

Supplement Analysis of the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington

Direct-Feed High-Level Waste (DFHLW)

DOE/EIS-0391-SA-04

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ACRONYMS AND ABBREVIATIONS

200E	200 East Area
200W	200 West Area
AoA	Analysis of Alternatives
ASIL	acceptable source impact level
BOF	balance of facilities
CD	critical decision
CFR	<i>Code of Federal Regulations</i>
CH	contact handled
DFHLW	direct-feed high-level waste
DFLAW	direct-feed low-activity waste
DOE	U.S. Department of Energy
DST	double-shell waste storage tank
Ecology	Washington State Department of Ecology
EPA	U. S. Environmental Protection Agency
ETF	Effluent Treatment Facility
EIS	environmental impact statement
FR	<i>Federal Register</i>
HEMF	HLW effluent management facility
HEMS	HLW effluent management system
HFFACO	Hanford Federal Facility Agreement and Consent Order
HLW	high-level radioactive waste
IHLW	immobilized high-level radioactive waste
IHS	Interim Hanford Storage
ILAW	immobilized low activity waste
IXC	ion exchange column
LAB	analytical laboratory
LAW	low-activity waste
LAWPS	Low-Activity Waste Pretreatment System
lb/hr	pound per hour
LCF	latent cancer fatality
LERF	Liquid Effluent Retention Facility
LLW	low-level radioactive waste
MEI	maximally exposed offsite individual
MLLW	mixed low-level radioactive waste
MW	megawatt
mrem	millirem
NEPA	<i>National Environmental Policy Act of 1969</i>
PM	particulate matter
RH	remote handled
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
ROD	Record of Decision
ROI	region of influence
SA	supplement analysis
SST	single-shell waste storage tank

TC&WM EIS	<i>Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington</i>
TEDF	Treated Effluent Disposal Facility
TPA	Tri-Party Agreement
TRU	transuranic (waste)
TSCR	Tank-Side Cesium Removal
WRF	waste receiver facility
WRPS	Washington River Protection Solutions LLC
WSP	WTP steam plant
WTP	Waste Treatment and Immobilization Plant
WTV	Waste Transfer Vault

1 INTRODUCTION

1.1 Background

The Hanford Site in southeastern Washington State stores approximately 56 million gallons of mixed chemical and radioactive waste in underground tanks—the result of more than four decades of plutonium production (1944 through 1987). The U.S. Department of Energy (DOE) is responsible for the retrieval, treatment, and disposal of this waste in a safe, efficient manner, reducing the threat posed to the Columbia River by Hanford’s hazardous, radioactive tank waste (DOE 2023a).

In December 2012, DOE issued the *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391; DOE 2012) (hereinafter, TC&WM EIS). In the TC&WM EIS, DOE analyzed 17 alternatives,¹ 11 of which involved retrieval, treatment, storage, and disposal of tank wastes, followed by the closure of the single-shell waste storage tanks (SSTs) at the Hanford Site. DOE issued the first in a series of Records of Decision (RODs) for the TC&WM EIS on December 13, 2013 (Volume 78 of the *Federal Register*, page 75913 [78 FR 75913]). For the tank closure portion of the alternatives, which encompasses operations of the tank farms and Waste Treatment and Immobilization Plant (WTP), DOE announced that it would select Tank Closure Alternative 2B,² which would, among other things: (1) retrieve 99 percent of the waste from the SSTs; (2) treat tank waste, including pretreatment of tank waste with separation into low-activity waste (LAW) and high-level radioactive waste (HLW); and (3) dispose of the vitrified LAW and secondary waste and construct immobilized HLW (IHLW) interim storage modules to store the IHLW prior to disposal.

This Supplement Analysis (SA) comports with (or is consistent with) DOE’s *National Environmental Policy Act* (NEPA) implementing procedures³ to assess the Proposed Action (and connected actions) of implementing the Direct-Feed High-Level Waste (DFHLW) approach and construction of additional tank waste storage capacity (see Chapter 2 of this SA for a detailed description of the Proposed Action and connected actions). The Proposed Action differs slightly from the actions analyzed in the TC&WM EIS. This SA evaluates the impacts of the Proposed Action against the impacts presented in the TC&WM EIS to determine if there are substantial changes to the proposal or significant new circumstances or information relevant to environmental concerns that would require further NEPA review. Based on this SA, DOE will determine whether the existing TC&WM EIS remains adequate, if a new EIS is warranted, or if the existing EIS should be supplemented. Background information related to the Proposed Action in this SA is as follows.

The WTP, as analyzed in the TC&WM EIS, would start processing tank waste by sending it to the WTP Pretreatment Facility, where it would be separated into HLW and LAW. The process would

¹ The TC&WM EIS analyzed 11 tank closures alternatives, 3 waste management alternatives, and 3 Fast Flux Test Facility decommissioning alternatives.

² The decision in the ROD to implement Alternative 2B stated, “DOE has decided to implement Tank Closure Alternative 2B, ‘Expanded WTP Vitrification and Landfill Closure,’ without supplemental treatment at WTP and without technetium-99 removal in the WTP Pretreatment facility.” This caveat is included in the selected Alternative 2B and not further repeated in this supplement analysis.

³ On June 30, 2025, DOE published new NEPA implementing procedures, which can be found at <https://www.energy.gov/sites/default/files/2025-06/2025-06-30-DOE-NEPA-Procedures.pdf>.

then send each of these waste streams to the HLW Vittrification Facility and the LAW Vittrification Facility, respectively, for further treatment. The WTP, as analyzed in the TC&WM EIS, also included an analytical laboratory (LAB) and 22 other support facilities referred to collectively as the “balance of facilities” (BOF). When DOE issued the ROD in 2013, its plan was to start operation of all WTP facilities at the same time.

To date, the LAW Vittrification Facility, LAB, and BOF have been constructed and DOE is commencing start-up of the LAW Vittrification Facility. To treat waste as soon as practicable, DOE decided to use Direct-Feed Low-Activity Waste (DFLAW), a sequenced approach that treats a portion of the tank waste first (*see* Section 1.4); *see* the textbox describing DFLAW for clarification.

Direct Feed Low-Activity Waste (DFLAW)

The DFLAW approach separates and pretreats some of the tank waste (approximately 23.5M gallons) from certain underground tanks at the Hanford Site and immobilizes (vitrifies in a glass matrix) the pretreated LAW at the LAW Vittrification Facility.

The DFLAW approach is a two-phased approach that separates and pretreats supernate (essentially the upper-most layer of tank waste that contains low concentrations of long-lived radionuclides) from some of the Hanford tanks, to generate a LAW stream. Phase 1 of the DFLAW approach includes in-tank settling; separation (removal by decanting) of the supernate (including dissolved saltcake and interstitial liquids); filtration; and cesium removal using ion exchange columns (IXC) in a tank-side cesium removal (TSCR) unit. For Phase 2, DOE will treat additional supernate (including dissolved saltcake and interstitial liquids) using the same processes and will deploy either an additional TSCR unit or construct a filtration and cesium removal facility. Collectively, the Phase 1 and Phase 2 pretreatment functions are referred to as the Low-Activity Waste Pretreatment System (LAWPS).

Facilities and equipment necessary to implement the DFLAW approach include the Effluent Management Facility; a TSCR unit, and either an additional TSCR unit or a filtration and cesium removal facility (LAWPS); transfer lines; and a storage pad for cesium IXCs.

Starting in June 2020, DOE, the Washington State Department of Ecology (Ecology), and the U.S. Environmental Protection Agency (EPA) Region 10 (collectively, “the parties”) engaged in mediated negotiations, known as “Holistic Negotiations,” to identify a mutually agreeable path forward for the Hanford Site tank waste retrieval and treatment mission, including the construction and operation of the WTP.⁴ The parties concluded negotiations and signed a settlement agreement on April 29, 2024, which proposed new and revised milestones in the *Hanford Federal Facility Agreement and Consent Order* (HFFACO), or Tri-Party Agreement (TPA), and changes to the Consent Decree in *State of Washington v. United States Department of Energy*. E.D. Wash., No. 2:08-cv-5085-RMP.

On January 10, 2025, the parties announced that a landmark agreement that outlines a realistic and achievable course for cleaning up the radioactive and chemical waste at the Hanford Site had been finalized.⁵

As part of the agreement, DOE is proposing the DFHLW approach for immobilizing HLW in glass, temporarily bypassing the WTP Pretreatment Facility. This *Supplement Analysis of the Final*

⁴ Information related to the Holistic Negotiations and the amended Consent Decree is presented in Section 1.3 of this SA.

⁵ The Final Approval Package is available at <https://pdw.hanford.gov/document/AR-33193>.

Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site (DFHLW SA-04) evaluates that Proposed Action (see Section 1.2).

In parallel with this DFHLW SA-04, DOE is also preparing an SA to evaluate a separate proposal, referred to as “200 West Area Tank Waste Treatment” (SA-05). That proposal would construct and operate pretreatment process modules in the 200 West Area (200W) to pretreat approximately 32 million gallons of tank waste from 200W by removing key radionuclides (e.g., cesium-137 and strontium-90) by ion exchange. This is an alternative to the previously planned transfer of the 200W tank waste to the 200 East Area (200E) for treatment by either the LAW Vitrification Facility or HLW Vitrification Facility. This 200W pretreated waste would be transferred to either a load in/load out station for shipment to a permitted treatment facility off site for treatment and disposal or to a proposed onsite treatment facility prior to shipping to a licensed and permitted commercial disposal facility outside the state of Washington. This proposal is also included as an element of the agreement reached in Holistic Negotiations; however, it has independent utility from the DFHLW approach to operations in 200E. Prior to implementation of the 200W tank waste treatment, DOE would determine, pursuant to its authorities under the *Atomic Energy Act*, that the tank waste from 200W, after separation, pretreatment, and solidification is not HLW, and may be managed and disposed of as low-level radioactive waste (LLW) under DOE Manual 435.1-1, *Radioactive Waste Management Manual*.

The 200W tank waste process is briefly discussed in various sections in this SA (e.g., Sections 1.3, 2.2.3.3, and 3.2). SA-05 contains additional description and analysis of 200W tank waste treatment; this SA (SA-04) is evaluating the potential impacts of the 200W tank waste treatment proposal as part of the cumulative impacts analysis (see Chapter 4).

1.2 Proposed Action

The HFFACO/TPA requires DOE to complete the River Protection Project tank waste treatment mission by December 31, 2047. As part of that effort, DOE proposes to operate the WTP HLW Vitrification Facility in a direct-feed configuration (DFHLW) as part of the Hanford Tank Waste Treatment Mission. There are connected actions associated with implementation of DFHLW and construction of additional tank waste storage capacity, including but not limited to, for example, interim storage of IHLW and the addition of a HLW effluent management system (HEMS). Specific details about the facilities and operations necessary to implement the Proposed Action and the connected actions are presented in Chapter 2 of this SA.

1.3 Purpose and Need for the Proposed Action

The purpose and need discussed in the TC&WM EIS relative to tank closure and waste management have not substantively changed since 2012. The purpose and need are to:

- Safely retrieve and treat radioactive, hazardous, and mixed tank waste;⁶ close the SST system; and store and/or dispose of the waste generated from these activities at the Hanford Site. Further, DOE needs to treat the waste and close the SST system in a manner that complies with federal and applicable Washington State laws and DOE directives to protect

⁶ SST waste retrieval is underway at the Hanford Site, and the DOE Hanford Field Office issues a monthly status report providing the official inventory for waste stored in underground storage tanks in the 200 Area. An example report for the Month of June 2025 is available at <https://pdw.hanford.gov/document/AR-36105>.

human health and the environment. Long-term actions are required to permanently reduce the risk to human health and the environment posed by post-retrieval residual waste in the 149 SSTs and 28 DSTs.

