MLLW wastes (after key radionuclides are removed) reduces potential accidents and related environmental, health and socioeconomic impacts (especially to communities of color, including Tribal members on reservations through which wastes would be transported).
        - As we discuss below in specific comments, the socioeconomic impact and environmental justice section should recognize that any accident risks during transportation will likely be borne by communities that already suffer disparate and disproportionate health, pollution and other effects due to location of transport corridors through these communities (and Reservations).

5-4
- USDOE (and Ecology in adoption of the EA for SEPA purposes) to acknowledge in the final EA that there are likely potential significant environmental **benefits** from use of the processes and treatment methodologies with offsite disposal of waste described in the EA if the demonstration phase of the TBI is successful. An EA should describe likely potential environmental benefits (which are "impacts" or can be viewed as "mitigation" measures of potentially significant adverse

environmental impacts from existing plans [no action alternative]). **Those likely benefits** if the test / demonstration that 2000 gallons can be removed from tanks, have Cesium and other key radionuclides removed via in-tank pretreatment, be treated to meet RCRA LDR and waste acceptance standards for offsite disposal **include**:

- Greatly reducing the total quantities of glassified and secondary waste from Hanford tanks needing to be disposed onsite. The onsite landfill (IDF landfill) cannot accommodate all the wastes from Hanford's tank farms and processing facilities without contaminating Hanford's groundwater. Thus, if significant quantities of the lower radionuclide waste from tanks can be disposed offsite there are major positive impacts for Hanford's groundwater, preventing exposures of Tribal members with Treaty rights to resource use on the Hanford Central Plateau, and for protecting the Columbia River.
    - As described in Alternative 1, the offsite disposal site in West Texas has no drinkable groundwater to put at risk – which is a tremendous environmental and health benefit compared to disposal at Hanford.
- Preventing more High-Level Nuclear Waste from leaking from Hanford's tanks to the soil and inevitably contaminating groundwater. Hanford's groundwater is a major natural resource and also needs to be protected for future use as a drinking water and irrigation resources. Contamination in Hanford's groundwater flows to the Columbia River. The TBI / SAFE treatment alternative offers the potential to protect Hanford groundwater and the Columbia River from current and future High-Level Nuclear Waste tank leaks.
- If demonstrated to be successful in meeting treatment and disposal standards, the TBI or SAFE Alternative would create an option for USDOE to dramatically speed up treatment for the 40-60% of tank wastes for which the EA acknowledges USDOE currently lacks treatment capacity for 40-60% of the "Low Activity Waste" (LAW) from Hanford's tanks. LAW comprises 90% of the tank waste by volume. It will cost billions of dollars to build a second LAW facility and take decades. The SAFE Alternative (if demonstrating on B-109) or TBI demonstration, if successful, will create an option that would speed up treatment (while DFLAW proceeds to vitrify 40-60% of the LAW waste) and SAVE billions of dollars with an estimated cost of retrieval, treatment and disposal that is 1/50th the cost per gallon compared to DFLAW. The environmental benefits from removing waste from tanks before more wastes leak is incalculably high. The whole point of the billions being spent on DFLAW and WTP is to process tank wastes to prevent their leaking into the environment. With every passing year, the likelihood of additional leaks and the size of leaks increase. **NEPA (and SEPA) require that the TBI EA present these environmental benefits to decision makers and the public.**

5-4 Contd

- The EA (and Ecology adoption of the EA) should describe the environmental benefits and potential positive impacts (or mitigations of potential adverse effects under existing plans) from the Test Bed Initiative and use of the same techniques, facilities and offsite disposal for Tank B-109 (the SAFE Alternative).

5-5

- USDOE to specifically adopt in the EA and published record of decision that the Waste Incidental to Reprocessing (WIR) determination will occur <u>after in-tank pretreatment</u> removes "key radionuclides to the maximum extent that is technically and economically practical" pursuant to DOE Order 435.1 <u>and waste is sampled; and, prior to transport</u> from the Hanford site to be treated.

5-6

Specific comments and supporting explanation of major points above:

5-7

USDOE and regulators are required by RCRA, CERCLA, HWMA and MTCA to remove leakable supernate and interstitial liquids from the currently leaking High Level Nuclear Waste Tank B-109 or other leaking tanks. The "SAFE Alternative" would use the same equipment[1] – already procured – and the same treatment and disposal described in the TBI EA Alternative 1 to remove leakable liquid from B-109. This would have immediate positive environmental benefits and mitigate the known harmful adverse impacts from continued inaction allowing B-109 to keep leaking.

5-8

Use of the same equipment, facilities and methods are "connected" or "related actions" which would be appropriate to consider under normal circumstances within the scope of this EA.[2] It would be beneficial to consider if there are any potential impacts outside of those which this EA analyzes for removal and treatment of waste from SY-101. However, if removal and treatment of waste from B-109 or any other leaking tank is undertaken as part of, or utilizing the same / similar steps and treatment as TBI, **it is not required that the removal and treatment await NEPA analysis because USDOE should be undertaking to remove and treat the waste from a leaking tank as a "time critical removal action" and an action required by the federal RCRA and Washington's HWMA and MTCA.** CERCLA exempts time critical removal actions from NEPA reviews. Actions taken in response to an Ecology order to respond to a release, including an order to follow the legal requirements to remove leakable liquids from a leaking tank and to remove it from service, are also exempt from SEPA. When there is an imminent and substantial risk due to an on-going release into the environment, neither a full RIFS (or RCRA evaluation) or NEPA / SEPA analysis is required. Undertaking the NEPA or SEPA review would delay the required action to abate the environmental harm from the release and prevent further releases.

In sum, USDOE and Ecology should be immediately removing leakable liquids from the leaking Tank B-109 using the available equipment, methods and facilities described in the TBI EA Alternative 1 and referred to as the "SAFE Alternative" for leaking tanks and B-109. That **immediate action to prevent further leakage and abate the harm from the leak does not need to wait for an EA to be completed**.

However, there is no reason not to include a discussion in the TBI EA of the positive environmental benefits from use of the SAFE Treatment Alternative for reducing leakage from Tank B-109. Indeed, because it is an obvious "connected" or "related" action, a discussion of the

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[1] In-Tank Pretreatment using pumps inserted into the tank with ion exchange resins to remove Cesium and other key radionuclides before the liquid waste is removed from the tank.

[2] NEPA rules at 40 CFR 1508.25(a) require the scope of impact statements include connected or related actions "which may be:

> **(1)** Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:
> **(i)** Automatically trigger other actions which may require environmental impact statements.
> **(ii)** Cannot or will not proceed unless other actions are taken previously or simultaneously.
> **(iii)** Are interdependent parts of a larger action and depend on the larger action for their justification."

The rule also includes "similar actions." Here there is no mistaking that use of the same equipment, facilities and methods on similar wastes from B-109 is a similar action to extracting and treating wastes from SY-101.

positive environmental benefits / impacts is required. NEPA requires consideration of "connected" or related actions. 40 CFR 1508.25 (a)(1).

5-8 Contd NEPA also requires consideration of cumulative effects. TBI and SAFE involve the same equipment and steps taken on the same type of wastes from Hanford tanks, and would lead to use of the same technology, methods and facilities on the same tank wastes in the future if the first demonstration is successful. The only difference is whether the waste used in the demonstration is from a currently leaking tank in order to prevent immediate, substantial and imminent harm or from Tank SY-101 in order to prevent future releases. They are not only "connected," but also involve "cumulative" effects that are required to be considered in the same EA (or EIS).

5-9 **Footnote 10, Page 2-3** should recognize that USDOE has determined that similar nonelutable Cesium removal Ion Exchange (IX) resin from the Tank Side Cesium Removal program will be vitrified as HLW. The EA and NEPA documentation for that decision should be cited and the EA should discuss potential environmental benefits from treating the Cesium IX in the same manner as the DFLAW Cesium IX columns. This EA should compare the quantity of Cesium contaminated IX resin from this action (2000 gallon test of TBI) with the approved Tank Side Cesium removal project's Cs IX columns which will be vitrified.

Transportation:

Page 2-4 first sentence mistakenly states that the distance a truck shipment "would travel between the Hanford Site and FPFNW is 26 miles." We believe this should say the total distance from Tank SY-101 to PFNW would be 26 miles, with only the final 1.2 miles off of the Hanford site.

5-10 The distance from the Hanford site to Perma-Fix NW is 1.2 miles. The distances to other alternate treatment facilities are 650, 1840 and 2500 miles. Because TBI is a "demonstration" project, it is appropriate to include demonstration of mitigation measures to reduce the potential for an accident while transporting untreated liquid waste. Alternative 1 involves only two truck shipments of liquid waste during the demonstration, but the connected future action would involve many more. While Alternative 1 is definitively the alternative with the least potential for transportation accidents, **the EA should still include discussion of mitigation measures**.

5-11 **Appropriate mitigation measures** would be to only ship waste from the tank farms to PFNW when traffic is lightest, weather conditions are favorable, and an escort is available for the 25 miles onsite and the 1.2 miles offsite. Obviously, far greater mitigation measures would be needed for transport between 650 to 2500 miles, and the EA must discuss that the simple mitigation measures available for a 1.2 miles trip offsite would not be available for Alternatives 2-4.

5-12 Section 3.7.1 transportation impacts states that "only MLLW would be transported off the Hanford site." This should be accompanied by a note that the Waste Incidental to Reprocessing (WIR) determination would be applied to the waste after key radionuclides are removed, per DOE Order 435.1, rather than after treatment and solidification. Otherwise, this statement would not be accurate as the waste transported would still be HLW.

The likeliest harms from transportation accidents are in corridors that disproportionately impact low income and communities of people of color (including on Tribal Reservations in rural areas).

Increased transport of liquid - rather than solid wastes - does have serious potential impacts which can be mitigated or almost entirely avoided by choosing Alternative 1, with only 26 miles of liquid trucked prior to treatment and solidification, rather than 650 to 2500 miles under the other alternatives.

The transportation risk analysis based on the Savannah River DWPF liquid waste transportation analysis is seriously flawed. While the radiological contents are about a seventh, of the SRS waste loads, this does not mean that there are not potential impacts that should be avoided by minimizing the trucking of the liquid waste prior to treatment. The SRS analysis adopted in this EA ridiculously assumes that no individual is closer than 500 or 1000 feet from the accident. Since this is an accident that likely involved other vehicles, it is ridiculous to assume that no one is closer than 500 or 1000 feet. The analysis does not consider any impact to the community other than latent cancer fatalities. The communities impacted by an accident are likely to have much poorer outcomes due to lower access to health care and preexisting conditions, increasing the risk of a cancer being fatal compared to the averages used in the underlying analysis. This should be discussed in the socioeconomic impact assessment rather than dismissing all consideration of environmental justice and socioeconomic impacts due to USDOE's implicit biases (mapping of the disparities for health care and outcomes along the routes shown is readily available).

USDOE fails to use the dose to cancer conversion factors adopted by the National Academy of Sciences, Engineering and Mathematics (Biological Effects of Ionizing Radiation, BEIR VI) or EPA's "blue book," which document far higher cancer risks from the postulated maximum doses. the analysis only considers immediate aerosolization of the liquid, and not subsequent runoff and other exposure paths or that a high temperature fire accident is likely to aerosolize a greater fraction.

