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Draft A

Action Memorandum for 200-DV-1 Operable Unit Perched Water Pumping/Pore Water Extraction

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

U.S. DEPARTMENT OF ENERGY | Richland Operations Office
P.O. Box 550
Richland, Washington 99352

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APPROVED
By Julia Raymer at 3:36 pm, Jun 05, 2014

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Executive Summary

This action memorandum (AM) documents the selected alternative for remediating perched water in the 200-DV-1 (deep vadose [DV] zone) Operable Unit (OU). The preparation of this AM was in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*,[1] as amended by the *Superfund Amendments and Reauthorization Act of 1986*,[2] and the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300).[3] This AM satisfies environmental review requirements and provides for stakeholder involvement, while providing a framework for selecting remediation alternatives.

The removal action is consistent with the remedial action objectives of previous Records of Decision and supports the overall cleanup objectives through the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989a),[4] as revised. This non-time-critical removal action (NTCRA) is described herein for the 200-DV-1 OU perched water. Without this removal action, contaminated perched water could adversely impact human health and the environment.

The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency, and Washington State Department of Ecology (also referred to collectively as the Tri-Parties) considered three alternatives for remediating the 200-DV-1 OU perched water under a NTCRA: (1) a legally required No Action alternative, (2) extraction of perched water with treatment at the Effluent Treatment Facility, and (3) extraction of perched water with treatment at the 200 West pump and treat (P&T).

Alternative 3 is selected for this NTCRA. This alternative extracts perched water from the 200-DV-1 OU and transfers the water by truck to the 200 West P&T, where it is treated and injected into the aquifer below the 200 West Area. Completion of the action will remove uranium, technetium-99, and nitrate (all at concentrations well above

[1] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002.

[2] *Superfund Amendments and Reauthorization Act of 1986*, as amended through P.L. 107-377, December 31, 2002.

[3] 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*.

[4] Ecology, EPA, and DOE, 1989a, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

maximum contaminant levels) from the perched water and will be protective of human health and the environment.

The selected alternative was recommended in the *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction* (DOE/RL-2013-37),[5] which was prepared and released for public comment. Comments received during the public comment period were addressed and are included in Appendix B of this AM. An Administrative Record was established to record information used to support the selected alternative and to provide documentation of decisions and the progress of the removal action.

As detailed in this AM, the selected alternative (Alternative 3) best meets the proposed removal action objectives regarding long-term risk, minimizes short-term worker risk and radiation exposure, provides a cost-effective approach, and provides a safe and stable configuration that is environmentally sound. The DOE also considers Alternative 3 to be consistent with and a contributor to the efficient performance of Hanford Site long-term remedial actions. Furthermore, the selected alternative promotes protection of ecological resources and restoration of the environment consistent with the Tri-Parties' goals.

[5] DOE/RL-2013-37, 2014, *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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Terms

AM	action memorandum
ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CY	calendar year
DOE	U.S. Department of Energy
DV	deep vadose
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
FY	fiscal year
gpm	gallons per minute
MCL	maximum contaminant level
NCP	National Contingency Plan
NEPA	*National Environmental Policy Act of 1969*
NTCRA	non-time-critical removal action
OU	operable unit
P&T	pump and treat
RAO	removal action objective
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	Record of Decision
TBC	to be considered
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
Tri-Parties	DOE, EPA, and Ecology

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1 Purpose

This action memorandum (AM) documents the selection of the recommended alternative for remediating perched water in the 200-DV-1 (deep vadose [DV] zone) Operable Unit (OU). The selected alternative was recommended in the *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction* (DOE/RL-2013-37). A copy of the engineering evaluation/cost analysis (EE/CA) is available in the Administrative Record at http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0086598.

This AM has been prepared in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986*, and the "National Oil and Hazardous Substances Pollution Contingency Plan" (hereafter referred to as the National Contingency Plan [NCP]) (40 CFR 300). This removal action is consistent with the remedial action objectives of previous Records of Decision (RODs) and supports the overall cleanup objectives through the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989a), as revised. This non-time-critical removal action (NTCRA) is described herein for the 200-DV-1 OU perched water. Without this removal action, contaminated perched water could adversely impact human health and the environment.

The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and Washington State Department of Ecology (Ecology) (also referred to collectively as the Tri-Parties) considered three alternatives for remediating the 200-DV-1 OU perched water under a NTCRA: (1) a legally required No Action alternative, (2) extraction of perched water with treatment at the Effluent Treatment Facility (ETF), and (3) extraction of perched water with treatment at the 200 West pump and treat (P&T).

Alternative 3 is the selected alternative and consists of pumping/extracting water from the 200-DV-1 OU perched zone and trucking the water to the 200 West P&T, where it will be treated to remove contaminants and then injected into the aquifer beneath the 200 West Area.

This AM document provides a concise written record of the selection and approval of the removal action, and it provides details related to site history, current activities being performed, health and environmental threats, details related to the action to be taken, and project costs.