- Expand or upgrade existing waste treatment, storage, and disposal capacity at the Hanford Site to support ongoing and planned waste management activities for onsite waste.

1.4 National Environmental Policy Act Documents Relevant to the Proposed Action

Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC&WM EIS) (DOE/EIS-0391; DOE 2012). The construction of the WTP was originally analyzed in the 1996 *Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement* (DOE/EIS-0189; DOE 1996). The TC&WM EIS (DOE 2012) revised and updated the analyses of the 1996 document, which addressed retrieval, treatment, and disposal of the tank waste, by also evaluating the impacts of different scenarios for final closure of the SST system. The TC&WM EIS provides the current baseline against which the potential impacts from the Proposed Action in this SA can be compared and evaluated. The Final TC&WM EIS analyzed 17 alternatives, 11 of which involved retrieval, treatment, storage, and disposal of tank wastes and closure of the SSTs. The TC&WM EIS 2013 ROD (78 FR 75913) announced that DOE intended to pursue Tank Closure Alternative 2B; it stated the following as to tank waste:

“This ROD includes decisions involving the following major activities from Tank Closure Alternative 2B: Retrieval of 99 percent of the tank waste by volume; use of liquid-based retrieval systems; leak detection monitoring and routine maintenance; **new waste receiver facilities, as needed; additional storage facilities, as needed; additional storage facilities for canisters**; operations and necessary maintenance, waste transfers and associated operations such as use of the ‘hose in hose’ transfer lines or installation of new transfer lines, where needed; and upgrades to existing DST and SST systems which includes piping and other ancillary equipment as needs are identified. Tank waste treatment includes pretreatment of all tank waste, with separation into LAW and HLW. **New evaporation capacity**, upgrades to the ETF, new transfer lines and processing of both vitrified LAW and secondary waste for disposal are included in this decision. Disposal activities include disposal of LAW onsite and **construction of enough IHLW Interim Storage Modules to store all the IHLW generated by WTP treatment prior to disposal.**” [Emphasis added (78 FR 75918)]

Amended ROD for Cesium and Strontium Capsules. On May 18, 2018, DOE issued an amended ROD for the TC&WM EIS for the management of cesium and strontium capsules at Hanford (83 FR 23270). This amended ROD was supported by the analyses conducted in Appendix E of the TC&WM EIS (Section E.1.2.3.4.5), which evaluated transfer of cesium and strontium capsules to dry storage. This decision is not related to the Proposed Action evaluated in this DFHLW SA.

Amended ROD for DFLAW Approach. On January 28, 2019, DOE issued another amended ROD related to the DFLAW approach (84 FR 424). This 2019 amended ROD was supported by an SA that evaluated implementation of the DFLAW approach (DOE/EIS-0391-SA-02; DOE 2019).

Amended ROD for Secondary Waste Management. The operation of WTP and non-WTP activities that are planned or ongoing at the Hanford Site (e.g., tank farm and 222-S laboratory operations) will generate an increased volume of liquid and non-liquid secondary waste over normal tank farm operations. In 2023, DOE prepared a SA-03 to evaluate transportation and treatment of certain secondary waste at licensed and permitted commercial treatment facilities located off the Hanford Site (DOE/EIS-391-SA-03; DOE 2023b). SA-03 also evaluated disposal of some of these secondary wastes (after treatment) off site at licensed and permitted commercial disposal facilities. DOE published an amended ROD to document that decision (88 FR 6241; January 31, 2023). This decision is not related to the Proposed Action evaluated in this DFHLW SA.

1.5 Scope and Organization

DOE NEPA implementing procedures state that “DOE is required to prepare supplements to environmental documents only if a major Federal action remains to occur, and DOE makes substantial changes to the proposed action that are relevant to environmental concerns; or DOE decides, in its discretion, that there are substantial new circumstances or information about the significance of the adverse effects that [have] bearing on the proposed action or its effects.” DOE NEPA implementing procedures also state that, “When it is unclear whether or not a supplement to an environmental document is required, DOE may prepare a supplement analysis.” This SA provides sufficient information for DOE to determine whether (1) to supplement an existing EIS, (2) to prepare a new EIS, or (3) no further NEPA documentation is required.

This SA analyzes whether implementing the DFHLW approach constitutes a substantial change to the original proposed action evaluated in the TC&WM EIS or significant new circumstances or information relevant to environmental concerns compared to those presented in the TC&WM EIS. Chapter 2 of this SA presents a description of the Proposed Action and connected actions, and Chapter 3 presents a comparative analysis of the potential environmental impacts of the Proposed Action and connected actions and those impacts presented in the TC&WM EIS. Chapter 4 presents potential cumulative impacts of the Proposed Action and connected actions when the incremental effects of the actions are combined with other past, present, and reasonably foreseeable future actions. Chapter 5 provides DOE’s determination. Lastly, Chapter 6 presents a listing of the references cited in, and relied upon for, this SA.

In cooperation with Ecology and the EPA, DOE provided a courtesy copy of this SA to these agencies prior to publication. EPA indicated that they had no comments. Ecology provided comments that DOE resolved and communicated back with the Agency. This Final SA incorporates all appropriate revisions associated with this courtesy review.

2 PROPOSED ACTION

The Proposed Action would involve the completion of the construction and commissioning of the WTP HLW Vitrification Facility and support facilities in a DFHLW configuration and construction of an additional 1 million gallons of multi-purpose tank waste storage capacity in 200W and would be in accordance with the amended Consent Decree and Holistic Negotiations between DOE, the State of Washington, and the EPA.

In January 2023, DOE published an analysis of alternatives (HLW AoA) to evaluate potential alternatives to meeting Consent Decree milestones and identified Alternative 18 as the most viable and affordable mission approach from both the annual budget and life-cycle cost perspective (Parsons 2023a, 2023b). The HLW AoA identifies Phases 1, 1B, and 2 for the implementation of Alternative 18. The facilities and activities identified in Phase 1 of Alternative 18 have independent utility and are primarily related to DFLAW, which were evaluated in a separate SA (*see* Section 1.4). The facilities and activities identified in Phase 1B also have independent utility and are evaluated in this SA and as part of the SA-05 cumulative impact analyses (*see* Section 1.1 of this SA). The facilities and activities identified in Phase 2 are currently conceptual and not expected to be implemented for decades. These actions are not ripe for analysis and will be evaluated under NEPA when appropriate.

In compliance with DOE Order (O) 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, DOE prepares mission need statements for capital projects that meet specific criteria. The HLW AoA was issued in accordance with DOE O 413.3B, which requires that DOE conduct an AoA prior to critical decision (CD)-1, *Approve Alternative Selection and Cost Range*, for capital projects. During preparation of this SA, DOE examined preliminary information that was available for the current and “in-process” mission need statements for five distinct capital projects that outline the Proposed Action and connected actions. Information derived from the mission need statements for specific capital projects includes the following:

- **Direct-Feed High-Level Waste Vitrification Project.** Complete construction and commissioning of the HLW Vitrification Facility in a DFHLW configuration (DOE 2024a).
- **Interim Hanford Storage (IHS).** Establish operational capability to receive the IHLW canisters from the WTP HLW Vitrification Facility and store them until a federal repository is available.
- **Waste Transfer Vault (WTV).** Add an operational capability between the tank farms and the HLW Vitrification Facility to transfer the solids portion of the tank waste from the DSTs. This capability must be able to transfer waste to, and receive liquid effluent from, the HLW Vitrification Facility.
- **High-Level Waste Effluent Management System.** Add operational capability to reduce the liquid effluent returns from the HLW vitrification process, preserving DST space. This additional capability would reduce the liquid volume in the DSTs, providing operational flexibility and efficiency in SST retrievals and WTP operations.

- **Multi-Purpose Tank Waste Storage.** Add an additional 1 million gallons of multi-purpose tank waste storage capacity in 200W to reduce risk, support SST retrieval, and store tank waste prior to transfer to SY-Farm and to 200E for vitrification.

2.1 Overview of the DFHLW Approach

The general layout of the 200 Area at the Hanford Site is shown in Figure 2-1. The Proposed Action and the connected actions evaluated in this SA primarily involve facilities and operations at WTP and 200E in the bottom half of the figure. One connected action (multi-purpose tank waste storage) would occur in 200W.



Figure 2-1 General Layout of the Hanford Tank Waste Treatment Complex

Under the DFHLW configuration, DOE would temporarily bypass the WTP Pretreatment Facility (only partially constructed) and send tank waste directly to the WTP HLW Vitrification Facility for immobilization in glass. During DFHLW operations, HLW slurries would be retrieved and prepared in the existing DST system in 200E.⁷ Sludge would be mobilized in source DSTs then transferred through underground pipelines to a designated DST and then sent toward the HLW Vitrification Facility via a newly constructed, intermediary facility (i.e., the WTV) to stage waste and receive effluents being returned to the tank farms from the HLW Vitrification Facility. The WTV would be a new facility to support the DFHLW approach and would stage waste to be sent to the HLW Vitrification Facility and process HLW effluents back to the DSTs (additional descriptions of new or modified facilities are provided in Section 2.2). Figure 2-2 depicts a simplified flowsheet for the DFHLW configuration including the new WTV. The legend within the figure identifies those facilities that are planned (included in the previous WTP design

⁷ Slurry is a mixture of solids, such as sludge or undissolved saltcake, suspended in a liquid. For example, a slurry results when the sludge and supernate in a tank are mixed together. Slurries can be used to transfer solids by pumping the mixture through a pipeline (DOE 2023a).

evaluated in the TC&WM EIS) and proposed (included for additional evaluation in this DFHLW SA). The balance of operations in the WTP HLW Vitrification Facility is consistent with its description in the TC&WM EIS (DOE 2012; Appendix E).

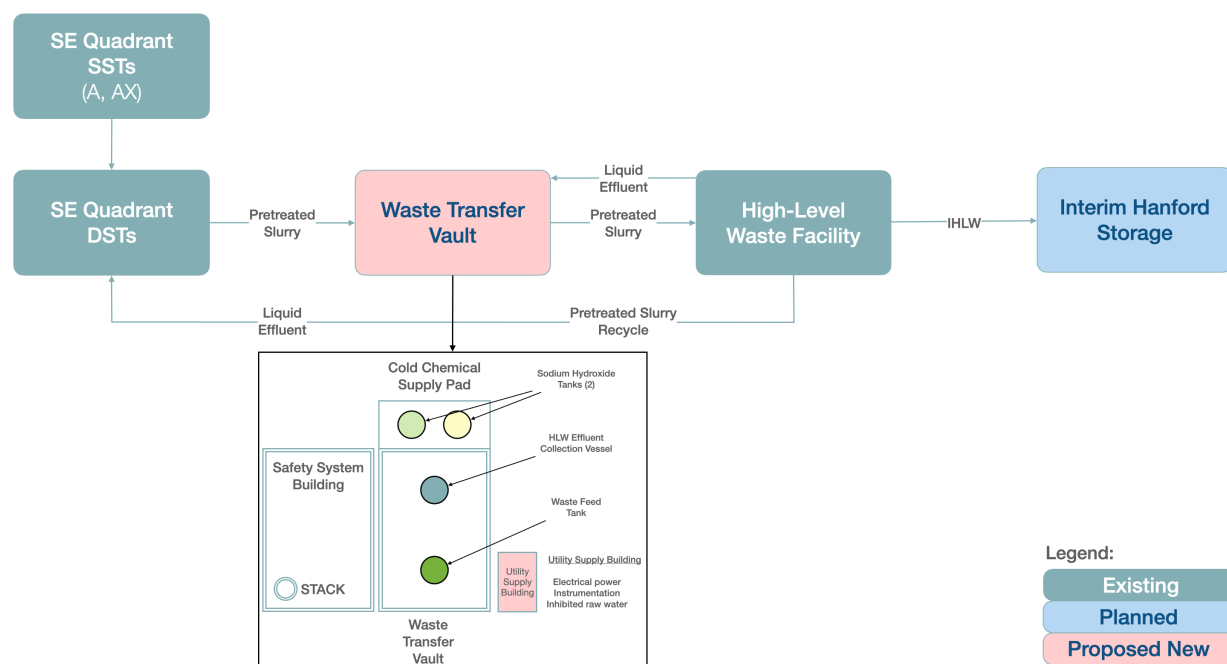


Figure 2-2 Simplified DFHLW Flowsheet

In addition to the new WTV, DFHLW would be supported by the LAB, BOF, and other ancillary facilities. This support is discussed below.