Table 3-1 page 3-2; and Section 3.7. should recognize that even unlikely releases due to transportation of not-yet treated liquid wastes in totes could have significant impacts. Therefore, the EA should compare the environmental benefits of alternative 1, treating the liquid and solidifying it at a facility immediately adjoining the Hanford site with only 26 miles traveled (and only two miles off of the site) versus transporting the liquid wastes 650, 1800 or 2500 miles under alternatives 4, 3 and 2 respectively.

Those potential adverse impacts from accidents (which go far beyond latent cancer fatalities) will be borne disproportionately by communities and peoples already suffering from disparately high pollution from the same transportation corridors, reduced access to health care, higher incidences of disease and are farthest from environmental justice. The EA should recognize this
5-13 and mitigate environmental injustice impacts by choosing the alternative which minimizes transportation of <u>untreated liquid</u> wastes during the demonstration, recognizing that a successful demonstration may lead to a "connected action" of many more shipments.

The bottom line is simple: reducing transportation miles for liquid waste prior to treatment reduces the potential for accidents and numerous impacts that will flow from accidents.

USDOE should not have eliminated "Water Resources" and "Socio-Economics and Environmental Justice" from Analysis (Table 3-1):

5-14 **The EA should not eliminate "water resources" from further analysis (Table 3-1, page 3-2), in Section 3.5.3 (No Action). Rather, the EA should describe the potential positive environmental impacts in regard to water resources at the Hanford site from successful deployment of the TBI methodology and treatment:**

a) reducing total quantity of post-treated tank wastes requiring disposal in the Hanford IDF landfill. Recent analyses, including by the NRC for the Waste incidental to Reprocessing (WIR) evaluation of DFLAW waste disposal notes that a large portion of secondary wastes would be disposed on site with potentially significant impacts to groundwater; and,

b) the great positive environmental benefit of using the TBI methods to prevent further leakage from already leaking High level Waste tanks such as B-109.

The No Action Alternative must include the environmental benefits that will not be realized if TBI is not implemented; if the test does not succeed in producing treated, solidified wastes that can be disposed offsite; or, if the TBI In-Tank Pretreatment System and use of totes is not deployed to remove leakable liquids from tanks that are leaking, such as B-109.

5-15 Use of the same methodology, treatment and disposal path for leaking tanks such as B-109 offers immediate and clear environmental benefits. If TBI testing succeeds it will demonstrate that this same methodology can be used for leaking tanks. And, use of the same technology and methods has been proposed for B-109 and is a related action. The potential environmental benefit compared to harm from unabated tank leakage under USDOE's current no-action plans for B-109 leakage must be included. NEPA EAs must include mitigation measures to prevent potential environmental impacts. Emptying leakable liquids from Tank B-109 using the same methods described in this TBI EA would be a very significant mitigation measure for on-going harm from a large leak of High Level nuclear Waste from Tank B-109 (which has leaked up to 4.5 gallons a day).

The potential adverse impacts from accidents (which go far beyond latent cancer fatalities), discussed at length above, will be borne disproportionately by communities and peoples already suffering from disparately high pollution from the same transportation corridors, reduced access to health care, higher incidences of disease and are farthest from environmental justice.

5-16 The EA should recognize this and mitigate environmental injustice impacts by choosing the alternative which minimizes transportation of <u>untreated liquid</u> wastes during the demonstration, recognizing that a successful demonstration may lead to a "connected action" of many more shipments.

The likeliest harms from transportation accidents are in corridors that disproportionately impact low income and communities of people of color (including on Tribal Reservations in rural areas). Increased transport of liquid - rather than solid wastes - does have serious potential impacts which can be mitigated or almost entirely avoided by choosing Alternative 1, with only 26 miles of liquid trucked prior to treatment and solidification (only 1.2 miles of which are offsite), rather than 650 to 2500 miles on public roads under the other alternatives.

The EA should not dismiss environmental justice impacts from the proposal and connected actions. The EA should discuss the environmental justice issues resulting from disparate risks of

5-16 Contd

transporting untreated liquid wastes (as opposed to solidified post treatment wastes enroute to disposal) and recommend Alternative 1 which almost entirely eliminates the risk of these impacts.

Section 3.5.3 No Action should include a comparison showing benefits from TBI compared to existing plans or other long-term alternatives that USDOE is considering:

There is an on-going release / accident leaking High Level Nuclear Waste from Tank B-109. This EA is required to report in the EA on the benefits from use of the same TBI technology and methods as a mitigation measure with significant environmental benefits. This includes prevention of thousands of gallons of leakable interstitial liquid from leaking from B-109 on top of the 3,100 gallons reported by USDOE - and which we have documented is likely two to three times greater. Every gallon of HLW in the soil column increases environmental harm and creates long-term impacts to groundwater. USDOE cannot remove all contamination from tank leaks which reach groundwater, even if USDOE were to somehow operate pump and treat facilities for the next thousand years.

Rather than eliminating "water resources" from further analysis (Table 3-1, page 3-2), in Section 3.5.3 (No Action) the EA should describe the potential positive environmental impacts in regard to water resources at the Hanford site from successful deployment of the TBI methodology and treatment: a) reducing total quantity of post-treated tank wastes requiring disposal in the Hanford IDF landfill. Recent analyses, including by the NRC for the Waste incidental to Reprocessing (WIR) evaluation of DFLAW waste disposal notes that a large portion of

5-17

secondary wastes would be disposed on site with potentially significant impacts to groundwater; and, b) the great positive environmental benefit of using the TBI methods to prevent further leakage from already leaking High level Waste tanks such as B-109.
The No Action Alternative must include the environmental benefits that will not be realized if TBI is not implemented; if the test does not succeed in producing treated, solidified wastes that can be disposed offsite; or, if the TBI In-Tank Pretreatment System and use of totes is not deployed to remove leakable liquids from tanks that are leaking, such as B-109.

Use of the same methodology, treatment and disposal path for leaking tanks such as B-109 offers immediate and clear environmental benefits. If TBI testing succeeds it will demonstrate that this same methodology can be used for leaking tanks. And, use of the same technology and methods has been proposed for B-109 and is a connected or related action. The potential environmental benefit compared to harm from unabated tank leakage under USDOE's current no-action plans for B-109 leakage must be included. NEPA EAs must include mitigation measures to prevent potential environmental impacts. Emptying leakable liquids from Tank B-109 using the same methods described in this TBI EA would be a very significant mitigation measure for on-going harm from a large leak of High Level nuclear Waste from Tank B-109 (which has leaked up to 4.5 gallons a day).

Table 3-7 "Natural Background and Other Radiological Dose Unrelated to Hanford Operations" misleadingly and incorrectly reports the Effective Dose Equivalent from natural

5-18

background radiation as 310 mrem per year. Because the table header refers explicitly to Hanford, the natural background radiation of approximately 90 mrem/year should be reported here, not the average for the US (which includes high radon geologic areas and high elevation areas - neither of which are relevant for Hanford).

5-18 Contd

The discussion of dose to workers (36 mrem/year average reported in this section) inappropriately compares the increased exposure of 36 mrem to the 310 mrem/year US average rather than the much more significant increase of over 33% in exposure compared to what the average worker received from natural sources living in the mid-Columbia.

5-19

Washington Ecology included discussion of an unrelated and dissimilar project involving treatment of brine from DFLAW in its August 27, 2021 letter regarding this EA and the NEPA and SEPA analysis of the Test Bed Initiative (letter 21-NWP-140). This is an entirely separate project and the two should not cloud each other. Ecology provided no discussion of how the projects are related (other than the same commercial treatment facility treating the wastes) or why it raised this project in the same letter. We disagree with Ecology in regard to a need for public meetings on this EA for the demonstration of retrieval and treatment of 2000 gallons of waste. As the largest public membership group (and the group which generates the majority of people commenting at Hanford cleanup meetings or submitting comments), we have said holding public meetings on this EA prior to results from the demonstration being known makes no sense to us (a view shared by others as well). The point of the demonstration project which is the subject of this EA is to obtain information on whether the elements of the proposed project work safely and if the treated waste will meet applicable standards. Sharing results of the demonstration project in public meetings or via other communications may be appropriate. We do not see what can be gained by holding one or more meetings prior to the demonstration.

Ecology's suggestion for a public meeting on the TBI EA is rather inexplicable as a priority when Ecology and USDOE have failed to discuss planning for public meetings and forums to discuss the leak from Tank B-109. The leak from B-109 is a tremendous public concern.

As discussed above, the same equipment for retrieval, the same offsite treatment and disposal as proposed for TBI in this EA could be used to immediately respond and abate the impacts from Tank B-109's on-going leak. An EA is not required prior to responding to a leaking tank. A public meeting on B-109 with discussion of the TBI based method to remove and treat leakable liquids would be well received and relevant for public understanding of TBI as well as the options for removing liquid from a leaking tank. The current priority for public meetings is to discuss the leak from B-109.

Conclusion:

USDOE should proceed with the Test Bed Initiative (TBI) demonstration and explicitly adopt Alternative 1 in the TBI EA as its preferred alternative. Alternative 1 involves transportation of untreated liquid wastes just 1.2 miles offsite compared to 650, 1840 and 2500 miles for the other alternatives. Alternative 1 would allow for additional mitigation measures to reduce the risk of accidents during transportation which are not feasible for the longer distance alternatives. The EA does not discuss mitigation, but it should. Similarly, the EA must discuss environmental justice impacts from the risks of truck accidents involving untreated liquid wastes in disparately impacted communities and Reservations along the truck routes. The EA should discuss the TBI project's clear environmental benefits / positive impacts to protect groundwater from leaking High Level Waste tanks and by reducing the quantities of wastes to be disposed in the on-site IDF landfill if the demonstration is successful and TBI (or SAFE) is used to remove and treat leakable liquids from tanks much sooner than under current USDOE plans (the no action alternative).

The leak from Tank B-109 has continued unabated since announced four months ago and for over two and a half years since it was obvious from monitoring data. The same equipment methods and facilities as proposed for TBI could be used to respond to the leak under the SAFE Alternative for removing, treating and disposing of leakable liquid waste from Tank B-109. This benefit should be discussed in the EA, while recognizing that responding to a leak cannot be held up to prepare a NEPA review.

Submitted via E-mail

September 1, 2021

NEPA Document Manager
Test Bed Initiative Draft Environmental Assessment
U.S. Department of Energy P.O. Box 550
Mailstop H5-20
Richland, Washington 99352
Email: TBI-EA@rl.gov

Subject: Comments on Draft Environmental Assessment for the Test Bed Initiative

NEPA Document Manager,

On August 17, 2021, DOE issued a request to agencies and tribes for comment on the draft Environmental Assessment for the Hanford Tank Waste Test Bed Initiative (TBI) DOE/EA-2086.[1]

It is the position of Hanford Challenge that this draft Environmental Assessment (EA) is of public concern and that the public should have an opportunity to learn about this project and to submit comments. The DOE has set a review period lasting for only 14 days, from August 21, 2021 to September 3, 2021, and only available to certain agencies and tribes. This is unacceptable.

We therefore request that the DOE –

6-1

1. Consider our preliminary comments on the completeness, factual accuracy, and additional information for consideration in the draft EA.
2. Establish a public comment period of at least 60 days on the draft Phase 2 TBI EA.
3. Hold a public hearing on the draft Phase 2 TBI draft EA.
4. Conduct a full Environmental Impact Statement (EIS).