Appendix A identifies the applicable or relevant and appropriate requirements (ARARs) and describes specific regulatory requirements that are ARARs for this removal action. Appendix B provides public comments and responses on the EE/CA (DOE/RL-2013-37). A 30-day public comment and review period (from February 3 through March 3, 2014) was held for the EE/CA, which provides an analysis of the alternatives considered for this removal action. Public comments and responses also are included in the Administrative Record.

2 Site Conditions and Background

This chapter provides an overview of the site conditions and background for the 200-DV-1 OU, as well as historical context for the alternatives considered for the removal action. A summary of the site and operational history, previous investigations, and remediation activities is also included.

2.1 Site Description and Operational History

The Hanford Site encompasses approximately1,517 km^2 (586 mi^2) in southeastern Washington State. The area is located just north of the confluence of the Columbia, Yakima, and Snake rivers. Figure 1 shows the location of the Hanford Site. Public access to the Hanford Site is currently restricted and

controlled at the Wye Barricade on Route 4 and the Yakima and Rattlesnake Barricades on State Highway 240.

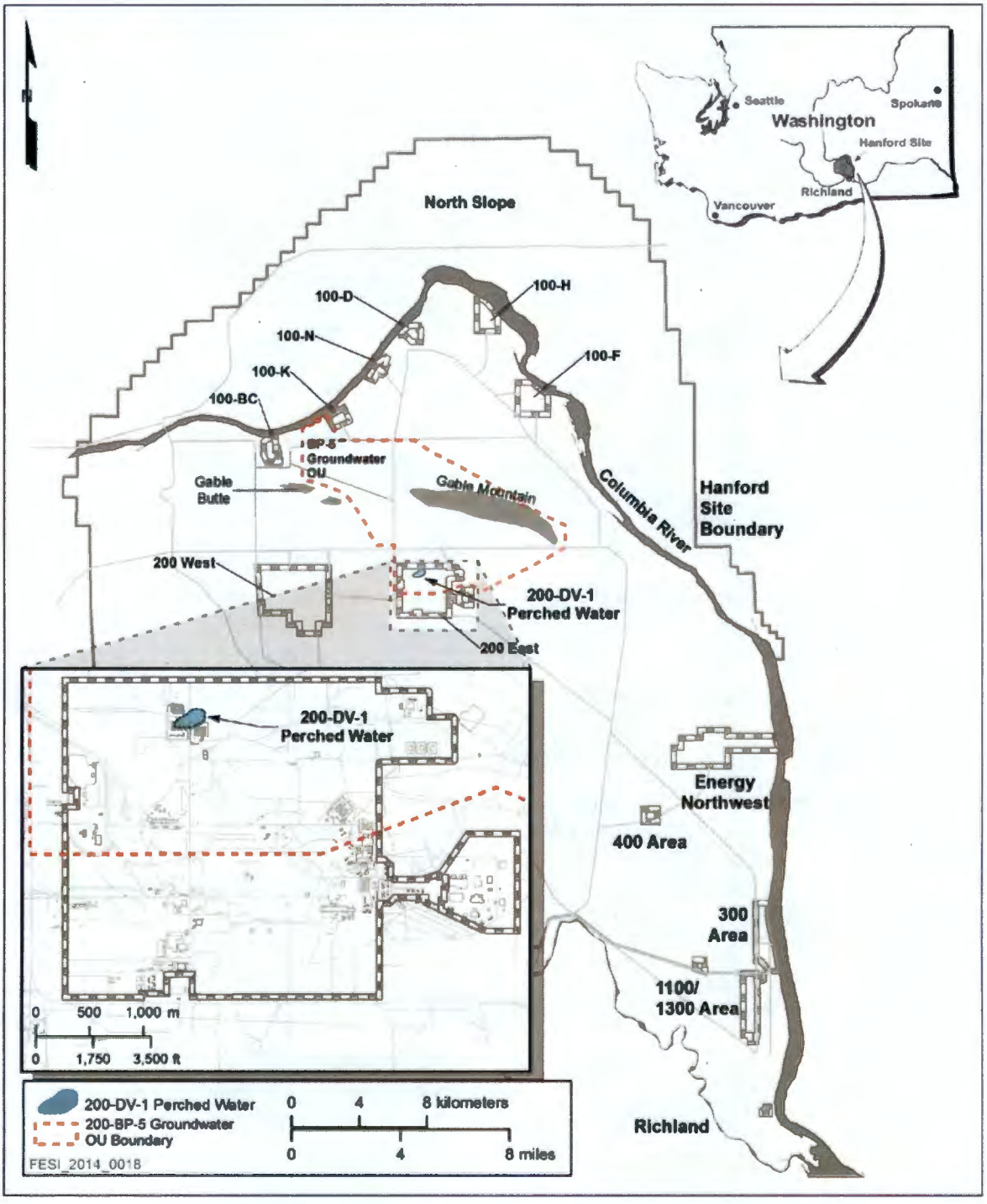

Figure 1. Location of the Hanford Site, 200-BP-5 Groundwater OU, and 200-DV-1 OU Perched Water

The Hanford Site was selected for plutonium production in 1942 as part of the Manhattan Project, primarily because of the availability of water from the Columbia River and access to power from the Bonneville and Grand Coulee Dams. The remote location and weather conditions of the area, which allowed for nearly year-round construction, also contributed to the selection. Between 1943 and 1964, nine plutonium-production reactors were built along the Columbia River in six areas: 100-BC Area (two reactors), 100-K Area (two reactors), 100-N Area, 100-D Area (two reactors), 100-H Area, and 100-F Area.