2.1.1 Analytical Laboratory

The LAB provides process support to the HLW Vitrification Facility. Samples will be transferred from the WTP HLW Vitrification Facility to the LAB. HLW Vitrification Facility samples will be analyzed in a series of shielded hot cells as described in the TC&WM EIS. Completion of LAB capabilities required to support HLW vitrification and waste treatment, most notably the LAB hot cells, will be completed during the construction and commissioning phase of the DFHLW configuration. Operations of the LAB facilities under the DFHLW configuration would be consistent with those described in the TC&WM EIS (DOE 2012, Appendix E).

2.1.2 Balance of Facilities

The BOF make up the overall support services infrastructure essential for the waste treatment process and includes multiple support buildings and systems that provide interconnecting utilities and support to the LAW Vitrification Facility, HLW Vitrification Facility, and LAB. Establishing the BOF infrastructure to support the DFHLW configuration would include a combination of reintegrating BOF capabilities to be shared with DFLAW operations, completing stand-alone BOF capabilities not required for DFLAW, and new facilities either previously planned or determined to be necessary for effective implementation of the DFHLW approach. The BOF facilities that support DFLAW would be managed to support DFLAW in parallel with DFHLW operations.

The following systems within the BOF complex will be shared with DFLAW operations as originally designed under the WTP Project (DOE 2024b).

- ammonia reagent,
- demineralized water,
- domestic water,
- plant cooling water,
- process service water,
- fire service water storage and distribution,
- sanitary disposal,
- stormwater drains, and
- nonradioactive liquid waste disposal.

Because these systems will be implemented as originally designed and evaluated in the TC&WM EIS, they are not discussed further in this SA. An effluent management facility, which is considered a BOF system, was added to support DFLAW. As noted in Sections 1.2 and 2.1.3 in this SA, operation of the WTP HLW Vitrification Facility would require the addition of the HEMS in addition to the DFLAW effluent management facility.

In this SA, DOE proposes to add or modify some BOF systems during the completion of the Vitrification Project, which includes DFHLW but also includes additional infrastructure to support the overall WTP operations. The following facilities included in the Vitrification Project are proposed to support the larger operations of WTP (and are not specifically required for DFHLW):

- administration annex,
- simulator building, and
- mockup facility.

The design and location of these facilities are in various stages of development and have independent utility from the Proposed Action evaluated in this SA (implementation of the DFHLW configuration) and will be evaluated under DOE Hanford's NEPA review screening process as the projects evolve.

The following additional BOF systems/facilities would support DFHLW. Details related to each of these are included in Section 2.2 (DOE 2024b).

- chiller compressor plant,
- wet-chemical storage facility,
- WTP steam plant (WSP),
- switchgear building,
- emergency power and air building, and
- glass-former reagent storage facility.

2.1.3 Ancillary Facilities

As identified in Section 1.2, implementation of the DFHLW approach would involve connected actions and associated facilities (because their necessity is driven by the WTP HLW Vitrification Project). These facilities are in the early stages of the DOE O 413.3B CD process and include the

HEMS and IHS facilities as well as storage vessels in 200W for the 1 million gallons of multi-purpose tank waste.

2.2 Description of New and/or Modified Facilities

2.2.1 Waste Transfer Vault and Associated Transfer Lines

The specific WTV design has not been developed; however, based on preliminary plans and information contained in the HLW AoA (Parsons 2023a), the WTV would consist of a structure with a footprint of between 2,000 and 6,000 square feet and include both aboveground and underground components (*see* Figure 2-3). The underground components would include a HLW feed tank (estimated at 24,000 gallons), which would receive waste from DSTs for staging prior to sending that waste to the WTP HLW Vitrification Facility. The HLW effluent collection vessel (also estimated at 24,000 gallons) would also be underground and shielded and would receive liquid effluents from the WTP HLW Vitrification Facility and hold them until they were transferred back to the 200E DSTs. The location of the WTV in 200E would be in the heavily disturbed area west of the WTP Pretreatment Facility and east of the AP tank farm (Parsons 2023a; DOE 2024b).

Outside of the WTV, at ground level, DOE would include a storage pad for chemicals (e.g., sodium hydroxide) and would construct a utility supply building, which would house several of the BOF systems (described in Section 2.2.2).

The construction and operation of the WTV would not be significantly different than that of the waste receiver facilities (WRF) evaluated in the TC&WM EIS (DOE 2012, Section 2.2.2.1.5). The TC&WM EIS evaluated the addition of four WRFs in each of the alternatives (total waste volume of about 1.8 million gallons). The WTV would be a staging location for HLW on its way to the WTP HLW Vitrification Facility. Figure 2-3 is a reproduction of the WRF figure from the TC&WM EIS.

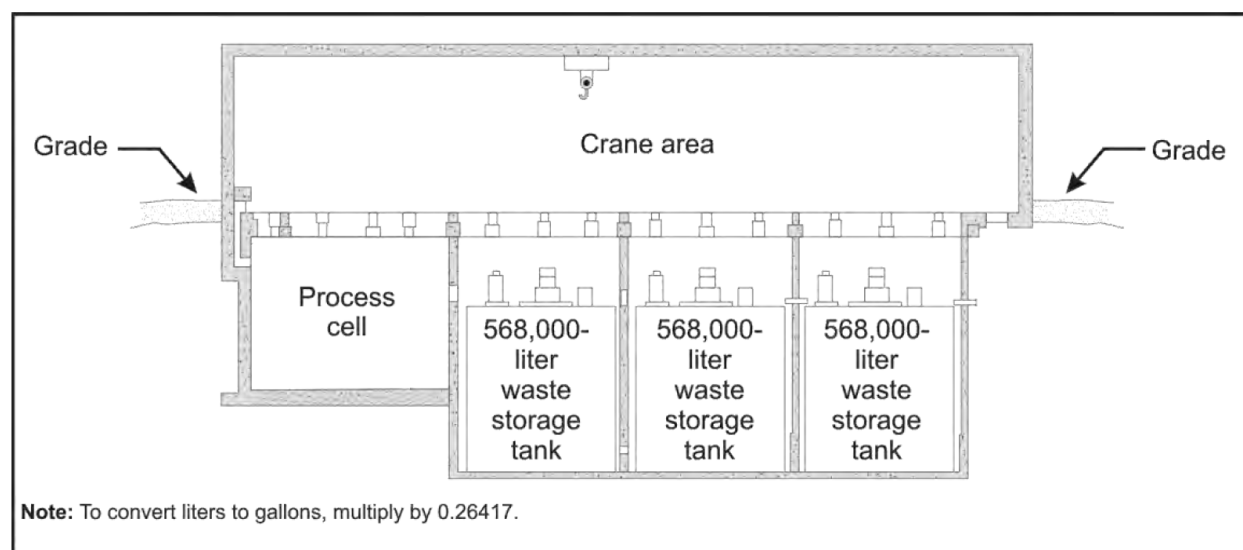


Figure 2-3 Waste Receiver Facilities Evaluated in the TC&WM EIS

As identified in Section 2.1, implementation of the WTV also would require the installation of new transfer lines from the AP tank farm to the WTV and from the WTV to the HLW Vitrification

Facility. All transfer piping for DFHLW configuration would be buried, double-contained piping and would be installed in a heavily disturbed industrial area west of the WTP. The TC&WM EIS evaluated the addition of waste transfer lines for normal maintenance, operations, and retrievals (DOE 2012, Section 2.2.2.1.4).

2.2.2 Balance of Facilities Systems or Facilities

As identified in Section 2.1.2, the DFHLW approach would add or modify some of the existing BOF systems or facilities.

2.2.2.1 Chiller Compressor Plant

The existing chiller compressor plant would be modified to allow installation of new chillers and compressors designed to accommodate service to the WTP HLW Vittrification Facility. The original design of the facility included capacity for full operations of WTP, including the Pretreatment Facility. The smaller, more efficient replacement equipment can be accommodated within the existing building. Required changes to the chiller compressor plant to support DFHLW operations include the following actions:

- Replace the existing, uncommissioned centrifugal compressors with new, variable speed drive rotary screw compressors;
- Replace the existing uncommissioned dryers with smaller dryers to operate more efficiently at reduced loads;
- Commission one additional chiller (refurbish or replace) to support DFHLW; and
- Update the control system design and software to operate the new equipment.

All changes would be internal to the existing chiller compressor plant.

2.2.2.2 Wet-Chemical Storage Facility

A wet-chemical storage facility would be constructed in the industrial area west of the WTP to support DFHLW operations. The wet-chemical storage facility would receive, store, and transfer reagent chemicals to the WTP HLW Vittrification Facility. Because DFLAW operations do not need the reagents planned for the HLW Vittrification Facility, the wet-chemical storage facility was not previously built but is a necessary element of the HLW Vittrification Facility design evaluated in the TC&WM EIS and is considered a “planned facility” as described in Section 2.1 of this SA. The discussion of the wet-chemical storage facility as a BOF is included in the TC&WM EIS (DOE 2012, Section E.1.2.3.1.6). The facility would include a heated, indoor storage area for chemical totes and outdoor bermed areas for heated storage tanks and have sufficient capacity to store a minimum of 7 days of reagents to support DFHLW operations. The TC&WM EIS evaluated a suite of chemicals that were expected to be used at the HLW Vittrification Facility (e.g., nitric acid, cerium (IV), sodium hydroxide) (DOE 2012; Sections E.1.2.3.1.2, E.1.2.3.1.7, and E.1.2.3.3.1). The specific location has yet to be finalized; however, DOE would follow an existing process for ecological and cultural screening reviews once a specific location is determined.

2.2.2.3 WTP Steam Plant

A new, all-electric WSP would be constructed immediately north of the existing steam plant and within the WTP industrial area to replace the existing diesel-powered steam plant to meet both DFHLW and DFLAW steam demands (e.g., building heating, process heating, and miscellaneous steam users). The WSP would receive power from the HLW switchgear building (*see* Section 2.2.2.4). The steam generated by the new WSP would be provided at the same process conditions as the existing steam plant albeit at a lower required volume. Several other systems and equipment, such as deaerators, surge tanks, chemical additive skids, drainage systems, and switchgear, would provide the necessary infrastructure to support steam production at the proposed WSP (Bechtel 2024a).

The full buildout of the WSP would have an estimated footprint of about 27,000 square feet and be designed for a peak steam capacity of 90,000 pounds per hour (lb/hr) steam delivery to the supply header, with an internal production rate of 108,000 lb/hr to account for losses (Bechtel 2024a). The existing boilers currently have the capacity to provide 248,400 lb/hr of steam. Initial buildout would be limited to the boilers necessary to support the DFLAW demand but would be designed with space to accommodate additional electric boilers for future operations, based on actual peak steam demands during combined HLW and LAW operations.

2.2.2.4 Switchgear Building

WTP facilities currently include a switchgear building (Building 87) that supports current electrical loads, including those from LAB, DFLAW, the effluent management facility, and others. The current electrical substation and the associated switchgear were not designed with an ability to perform major modifications without interrupting power, such as connecting new feeders. This has led to the unintended consequences of not being able to connect future facilities to the WTP power source without extended outages to DFLAW operations (HMIS 2023).