Hanford Challenge is a non-profit, public interest, environmental and worker advocacy organization located at 2719 East Madison Street, Suite 304, Seattle, WA 98112. Hanford Challenge is an independent 501(c)(3) membership organization incorporated in the State of Washington with a mission to create a future for the Hanford Nuclear Site that secures human health and safety, advances accountability, and promotes a sustainable environmental legacy. Hanford Challenge has members who work at the Hanford Site. Other members of Hanford Challenge work and/or recreate near Hanford,

[1] Letter 21-ECD-002148, "NOTICE OF AGENCY REVIEW PERIOD," DOE Hanford Site to Addressees, August 17, 2021.

where they may also be affected by hazardous materials emitted into the environment by Hanford. All members have a strong interest in ensuring the safe and effective cleanup of the nation's most toxic nuclear site for themselves and for current and future generations, and who are therefore affected by conditions that endanger human health and the environment.

Phase 2 of the Test Bed Initiative is planned to use in-tank filters and ion-exchange to remove cesium-137 from about 2,000 gallons of tank waste from Tank SY-101. The pretreated tank liquids would be transported in special containers called "totes" to an offsite commercial treatment facility; either Perma-Fix Northwest in Richland; Perma-Fix DSSI in Kingston, TN; or directly transported to Waste Control Specialists in TX, or EnergySolutions in Clive, UT. The commercial facility would mix the pre-treated liquids with cement, resulting in approximately 65 drums of grouted waste to be disposed at either Waste Control Specialists (WCS) in Andrews County, TX or Energy*Solutions* in Clive, UT. Phase 3 would scale-up to 300,000-500,000 gallons of tank waste liquid treatment.

According to DOE draft EA, grouting the 2,000 gallons would multiply the volume of Hanford's soluble tank wastes by 1.7 times.[2]

Hanford Challenge is concerned about implications these tests could have on the future of tank waste treatment and disposal at Hanford. The research and information we have access to suggests that a grouted waste form is ultimately less protective of human and environmental health than glass.[3] DOE itself has reached this conclusion in past reports, as documented in Hanford Challenge's recent report, *Why Grout Failed at Hanford*[4], which we incorporate into this comment. While we understand that the Test Bed Initiative is focused on offsite treatment, the information from the tests could prove to be a foundation for future disposal of grouted waste at Hanford. The 2,000 gallon test needs more public involvement to ensure it is not fast-tracked in ways that negatively impact the future of tank waste treatment and disposal and the mission to immobilize tank waste in glass. We are also concerned that the Phase 2 draft EA may be used as a blueprint for the Phase 3 Test Bed Initiative EA, and therefore needs to be updated with consideration for the scale-up.

6-2

Our preliminary comments on the completeness, factual accuracy, and additional information that should be considered in the draft EA are listed below.

1. Hold a 60-day public comment period on the Phase 2 TBI Draft EA.

The request for comments should go beyond seeking comments from agencies and tribes. The public should be given the opportunity to comment with adequate review time and a public hearing. Treating 2,000 gallons of tank waste and sending it offsite to be grouted and disposed sets precedent for the planned scale-up in Phase 3 to 500,000 gallons, and may be in play in future decisions about supplemental low-activity tank waste treatment. The public should have a chance to review the options under consideration and share formal comments for agency consideration.

6-3

The public hearing should include information about the Phase 2 TBI draft EA including the entire Test Bed Initiative Plan scale up to Phase 3 and how it fits into plans for Supplemental Low Activity Waste

[2] U.S. Department of Energy, Draft Environmental Assessment of the Test Bed Initiative Demonstration, at 2-1, fn. 9, available at https://pdw.hanford.gov/document/AR-15241.

[3] Hanford Challenge, *Why Grout Failed at Hanford, Chronology of the Failed Grout Program*, June 2021, available at https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/60f9b2bdb9480b7aeb6cbe15/1626976958173/2021+06.15+Why+Grout+Failed+at+Hanford.pdf

[4] Id.

decisions. Allow participants to make formal comments at the meeting.

6-3 Contd

The draft Environmental Assessment (EA) proposes the use of a local facility called Perma-Fix NW as a treatment location for the tank waste in Alternative 1. Perma-Fix NW has off-gas stacks and groundwater within the Richland city limits, where residential communities are potentially impacted from releases. Public comment opportunity was invited in an EA for transport and treatment of wastewater from Savannah River (See Federal Register Vol.84, No. 111, June 10, 2019, page 26847.) A public comment period, along with a public hearing, should be a part of this EA, and the period for comment should be at least 60 days.

2. Perma-Fix NW is not a facility that should be under consideration for the Test Bed Initiative.

Perma-Fix Northwest is at the center of the Department of Energy's "Test Bed Initiative," a proposal launched in 2016 to explore the feasibility of treating liquids from Hanford's underground high-level waste (HLW) tanks by removing cesium and mixing the liquid tank waste with grout for offsite disposal. After initial in-tank pretreatment (cesium-ion exchange and filtration) the liquids would be classified by DOE as Mixed Low Level Wastes (MLLW) which the U.S. Nuclear Regulatory Commission (NRC) says may be highly radioactive and contain long-lived radionuclides. According to the NRC, this waste (LAW feed), which constitutes about 80% of the total volume in Hanford's HLW tanks:

> "has high radiation levels requiring handling within shielded structures. Three envelopes of LAW have been defined: Envelope A is standard, Envelope B contains higher levels of cesium, and Envelope C contains higher levels of strontium and TRU ... . LAW would come from the liquid phases of the DSTs and from solids washing operations.... LAW is still HLW and DOE identifies the solid phases as HLW, defined as Envelope D .... Envelope D contains cesium, strontium, and TRUs as the radionuclides. Metal oxides, hydroxides, nitrates, phosphates, and aluminates constitute the bulk of the chemical species."[5]

6-4

The Test Bed Initiative operates on a three phase plan to pretreat liquid tank wastes, known as supernate, from Hanford's double-shell waste tanks, send the pre-treated liquid waste to an offsite treatment facility to be mixed with cement (grout) and dispose the grouted waste offsite at a commercial low-level radioactive waste disposal site. In 2017, Phase 1 of this initiative was demonstrated using Perma-Fix Northwest as its offsite treatment facility.[6] It involved a composite of approximately 3 gallons of wastes from six of Hanford's high-level waste tanks. The waste was pretreated, mixed with grout at the Perma-Fix Northwest facility and then shipped to the Waste Control Specialists (WCS) disposal site in Andrews, Texas. WCS has less restrictive waste acceptance criteria as compared to what is expected for onsite landfill disposal at other sites. Neither Waste Control Specialists, nor Hanford has analyzed whether grouted waste from pretreated high-level waste tanks meets the Waste Acceptance Criteria for disposal at Waste Control Specialists.

The practice of treating Hanford's low-level and plutonium-containing wastes at Perma-Fix Northwest, a commercial facility in Richland, WA, should end.

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[5] U.S. Nuclear Regulatory Commission, *Overview and Summary of NRC Involvement with DOE in the Tank Waste Remediation System-Privatization* (TWRS-P) Program June 29, 2001 NUREG 1747, p. 1. Table 2, pp. 1–3, https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1747/.

[6] U.S. Department of Energy, Office of River Protection, Hanford Tank Waste Strategy, Test Bed Initiative-Phase II, For the Hanford Advisory Board, Tank Waste Committee, January 9, 2019.

Perma-Fix Northwest is a commercial Low-Level Waste (LLW) and Mixed Low-Level Radioactive Waste (MLLW) treatment and storage facility approved, permitted or licensed for operation by the Environmental Protection Agency (EPA) Region 10, the Washington State Department of Ecology, and the Washington State Department of Health under their respective authorities. Perma-Fix Northwest is located on 35 acres in an urban area in the City of Richland and near the Department of Energy's (DOE) Hanford Nuclear Site.

Continued offsite shipping, storage and treatment of plutonium-containing nuclear wastes from Hanford to surrounding residential communities creates avoidable health, safety and security risks. According to the EPA, in 2010 over 32,000 people lived within 5 miles of Perma-Fix Northwest. Richland residents are at risk from the radioactive and hazardous materials transported over public roads between Hanford and Perma-Fix Northwest.

6-4 Contd

According to the State of Washington and federal regulators, Perma-Fix Northwest in Richland exceeded onsite soil contamination limits, improperly stored radioactive and other hazardous wastes, handled wastes resulting in leakage of plutonium and significant workplace contamination, failed to notify regulators of known violations, and exposed several employees to radiation. Perma-Fix Northwest was also fined a total of $551,891 from 2008 to 2019 by the U.S. Environmental Protection Agency and the Washington Department of Ecology for hazardous waste violations.

Hanford Challenge's November 2020 investigation, *Risky Business at Perma-Fix Northwest*[7], uncovered a disturbing history of accidents, violations, findings, and non-compliances that raise serious questions about whether Perma-Fix should be allowed to continue treating dangerous Hanford waste. Cost-savings is only one aspect to consider when deciding where and how to clean up Hanford's dangerous waste, but cost savings should never be the sole consideration.

3. Revitalize treatment capacity on the Hanford site to perform waste treatment functions currently performed by Perma-Fix Northwest

Hanford Challenge has concluded that it would be safer to expand the treatment capacity at the Hanford Site instead of sending waste for treatment at Perma-Fix Northwest. Treatment of waste on the Hanford Site provides the best environment for compliance with safety standards, clear and coordinated regulatory oversight, transparency, and accountability.

6-5

Hanford Challenge recommends that the Department of Energy revitalize its internal capacity at Hanford to perform the waste treatment functions that it is currently sending to Perma-Fix Northwest. There are many reasons why Hanford should treat its own waste onsite rather than at Perma-Fix Northwest. Hanford is a more suitable location for treatment due to a higher level of transparency and accountability, remote location further away from populated areas, further from the groundwater, ability to avoid the risky practice of transporting thousands of cubic meters of dangerous waste on public roadways, and a workforce that is highly trained, qualified, and certified.

[7] Hanford Challenge, *Risky Business at Perma-Fix Northwest*, Nov 2020, available at https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/5fce533274a40730fbc928bf/1607357241336/2020+12.04+PermaFix+Report+updated.pdf. This report and the documents referenced to in the report are incorporated as part of this Hanford Challenge comment.

4. Revise the draft EA to include on-site treatment as an alternative.

By only considering treatment of pre-treated waste at offsite facilities, the information contained in the draft EA is incomplete. Detailed information about how the offsite facilities plan to safely grout the treated tank waste liquids is missing and should be required in the draft EA and resulting EIS.

We understand that the TBI EA for Phase 2 only considers treatment of 2,000 gallons, however we are concerned that conclusions drawn from analysis of Phase 2 alternatives will be incomplete without an alternative that considers an onsite treatment facility. There are major issues with using Perma-Fix Northwest that are exacerbated in the Phase 3's scale-up scenario, that won't show up as clearly in the Phase 2 EA.

6-6

Phase 3 would expand to production scale to grout 300,000 to 500,000 gallons of soluble radioactive tank wastes over an 18-month period. At DOE's Phase 3 production scale, the Perma-Fix Northwest facility would generate as many as 16,364 55-gallon drums at a rate of about one drum filled every 45 minutes. In 2018, Perma-Fix Northwest proposed a similar plan.