Beginning in the mid-1940s, the 200 East and 200 West Areas were the center of activity for processing plutonium at the Hanford Site. Five general plant process groupings exist in the 200 Areas, including fuel processing, plutonium isolation, uranium recovery, cesium/strontium recovery, and waste storage/treatment.

Liquid wastes discharged from the operations are considered the most significant type of discharge to the environment in terms of volume and number of constituents. Detailed information on the historical operations and waste generation mechanisms is provided in *Long-Range Deep Vadose Zone Program Plan* (DOE/RL-2010-89).

Contaminated perched water underlying the B Tank Farm Complex is found in a sand lens at approximately 67 m (220 ft) below ground surface. The maximum thickness of the sand lens is approximately 4.6 m (15 ft). The lateral and vertical extent of the perched water is limited to the region containing the sand lens and underlying silt zone. The bottom of the sand lens is approximately 4.6 m (15 ft) above the unconfined aquifer at its lowest point. The underlying silt layer forms a natural barrier that slows contaminant migration from the perched water within the sand lens to the 200-BP-5 Groundwater OU aquifer. The conceptual site model and detailed information for the perched water zone is provided in *Path Forward Recommendations Report for the Uranium Contamination in the B Area* (SGW-53604).

The areal extent of the perched water is estimated to be 19,175 m^2 (206,398 ft^2). Detailed information on the estimated extent is provided in *Perched-Water Evaluation for the Deep Vadose Zone Beneath the B, BX, and BY Tank Farms Area of the Hanford Site* (PNNL-22499).

The B Tank Farm complex and associated cribs, trenches, and unplanned releases are sources of contamination found in the 200-DV-1 OU perched water sand lens area (Figure 2). The perched water contains uranium, technetium-99, and nitrate at concentrations well above maximum contaminant levels (MCLs). These contaminants are slowly moving downward and entering the 200-BP-5 Groundwater OU aquifer and contributing to groundwater contamination. Figure 3 illustrates a southwest-northeast sectional view of the perched water area based on well data and geology.

2.2 Previous Investigations and Remediation Activities

The *Deep Vadose Zone Treatability Test Plan for the Hanford Central Plateau* (DOE/RL-2007-56) focused on the following:

- Actions to immobilize and/or extract contamination with potential to have an adverse impact on groundwater
- Proposed options for multiple treatability tests

The 200-DV-1 OU perched water treatability test was selected as one of the tests.