A new electric switchgear building would be needed to service the HLW Vitrification Facility and the conversion of the legacy WTP steam plant to the new WSP (*see* Section 2.2.2.3). The switchgear building would be supplied by two 13.8-kilovolt power lines and would supply approximately 35 megawatts (MW) of power for WTP operations, with the WSP as the primary load. The building would have a footprint of about 5,000 square feet and be sited just south of the existing steam plant and chiller compressor plant. Power would be distributed from the primary 13.8-kilovolt power distribution system switchgear to various WTP facilities throughout the site via underground duct banks and aboveground cable trays.

2.2.2.5 Emergency Power and Air Building

HLW Vitrification Facility safety systems are required to be backed up with safety-related emergency power and to provide instrument service air to purge vessel head space for hydrogen mitigation in the case of the loss of power to the HLW Vitrification Facility. Emergency backup capabilities are required to ensure continued operation of critical safety systems including ventilation, vessel agitation, safety air, and safety software operations (Bechtel 2024b).

The safety-related air supply systems to support the HLW Vitrification Facility were planned as part of the WTP Pretreatment Facility; however, the Pretreatment Facility is not currently being completed. The HLW-dedicated emergency power and air building would replace the previously

planned emergency turbine generators. The emergency equipment and systems would be housed in a reinforced concrete structure designed to safety-significant requirements. The emergency power and air building would contain two redundant safety trains, each with an estimated 2-MW diesel generator. The proposed location for the emergency power and air building is immediately south of the HLW Vitrification Facility within the WTP footprint. The estimated footprint of the building is 34,000 square feet (about 0.8 acre).

While the specific emergency generator size was not identified in the TC&WM EIS, the construction and operation of this replacement facility would be expected to be consistent with, or lower than, parameters analyzed in the TC&WM EIS (e.g., amount of diesel fuel used) since it would not be supporting a WTP Pretreatment Facility. The main differences between the current plans and the design evaluated in the TC&WM EIS are the current plan calls for a building to house the emergency power and air system together and the previous design placed the air systems in the WTP Pretreatment Facility and the emergency power systems outside.

2.2.2.6 Glass-Former Reagent Storage Facility

Similar to the wet-chemical storage facility, the glass-former storage facilities and glass-former handling and transport facility would be two of the larger facilities in BOF (DOE 2012, Section E.1.2.3.1.6). These buildings are planned to be constructed within the WTP complex, between the LAW Vitrification Building and the chiller compressor plant. The function of these facilities has not changed from that analyzed in the TC&WM EIS.

2.2.3 Ancillary Facilities

As identified in Sections 1.2 and 2.1.3, this SA also addresses ancillary facilities that are considered connected actions for the implementation of the DFHLW approach. This section provides a description of these facilities.

2.2.3.1 High-Level Waste Effluent Management System

Vitrification of HLW produces a secondary, dilute liquid effluent that must be treated. The WTP HLW Vitrification Facility generates additional dilute liquid waste from line flushes and canister decontamination, among other sources. Additionally, large quantities of water are planned to be added to wash soluble solids from tank waste prior to delivery to the WTP HLW Vitrification Facility. Collectively, these dilute liquids are known as secondary liquid effluent waste.

As identified in the HLW AoA, the DFHLW configuration would include a HEMS (referred to in the AoA as a HLW Effluent Management Facility, or HEMF) to concentrate this secondary liquid effluent waste from the HLW Vitrification Facility.

The HEMS would include an evaporator to manage the volume of secondary liquid effluents. The secondary liquid effluents that would be evaporated from the HEMS would be sent to a DST in 200W prior to being managed through the Liquid Effluent Retention Facility (LERF), an existing onsite waste management facility.

The specific design and location of the HEMS would be identified as the CD process evolves (CD-1 is expected in 2026); however, the most likely location for the HEMS would be within, or

immediately adjacent to, the WTP footprint. Figure 2-4 illustrates how the HEMS would fit within the process associated with the DFHLW approach.

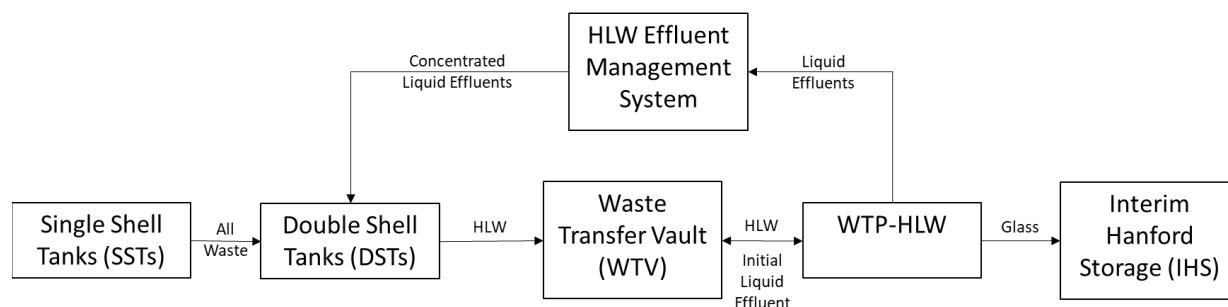


Figure 2-4 High-Level Waste Effluent Management System

The pre-conceptual design of the HEMS includes a HLW evaporator process building (which would receive liquid effluents from the HLW Vitriification Facility), pump and valve pits, and an effluent management vault with evaporator feed vessels and other process tanks. The facility would likely be a Hazard Category 2 facility, and the primary and secondary containment structures and systems would be designed to Seismic Category I requirements. The design would also include active vessel ventilation, vessel air sparging, and active confinement ventilation (Parsons 2023a).

The WTP design evaluated in the TC&WM EIS included evaporation capability in the Pretreatment Facility, which is not required in the DFHLW configuration. Therefore, the general function of the evaporators in the Pretreatment Facility would be replaced by this proposed evaporator in the HEMS.

2.2.3.2 Interim Hanford Storage

According to Appendix E of the TC&WM EIS, safe, interim, onsite storage of IHLW glass would be necessary until disposition decisions are made and implemented (e.g., a future repository). Storage would occur in the Canister Storage Building and interim storage modules. The planned capacity of the Canister Storage Building, as noted in the TC&WM EIS, is 880 canisters of IHLW glass. Eventually, additional interim storage modules, each able to hold 2,640 canisters, would be constructed. Alternative 2B from the TC&WM EIS assumed that four additional interim storage modules would be constructed at Hanford. This equates to an evaluation of storage capacity for approximately 11,440 IHLW canisters. (DOE 2012, E.1.2.1.3 and E.1.2.4.1.2).

As reported in the draft mission needs statement for the IHS:

“Vitrification of the HLW fraction of the Hanford tank waste will produce IHLW glass canisters. Given the present unavailability of a final disposal alternative for offsite shipment of IHLW canisters and the lack of existing onsite facilities capability of storing IHLW canisters, IHS is needed to receive and store IHLW canisters output from WTP. By 2033, DOE needs a capability to store IHLW until a federal repository is available to enable the Hanford tank waste treatment mission of waste retrieval, treatment, and closure to continue.”

A conceptual design report for IHS, which selected an open rack vault design, as noted in RPP-RPT-52176, *Interim Hanford Storage Conceptual Design Report*, was completed in 2012. However, during the upcoming CD process for IHS, the alternatives and associated conceptual design of IHS will be reperformed to account for any changes since that time. Therefore, a specific design for the IHS is not yet available; however, for the purposes of this SA, the design would be similar to that evaluated in the TC&WM EIS (DOE 2012). One aspect of the original design that is expected to remain is the modular nature of the IHS; the TC&WM EIS evaluated the construction of four modules, and these individual storage modules would be constructed as needed. If changes are made to the overall IHS design, DOE would determine the need for additional NEPA analysis.

2.2.3.3 Multi-Purpose Tank Waste Storage

There are 149 SSTs, constructed between 1943 and 1964. Of those 149 SSTs, 66 are located in 200E and 83 are in 200W. There are 28 DSTs on the Hanford Site; 3 of which are in 200W, and 25 in 200E. The tanks contain a mix of radioactive and chemical waste in the form of sludge, salts, and liquids, requiring a variety of waste retrieval, treatment, and disposition methods. The tank space in the DSTs is critical to support retrieval of waste from the SSTs and prepare the waste for safe disposition.

As part of the Hanford tank waste treatment mission, tank waste from SSTs is retrieved and transferred to DSTs. The 200W DSTs act as the hub for receiving waste from the 200W SSTs and the 222-S Laboratory, as well as a location for staging and delivering that waste for treatment. During 200W retrievals from SSTs, the waste is received, staged, and routed for treatment through the 200W DSTs. The solids portion of the waste is transferred to 200E via a cross-site transfer line for vitrification and disposal. The liquid portion, or supernate, is proposed for treatment by the process described in SA-05 and transported for immobilization and out-of-state disposal (*see* Section 1.1).

DST space is a critical commodity to support the overall tank waste mission. DST space availability in 200W drives the duration of retrievals of 200W SSTs and the disposition of pretreated tank waste. 200W DST space is also required to receive waste from the 222-S Laboratory, which performs necessary analytical operations for Hanford Site operations. The 1 million gallons of multi-purpose tank waste storage capacity project would provide additional space for operational flexibility and continuity of treatment operations. It likely would be implemented via the installation of four 250,000-gallon tanks, although that specific detail has not yet been finalized. Impacts would not be expected to vary substantially if DOE were to implement the 1 million gallons of additional tank waste storage as ten 100,000-gallon tanks or two 500,000-gallon tanks because all the tanks would be expected to be located within the 200W Area.

The proposed multi-purpose storage would provide more space for retrieved waste and lessen the dependency on the existing facilities in 200E to maintain process throughput and continue SST retrievals. Adding storage capacity in 200W would also allow for uninterrupted retrieval operations while sustaining the throughput of the proposed supernate pretreatment. The additional multi-purpose storage capacity would also provide potential additional contingency capacity in the event of operational issues with current DSTs, additional emergency space capacity, and greater operational flexibility overall. Therefore, recent TPA milestones include the construction and operation of 1 million gallons of multi-purpose tank waste storage capacity in 200W by 2040.

The TC&WM EIS (Section E.1.2.2.9.3) describes the new DSTs evaluated under Alternative 5 as follows (DOE 2012):

“Construction of new DSTs to provide safe storage space for retrieved SST/DST waste was evaluated in the early 1990s as a multifunction waste tank facility project. A facility similar to the multifunction facility would be constructed on approximately 24 acres near the WTP site in 200E. Electric power, raw water, steam, sanitary water, and process lines would be routed to the site.

New DSTs would be constructed in modules, with four DSTs per module, similar to the multifunction waste tank facility design. Each tank would have a 75-foot internal diameter and a capacity of up to 1.2 million gallons. The outer tank would be steel-lined reinforced concrete that provides the secondary containment required by DOE directives. The inner tank would be enclosed within the outer tank and separated from the outer tank liner by an annular space where leak detection equipment would be installed. The outer tank would serve as secondary containment in the event of a leak from the primary tank liner. In addition, the base of the outer tank would be equipped with leak detection runners leading to a sump for detecting and mitigating possible leakage from the outer tank of a DST.

Each primary tank would be equipped with a transfer pump, and transfer lines would be installed to connect the tank system with the AP tank farm, other tank farms, or the WTP, as required. All transfer lines, process piping, sample lines, and drain lines for tank waste would be encased in secondary piping equipped with leak detection systems.”

3 ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

DOE conducted an initial screening review to identify the differences between the Proposed Action from the actions evaluated in the TC&WM EIS. Resource areas that would be unaffected or any impacts that would be minimal and clearly bounded by the TC&WM EIS analyses were eliminated from detailed analysis in this DFHLW SA. Section 3.2 describes the results of that initial screening review. For those resource areas that warranted additional evaluation, Section 3.3 provides the analysis of the potential environmental impacts associated with the differences identified in Section 3.2.