A review of TBI's Phase 3 done in 2018 by federal and contractor experts at Hanford, questioned "whether Perma-Fix has the physical capacity and personnel required to handle the volume of waste which will be generated."[8] It would "require a 55 gallon drum to be produced roughly every 45 minutes."[9] After the drums are filled nearly 1,000 would have to remain in lag storage each month at the site for about 30 days, so that the grout can be cured to ensure its compressive strength before transport.[10] The transportation logistics for a waste volume this large have not been worked out. It's quite possible that the large waste volumes of about 1,000 drums per month, could create a transportation bottleneck resulting in a large backlog of stored grouted waste drums sitting at the Perma-Fix Northwest site.

5. Perma-Fix NW is operating under a temporary permit and has been since 2009.

The draft EA states that DOE is relying on a future permit for any tank waste treatment at PFNW in Richland: "PFNW is currently *in discussions with Ecology to renew PFNW's Dangerous Waste*
6-7 *Regulations permit. After the permit renewal, DOE would verify that the 2,000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit."*

Perma-Fix NW does not have a reasonable expectation that a new permit will be issued to include Hanford tank waste for a test bed initiative in the near future. The permit is dependent on the issuance of a State Environmental Protection Act (SEPA) analysis, a draft of which has not been issued as of this date. Perma-Fix NW itself characterizes as "uncertain" as to the date for treating the 2,000 gallons of TBI waste to the Securities and Exchange Commission in their June 30, 2021 Form 10-Q

[8] U.S. Department of Energy, Richland Operations Office, OA Database entry 37276, Chief Engineer/TPD/TOD/MIO/ECD review of DFLAW Readiness, Downstream Treatment & Disposal (LERF, ETF, Off-Site Treatment of MLLW, SALDS, TEDF, IDF) April 19, 2018 p. 8.

[9] OA Database entry 37276, Chief Engineer/TPD/TOD/MIO/ECD review of DFLAW Readiness, Downstream Treatment & Disposal (LERF, ETF, Off-Site Treatment of MLLW, SALDS, TEDF, IDF), available at https://www.dropbox.com/s/ramkr3y334k0ns2/FN%20200%202018%2004.19%20DOE%20Review%20of%20DFLAW%20Interfaces%20PFNW.pdf?dl=0

[10] W.L. Elbert and J.L Jerden Jr., *Test Plan for Formulation and Evaluation of Grouted Waste Forms with SHINE Process Wastes*, U.S. Department of Energy, Argonne National Laboratory, ANL/NE-15/29, September 2015, p. 37, available at https://publications.anl.gov/anlpubs/2017/02/133742.pdf.

Quarterly Report for the period ending June 30, 2021.[11]

6. Update history and information about hazardous waste components of SY-101 waste in the EA and potential impacts on grout integrity.

Tank SY-101 is estimated to contain 892,000 gallons of supernate liquids and 223,000 gallons of salt cake.[12] As of 2013 it was estimated to contain about 705,000 curies of radioactivity, of which about 75% is from Cs-137.[13] The salt cake in this tank contains retained hydrogen gas, which poses a hazard if released as a result of the addition of water to dissolve the salt.[14]

In 2007, a report by Pacific Northwest National Laboratory (PNNL) describes the history of this tank as follows:

> "From 1990 through 1993, SY-101's flammable gas troubles were acknowledged as the highest priority safety issue in the entire DOE complex. Uncontrolled crust growth demanded another high-priority remedial effort from 1998 through April 2000. The direct cost of the bubbles, toils, and troubles was high. Overall, the price of dealing with the real and imagined hazards in SY-101 may have reached $250 million. The indirect cost was also high."[15]

6-8

Removing radioactive cesium elements is not enough to guarantee the integrity of the grout. There are also several chemicals in the SY-101 tank liquids that can cause deterioration of the cement used in grout. According to the Portland Cement Association, "chlorides and nitrates of ammonium, magnesium, aluminum, and iron all cause concrete deterioration, with those of ammonium producing the most damage."[16] All of these elements are present in Hanford's tank waste and it raises an important question as to whether Perma-Fix Northwest will have to control them to ensure the integrity of its grout.

Tank SY-101 has one of the largest Total Organic Carbon (TOC) loads of Hanford's HLW tanks. Nearly 150 volatile organic compounds have been measured in retained gas emanating from the slurry in this tank.[17] At 46,900 kg,[18] this quantity of organic compounds poses a significant challenge without

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[11] https://ir.perma-fix.com/all-sec-filings#document-50126-0001493152-21-019308

[12] A.M Templeton, Waste Tank Summary Report for Month Ending November 30, 2018, p. 20, available at https://www.emcbc.doe.gov/SEB/TCC/Documents/Site%20Tours/Waste%20Tank%20Summary%20Report%2011-18.pdf

[13] Tank Waste Inventory Network System, Best Basis Estimate 2013, available at https://phoenix.pnnl.gov/phoenix/apps/tanks/index.html

[14] J. S. Rodriguez, J. W. Kelly, D. C. Larsen, *Integrated Waste Feed Delivery Plan Volume 3 – Project Plan* Washington River Protection Solutions, LLC, March 26, 2012. Table D-1, available at https://www.hanford.gov/files.cfm/RPP-40149-VOL3_-_Rev_02.pdf

[15] Charles W. Stewart, *Hanford's Battle with Nuclear Waste Tank SY-101: Bubbles, Toils, and Troubles,* PNNL-SA-43778, June 2006, available at https://www.osti.gov/biblio/892228-hanford-battle-nuclear-waste-tank-sy-bubbles-toils-troubles

[16] Robert Alvarez, *Reducing the Risks of High-Level Radioactive Wastes at Hanford,* Science and Global Security, 13:43–86, 2005, Table 1, available at http://scienceandglobalsecurity.org/archive/sgs13alvarez.pdf

[17] L.M. Stock, *Occurrence and Chemistry of Organic Compounds in Hanford Site Waste Tanks*, RPP-21854, Rev. 0, 07/27/2004, Table 3-10, available at https://hanfordvapors.com/wp-content/uploads/2016/09/Occurence-and-Chemistry-of-Organic-Compounds-in-Hanford-Site-Waste-Tanks-RPP-21854-Rev.-0-07-29-2004.pdf.

[18] Tank Waste Inventory Network System Best Basis Estimate 2013, available at https://phoenix.pnnl.gov/phoenix/apps/tanks/index.html.

potentially complex pretreatment prior to grouting in order to comply with RCRA land disposal restrictions.[19]

7. Groundwater risks need to be evaluated.

The fact that discussion of grout treatment at facilities like Perma-Fix Northwest does not include or evaluate the relative risks to groundwater, air, and local populations makes this draft EA incomplete. The Perma-Fix NW Annual Environment Report for 2020 states that "the area water table varies from approximately 10 feet at the west well to 21 feet at the east well[20]." Contrast this with the hundreds of feet to the water table in the Hanford 200 Areas. A spill during the handling or transportation of wastes at PFNW would quickly contaminate water that flows towards intakes and wells used by the City of Richland for drinking and irrigation. There is a history of Perma-Fix NW experiencing losses of contamination control at the facility[21].

6-9

8. Tank vapor issues, including more accurate information on worker health and safety risks, and data on chemical constituents in the waste, need to be included.

Tank SY-101 was a "burping" gas-producing tank, containing a variety of organic and inorganic compounds. Tank vapor releases pose a threat to both workers and the public nearby the Perma-Fix NW facility. Incredibly, the DOE characterizes vapor risks for workers in the EA as minimal or temporary. This statement belies the long history of vapor exposures at Hanford and is demonstrative of the DOE's dismissive attitude towards the health and safety of workers.

This statement come on the heels of a just-released report from the Washington State Department of Commerce that conducted a survey of some 1,600 Hanford workers who reported that 57% of those surveyed had been exposed to toxic vapors.

6-10

- Nearly a third, 32%, reported they had long-term exposure to hazardous materials at the nuclear reservation, rather than exposure during a single incident. The survey was conducted by the Hanford Healthy Energy Workers Board. The board was created by the Legislature and directed to survey workers and then provide recommendations to better meet the health care needs of Hanford workers.
- Over 21% of those surveyed said they had illnesses due to a short-term exposure to hazardous materials at Hanford. In addition, 28% said they had illnesses from long-term exposure to hazardous materials at Hanford.

The EA does not contain information on the chemical constituents present in the waste. This is the kind of data that an environmental analysis must contain.

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[19] U.S. Department of Energy, Savanah River National Laboratory, *Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation*, SRNL-RP-2018-00687 October 10, 2019, Table 2, p. 28, available at https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/D5103F716F7BE9B50A8749F6FAD7382E42825D4BFC3E.

[20] PermaFix Northwest Richland, Inc., Annual Environmental Monitoring Report for 2020, submitted to the Washington Department of Health, July 29, 2021.

[21] Hanford Challenge, *Risky Business at Perma-Fix Northwest*, Nov 2020, available at https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/5fce533274a40730fbc928bf/1607357241336/2020+12.04+PermaFix+Report+updated.pdf.

9. The DOE EA does not perform any kind of cumulative impact analysis of the operations at Perma-Fix NW.

The DOE EA states that the 2,000 gallon treatment project would be a "small" fraction of the total capacity at Perma-Fix NW and elsewhere. The EA should evaluate the cumulative impact of the waste forecast for treatment at Perma-Fix NW, per DOE's "emwims.org" web page. The sum of all the waste to be sent to PFNW is not only large by any standard, but is expected to grow even larger in the near future.

The volume and degree of radiologically-contaminated and high hazard waste DOE plans to send to Perma-Fix Northwest over the next 45 years should be considered against the additional waste DOE may send to Perma-Fix NW for treatment. The EA should assess the cumulative human and
6-11 environmental risks to the surrounding residential communities and workers. According to DOE projections, Perma-Fix NW is planning to accept and treat more than 43,000 cubic meters of mixed and low level radioactive wastes from Hanford and other sites between now and 2066. This will include toxic lead, cadmium, and mercury; pyrophoric depleted uranium metal, organic liquids, Waste Treatment Plant (WTP) wastes, contaminated equipment, radioactive lead wastes, transuranic wastes, contaminated pumps, Direct-Feed Low-Activity Waste (DFLAW) residuals, contaminated devices, and transfer lines. This also includes more than 600 cubic meters of radioactive wastes in packages larger than 10 cubic meters and with contact activity above 200 mRem per hour which will require remote handling. Some wastes, such as 473 cubic meters of spent resin (possibly for Cs-137 removal) will have unknown activity.

The magnitude of dangerous radioactive and non-radioactive hazardous waste envisioned to be processed by DOE at Perma-Fix Northwest over the next 45 years, if realized, could well exceed the current regulatory capabilities of Washington State and the EPA to ensure safety of workers and the public.

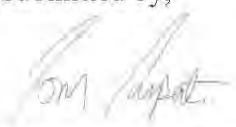
Conclusion

Hanford Challenges submits these comments to bring to the attention of the Department of Energy the issues that we believe need to be addressed in the draft TBI EA currently being considered by the agency.

We therefore request that the DOE –

1. Consider our preliminary comments on the completeness, factual accuracy, and additional information for consideration in the EA.
2. Establish a public comment period of at least 60 days on the draft Phase 2 TBI EA.
3. Hold a public hearing on the draft Phase 2 TBI EA.
4. Conduct a full Environmental Impact Statement (EIS).

Submitted by,



Tom Carpenter, Executive Director
Hanford Challenge

Department of Ecology Comments on Environmental Assessment of the Test Bed Initiative Demonstration, DOE/EA-2086

General Comments

Public participation

Ecology Letters 19-NWP-064 and 21-NWP-140 addressed the need for public involvement in this Environmental Assessment (EA). Specifically, the U.S. Department of Energy (DOE) rules require DOE to "make its NEPA documents available to other Federal agencies, states, local governments, American Indian tribes, interested groups, and the general public, in accordance with 40 CFR 1506.6, except as provided in § 1021.340 of this part." 10 C.F.R. § 1021.301(a).