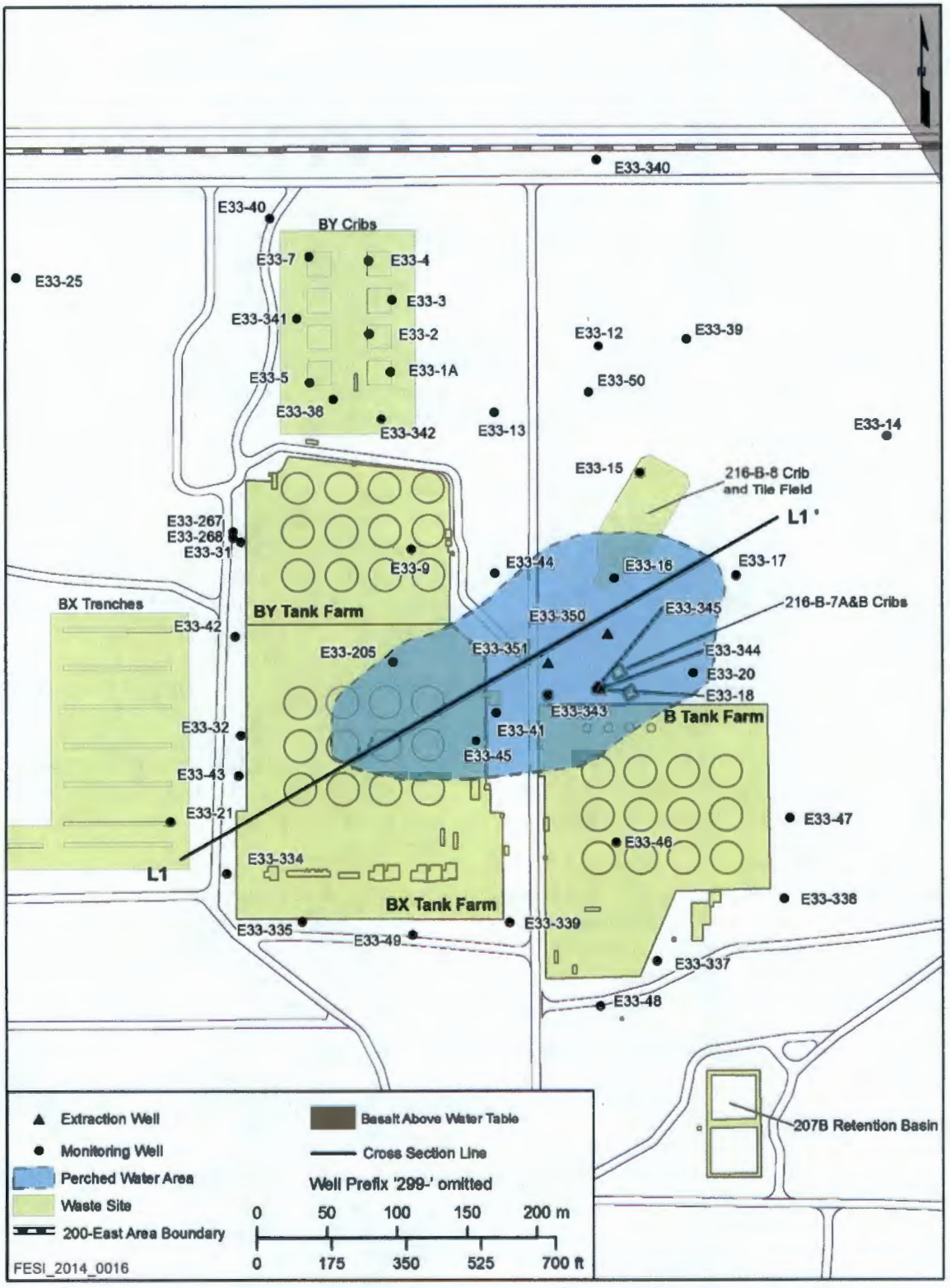

Figure 2. Plan View of 200-DV-1 OU Perched Water Sand Lens Area

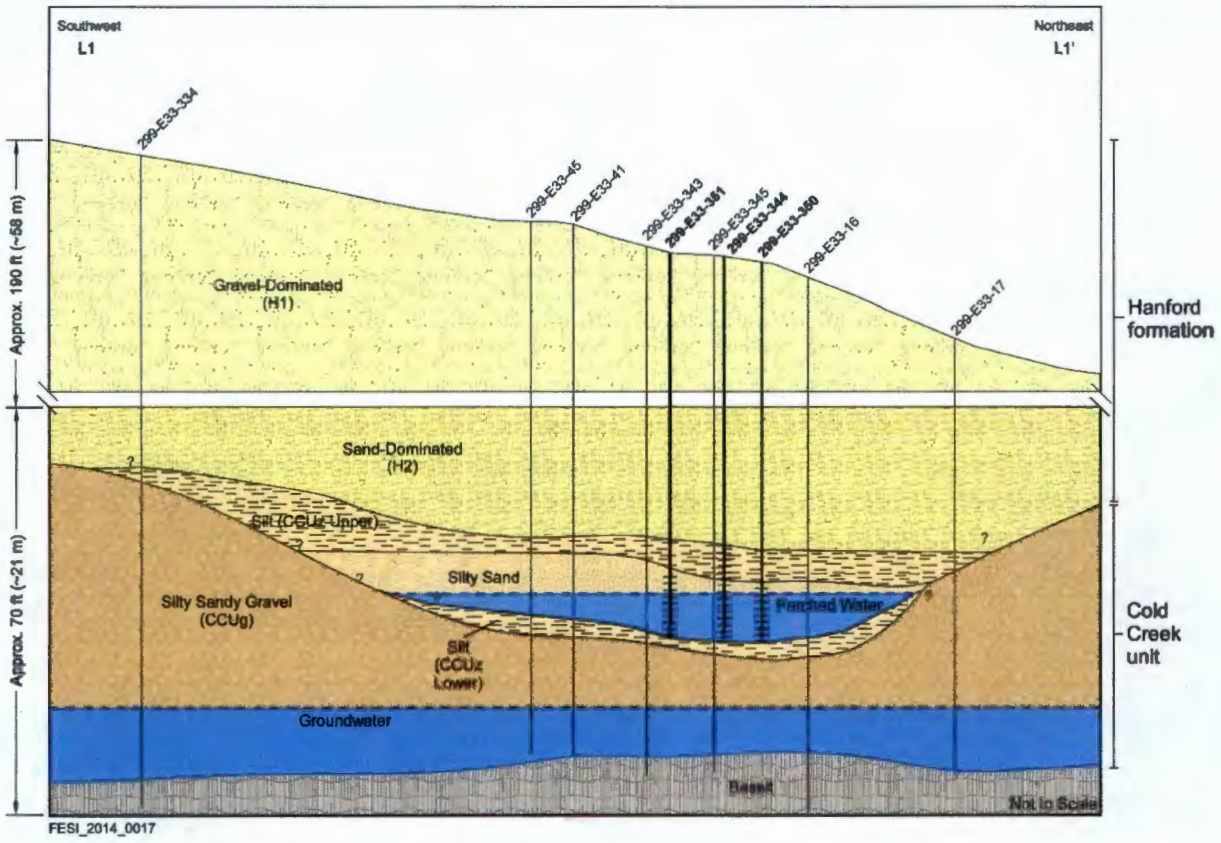

Figure 3. Southwest-Northeast Section View of 200-DV-1 OU Perched Water Area

The perched water treatability test description is found in the *Field Test Plan for the Perched Water Pumping/Pore Water Extraction Treatability Test* (DOE/RL-2011-40) and the *Sampling and Analysis Plan for the Perched Water Pumping/Pore Water Extraction Treatability Test* (DOE/RL-2011-37).

This treatability test and the drilling of two new wells are the only investigations that have been conducted for the 200-DV-1 OU perched layer; however, sampling of water from the perched layer has been ongoing for several years. Data collected are presented in annual reports on perched water extraction and in annual groundwater reports, and the data are maintained in the Hanford Environmental Information System database.

The treatability test currently uses well 299-E33-344 (Figures 2 and 3) with a screen that overlaps the lens of perched water. For the initial phase of the treatability test, the perched water is being removed using gravity to drain contaminated water into the well sump, and the water is subsequently pumped to a holding tank on the ground surface. As part of the NTCRA, the gravity drainage and pumping will continue until the yield decreases.

Two wells (299-E33-350 and 299-E33-351) were recently installed in 2014 in the perched water zone and will be used to support the removal action.

At the time that the treatability test plan was written in 2011, the 200 Area ETF represented the most technically sound and cost-effective approach for treating perched water. Water from the test is transported by tanker to the ETF for treatment and disposal.

The treatability test has been successful. Testing was initiated in August 2011, and by August 2013, approximately 567.811 L (150,000 gal) of perched water had been extracted. Estimates indicate that approximately 7,570,820 L (2,000,000 gal) of extractable water remain in the perched zone.

3 Threats to Human Health or the Environment

Contaminant sources addressed by this AM include both radioactive and chemical hazardous substances. The perched water contains dissolved uranium, technetium-99, and nitrate at concentrations that are well above the MCLs. Table 1 provides the measured ranges of concentrations for the target analytes during calendar years (CYs) 2011, 2012, and 2013.