3.2 Initial Screening Review

Implementation of the Proposed Action represents the following primary differences from the facilities and actions analyzed in the Final TC&WM EIS (and previous SAs): (1) installation of a WTV in 200E, (2) modification of several BOF facilities or systems to implement vitrification in the HLW Vitrification Facility, (3) construction and operation of IHS for IHLW canisters, (4) construction and operation of a HEMS, and (5) construction and operation of storage tanks for 1 million gallons of multi-purpose tank waste. The following paragraphs discuss each of these elements, and Table 3-1 provides a comparative analysis for each of the environmental resource areas evaluated in the TC&WM EIS. In general, location and functional equivalency were the basis for the comparative evaluation and assessment.

1. **Waste Transfer Vault.** The TC&WM EIS evaluated the construction of four WRFs under each of the EIS alternatives, including Alternative 2B. Each WRF had an assumed waste volume of 450,000 gallons. No WRFs have yet to be constructed on the Hanford Site. The proposed WTV would include internal tanks, piping, and valves that would manage a much smaller volume (likely less than 100,000 gallons).

Construction of the WTV would require the potential addition of buried transfer lines from the WTV to an existing DST and to the HLW Vitrification Facility. In the TC&WM EIS, DOE evaluated upgrades to the tank farms, which included replacement of components, such as pumps and surface-leak detectors, and installation of transfer lines. DOE uses numerous existing transfer lines in the 200 Area to move waste among tanks and tank farms. The TC&WM EIS evaluated several new transfer lines in the 200 Area that would be used to move tank waste in 200E to support WTP and SST retrieval. The areas in 200E are heavily impacted and highly disturbed. In Section E.1.2.2.7.4, “Future Transfer Lines,” of the Final TC&WM EIS, DOE pointed out that because the exact locations of the waste transfer lines could not be anticipated for all waste movements needed in the future, the TC&WM EIS analyzed three lines—a primary, a secondary, and a spare—located along each potential transfer route that might be needed to move liquid waste to and from various facilities. The TC&WM EIS did not identify any potentially significant impacts from these lines. Moving radioactive waste through both permanent and temporary transfer lines is a common practice on the Hanford Site, and the potential impacts of this activity were analyzed in the TC&WM EIS; impacts from the anticipated new transfer line segments are well represented by the analysis in the EIS (*see* Table 3-1 below).

- 2. Modification of BOF Facilities.** As described in Section 2.2.2 of this SA, there are several proposed additions or modifications to BOF facilities. Most of the BOF changes are related to upgrades of planned facilities or systems to best support the evolution of the design of the HLW Vitrification Facility.
- a. Chiller compressor plant.** Because the proposed modifications would be within the existing building and would involve the replacement of original equipment with smaller, more efficient versions, there should be no notable difference in environmental impacts attributable to this facility in the TC&WM EIS. Chapter 3 addresses the reduction in electricity use from the new equipment.
 - b. Wet-chemical storage facility and glass-former reagent storage.** Because the function of these storage facilities would be consistent with the storage functions in the WTP design evaluated in the TC&WM EIS, there would be no additional risks with this element of the Proposed Action. The specific location of the approximately 10,000-square-foot wet-chemical storage facility has not been selected; however, the building site would be within the WTP complex. The glass-former reagent storage is planned for a location between the LAW Vitrification Facility and the chiller compressor plant, which is a highly disturbed, industrial area. Once a specific location is identified, the typical cultural and ecological clearance reviews would be performed to ensure that any potential impacts would be properly mitigated. These facilities are not further evaluated in Chapter 3.
 - c. WTP steam plant.** The WSP would be an all-electric facility north of the existing steam plant. The footprint of the WSP would be totally contained within the heavily disturbed WTP complex. The WSP would replace the current steam plant powered by diesel boilers. The reduction in the projected annual diesel-fuel use would be offset by an increase in electrical power usage associated with steam production.
 - d. Switchgear building.** The approximately 5,000-square foot electric switchgear building would be supplied by two 13.8-kilovolt power lines from the A6 substation and would supply approximately 35 MW of power for WTP operations. Construction of the building would be within the heavily disturbed WTP complex and the power lines would adjoin with the A6 substation. The new switchgear building would support the WTP electrical system in parallel with the existing switchgear building.
 - e. Emergency power and air building.** DOE would construct a 34,000-square foot reinforced concrete structure to contain the safety-related air supply systems and the emergency diesel generators. Initial planning is for two 2-MW diesel generators to supply emergency power. The proposed location for the building is within the heavily disturbed area of the WTP complex. This proposed facility would replace the two functions that were addressed in the TC&WM EIS: (1) safety-related air supply systems that were planned for the WTP Pretreatment Facility, and (2) emergency diesel generators that were planned for backup power supply.
- 3. HLW effluent management system.** As described in Section 2.2.3.1, the HEMS would be a replacement facility for one of the evaporators that was originally planned for the WTP Pretreatment Facility when the design was analyzed in the TC&WM EIS. Because there would not be an increased throughput of material in the HLW Vitrification Facility, the

volume of secondary effluents is not expected to increase above what was evaluated in the TC&WM EIS as a combination of the Pretreatment Facility and the HLW Vitrification Facility. Therefore, the operational parameters associated with a separate HEMS would be expected to be within those parameters evaluated in the EIS.

Per Section 4.1.6 of the TC&WM EIS (DOE 2012), there would be no direct discharge of effluents to either surface water or groundwater during construction, operations, and deactivation under Alternative 2B. Industrial wastewater effluent would consist of mainly process effluents from the WTP. Nonhazardous process wastewater would be discharged to the Treated Effluent Disposal Facility (TEDF) in 200E, while radioactive liquid effluents would be discharged to the 200 Area prior to treatment in the Effluent Treatment Facility (ETF). The proposed HEMS would reduce the volume of projected HLW liquid secondary effluents to minimize both the potential for negatively impacting available tank space and the potential discharge of effluents to the LERF.

4. **Interim Hanford Storage.** As described in Section 2.2.3.2, DOE would construct multiple interim storage modules for IHLW canisters after they are produced in the HLW Vitrification Facility. This connected action is being implemented as planned and analyzed in the TC&WM EIS. The DOE O 413.3B process will re-evaluate the design alternatives and the location of the IHS; however, for the purposes of this SA, the design and potential location are the same as those evaluated in the TC&WM EIS (DOE 2012).
5. **Multi-purpose tank waste storage.** As described in Section 2.2.3.3, DOE has committed to evaluate the construction of 1 million gallons of multi-purpose tank waste storage capacity in 200W as part of the agreement with Ecology and EPA. This additional capacity, expected to include four separate 250,000-gallon tanks, would be installed near SY Tank Farm in 200W. This potential 1 million gallons of additional tank storage would add DST storage capacity to 200W to facilitate the storage of untreated tank waste and to manage solids and slurries that accumulate as a result of retrievals associated with the 200W alternative tank waste treatment mission. Among the many potential needs these tanks would serve, the additional storage capacity would add flexibility to WTP operations and lessen the dependency on the existing facilities in 200E to maintain process throughput and continue SST retrievals.

The TC&WM EIS evaluated multiple instances of additional waste storage capacity. All alternatives except for 1, 2A, and 6 included the addition of 4 WRFs (2 in 200W and 2 in 200E), for a total additional waste storage capacity of about 1.8 million gallons. Three of the alternatives also considered the construction of additional DSTs, each about 1.2 million gallons. Alternative 5 evaluated the addition of 4 new DSTs, Alternative 2A evaluated the addition of 28 new or replacement DSTs, and Alternative 6A evaluated the addition of 84 new DSTs to extend storage and treatment of tank waste to 2163.

Table 3-1 provides a comparative evaluation of the potential impacts for each of the environmental resource areas analyzed in the TC&WM EIS. The center column presents the summary of potential impacts from the TC&WM EIS for Alternative 2B (which was selected in the 2013 ROD [78 FR 75913]). The right-hand column provides an assessment of the potential impacts from implementation of the Proposed Action for that resource. The assessments include bold text to indicate if a resource area is further evaluated in Section 3.3 of this SA.

Table 3-1 Comparative Resource Screening Analysis of Environmental Impacts

Resource Area	Impacts in 2012 TC&WM EIS for Alternative 2B	Assessment of Impacts for DFHLW Configuration
Land Use	Presented as percent of total land commitment within either the Industrial-Exclusive Zone^a or Borrow Area C,^b as appropriate 41.3 acres of new facilities. Total land commitment of 249 acres (2 percent) associated with tank closure within the Industrial-Exclusive Zone. (TC&WM EIS, Section 4.1.1.3.1)	The footprint of the proposed facilities evaluated in this SA is within the Industrial-Exclusive Zone^a that includes the tank farms in the 200 Area and WTP complex. The new facilities are not expected to require Borrow Area C^b materials. There would be negligible differences in the potential land use impacts as evaluated for Alternative 2B. The key differences would be the addition of a WTV, wet-chemical storage, a replacement steam plant, and buildings for switchgear and emergency power and air. These differences would all be within the Industrial-Exclusive Zone. Specific locations have not been identified for the HEMS or IHS; however, these are expected to be constructed within the 200 Area. The additional 1 million gallons of tank waste storage is proposed to be constructed in 200W, also within the Industrial-Exclusive Zone.
Visual Resources	Little change in the overall visual character of the 200 Area. With respect to visual impacts resulting from mining activities at Borrow Area C, both alternatives would result in a moderate change to the area as viewed from nearby higher elevations (principally Rattlesnake Mountain, a Traditional Cultural Property) and State Route 240. (TC&WM EIS, Section 2.8.1.1)	Implementation of the Proposed Action would not introduce any uniquely different or larger facilities that would change the potential impacts to visual resources presented in the TC&WM EIS for Alternative 2B. Most of the facilities would be constructed within the heavily developed 200E; all of the facilities are expected to be constructed in the 200 Area, which is in the central part of the Hanford Site. The new facilities are not expected to require Borrow Area C^b materials.
Noise and Vibration	Negligible offsite impact of onsite activities. Minor traffic noise impacts. (TC&WM EIS, Section 2.8.1.3)	The proposed facilities in the 200 Area are functionally equivalent to facilities evaluated in the TC&WM EIS and would not change the potential noise or vibration considerations evaluated for Alternative 2B. The chiller compressor plant is a high-noise area; however, the Proposed Action would replace existing equipment with smaller, more efficient equipment. This should reduce noise in the plant. The replacement of the diesel-powered steam plant with the all-electric WSP could lower the potential operational noise within 200E; however, there likely would be no discernible change at the site boundary. There could be increased noise from construction and operation of the new facilities; however, considering the distance to the nearest offsite receptor, noise impacts would be negligible.