7-1 NEPA regulations require agencies to "[s]olicit appropriate information from the public." 40 C.F.R. § 1506.6(d). "The Ninth Circuit has interpreted NEPA's regulations to mean that the public must be given an opportunity to comment on draft EAs and draft EISs." *Ocean Mammal Institute v. Gates*, 546 F.Supp.2d 960, 972 (2008) (citing *Citizens for Better Forestry v. U.S. Dept. of Agriculture*, 341 F.3d 961, 970 (9th Cir.2003)).

Ecology again encourages DOE to publish a Federal Register notice to announce the availability of a draft EA with a 30-day public comment period and public meeting, after incorporating changes to the draft EA based on comments received during the 14-day agency review period. Ecology also encourages DOE to utilize the Hanford Public Involvement Plan for Phases 2 and 3 of DOE's Test Bed Initiative (TBI).

Inaccurate and inconsistent use of the terms LAW and MLLW

Section 1.1 (Pg. 1-1), refers to pretreated tank waste as "low-activity waste (LAW) and high-level radioactive waste (HLW)." See also pages 1-3, 1-4, 1-7. The second sentence of Section 1.2.1 (Pg. 1-3) acknowledges that waste subject to a Waste Incidental to Reprocessing (WIR) determination "could be managed and disposed of as MLLW." See also Section 1.2.2 (waste subject to a WIR Determination
7-2 "may be managed under DOE's authority as MLLW."). The text then shifts to referring to the waste as MLLW, not only for disposal purposes, but for treatment purposes as well. (For example, Pg. 1-3, "classified as MLLW"; Pg. 1-4, "Following pretreatment, DOE would characterize and, if appropriate, classify the waste as MLLW").

Note that DOE's radiological waste classification process under DOE Order 435.1 is separate and distinct from the RCRA Land Disposal Restriction (LDR) requirements. The Order 435.1 WIR process is governed by internal DOE orders pursuant to its AEA authority, and does not affect any RCRA provisions. DOE acknowledged this concept in DOE Order 435.1 Implementation Guide (rescinded in 2021 associated with administrative changes to DOE Order 435.1):

> "A treatability variance (40 CFR 268.44) and/or determination of equivalent treatment (40 CFR 268.42(b)) may be necessary to fully comply with the LDR standards if a DOE site elects to use a technology other than vitrification, the BDAT, of [sic] if it is impractical to comply with all the standards applicable to individual waste codes."

7-3

In other words, waste subject to a WIR determination can be disposed of as MLLW for Atomic Energy Act and Nuclear Waste Policy Act purposes (i.e., disposed in a location other than a deep geologic repository), however, a WIR determination alone does not affect any RCRA regulatory requirements. Under RCRA, waste codes and treatment standards attach at the point of generation. Thus, the HLVIT LDR treatment standard attached to Hanford tank wastes at the point of generation and remains applicable unless and until one of the following factions occur:

(1) the waste is vitrified in accordance with the HLVIT standard prior to land disposal;

(2) the regulatory authority for the disposal site issues a site-specific treatability variance under 40 CFR 268.44(h) (plus treatment to satisfy LDR standards for any other waste codes other than D002 and D004-D011);

(3) EPA issues a determination of equivalent treatment under 40 CFR 268.42(b) (i.e., treatment to some other method can be approved through a determination of equivalent treatment with respect to the HLVIT treatment standard plus treatment for any other waste codes other than D002 and D004-D011);

7-3 Contd

or

(4) EPA approves a no-migration petition for the disposal site under 40 CFR 268.6.

There is no new point of generation after pretreatment because the LDR treatment standard of vitrification (HLVIT) has already attached to the waste and pretreatment does not meet the HLVIT treatment standard. Thus, the change in treatability group principle does not apply after pretreatment.

7-2 Contd

We encourage the use of consistent and accurate terminology throughout the EA. Specifically, refer to the low-activity fraction of tank waste (including pretreated tank waste) as LAW to distinguish it from MLLW for RCRA treatment purposes. Note that using the term LAW is consistent with the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site (draft EA page 1-7). Specific changes to incorporate this general comment are also provided below.

HLVIT LDR Treatment Standard

7-3 Contd

Include a description of how DOE intends to address the RCRA LDR treatment standard of HLVIT, which attached to the tank waste at the point of generation (see above comment). Specifically, given that this draft EA is premised on the HLVIT treatment standard not being met, describe how DOE plans to obtain a site-specific treatability variance, a determination of equivalent treatment, or a no-migration variance.

Specific Comments

Pg. 1-3, Section 1.2.1

7-4

Revise text as follows for accuracy: "The decanting, filtration, and IX process removed the key radionuclides (primarily cesium and strontium) from the tank waste, resulting in residual liquids classified as ~~MLLW~~LAW. The liquid ~~MLLW~~LAW was then packaged and transported to Perma-Fix Northwest (PFNW), a permitted waste treatment facility near the Hanford Site. At PFNW, the ~~MLLW~~LAW was treated and stabilized in grout."

Pg. 1-5, Section 1.4

7-5

Revise text as follows for accuracy: "Following pretreatment, DOE would characterize and, if appropriate, classify the waste as MLLW for management and disposal purposes. DOE would treat and stabilize the ~~MLLW~~LAW by grouting and then dispose of the immobilized waste form in an appropriately permitted and licensed commercial disposal facility."

Revise text as follows for accuracy: "Transportation (to a destination depending on the alternative) and disposal of the solid, stabilized waste at a permitted and licensed facility for disposal." As worded, sentence can be interpreted to mean that transportation would not occur under some alternatives. Revised language clarifies that different alternatives have different disposal locations.

Pg. 1-6, Section 1.4

7-4 Contd

Revise text as follows for accuracy: "Under Alternatives 1 and 2, the treated/stabilized ~~MLLW~~LAW would be transported to either the WCS disposal facility near Andrews, Texas, or the EnergySolutions disposal facility near Clive, Utah, for disposal depending on its LLW classification. Under Alternative 3, DOE would transport the liquid ~~MLLW~~LAW to the WCS facility near Andrews, Texas. WCS would treat, stabilize, and dispose of the waste. Under Alternative 4, DOE would transport the liquid ~~MLLW~~LAW to the EnergySolutions facility in Clive, Utah."

Pg. 1-6, Section 1.4, footnote 8

7-6 Provide a description of the disposal pathway in the event the waste stream is classified as greater than Class C.

Pg. 2-1, Section 2

Revise text as follows for accuracy: "Once characterized and classified as ~~MLLW~~LAW, the waste would be treated and stabilized by grouting and disposed of in a permitted and licensed commercial MLLW disposal facility."

7-4 Contd **Pg. 2-1, Section 2.1.1**

Revise text as follows for accuracy: "Transport the resultant liquid ~~MLLW~~LAW to the PFNW facility in Richland."

Revise text as follows for accuracy: "Treat and stabilize the liquid ~~MLLW~~LAW via chemical treatment and grouting to form a waste that meets the land disposal restrictions (LDRs) of the Resource Conservation and Recovery Act (RCRA) and the waste acceptance criteria of a permitted and licensed disposal facility operated by either WCS (Class A, Class B or Class C MLLW) or EnergySolutions (Class A MLLW)."

7-7 Include in the above (third bullet point) a description of the type of RCRA variance DOE intends to pursue to meet RCRA LDR treatment standards.

7-4 Contd Revise text as follows for accuracy: "Dispose of the ~~MLLW~~LAW at the permitted and licensed commercial ~~LLW/~~MLLW disposal facility."

Page 2-2, Section 2.1.1, Figure 2-1

Revise the figure to reference "LAW" in place of the 2 references to "MLLW".

Page 2-3, Section 2.1.1

7-8 The use of a non-elutable IX media would have different impacts than an elutable resin. The decision to use a non-elutable resin may have the greatest potential impact of any aspect of this proposal. We suggest that the EA discuss the difference in impacts.

The last sentence in the third full paragraph refers to "heavy metals and organics" but doesn't describe the relative hazards of those constituents. Compare this lack of detail to the precise description of radiological content (e.g., "0.3 curies per container"). We suggest adding more detail about the heavy metals and organics.

Pages 2-3 through 2-4

7-9 Transportation to PFNW is discussed, but the steps of unloading the waste is skipped. Waste loading/unloading is a significant step with potential for accidents to cause releases, so we suggest adding discussion of that step. We note that page 2-3 the EA describes the loading of the waste at Hanford in more detail than is given to the unloading at PFNW.

7-4 Contd **Page 2-4, Section 2.1.1, Figure 2-2**

Revise the figure to reference "LAW" in place of the reference to "MLLW" for accuracy.

7-10 **Page 2-4, Section 2.1.1**

Describe the type of RCRA variance DOE intends to pursue to meet RCRA LDR treatment standards.

Revise text as follows for accuracy: "After custodianship of the liquid ~~MLLW~~LAW is transferred to PFNW, Perma-Fix would perform the following actions:

- Treatment and stabilization of the liquid ~~MLLW~~LAW using an in-container mixer (ICM) to form a waste that meets the RCRA LDR requirements and waste acceptance criteria of the permitted disposal facility operated by either WCS or EnergySolutions; and
- Transport of the grouted waste in 55-gallon drums to the permitted and licensed commercial ~~LLW/~~MLLW disposal facility (estimated two truck shipments). The approximate highway distance from PFNW to WCS in Andrews County, Texas, is 1,800 miles. The approximate highway distance from the Hanford Site to EnergySolutions in Clive, Utah, is 650 miles."

7-4 Contd

Page 3-24 through 3-26

The text on Page 3-24 states "As shown in Figure 3-1, the waste shipments for the proposed TBI Demonstration would be transported over federal highways for the majority of the route." This omits discussion of LAW transported from Hanford over publicly-accessible roads located on US DOE property, then onto City of Richland streets. It omits discussion of treated waste transported over city streets until, presumably, transport would continue on I-182 and I-82.

7-11

Then the text on Page 3-26 about emergency response is generic, not specific. The responsibility for emergency response to a transportation accident may change as waste is transported from Hanford over publicly-accessible roads located on US DOE property, then onto City of Richland streets. We request added text to clarify the responsibility and capability for emergency response at each of these 3 stages (DOE property, City of Richland streets, and the Interstate highways) within Washington State.

Page 2-5, Section 2.1.1, 1st paragraph

The third sentence in the first paragraph reads, "The radioactive material licenses authorize PFNW to possess and process radioactive material, including treatment and stabilization." This sentence can be interpreted incorrectly that only DOH's license would allow treatment of TBI phase 2 waste, which is "mixed radioactive and chemically hazardous waste". Treatment of mixed waste at PFNW is regulated under a Dangerous Waste Regulations (DWR) permit. See Page 2-5 ("PFNW also operates under a permit for treatment and storage of dangerous waste (Permit Number WAR 000010355).") PFNW's DWR permit does not currently allow for treatment of hazardous waste to which the HLVIT treatment standard has attached. As discussed above, a RCRA variance or determination of equivalent treatment would be required before PFNW could accept LAW for stabilization.