Table 1. Measured Ranges for Target Analytes, CY 2011 and CY 2013

Target Analyte	Range	Maximum Contaminant Level
Uranium	4,500 µg/L – 71,000 µg/L	30 µg/L
Technetium-99	5,640 pCi/L – 51,000 pCi/L	900 pCi/L
Nitrogen as nitrate*	90 mg/L – 183 mg/L	10 mg/L

* The federal and state drinking water standard for nitrate is 10 mg/L, expressed as NO_3-N (the actual nitrogen in nitrate). Converting NO_3-N values to nitrate as the NO_3 ion requires the NO_3-N value to be multiplied by 4.4268.

The perched zone is a transient perching layer where current or recent rates of water infiltrating through the vadose zone exceed the rate at which water moves through the silt layer, resulting in the buildup of water on top of the silt layer. The contaminated water built up on the perched layer slowly migrates downward and contaminates the 200-BP-5 Groundwater OU. Distributions of uranium, technetium-99, and nitrate in groundwater near the 200-DV-1 OU perched water area for 2012 are shown in Figures 4, 5, and 6, respectively. These three contaminants, found in the perched water and the groundwater, could adversely impact human health and the environment.

4 Endangerment Determination

Security controls, including administrative and physical access controls, are currently in place to limit unauthorized entry to the Hanford Site. Only authorized personnel are allowed entry into areas where hazards exist. As long as DOE retains control of these areas, institutional controls prevent direct contact with and exposure to the hazardous substances. However, institutional controls do not prevent the continuing migration of contaminated perched water to the 200-BP-5 Groundwater OU aquifer.

The potential contamination of the groundwater and the potential threat to sensitive ecosystems addressed by this AM justified the use of CERCLA removal action authority in accordance with the NCP (40 CFR 300.415[b][2]). In addition, DOE Order 5400.4 (*Comprehensive Environmental Response, Compensation and Liability Act Requirements*) requires the response to any release or substantial threat of a release of a hazardous substance into the environment in a manner consistent with CERCLA and the NCP (40 CFR 300), regardless of whether the release or threatened release is from a site listed on the National Priorities List. DOE will use CERCLA response authority to conduct necessary response action to protect public health, welfare, and the environment.