Resource Area	Impacts in 2012 TC&WM EIS for Alternative 2B	Assessment of Impacts for DFHLW Configuration
Infrastructure	<u>Electricity</u> The peak electrical energy demand of 1.18 million MW-hours (approximating an electric load of 135 MW) would be about 68 percent of the 1.74-million-MW-hour annual capacity (199-MW load capacity) of the Hanford electric power distribution system. <u>Fuel</u> Peak liquid fuel consumption would total about 73.7 million gallons. <u>Water</u> Peak water requirements would be dominated by peak operations coinciding with landfill closure activities. The projected peak water demand of 947 million gallons would be about 19 percent of the 4,890-million-gallon annual capacity of the Hanford Export Water System and about 16 percent of the 200 Area's historical average annual water use of more than 6,000 million gallons.	The proposed facilities would result in changes to electricity, diesel fuel, and water consumption. The new WSP would reduce the reliance on diesel fuel for steam production; however, the all-electric WSP would result in increases in electricity use. Diesel use could increase for the 2-MW emergency generators but would be much less than the reduction in fuel consumption saved by electric boilers. Water consumption from the new WSP for use at WTP and the HEMS would be reduced from that evaluated in the TC&WM EIS. Potential impacts to infrastructure are discussed in more detail in Section 3.3.1.
Air Quality	<u>Peak-year incremental criteria pollutant</u> – most stringent guideline/standard (micrograms per cubic meter) Carbon monoxide (1-hour) standard = 40,000/40,500 Nitrogen oxides (1-hour) standard = 188/35,200 PM₁₀ (24-hour) standard = 150/4,910 PM_{2.5} (24-hour) standard = 35/4,910 Sulfur oxides (1-hour) standard = 197/105 <u>Peak-year incremental toxic chemical concentrations</u> (micrograms per cubic meter) Ammonia (24-hour) ASIL = 70.8/12.0 Benzene (annual) ASIL = 0.0345/0.00459 Mercury (24-hour) ASIL = 0.09/0.117 Toluene (24-hour) ASIL = 5,000/3.62 Xylene (24-hour) ASIL = NL/1.1 (TC&WM EIS, Table 4-3 and Table 4-4)	The proposed facilities in the 200 Area are functionally equivalent to those evaluated in the TC&WM EIS and would not introduce new sources or significant increases in air quality considerations beyond those potential impacts evaluated in the TC&WM EIS. There would be typical emissions related to land disturbance and construction of the facilities. The replacement of the diesel-powered boilers with the all-electric WSP would result in a decrease of criteria pollutants and greenhouse gases. The replacement of 2 new 2-MW emergency generators would result in nonradiological emissions; however, these emissions would only be intermittent during surveillance testing of the generators and would be similar to the emissions of the generators included in the design evaluated in the TC&WM EIS.

Resource Area	Impacts in 2012 TC&WM EIS for Alternative 2B	Assessment of Impacts for DFHLW Configuration
Geology and Soils	Small impact from construction, including potential for short-term soil erosion. Excavation depths limited to 12 meters. New permanent land disturbance, 276 acres for Alternative 2B and 271 acres for Alternative 3B (3B includes a smaller disturbance of Borrow Area C). (TC&WM EIS, Section 2.8.1.5)	The footprint of the proposed facilities in the 200 Area is within the Industrial-Exclusive Zone^a that includes the tank farms in the 200 Area and WTP complex. Although some of the construction activities would increase the amount of non-permeable surfaces from that evaluated in the TC&WM EIS, there would be no discernible differences in the potential impacts to geology and soils as evaluated for Alternative 2B because the area has been highly disturbed and is gravel and fill. The proposed facilities would be designed to meet applicable seismic criteria requirements.
Water Resources	<u>Surface Water</u> Short-term increase in stormwater runoff during construction, but no direct disturbance to surface-water features. No direct, routine discharge of effluents during operations to surface waters or to the subsurface. Water use will not exceed site capacity. <u>Vadose Zone and Groundwater</u> Potential for SST retrieval leaks in the short term without any recovery once in the subsurface. Groundwater mounds could begin to re-expand due to increased discharge of sanitary wastewater, nonhazardous process wastewater, and treated radioactive liquid effluents to onsite treatment and disposal facilities during waste treatment. (TC&WM EIS, Section 2.8.1.6)	<u>Surface Water</u> The proposed facilities in the 200 Area are functionally equivalent to those evaluated in the TC&WM EIS. The HEMS would increase the amount of liquid effluent sent to the tank farm DSTs and TEDF and LERF from the current operational volume; however, since the HEMS is a replacement for an evaporator that was planned for the Pretreatment Facility, the existing liquid waste treatment facilities were sized to accommodate the expected increase associated with operations of the HLW Vitrification Facility. After final design of HEMS is complete and the attributes of the discharge of the treated effluent are outside of the current approved permit, DOE would work with Ecology to modify the treatment process or the permit to ensure the protection of the surface and ground water resources. Although construction of the Proposed Action facilities within the 200 Area would increase the amount of non-permeable surfaces, it would have a negligible effect on surface water runoff. As noted in Section 4.1.6 of the TC&WM EIS, no portion of the 200 Area lies within a floodplain. Although the southwest corner of 200W is within the probable maximum flood zone of Cold Creek, no facilities would be constructed there under any tank closure alternative, including the current proposal evaluated under this SA. <u>Vadose Zone and Groundwater</u> Similar to surface water, the Proposed Action would not introduce new potential impacts to the vadose zone or groundwater beyond those potential impacts evaluated in the TC&WM EIS. Under normal conditions, there would be no releases to groundwater from operations of any of the facilities associated with the Proposed Action. The WTV and any additional waste storage capacity would

Resource Area	Impacts in 2012 TC&WM EIS for Alternative 2B	Assessment of Impacts for DFHLW Configuration
		be constructed with dual containment and leak detection, as described in the TC&WM EIS, to preclude any potential leakage from accessing groundwater.
Ecological Resources	<u>Terrestrial Resources</u> 3 acres of sagebrush habitat affected in 200E that would be unmitigable. No affected sagebrush habitat in 200W. <u>Wetlands</u> No impact on wetlands within the 200 Area. <u>Aquatic Resources</u> No impact on aquatic resources within the 200 Area. <u>Threatened and Endangered Species</u> No impact on any federally listed threatened or endangered species. Potential impacts on two State-listed species in 200E. No potential impact in 200W. (TC&WM EIS, Section 4.1.7.3)	The footprint of the proposed facilities in the 200 Area is within the Industrial-Exclusive Zone^a that includes the tank farms and WTP complex. There would be no differences in potential impacts to ecological resources as evaluated for Alternative 2B. There would be no potential for impacts to ecological resources from the operation of any of the proposed facilities. Prior to construction of the facilities, DOE's contractor would follow the requirements in the Hanford Site Biological Resources Management Plan to ensure that there would not be any inadvertent impacts to biological resources (DOE 2017). As part of the process of environmental review for the Hanford Site, DOE performs an ecological clearance review of the specific potential areas of disturbance associated with proposed project construction. The specific siting for the proposed facilities has not been finalized. The ecological clearance process would evaluate the specific siting locations of all facilities prior to construction.
Cultural and Paleontological Resources	<u>Prehistoric, historic, and paleontological resources</u> No impacts. <u>American Indian Interests</u> After closure, the 200 Area's containment structures and closure barriers will be visible from higher elevations. (TC&WM EIS, Section 2.8.1.8)	The footprint of the proposed facilities in the 200 Area is within the Industrial-Exclusive Zone^a that includes the tank farms and WTP complex. There would be no significant differences in potential impacts to cultural and paleontological resources as evaluated for Alternative 2B. Prior to construction, the tank farm contractor would follow the requirements in the Hanford Site Cultural and Historic Resources Management Plan to identify and minimize inadvertent impacts to cultural resources (DOE 2003). As part of the process of environmental review for the Hanford Site, DOE performs a cultural resources clearance review of the specific potential areas of disturbance associated with proposed project construction. The specific siting for the proposed facilities has not been finalized. The cultural resources clearance process would evaluate the specific siting locations of all facilities prior to construction

Resource Area	Impacts in 2012 TC&WM EIS for Alternative 2B	Assessment of Impacts for DFHLW Configuration
Socioeconomics	Peak annual workforce (full-time equivalent) = 6,860 Peak daily commuter traffic (vehicles per day) = 5,500 Peak daily truck loads, off site = 48 <u>Impact on the ROI</u> Potential for change in the socioeconomic ROI, including increases in population, demand and cost for housing and community services, and level-of-service impacts on local transportation. (TC&WM EIS, Section 4.1.9.3)	The proposed facilities in the 200 Area are functionally equivalent to those evaluated in the TC&WM EIS and would not require substantively more resources than full WTP operations. Therefore, the Proposed Action would not require a substantively increased workforce beyond that evaluated for Alternative 2B. There would be negligible impacts to socioeconomics resources from construction of and operations of the facilities.
Public and Occupational Health and Safety (Normal Operations)	<u>Normal Operations</u> <i>Offsite population impact – life of project</i> Dose (person-rem)/LCF = 1,600/1 <i>Peak year maximally exposed individual impact</i> Dose (mrem/yr)/increased risk of an LCF = $10/6 \times 10^{-6}$ <i>Peak year onsite maximally exposed individual impact</i> Dose (mrem/yr)/increased risk of an LCF = $1.7/1 \times 10^{-6}$ <i>Radiation worker population impact – life of project</i> Dose (person-rem)/LCF = 11,000/7 <i>Average annual impact per radiation worker</i> Dose (mrem/yr)/increased risk of an LCF = $160/1 \times 10^{-4}$ <i>Peak year noninvolved worker impact</i> Dose (mrem/yr)/increased risk of an LCF = $3.4/2 \times 10^{-6}$ (TC&WM EIS, Section 4.1.10.3)	The proposed facilities in the 200 Area are functionally equivalent to those evaluated in the TC&WM EIS. The inclusion of a WTV, IHS, HEMS, and additional multi-purpose tank waste storage could increase the locations where workers could receive radiological doses. These changes are all internal to the 200 Area and would not affect radiological air emissions; therefore, the proposed facilities would not affect potential exposure pathways to members of the offsite public. Potential health and safety impacts to workers from the proposed onsite facilities are evaluated in Section 3.3.2.
Public and Occupational Health and Safety (Facility Accidents)	<u>Facility Accidents</u> <i>Offsite population consequences</i> Dose (person-rem)/LCF = 75,000/50 <i>MEI individual consequences</i> Dose (rem)/increased risk of LCF = $4.3/3 \times 10^{-3}$ <i>Noninvolved worker consequences</i> Dose (rem)/increased risk of LCF = 13,000/1 <i>Offsite population risk</i> Annual number of LCFs/number of LCFs over the life of the project = 0/1 <i>MEI individual risk</i> Annual increased risk of an LCF/increased risk of an LCF over life of the project = $1 \times 10^{-6} / 3 \times 10^{-5}$ <i>Noninvolved worker risk</i> Annual increased risk of an LCF/increased risk of an LCF over life of the project = $8 \times 10^{-3} / 2 \times 10^{-1}$ (TC&WM EIS, Section 2.8.1.11)	The proposed facilities in the 200 Area are functionally equivalent to those evaluated in the TC&WM EIS and would not introduce any increased or unique accident scenarios compared to those that were previously evaluated. More detail related to potential health and safety impacts from facility accidents associated with the proposed onsite facilities is included in Section 3.3.3.

Resource Area	Impacts in 2012 TC&WM EIS for Alternative 2B	Assessment of Impacts for DFHLW Configuration
Public and Occupational Health and Safety (Transportation)	<u>Transportation</u> <i>Incident-free transportation (Dose/LCF)</i> Workers = 260 person-rem/0.16 Public = 73 person-rem/0.04 <i>Traffic accidents</i> (nonradiological fatalities) = 0.05 Assumed no offsite radioactive waste shipments <i>Offsite population (accident risk)</i> Dose (person-rem)/LCFs = $3.5 \times 10^{-6} / 2.1 \times 10^{-9}$ (TC&WM EIS, Section 4.1.12.3)	There would be no offsite transportation of radiological materials associated with the Proposed Action. There would be onsite transfers of the IHLW from the HLW Vitrification Facility to the IHS; however, those particular actions would be no different than those addressed in the TC&WM EIS.
Industrial Safety	Worker Population Impact – Total Project Total recordable cases (fatalities) = 3,880 (0.50) (TC&WM EIS, Table 4-98)	The proposed facilities in the 200 Area are functionally similar to those evaluated in the TC&WM EIS and would not introduce any new industrial hazards that were not included in the evaluation of Alternative 2B in the TC&WM EIS.
Waste Management	<u>Disposed of offsite and/or stored onsite</u> (cubic meters unless otherwise noted) IHLW glass (# of canisters) = 14,200 (12,000) IHLW cesium and strontium glass (# of canisters) = 400 (340) HLW melters (# of melters) = 1,350 (11) Mixed TRU waste (includes tank and secondary, CH and RH) = 206 Hazardous waste - 79,600 <u>Disposed of onsite</u> ILAW glass (# of canisters) = 213,000 (92,300) LAW melters (# of melters) = 8,000 (31) LLW (secondary) = 37,600 Liquid LLW (liters) = 9,690 Closure LLW = 679 MLLW (secondary) = 36,900 Closure MLLW = 468,000 (TC&WM EIS, Table 4-86)	The proposed facilities in the 200 Area are functionally similar to those evaluated in the TC&WM EIS and would not introduce new waste types beyond those evaluated for Alternative 2B in the TC&WM EIS. The Proposed Action would include construction of IHS storage modules and 1 million gallons of additional tank waste storage capacity; both of which were evaluated in the TC&WM EIS. The waste management elements of the Proposed Action are evaluated in more detail in Section 3.3.4.