7-12

Section 3.3.2.1 (pg. 3-5) in the last sentence also reads; "...the liquid MLLW would be treated and stabilized at the PFNW facility using the ICM. Operations at PFNW would be conducted in accordance with its radioactive material licenses (WDOH 2019, 2020)". PFNW's DWR permit addresses the permitted use of the ICM.

The above two quoted sentences are misleading and inconsistent with the last sentence of the first paragraph in Section 3.6.1.2, that reads; "The licenses *and permit* authorize PFNW to possess and process radioactive material, including treatment and stabilization." (Emphasis added.) Ecology agrees with this sentence.

Please revise the sentences in Section 2.1.1 and Section 3.3.2.1 to refer to the DWR permit for accuracy and consistency throughout the document.

Page 2-5, Section 2.1.1, 2nd paragraph

7-4 Contd

Revise text as follows for accuracy: "For the proposed TBI Demonstration ~~LLW/~~MLLW, the PFNW facility would utilize a non-thermal treatment and solidification process, as was done for TBI laboratory-scale test."

Page 2-5, Section 2.1.1, 3rd paragraph

The first sentence states "Once treated and stabilized, PFNW would transport the waste . . . ."

The third sentence states "In fiscal year 2020, DOE's transportation contractors safely transported more than 3,200 hazardous materials shipments over six million miles with no USDOT recordable accidents."

The fourth sentence refers to "DOE's transportation contractors and transportation contractors used by PFNW . . .." Page 3-26 refers to transportation by contractors to PFNW, and later indicates that PFNW would use DOE transportation. Update the EA with a more precise and consistent description of waste transportation.

7-13

The second sentence reads, "DOE estimates that two truck shipments would be required to handle the approximately 62 waste drums". Update the EA to include the disposition pathway for the 6 process totes, including whether they will be decontaminated at PFNW and then sent back to the Hanford site for reuse or sent to the disposal site with the 62 waste drums. Also address whether there are other secondary wastes generated that will be sent for disposal with the 62 waste drums.

Page 2-5, Section 2.1.1, footnote 13

Revise text as follows: "~~PFNW~~ The current estimate for issuance of the PFNW Dangerous Waste Regulations permit renewal is October 2023~~is currently in discussions with Ecology to renew PFNW's Dangerous Waste Regulations permit~~. After the permit renewal, DOE would verify with Ecology that the 2,000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit."

7-14

Page 2-6, Section 2.1.2

Revise text as follows for accuracy: "The treatment in Tennessee would be accomplished using the same process applied at the PFNW facility under Alternative 1 to treat and stabilize the liquid ~~MLLW~~LAW in 55-gallon drums to meet the waste acceptance criteria for the permitted and licensed disposal facility."

Page 2-6, Section 2.1.3

Revise text as follows for accuracy: "After custodianship of the liquid ~~MLLW~~LAW is transferred to WCS, the actions taken by WCS would include:

7-4 Contd

- Treatment and stabilization (immobilization) of the liquid ~~MLLW~~LAW to form a waste that meets the RCRA LDR requirements and waste acceptance criteria of the WCS FWF; and
- Disposal of the grouted waste at the WCS FWF.

WCS is permitted and licensed to accept liquid ~~MLLW~~LAW, treat and stabilize it, and dispose of the solidified Class A, Class B, or Class C as MLLW at the FWF (TCEQ 2021). Figure 2-4 presents the block flow diagram for Alterative 3."

7-15 Describe how WCS is licensed to accept LAW.

Page 2-6, Section 2.1.4

Revise text as follows for accuracy: "After custodianship of the liquid ~~MLLW~~LAW is transferred to EnergySolutions, the actions taken by EnergySolutions would include:

7-4 Contd

- Treatment and stabilization of the liquid ~~MLLW~~LAW to form a waste that meets the RCRA LDR requirements and waste acceptance criteria of the EnergySolutions permitted and licensed disposal facility; and
- Disposal of the grouted waste at the EnergySolutions permitted and licensed disposal facility.

7-4 Contd EnergySolutions is licensed to accept Class A liquid ~~MLLW~~LAW, treat and stabilize it, and dispose of the solidified Class A MLLW at its facility (UDEQ 2020a, 2020b)."

7-16 Describe how EnergySolutions is licensed to accept LAW.

Page 2-7, Figures 2-3 and 2-4

Revise the figures to change "MLLW" to "LAW".

Page 2-8, Figures 2-5

Revise the figure to change "MLLW" to "LAW".

7-4 Contd **Page 2-9, Section 2.3**

Revise text as follows for accuracy: "Because the process totes and drums of grouted ~~MLLW~~LAW are readily capable of being transported on a legal-weight truck and there is not direct rail access to the 200 East Area, this EA does not evaluate transportation of these materials via rail."

Page 3-2, Table 3-1

Revise the third sentence in the Socioeconomics and Environmental Justice Rationale to change "MLLW" to "LAW" for accuracy.

7-17 **Section 3.3**

2020 inventory values have already been provided to Ecology and could be included or substituted for 2019 values.

7-18 **Page 3-3, Section 3.3.2.1, Paragraph 3**

Incorrect citation to AOP regulations (Title 173, Chapter 401—not Chapter 480)

Page 3-3, Section 3.3.2.1

7-19 There is no reference to the applicable requirements of WAC 173-400, such as 173-400-040 (General standards for maximum emissions), 173-400-075 (Emission standards for sources emitting hazardous air pollutants), 173-400-105 (Records, monitoring, and reporting), 173-400-110 (New source review for sources and portable sources)

In particular, there is no mention of the need for NOC Approval Orders for any activities not already incorporated into the AOP or whether the TBI activities meet the requirements of current Approval Orders for 241-SY and the exhausters.

Page 3-4, Table 3-2

7-20 The provided table is incomplete for the site and not representative of emissions from DSTs. Currently, potential to emit from the tanks alone includes more than 100 TAPs, not including other significant on-site TAPs such as diesel exhaust particulate matter from engines. Additionally, the 2019 emission inventory doesn't represent the significant increase in emissions expected when DFLAW/WTP actually begins to operate. Even though TAP emissions are significantly less than the criteria pollutant emissions listed in Table 3-2, including just ammonia makes it appear that this is the only TAP of concern for Hanford and the DSTs.

Table 3-2, or an additional table, should include a more complete list of expected TAP emissions. If inventory values are presented, discussion should address that Hanford has generally not reported most TAPs and the justification for their omission on the inventory.

Page 3-5, Section 3.3.2.1, Paragraph 1

7-21 There is no mention as to whether the exhauster will continue to run during insertion of ITPS to maintain negative pressure in the tank, or of potential changes in emission from this step. Emissions, including VOC and other criteria pollutants, should be addressed for this step.

Page 3-5, Section 3.3.2.1

"No air emissions would occur during this process since the filtration, IX, and pumping would be within the actively ventilated head space of the tank."

7-22
- The tanks are constantly emitting and agitation of tank waste tends to release vapors from the waste. The discussion should address emissions from the tanks during TBI compared to what is authorized in current Approval Orders and the Air Operating Permit.
- Current Approval Orders may be based upon the site boundary, rather than the current ambient air boundary identified in the "Memorandum of Agreement Between the U.S. Department of Energy Richland Operations Office and office of River Protection and the Washington State Department of Ecology Regarding the Hanford Ambient Air Boundary," signed July 22, 2020.

Page 3-5, Section 3.3.2.1

"Air displaced from the totes during filling would be vented through high-efficiency particulate air filters, which are more than 99.95 percent effective in capturing radionuclides. The resultant emissions would
7-23 contain negligible concentrations of radionuclides."

- How is "negligible concentrations of radionuclides" defined?
- There is no mention whatsoever of the criteria and/or toxic air pollutants that would be emitted during this displacement, which apparently would be unabated except for particulate matter (no mention of any treatment or control other than HEPA filters for the rad emissions).

Page 3-5, Section 3.3.2.1

7-24 Potential emissions from the backwashing, drying, and equipment removal/disposal processes are not addressed. The process could potentially be referenced to elsewhere in the document, such as Section 3.6.2.1, but there should be a discussion as to what is known about whether equipment will be ventilated through the tank and an exhauster, isolated from the tank, or otherwise handled for these steps. Resultant emissions, including VOC and other criteria pollutants, should be addressed for this step.

Page 3-5, Section 3.3.2.1

7-25 "Operations at PFNW would be conducted in accordance with its radioactive material licenses."

- There is no mention of the BCAA permit for criteria and toxic air pollutant emissions from PFNW.

7-4 Contd **Page 3-5, Section 3.3.2.1**

In both paragraphs, there are three sentences that reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

7-26 In the last paragraph, describe the type of RCRA variance DOE intends to pursue to meet RCRA LDR treatment standards.

Include a discussion on emission impact of heavy metals and organics (i.e., volatile organics) during the waste transfer from delay tote to process totes.

The 3rd sentence in the last paragraph reads, "the treatment and stabilization process entails chemicals and other material, such as cement or polymeric-like materials, being added to the MLLW in a bulk mixer inside of the permitted and licensed facility and transferred to a disposal container to cure."

7-26 Contd

This sentence is misleading as it could be interpreted as there might be another treatment unit besides ICM. In addition, in the treatment with ICM, a 55-gallon drum serves as both the mixing vessel and the final disposal containers for the waste being treated in this process. Adding reagents to the LAW, mixing, curing, and disposal all takes place in the same 55-gallon drum. Revise the sentence to include a more accurate description of the treatment and stabilization process at PFNW.

Page 3-6, Section 3.3.2.1

"The approximately 2,000 gallons of MLLW processed under the Proposed Action would account for less than 1 percent of the annual treatment capacity of the ICM equipment at PFNW and would therefore not contribute to potential air impacts beyond those evaluated as part of the permits and licenses granted by the State of Washington."

7-27

- This conclusory statement is not supported by any narrative description of the analysis that supports it. If the TBI waste can, and will be, accepted under current permits without increasing potential to emit this is a different situation than TBI being an additional new material added under the physical capacity of PFNW.
- This should be modified to recognize BCAA as the air permitting authority for PFNW.

The first sentences of the first and second paragraphs reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-6, Section 3.3.2.2

The first sentence of the second paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-7, Section 3.3.2.3

The first sentences of the second and third paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-8, Section 3.3.2.4

7-4 Contd

The first sentences of the second, third, and fourth paragraphs reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-10, Section 3.4.2.1

The first and third sentences of the last paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-11, Section 3.4.2.2

The first and third sentences of the second paragraph and the first sentence of the third paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-11, Section 3.4.2.3

The first and third sentences of the second paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-12, Section 3.4.2.4

The first and third sentences of the second paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-14, Section 3.5.2.1

The first sentence of the first full paragraph and the first, third, and last sentences of the second paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-14, Section 3.5.2.2

The first, third, and last sentences of the second paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-15, Section 3.5.2.2

7-4 Contd

The partial sentence at the top of the page references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-15, Section 3.5.2.3

The second sentence of the first paragraph and the first, third, and last sentences of the second paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-15, Section 3.5.2.4

The first, third, and last sentences of the second paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-16, Section 3.5.4

The last sentence of the second paragraph twice references "MLLW" inaccurately. Revise the sentence to change both references to "MLLW" to "LAW".

Page 3-17 through 3-18, Section 3.6.1.1

7-28

It is misleading to focus on LLW and MLLW without any description of HLW and DOE Order 435.1-1. As stated on Page 1-2, "Hanford tank waste is managed as HLW mixed with hazardous chemicals." Provide a description of HLW and the Waste Incidental to Reprocessing process applicable at Hanford, including that waste subject to a WIR determination can be managed and disposed of as MLLW under DOE's authority, but is not MLLW for RCRA LDR treatment purposes.