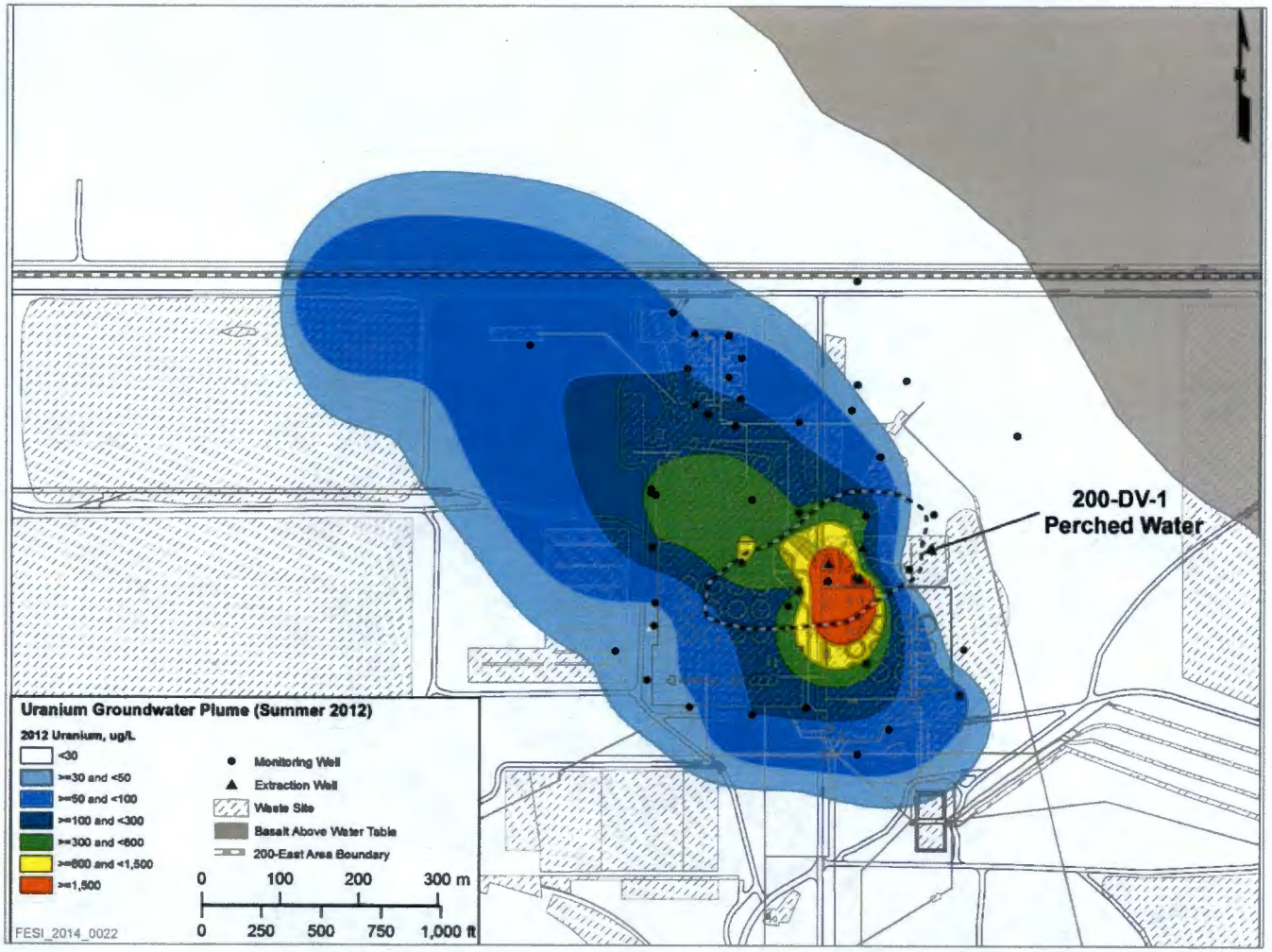

Figure 4. 2012 Uranium Plume in the Groundwater near 200-DV-1 Perched Water Zone