- a. Industrial-Exclusive Zone: Land within the 200 Area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes as designated by DOE/EIS-0222-F, *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement and Record of Decision* (64 FR 61615, November 12, 1999).
- b. Borrow Area C: Located south of 200W along State Route 240. It is a proposed supply site for the sand, soil, and gravel needed to support the RCRA Subtitle C closure cap portion of the alternatives discussed in the TC&WM EIS.

ASIL=Acceptable Source Impact Level; CH=contact-handled; HEMS=HLW effluent management system; HLW=high-level radioactive waste; IHLW=immobilized high-level radioactive waste; IHS=HLW effluent management system; ILAW=immobilized low-activity waste; LAW=low-activity waste; LCF=latent cancer fatality; LERF=Liquid Effluent Retention Facility; LLW=low-level radioactive waste; MEI=maximally exposed individual; MLLW=mixed low-level radioactive waste; mrem/yr=millirem per year; MW=megawatt; NL=not listed; PMn=particulate matter with an aerodynamic diameter less than or equal to n micrometers; RCRA=Resource Conservation and Recovery Act of 1976; RH=remote-handled; ROI=region of influence; SST=single-shell waste storage tank; TEDF=Treated Effluent Disposal Facility; TRU=transuranic; WSP=WTP steam plant; WTP=Waste Treatment and Immobilization Plant; WTV=Waste Transfer Vault

3.3 Additional Evaluations

The environmental resource area screening process described in Section 3.2 (Table 3-1) identified four resource areas related to the proposed implementation of the Proposed Action for further evaluation: (1) infrastructure, (2) public and occupational health and safety (normal operations), (3) public and occupational health and safety (facility accidents), and (4) waste management.

3.3.1 Infrastructure

The Proposed Action would result in several changes to potential utility usage that are discussed below. The utilities evaluated in this section are the same resources discussed in the TC&WM EIS: electricity, fuels, and water use.

3.3.1.1 Electricity

The primary changes addressed in this SA that would potentially affect electricity use include: (1) more efficient equipment changes in the chiller compressor plant, and (2) replacement of the diesel-powered boilers with the WSP all-electric boilers for steam production. The addition of the WTV or the additional 1 million gallons of tank waste storage would not notably affect electricity use. The HEMS would be a notable steam user but would not involve a significant direct electrical load. The switchgear building and the emergency power and air building would themselves not be notable power users but would be important to supplying uninterruptable power supply to the WTP facilities.

The plant cooling water system circulates cooling water directly to the chiller compressor plant for the air compressors and the chillers. The Proposed Action would replace existing centrifugal compressors and air dryers with smaller, more efficient equipment that operates better under reduced loads. The initial design of the chiller compressor plant would have supported full operations of the WTP HLW Vitrification Facility, the LAW Vitrification Facility, and the Pretreatment Facility. The current equipment includes four centrifugal-compressor packages, four rotary-screw-compressor packages, five heat-of-compression dryer packages, and two air receivers. Most, if not all, of this equipment would be replaced with more efficient units. Because the specific equipment has not yet been selected, the reduction in electricity use associated with this part of the Proposed Action cannot be determined at this time.

The Proposed Action includes replacing the diesel-powered boilers with all electric boilers for steam production. This would result in an increase in electricity use for the new WSP (as compared to the existing steam plant), which is a primary reason for the new switchgear building proposed to be located just south of the new WSP. The *Hanford Site Electrical Utilities Master Plan* (HMIS 2023) evaluates the existing and projected electrical loads for the Hanford Site, including the proposed changes to the 200 Area to support operation of the WTP in the DFHLW configuration. With the tradeoffs in the WSP and the addition of the switchgear building, HMIS (2023) states, “the Central Plateau has adequate capacity to support both current and future needs.”

3.3.1.2 Fuels

The primary changes addressed in this SA that would potentially affect potential fuel use include: (1) replacement of the diesel-powered boilers with the WSP all-electric boilers for steam production, and (2) the addition of two, 2-MW emergency diesel generators. The TC&WM EIS

estimated that the peak annual volume of diesel fuel use would be about 72 million gallons per year. The changes resulting from replacing the diesel-powered steam boilers would reduce demand by about 126,000 gallons per year (DOE 2012, Section E.1.2.3.2.3). The new emergency diesel generators are expected to replace the existing generators; however, even if they did not, emergency diesel generators run for about 15 minutes per month as a safety check to ensure their operational capability; therefore, their annual consumption is minimal compared to the reductions in fuel use from the boiler replacement. Future fuel use would be less than projected for Alternative 2B in the TC&WM EIS.

3.3.1.3 Water Use

The primary changes addressed in this SA that would potentially affect water consumption include: (1) replacement of the diesel-powered boilers with the WSP all-electric boilers for steam production, and (2) the operation of a HEMS to manage HLW liquid effluent. For steam production, the existing boilers currently have the capacity to provide 248,400 lb/hr of steam. The proposed electrical boilers in the new WSP would support a lower capacity of 108,000 lb/hr. This steam amount is directly related to the amount of water required; therefore, the estimated water consumption for steam production would be reduced by over 50 percent from that projected in the TC&WM EIS.

As discussed in Table 3-1, the HEMS would increase the amount of liquid effluent sent to the tank farms from the current operational volume; however, since the HEMS is a replacement for an evaporator that was planned for the WTP Pretreatment Facility, overall planned discharge of water to the environment would not be expected to notably change from that evaluated in the TC&WM EIS. Ultimately, the change in operations of the HLW Vitrification Facility to a DFHLW configuration would not have a negative impact to water consumption on the Hanford Site.

3.3.2 Public and Occupational Health and Safety (Normal Operations)

The TC&WM EIS evaluated the potential health and safety impacts associated with the management, treatment, and disposal of hundreds of thousands of canisters/packages of radioactive waste (e.g., HLW, LLW, mixed LLW [MLLW], and transuranic [TRU] waste) that would result from the operations of all facilities needed to support the treatment of tank waste (DOE 2012, Tables 4-23 and 4-142). These potential health impacts also included operations of the WTP facilities and included management of both contact- and remote-handled waste canisters/packages (e.g., IHLW). The TC&WM EIS evaluates potential radiological impacts to workers and the public as well as industrial safety impacts to workers (e.g., lost workdays).

The primary changes addressed in this SA that would potentially affect human health and safety from a radiological perspective include operation of the: (1) WTV as an interim facility for staging HLW prior to sending it to the HLW Vitrification Facility, (2) HEMS to manage HLW liquid effluent, (3) IHS to provide interim storage of IHLW, and (4) 1 million gallons of additional tank waste storage.

The functions of each of these facilities was considered as part of the implementation of Alternative 2B in the TC&WM EIS. The WTV is roughly equivalent to the WRF, except it would have a smaller working volume. The HEMS would be an evaporator facility similar to the evaporator in the WTP Pretreatment Facility. The IHS would be equivalent to the interim storage

modules evaluated in the TC&WM EIS. The additional tank waste storage was also considered in the TC&WM EIS because Alternatives 2A, 5, and 6A evaluated the potential impacts of installing new DSTs, and all alternatives evaluated the addition of at least four WRFs, which equate to additional storage capacity of at least 1.8 million gallons. The potential annual health and safety impacts to the offsite population and workers were generally the same or less for these alternatives with additional tank waste storage as compared to Alternative 2B.

Based on the above considerations regarding both workers and the public, there would be no substantive difference in normal operational radiological health impacts to workers or the public from those originally estimated in the TC&WM EIS related to the Proposed Action.

3.3.3 Public and Occupational Health and Safety (Facility Accidents)

The TC&WM EIS analyzed a spectrum of accidents for operations associated with Alternative 2B (DOE 2012, Table 4-50). The accidents analyzed included leaks, fires, and design-basis seismic events. The accident with the highest consequence and risk was a seismic-induced collapse and failure of the WTP. Under that bounding scenario, DOE estimated that the hypothetical MEI at the nearest offsite location could receive a dose of 4.3 rem, and the population surrounding the Hanford Site within a 50-mile radius could receive a collective dose of 75,000 person-rem. That accident was estimated to have a probability of occurrence of 5×10^{-4} per year, or once in 2,000 years. The accident risk to the population was reported as 2×10^{-2} LCF, or essentially zero.

The primary changes addressed in this SA that could potentially affect radiological impacts of facility accidents also include the (1) WTV as an interim facility for staging HLW prior to sending it to the HLW Vitrification Facility, (2) HEMS to manage HLW liquid effluent, (3) IHS to provide interim storage of IHLW, and (4) 1 million gallons of additional tank waste storage.

Section 3.3.2 describes how each of these facilities was considered as part of the implementation of Alternative 2B in the TC&WM EIS.

The TC&WM EIS also evaluated a potential drop of an IHLW glass canister (DOE 2012, Section K.3.4.10.1). The canister was assumed to drop from a height of 55 feet. The impacts of this accident represented the upper end of the range of waste product storage and handling accidents in the TC&WM EIS and still does under the Proposed Action in this SA. Under this bounding accident for waste product storage and handling accidents, DOE estimated that the hypothetical MEI at the nearest offsite location could receive a dose of 0.00026 rem, and the population surrounding the Hanford Site within a 50-mile radius could receive a collective dose of 4.6 person-rem. That accident was estimated to have a probability of occurrence of 1×10^{-3} per year, or once in 1,000 years. The accident risk to the population was reported as 3×10^{-6} LCF; much lower than the risk of a seismic failure of the WTP. Both accidents were considered under Alternative 2B in the TC&WM EIS.

Additional waste storage or staging (i.e., WTV or additional tank waste storage) was also evaluated as an element of Alternative 2B in the TC&WM EIS. This additional storage would not increase the accident risks identified in Section 4.1.11.3 of DOE (2012).

Based on the above considerations regarding both workers and the public, there would be no substantive difference in radiological health impacts to workers or the public associated with

facility accidents from those originally estimated in the TC&WM EIS related to the Proposed Action in this SA.

3.3.4 Waste Management

The TC&WM EIS evaluated management of several radiological waste streams, including LLW, MLLW, TRU waste, and HLW. This DFHLW SA discusses four key changes to waste management: (1) installation of a WTV, (2) installation of HEMS, (3) construction and operation of IHS, and (4) the additional 1 million gallons of tank waste storage in 200W.

Operation of the WTV would not result in any changes in waste management from that evaluated in the TC&WM EIS. The WTV would be used for staging HLW prior to sending it to the HLW Vittrification Facility and would receive liquid effluents from the HLW Vittrification Facility prior to sending it back to the 200E DSTs.