Page 3-19, Section 3.6.1.2

7-4 Contd

Revise text as follows for accuracy: "Under Alternative 1, PFNW would receive the liquid ~~MLLW~~LAW in totes from the Hanford Site, mix it with grout, containerize the resultant mixture in 62, 55-gallon drums, and transport the waste off site to the WCS facility near Andrews, Texas, or EnergySolutions in Clive, Utah, depending on the resulting MLLW classification."

Page 3-19, Section 3.6.1.3

The first sentence of the third paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-21, Section 3.6.2.1

7-29

Revise text as follows for accuracy: "Under Alternative 1, the primary waste stream would begin with the pretreated ~~MLLW~~LAW produced from in-tank settling and the ITPS, continue with treatment and stabilization of the ~~MLLW~~LAW at PFNW utilizing a non-thermal, chemical treatment and solidification process using grout, as was done for the TBI low-activity test samples in 2017, and end with disposal at a permitted and licensed MLLW disposal facility. The final treated, grouted, solid material would be contained in approximately 62, 55-gallon drums and shipped to a MLLW disposal facility.

7-29 Contd

Disposal of the grouted waste at the MLLW disposal facility would be conducted in accordance with the receiving facility's operating license, hazardous waste permit, and waste acceptance criteria. This will be the first ~~T~~treatment and stabilization of the ~~MLLW~~LAW at PFNW. ~~is a routine activity~~After the permit renewal, DOE would verify with Ecology that this activity would be allowed under its permit."

Describe how potential waste management impacts would be negligible if that language is retained.

7-4 Contd

Page 3-22, Section 3.6.2.2

The first, third, and last sentences of the second paragraph and the second sentence of the third paragraph references "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-22, Section 3.6.2.3

The second sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-23, Section 3.6.2.3

The first sentence of the first full paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

7-30 Explain how treatment and stabilization of LAW at WCS FWF is a routine activity.

7-4 Contd

Page 3-23, Section 3.6.2.4

The first sentence of the first paragraph and the first sentence of the second paragraph references "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

7-30 Contd Explain how treatment and stabilization of LAW at EnergySolutions is a routine activity.

7-4 Contd

Page 3-23, Section 3.7.1

The first sentence of the first paragraph twice references "MLLW" inaccurately. Revise the sentence to change both references to "MLLW" to "LAW".

Page 3-24, Section 3.7.1

The first sentence of the second paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-26, Section 3.7.2.1

The first sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-28, Section 3.7.2.1

The second sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

7-31 Describe how LAW equates to MLLW for transportation purposes.

7-4 Contd

Page 3-28, Section 3.7.2.2

The first sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-28, Section 3.7.2.3

The first and second sentences of the first paragraph reference "MLLW" inaccurately. Revise the sentences to change "MLLW" to "LAW".

Page 3-29, Section 3.7.2.4

The first sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

7-4 Contd

Page 3-29, Section 3.7.3

The first sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-32, Section 3.8.2.2

7-32 Revise text as follows for accuracy: "The treatment and stabilization of ~~MLLW~~LAW from the proposed TBI Demonstration ~~w~~could ~~not~~ incrementally add impacts beyond those Ecology is evaluating during the permit renewal."

Page 3-32, Section 3.8.2.3

The last sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-32, Section 3.8.2.4

The last sentence of the second paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page 3-33, Section 3.8.2.4

The second sentence of the first paragraph and the first sentence of the second paragraph reference "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

7-4 Contd

Page 3-33, Section 3.8.2.5

The first sentence of the first paragraph and the first sentence of the last paragraph reference "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page A-2, Table A-1

The table name references "MLLW" inaccurately. Revise the table name to change "MLLW" to "LAW".

Page A-5, Section A-3

The third sentence of the first paragraph references "MLLW" inaccurately. Revise the sentence to change "MLLW" to "LAW".

Page A-6, Section A-3 and Table A-4

The third bullet point, the last sentence of the paragraph following the bullet point, and the table name reference "MLLW" inaccurately. Revise the sentences and table name to change "MLLW" to "LAW".

Page A-6, Table A-5

The table name references "MLLW" inaccurately. Revise the table name to change "MLLW" to "LAW".

SPOKANE WA 990
31 AUG 2021 PM 3 L

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DC MD
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Hanford Test Bed Initiative Environmental Assessment Comment

Copy for:

Mr. Brian Costner, Director
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August 28, 2021

NEPA Document Manager
Test Bed Initiative Draft Environmental Assessment
U.S. Department of Energy P.O. Box 550
Mailstop H5-20
Richland, Washington 99352

Subject: Comments on Draft Environmental Assessment for the Test Bed Initiative

Dear NEPA Document Manager:

Recently, DOE issued a request to select agencies for comment on the draft Environmental Assessment for the Hanford Tank Waste Test Bed Initiative (TBI) DOE/EA-2086[1]. The review period was established as lasting for only 14 days, from August 21, 2021 to September 3, 2021.

Comments on the completeness, factual accuracy, and additional information that should be considered in the EA were requested and are listed below.

1. **The public should have been invited to comment and should have been given a longer review time.**

8-1 DOE's letter did not seek public input, yet facilities considered for treatment have off-gas stacks and groundwater within the Richland city limits, close to environmentally sensitive businesses and residences. Please note that DOE solicited public comment in an EA for transport and treatment of wastewater from Savannah River (See Federal Register Vol. 84, No. 111, June 10, 2019, page 26847.) For Savannah River waste water demonstration tests, the public was invited to submit comments, but for actual Hanford Tank Waste, the public has been ignored. This is an inconsistency. A public review period would have been appropriate. Also, a 14 day review period in the current pandemic environment, ending the Friday before Labor Day, is inadequate for completeness of comments.

2. **Additional Details were Omitted from the Fact Sheet.**

8-2 Letter 21-ECD-002148 stated that its attached Fact Sheet would provide additional details about the comment period and ways to provide input. Contrary to this statement, the attached one-page Fact Sheet is entirely silent on the comment period or additional details for providing input, including any means for requesting public comment.

[1] Letter 21-ECD-002148, "NOTICE OF AGENCY REVIEW PERIOD," DOE Hanford Site to Addressees, dated August 17, 2021.

3. **The EA is Inconsistent Regarding Use of Existing, Permitted Facilities**

Page 2-8 of the EA states that "There are ***no existing, permitted facilities*** on the Hanford Site for grouted tank waste; therefore, onsite disposal was **not considered** a reasonable alternative."

Contrary to the rejection of this line of inquiry, the EA states that DOE is relying on a **future permit** for any tank waste treatment at PFNW in Richland: According to the EA *"PFNW is currently in discussions with Ecology to renew PFNW's Dangerous Waste Regulations permit. After the permit renewal, DOE would verify that the 2,000 gallons of liquid waste could be treated and stabilized within the terms and conditions of the permit."*

In addition, the EA states that the Tennessee Department of Environment and Conservation Perma-Fix DSSI facility is *processing a renewal* of Perma-Fix DSSI's hazardous waste permit. As part of the renewal process, TDEC will evaluate the potential impacts of continued operations at DSSI. As a result, Perma-Fix DSSI does not have a valid permit for Hanford tank waste either.

8-3

PFNW does not have an existing, permitted facility to receive this waste. To be consistent, PFNW should also "not be considered" a reasonable alternative. The same condition applies to PFNW-DSSI. The same rules should apply to off-site commercial vendors as to onsite disposal facilities for non-approved waste.

Notably, PFNW itself does not have a reasonable expectation that a new permit will be issued to include Hanford tank waste for a test bed initiative. In **July 2020**, at the PFNW annual shareholder's meeting, the company presentation stated that PFNW "anticipated" receiving the 2,000 gallons of test bed initiative ("LLW-Off-Site Phase 2") waste, expecting the waste to arrive "within the next nine months." [By April 2021, and this after a couple of prior delays]. A later investor presentation[2], from July 2021 tells investors the "Perma-Fix team still anticipates receipt of 2,000 gallons in early 2022 (this time many months later)." The delays indicate trouble with PFNW's permitting process. Indeed – PFNW was more gloomy in talking to the Securities and Exchange Commission in their June 30, 2021 Form 10-Q Quarterly Report for the period ending June 30, 2021, stating that corporate milestones for treating the 2,000 gallons and the associated payouts were now "uncertain[3]."

Just as in the case of no disposal approval of grout in the IDF, DOE should not "bet" on future regulatory action for PFNW, for which no public comment has even begun, starting with the revision to the out of date EIS. Conversely, DOE should evaluate on-

[2] https://d1io3yog0oux5.cloudfront.net/_901bd1fa2577b9d499f0bbb69a5ce4b1/pesi/db/17/199/pdf/PESI+Investor+Presentation+-+July+2021+-+FINAL.pdf

[3] https://ir.perma-fix.com/all-sec-filings#document-50126-0001493152-21-019308

site grouting and disposal to IDF or ERDF to maintain consistency. The recent addition of a grout module to ETF for grouting WTP effluent-derived brine shows it can be done.

4. **The PFNW EIS is Out of Date, further undermining optimistic assumptions.**

8-4 The PFNW EIS results were based on a "historical average" of waste receipts at its predecessor ATG facility, which are entirely out of date. The EIS was issued in February 1998[4] and has not been changed, while the parade of wastes treated has increased. The public has not been able to see the draft EIS in progress, and there have been years of delays. There is no way to evaluate scope.

5. **Having a Permit is Not a basis for Limiting Inventory or Risk at PFNW**

8-5 Even if the permits were valid, instead of providing confidence to the public, as is assumed in the EA, the PFNW permits do not actually limit inventories or risks. The report by Hanford Challenge[5] shows that the Washington Department of Health continuously issues "variances" for PFNW to exceed permit limits. Similarly, the Washington Department of Ecology has issued permissions for treatment demonstrations that are outside the EIS scope.

6. **Risk from Distance to Groundwater during Grouting is Omitted**

8-6 The discussion of grout treatment at the facilities does not address the relative risks to groundwater, air, and local populations. For example, the PFNW Annual Environment Report for 2020 states that "the area water table varies from approximately **10 feet** at the west well to 21 feet at the east well[6]." Contrast this with the hundreds of feet to the water table in the Hanford 200 Areas. A spill during opening/processing at PFNW would instantly contaminate water that flows towards intakes and wells used by the City of Richland for drinking and irrigation. PFNW has experienced losses of contamination control at the facility in spite of secondary containment as documented in NRC event reports. PFNW responses to events are not always prompt, as documented Hanford Challenge's independent report[7]. The existence of secondary containment was not verified in the EA, nor was there an evaluation of its integrity and risk, versus the risk avoided by not opening containers just above the water table. The safety hierarchy requires "safe by design" first, before engineered features/administrative controls – and way above the water table is better as a control/layer of protection. What are the distances to ground water in the 200 Areas? At Oak Ridge? In Utah? In Texas?

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[4] Final Environmental Impact Statement for Treatment of Low-Level Mixed Waste, Prepared by Jacobs Engineering Group, Inc., for Allied Technology Group, Inc., Richland, Washington.

[5] https://www.hanfordchallenge.org/pfnw and https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/5fbde47518e72e5fdb9a8298/1606280319740/FINAL+PermaFix+Report.pdf.