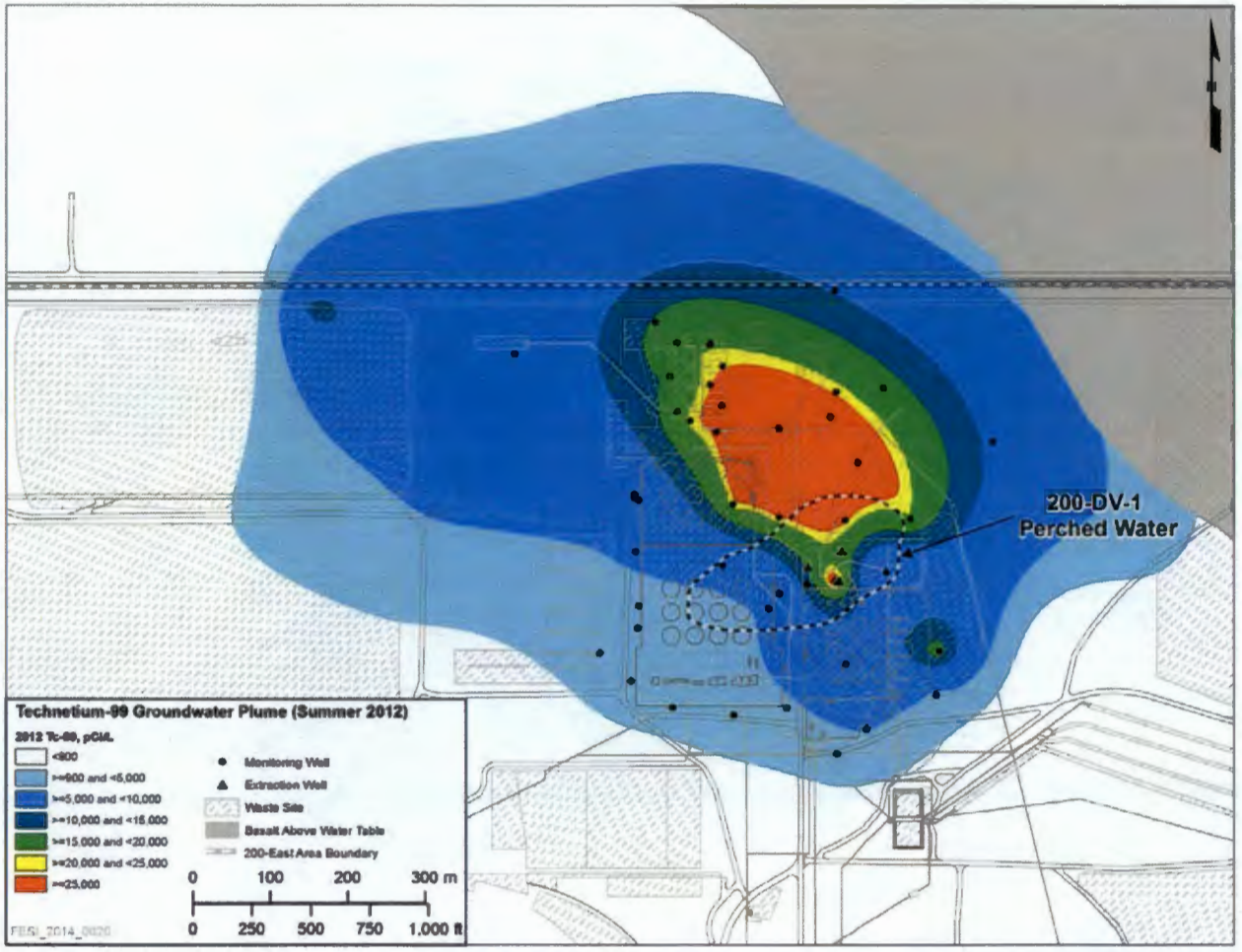

Figure 5. 2012 Technetium-99 Plume in the Groundwater near 200-DV-1 Perched Water Zone