Operation of the HEMS would allow tank farm operations to better manage available tank capacity in 200E by reducing the volume of secondary liquid effluent through the use of an evaporator. This system essentially would be a replacement for one of the evaporators that was planned for the WTP Pretreatment Facility. The HEMS would interface with the existing DSTs and the liquid waste management systems, (i.e., 242-A Evaporator), ETF/LERF, TEDF, and State-approved land disposal site.

Interim storage modules in IHS were evaluated as part of the WTP design in the TC&WM EIS to provide interim storage for IHLW canisters. As reported in Section 2.2.3.2, the design for the facility that was evaluated in 2012 was an open rack vault design. This internal operational design may change in the ongoing DOE O 413.3B CD process. For the purposes of this SA, the design would be similar to that evaluated in the TC&WM EIS; therefore, DOE does not anticipate changes in waste management from IHS.

The addition of up to 1 million gallons of multi-purpose tank waste storage in 200W would provide additional flexibility for waste management facilities at the WTP to continue with planned campaigns without interruption to manage tank inventories in 200W. The additional storage capacity would reduce reliance on SSTs and therefore minimize the potential for leakage while providing additional staging volume for eventual treatment in WTP.

In summary, the Proposed Action (and connected actions) would not result in new waste types nor increase projected volumes of the waste types evaluated in the TC&WM EIS. The Proposed Action would add operational flexibility to waste management operations in the 200 Area.

4 CUMULATIVE IMPACTS

This chapter presents an analysis of the potential cumulative impacts (or effects) resulting from the Proposed Action (and connected actions). The TC&WM EIS defined cumulative impacts as “impacts that can result from individually minor, but collectively significant, actions taking place over a period of time.” This analysis includes impacts from other past, present, and reasonably foreseeable future actions on the Hanford Site.

The TC&WM EIS presented the cumulative impacts analysis in Chapter 6, specifically identifying the past, present, and reasonably foreseeable future actions relative to that Proposed Action. This chapter evaluates the incremental impacts of implementing the Proposed Action of this SA and those evaluated in the TC&WM EIS. This chapter also evaluates if there are any new present or reasonably foreseeable future actions that were not considered in the TC&WM EIS that could contribute to cumulative impacts with the incremental impacts of the Proposed Action.

4.1 Incremental Impacts of DFHLW

As noted in Chapter 3 of this SA, implementation of the Proposed Action (and connected actions) would not be expected to result in a substantive change in potential impacts to any resource area beyond those identified in the TC&WM EIS. The resource areas evaluated in more detail in Chapter 3 were infrastructure, public and operational health and safety (normal operations and facility accidents), and waste management. These resource areas are discussed in the following section in combination with potential impacts from past, present and reasonably foreseeable future actions that were not previously included in the TC&WM EIS.

4.2 Evaluation of New Present and Reasonably Foreseeable Future Actions

As part of the analysis of cumulative impacts for this SA, DOE considered both the timing and the ROI for each environmental resource area that could be affected. Ongoing and reasonably foreseeable future actions that are considered in this SA include the following:

- As identified in Section 1.1 in the **DFLAW approach** discussion, DOE will separate the LAW from other waste in the Hanford Site tanks and vitrify a portion of the LAW. During DFLAW, the supernate portion of the radioactive waste in 200E is transferred and pretreated in the LAWPS to remove cesium-137 and solids. The pretreated waste is then fed to the WTP LAW Vitrification Facility. The vitrified waste will be disposed of onsite at the Integrated Disposal Facility in 200E. An integral element of the DFLAW approach is the construction of an IXC storage pad in 200E for the loaded IXCs.

DOE decided to implement DFLAW in an amended ROD, which was based on the DFLAW SA (SA-02) (*see* Section 1.4 of this SA). The activities evaluated in this DFHLW SA would also occur over the same time frame as DFLAW and occur in 200E. Specific resource area analyses were prepared for human health and safety (normal operations and facility accidents) and waste management.

- As identified in Section 1.1 of this SA, the proposed implementation of **200W tank waste treatment** would occur primarily in 200W and involve pretreatment of approximately 32 million gallons of supernate from 22 to 24 SSTs in the S, SX, and U tank farms and the DSTs in SY tank farm. This proposed tank waste treatment approach includes the

construction of an onsite solidification/treatment facility and installation of equipment to facilitate shipments of pretreated and solidified waste for out-of-state disposal and/or installation of onsite equipment to facilitate shipments of liquid, pretreated waste to appropriately licensed and permitted facilities for treatment and/or out-of-state disposal. Additional impacts to specific resources are addressed for human health and safety (normal operations and facility accidents) and waste management. Because the Proposed Action evaluated in this DFHLW SA would not include offsite transportation, impacts to air quality and human health from transportation from 200W tank waste treatment would not be cumulative.

- As addressed in the **Secondary Waste Management SA (SA-03)** and detailed in Section 1.4 of this SA, DOE plans to transport and treat certain solid and liquid secondary wastes at licensed and permitted commercial treatment facilities off the Hanford Site. DOE also plans to dispose of some of these secondary wastes (after treatment) off site at a licensed and permitted commercial disposal facility. This action 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). Therefore, much of this action would occur in parallel with the Proposed Action.

DOE (2023b) presents the potential impacts of this secondary waste management and describes the resource areas where impacts could be in addition to those presented in the TC&WM EIS. The potential increases in potential impacts associated with the offsite transportation of secondary waste would not be cumulative with the Proposed Action; however, the potential changes to waste management are addressed below in Section 4.2.4.

4.2.1 Infrastructure

None of the reasonably foreseeable actions discussed above identify any substantive changes to projected consumption of electricity, diesel fuel, or water on the Hanford Site. The potential offsite transportation of secondary waste associated with SA-03 and the ongoing review of the proposed 200W tank waste treatment would result in diesel fuel use for truck and rail transport of liquid or solidified waste; however, since there would be an overall reduction in diesel fuel use from the Proposed Action evaluated in this SA, it would not contribute to cumulative impacts for diesel fuel use. Additionally, there is no shortage of diesel fuel in the western United States, and the other SAs consider the use of diesel fuel in their respective air quality analyses.

4.2.2 Public and Occupational Health and Safety (Normal Operations)

The cumulative impacts to health and safety of workers and the public at or near the Hanford Site would not be notably different than those presented in the TC&WM EIS. Implementation of the DFLAW approach is not expected to increase the radiological doses to either the workforce or members of the public beyond those that were projected in the TC&WM EIS (*see* DOE 2019).

As stated in SA-03, transportation of secondary waste off site for treatment (and potential subsequent disposal), as opposed to the onsite treatment options evaluated in the TC&WM EIS, essentially would transfer the potential normal operational health impacts from the Hanford workforce to workers at commercial treatment and disposal facilities, given that the scopes of work would be similar in nature regardless of location (DOE 2023b). Accordingly, radiological impacts

resulting from this work would be comparable to those presented in the TC&WM EIS for treatment/disposal activities originally proposed for the Hanford Site; however, fewer of the impacts would be borne by the Hanford workers.

The potential impacts to workers and the public from the proposed 200W tank waste treatment would include those from pretreatment of about 32 million gallons of supernate in 200W, operation of an onsite solidification/treatment facility, and the interim storage of IXC's that contain key radionuclides removed from the liquid waste. The potential impacts are specifically discussed in the 200W Tank Waste Treatment SA and are not expected to be notably higher than those evaluated in the DFLAW SA since a similar operation and storage was evaluated in 200E, which is closer to the site boundary than 200W (DOE 2019).

The additional, transportation-related impacts to the offsite public along the transportation routes from the Hanford Site to the treatment and disposal facilities would occur to a different population and, because the Proposed Action evaluated in this SA does not have a transportation component, would not be cumulative.

4.2.3 Public and Occupational Health and Safety (Facility Accidents)

The cumulative impacts associated with facility accidents at or near the Hanford Site would not be notably different than those presented in the TC&WM EIS. Implementation of the DFLAW configuration would not be expected to increase the potential accident consequences or risks beyond those that were projected in the TC&WM EIS (*see* DOE 2019).

Treatment and stabilization of pretreated or secondary waste at any of the proposed TSD facilities would not change the types of accidents that could occur either at the facility or on the Hanford Site (DOE 2023b).

The potential for accidents associated with the proposed 200W tank waste treatment mission are specifically discussed in the 200W Tank Waste Treatment SA and include an evaluation of pretreatment of about 32 million gallons of supernate in 200W, operation of an onsite solidification/treatment facility, and the interim storage of IXC's. The potential accident risks do not approach those presented in the TC&WM EIS or the DFLAW SA (SA-02) (DOE 2019). Accidents associated with onsite treatment were evaluated in the TC&WM EIS (DOE 2012, Table 4-54) and shown to be orders of magnitude less than the bounding accident risk described in Section 3.3.3 of this SA. Additionally, accidents associated with the IXC storage were evaluated in the DFLAW SA (DOE 2019).

4.2.4 Waste Management

The cumulative impacts to waste management would include potential contributions from the current and reasonably foreseeable future actions identified in the introductory text of Section 4.2.

Under the DFLAW approach, DOE would manage loaded IXC's onsite in 200E. Per DOE (2019), these waste management actions would not be substantively different than the proposed action evaluated in the TC&WM EIS.

The current plan for secondary waste management (as analyzed in SA-03 [DOE 2023b]) would result in a reduction of onsite waste management (including onsite disposal) of solid and liquid LLW/MLLW because waste would be sent off site to appropriately licensed and permitted

commercial facilities for treatment and disposal outside of the state of Washington. The expected volume of waste that would be disposed of off site over the approximate 10-year duration of the proposal evaluated in SA-03 would be about 206 cubic meters of solid MLLW and 3,290 cubic meters of liquid MLLW.

For the 200W tank waste treatment mission, DOE would be grouting about 32 million gallons of pretreated supernate at an onsite solidification/treatment facility and/or sending the pretreated supernate to an appropriately licensed and permitted commercial treatment facility off the Hanford Site. After treatment (e.g., grouting), the solidified waste would be disposed of outside the state of Washington.

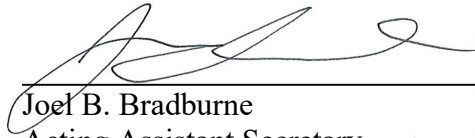
In addition, as part of the 200W tank waste treatment, DOE would provide interim storage of loaded IXC's in 200W. As assumed in the DFLAW SA (DOE 2019), the contents of these IXC's would be processed through the WTP HLW Vitrification Facility, when appropriate.

Since the Proposed Action evaluated in this SA does not involve offsite treatment or disposal of waste, the impacts associated with these reasonably foreseeable actions are not cumulative.

5 DETERMINATION

DOE prepared this SA in accordance with NEPA and the DOE NEPA implementing procedures. The Proposed Action evaluated in this SA is to operate the WTP HLW Vitrification Facility in a direct-feed configuration (DFHLW) as part of the Hanford Tank Waste Treatment Mission. The connected actions associated with implementation of DFHLW include operation of a HLW effluent management system, interim storage of immobilized HLW, and construction of 1 million gallons of additional tank waste storage capacity in 200W. DOE concludes that the changes to the proposed action are not a substantial change relevant to environmental concerns, nor are there substantial new circumstances or information about the significance of the adverse effects. Consistent with DOE's NEPA implementing procedures, Section 3.9, these changes do not require a new or supplemental EIS. No further NEPA documentation is required.

All disturbances would be expected to be within the Industrial-Exclusive Zone in the 200 Areas and all functions would be consistent with those facilities analyzed in the TC&WM EIS. The key difference would be the inclusion of the WTV between the DSTs and the HLW Vitrification Facility to provide a staging function. This would have been a function of the WTP Pretreatment Facility as analyzed in the TC&WM EIS.



Joel B. Bradburne
Acting Assistant Secretary
for Environmental Management

10/7/25

6 REFERENCES

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