[6] PermaFix Northwest Richland, Inc., Annual Environmental Monitoring Report for 2020, submitted to the Washington Department of Healy, July 29, 2021.

[7] See links at footnote 5.

7. **Risks from Tank 241-SY-101 Vapors are Ignored**

The EA identifies tank waste vapors as a hazard, but does not specifically characterize vapors from SY-101 waste. SY-101 was a "burping" gas-producing tank, containing a variety of organic and inorganic compounds. Gas is still being generated, but is not trapped as before due to dilution with water to reduce the viscosity. How will each treatment facility deal with vapor exposures? Releases of tank vapors near the public will
8-7 be new risks. The EA states that for vapors "in nearly all" cases, worker health impacts were minimal or temporary. What about the impacts that were not minimal or temporary? What is the distance from stacks to the public at each treatment facility? The 2020 PFNW Environmental Report (Figure 1.1) shows the "Crystal Water" company is right next door to PFNW, and the Central Washington Corn Processors are just to the south. Many Richland residents would be averse to tank waste vapors being introduced by DOE. Further, the tables in the EA do not provide information on the chemical constituents present in the waste. No comparison is made to drinking water standards so that the public can understand the nature of the risk from a spill or stack release.

8. **The EA has Disparate text about experience at PFNW potentially associated with Lobbying**

Page 2-5 of the EA states that PFNW is "conveniently located" and PFNW and Perma-Fix DSSI "have completed numerous projects supporting the nuclear industries and has received waste from the federal government…" Similar language for Waste Control Specialists and Energy Solutions is absent. What objective data were used to support these special statements for Perma-Fix? Of note is that not all PFNW "completed"
8-8 projects were completed well. In addition, Securities and Exchange Commission documentation shows that at least one lobbyist/consultant has been incentivized since 2017 to ensure the waste goes to PFNW. I believe Mr. Ferguson (described below) has published a number of letters and articles in the Tri-City Herald supporting the TBI at Perma-Fix in Richland. Was DOE lobbied to include optimistic language in this EA? Performance of a full EIS might help to ensure that consistent information is used across all facilities.

From the US Securities and Exchange Commission[8]:

The Company granted a NQSO [non-qualified stock option] to Robert Ferguson on July 27, 2017 from the Company's 2017 Stock Option Plan ("2017 Plan") for the purchase of up to 100,000 shares of the Company's Common Stock ("Ferguson Stock Option") in connection with his work as a consultant to the Company's ***Test Bed Initiative ("TBI")*** *at our Perma-Fix Northwest Richland, Inc. ("PFNWR") facility at an exercise price of $3.65 per share, which was the fair market value of the Company's Common Stock on the*

[8] Form 10-Q, Perma-Fix Environmental Services, Inc., for the Quarterly Period Ended June 30, 2021, https://www.marketwatch.com/investing/stock/pesi/SecArticle?guid=15152891.

8-8 Contd

date of grant. The term of the Ferguson Stock Option is seven years from the grant date. The vesting of the Ferguson Stock Option is subject to the achievement of three separate milestones by certain dates. ***The 10,000 options under the first milestone were exercised by Robert Ferguson in 2018.*** **[this was for the first three gallons treated]** *The vesting date for the second and third milestones for the purchase of up to 30,000 and 60,000 shares of the Company's Common Stock was previously extended to December 31, 2021 and December 31, 2022, respectively. The Company has not recognized compensation costs (fair value of approximately $262,000 at June 30, 2021) for the remaining 90,000 Ferguson Stock Option under the remaining two milestones since achievement of the performance obligation under each of the two remaining milestones is uncertain at June 30, 2021. All other terms of the Ferguson Stock Option remain unchanged.*

9. **The EA is Silent on Grouted Waste Performance from the Three Gallon Test**

8-9

This EA proposes sending more grouted waste to land disposal but no data are given for the performance of the first three gallons treated. Was there a control batch? How has the three gallons held up? How is the grouted waste handled in the performance assessments for each of the disposal sites? How much of the waste is assumed to be retained in the grout in each of the disposal site the performance assessments? What about grouts in the IDF? There is no reason to continue if the performance is not acceptable. Can't grouts with nitrate salts in them dry out and fall apart, with a result of being no better than if mixed with soil? What has happened in this case? How does the SY-101 waste differ from the 3 gallon demonstration test? How can you make a decision with this information absent?

10. **The EA does not Distinguish Federal Transportation Contractors from Subcontractors**

8-10

Page 2-5 of the EA does not distinguish between DOE transportation contractors and subcontractors used by PFNW and other vendors. There could be quite a difference in safety and performance, yet this was not evaluated. Subcontractors have had a number of transportation problems, including receipt of leaking containers. Alternatives 3 and 4 cut out the sub-contracted transporters.

11. **Grouted Tank Waste is Disposed at Hanford**

8-11

Page 2-9 of the EA states that there are no existing, permitted facilities on the Hanford Site for grouted tank waste. This appears to be an oversimplification. Lots of grouted tank waste is disposed at Hanford, including equipment and waste contaminated with tank waste that has been grouted. Again – this is a reasonable alternative, given the volume of already disposed piping, pumps, and other grouted items disposed.

12. **The Hanford Air Operating Permit Excludes PFNW**

8-12

Page 3-4 of the EA describes Hanford's air operating permit reports, but does not mention that the PFNW stacks, which handle mostly DOE waste, were taken out of those

8-12 Contd reports, so the public has no easy access to information about what happens there. Data from the vicinity of PFNW, including prior releases and spills, should be added.

13. **The EA does not Recognize the Full Extent of Potential PFNW Operations**

Section 3 of the EA calls out that the 2,000 gallon treatment project would be a "small" fraction of the total capacity at PFNW and elsewhere. Yet no quantitative data are provided. The cumulative impact of proposed operations at PFNW includes all sorts of wastes. The EA should evaluate the cumulative impact of the waste forecast for treatment at PFNW, per DOE's "emwims.org" web page. The sum of all the waste to be sent to PFNW could be beyond the acceptable, per the future, unpublished PFNW revised EIS. This information should be called out in detail in the "reasonably foreseeable" trends section on Page 3-29.

8-13

14. **The EA makes Optimistic Assumptions**

The EA states on page 3-21 that "treatment and stabilization of the MLLW at PFNW is a routine activity that would be allowed under its permit, and potential waste management impacts would be negligible." On what basis is this statement made? More lobbying? The Hanford Challenge report shows that no waste is "routine" at PFNW. Even the permit process for the In Container Mixer was fraught with errors and non-compliances. Please look at the State of Washington Department of Ecology Dangerous Waste Violation Settlement Agreement and Agreed Order No. 13808, (In the Matter of Expedited Enforcement Action for Perma-Fix Northwest, Richland, Inc., which states:

8-14

"PFNW accepted an excess of 50 MW containers during a 12-month time period for treatment in the in-container mixer. PFNW failed to comply with their permit conditions when the facility accepted waste for which it had no treatment capability. During this time frame, the facility removed the existing permitted in-container mixer and requested a permit modification for a new in-container mixer and a temporary authorization for its immediate use. A demonstration was provided to Ecology and USEPA staff of this in-container mixer's capabilities. The demonstration of the mixer was not successful, and Ecology denied the temporary authorization and Ecology permit writers instructed PFNW to cease acceptance of waste for the in-container mixer line of treatment. It appears that acceptance of MW for treatment in this line continued."

As a result, compliant, routine operations cannot be assumed for this EA. There are no normal operations.

I would appreciate if you will conduct a full EIS for this proposed action.

From: _____
To: ^TBI EA Comments
Subject: [EXTERNAL]Test Bed Initiative at Hanford
Date: Friday, September 3, 2021 2:32:29 PM

CL1-1 I am a resident of Spokane, WA. I ask that the proposed Test Bed Initiative (TBI) and "SAFE Alternative" move ahead quickly to demonstrate if 2000 gallons of leakable liquid waste can be removed from Hanford's High-Level Waste Tanks and be successfully treated and disposed offsite.

- CL1-2 USDOE should act quickly to determine whether the Test Bed Initiative / "SAFE treatment alternative can successfully treat and dispose of waste **off of the Hanford site** and away from the Columbia River. It should be moved to a location where it will never contaminate ground or surface waters.
- CL1-3 Hanford's tank B-109 has been leaking for two years or more without any action. If the equipment and techniques for TBI work, then USDOE and Washington Ecology could quickly use the same methods to remove leakable waste from B-109 and stop it from leaking.
- CL1-4 I support Alternative #1 in the TBI-EA. The demonstration should use a permitted treatment facility that is just one mile from the Hanford site to reduce transportation impacts, not the alternatives that are 650 to 2500 miles away. USDOE should include an environmental justice analysis of trucking the untreated waste.
- CL1-5 The Environmental Assessment (EA) should include a discussion of the substantial benefits if the 200 gallon test is successful as a new option to remove leakable liquid waste from Hanford tanks and permanently remove waste from Hanford.
- CL1-6 It makes no sense to wait decades and spend a billion dollars for USDOE to build its own treatment facility for these particular liquid tank wastes when a permitted facility is one mile away. If TBI is demonstrated to work, USDOE should move quickly to remove more leakable liquid wastes and have the waste treated and disposed offsite

Sincerely,

From: Albert Snow
To: ^TBI EA Comments
Subject: [EXTERNAL]Allow Public Comment on Test Bed Initiative EA
Date: Friday, September 3, 2021 1:16:52 AM

Re: Allow Public Comment on Test Bed Initiative EA

Dear Department of Energy,

CL2-1 I am writing to ask DOE to open up the Phase Two Test Bed Initiative Environmental Assessment (EA) for formal public comment. Treating 2,000 gallons of tank waste and sending it offsite to be grouted and disposed of sets precedent for the planned scale up in Phase 3 to 500,000 gallons. The public should have a chance to review the options under consideration and share formal comments for agency consideration.

Though it is being framed as a small test, conclusions and assumptions from the Environmental Assessment will inform future work and have bigger impacts in a 500,000-gallon Phase 3 scale-up.

CL2-2 It is important to me that extra precautions are taken for any action related to tank waste treatment and disposal. Worker health and safety risks from high-radiation levels, toxic chemical vapors, and the non-radioactive hazardous components of the waste are not sufficiently addressed in the EA.

CL2-3 Additionally, I am concerned about worker, public, and environmental safety risks from treating Hanford waste at Perma-Fix Northwest in Richland, WA. There is insufficient information in the EA about offsite treatment. An onsite treatment alternative should be added for inclusion in the final EA.

CL2-4 I am aware that a 120-day public comment period is planned for the next step in the Phase 2 process for the draft Waste Incidental to Reprocessing Evaluation comment period. I think the public should have a chance to weigh in now on the Environmental Assessment.

Please consider the following comments:

1) Open up the TBI EA for a 60 day formal public comment period.

2) Hold a public hearing to share information about the Phase 2 TBI EA, including the entire Test Bed Initiative Plan scale up to Phase 3 and how it fits into plans for Supplemental Low Activity Waste decisions. Allow participants to make formal comments at the meeting.

CL2-5

3) Include more information about the hazardous components of the tank waste liquids, including a more accurate assessment of worker risks from exposure to toxic chemical vapors.

4) Do not send waste to Perma-Fix Northwest for treatment. Include an onsite treatment alternative in the EA.

5) Conduct a full Environmental Impact Statement (EIS) on the Test Bed Initiative.

Thank you for considering my comments,

Sincerely,