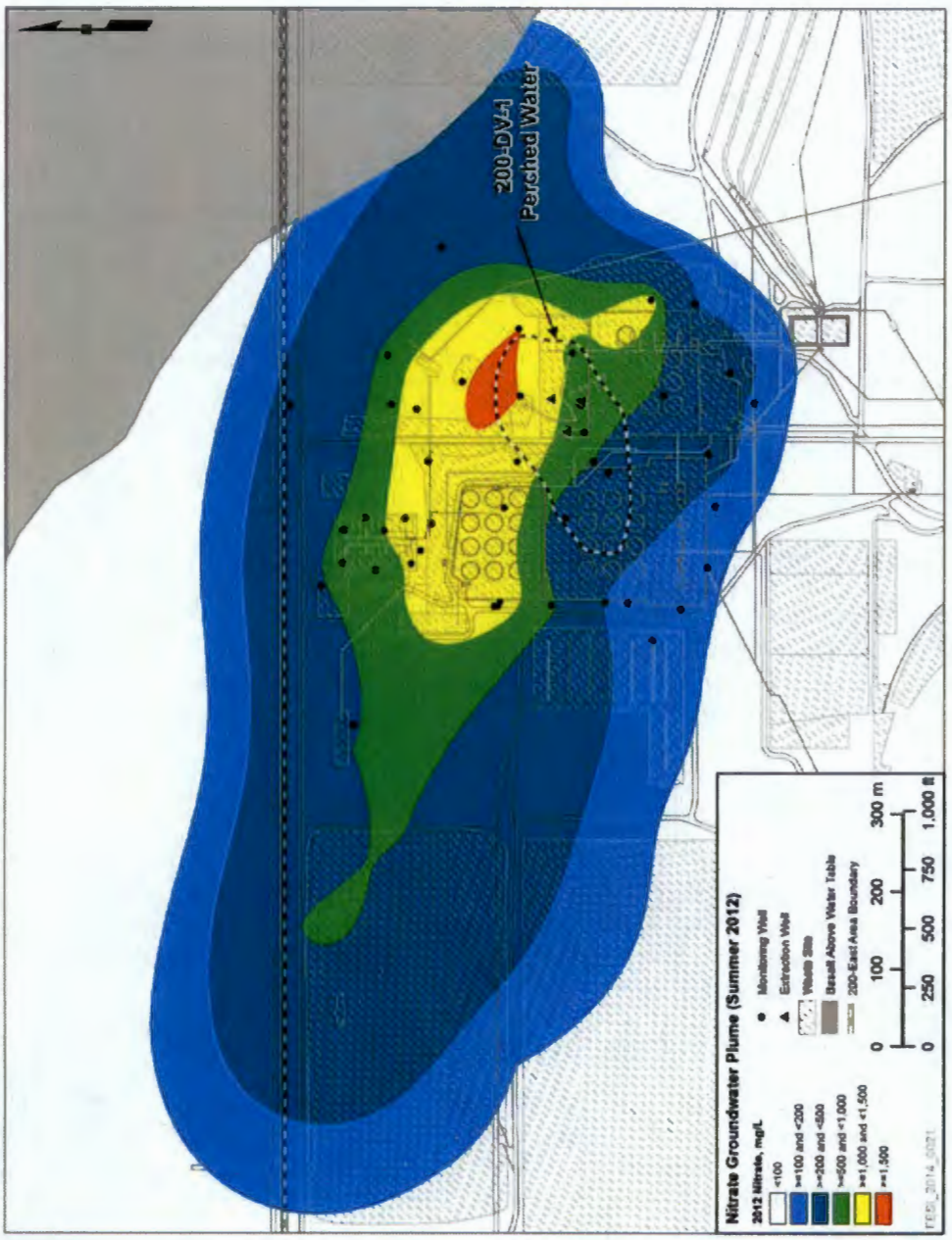

Figure 6. 2012 Nitrate Plume in the Groundwater near 200-DV-1 Perched Water Zone

5 Proposed Actions and Estimated Costs

Alternatives for treating the contaminated perched water extracted from the 200-DV-1 OU were identified and evaluated in terms of their effectiveness, implement ability, and cost. The EE/CA (DOE/RL-2013-37) provides details on the identification and evaluation of the alternatives and is available through the Administrative Record at http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0086598.

This section summarizes the proposed actions and the cost estimates for the three alternatives.

5.1 Removal Action Objectives

The removal action objectives (RAOs) are as follows:

- Protect human and ecological receptors from exposure to contaminants that exceed acceptable risk levels for drinking water
- Control sources of groundwater contamination
- Remove contaminant mass from perched water and support final remedial options for both the 200-DV-1 OU and 200-BP-5 Groundwater OU
- Apply institutional controls to prevent exposure to contaminants.

The order of the above RAOs is not intended to be a ranking or a prioritization.

5.2 Alternatives Evaluated in the Engineering Evaluation/Cost Analysis

The Tri-Parties considered three removal action alternatives for treating the extracted perched water from the 200-DV-1 OU under the NTCRA: (1) a legally required No Action alternative, (2) extraction of perched water with treatment at the ETF, and (3) extraction of perched water with treatment at the 200 West P&T. The EE/CA (DOE/RL-2013-37) documents the identification and evaluation of the alternatives.

5.2.1 Alternative 1 – No Action

Alternative 1 provides a baseline for comparing the other alternatives. Under this alternative, it is assumed that the perched water would be abandoned without any further actions. All current activities would be discontinued indefinitely. No legal restrictions, institutional controls, or active measures are applied to perched water zone. Initial risks are minimal, but over time, the risks are anticipated to increase. This alternative is not protective.

5.2.2 Alternative 2 – Treatment at Effluent Treatment Facility

Alternative 2 is similar to the existing treatability test. Water from the 200-DV-1 OU perched zone is extracted and transferred by truck to the ETF in the 200 East Area, where it is treated and injected into the aquifer. Under this alternative, perched water is extracted using gravity drainage into a well sump with subsequent pumping to the surface to a holding tank. The extraction is initially from the existing perched water well, with an expected recovery of approximately 380,000 L (100,000 gal) per year, extracted at a rate of 0.722 L/min (0.19 gallons per minute [gpm]). Two additional installed wells increase the extraction rate to approximately 2.16 L/min (0.57 gpm). The gravity drainage and pumping continues until the yield decreases. At that time, a vacuum is applied to the extraction system to increase flow to the wells. Once the perched zone is in a mostly unsaturated condition, a higher vacuum will be applied to induce pore water extraction. The extracted water is transported by tanker to the ETF for treatment and

disposal. The treated liquid waste from the ETF is discharged to the State-Approved Land Disposal Site in the 200 West Area. The ETF has determined that both extracted perched water and contaminants can be accepted and treated at the facility. At the time that the treatability test plan was written, the ETF represented the most technically sound and cost-effective approach for treating and disposing perched water from the 200-DV-1 OU.

5.2.3 Alternative 3 – Treatment at the 200 West Pump and Treat

Alternative 3 consists of extracting water from the perched zone of the 200-DV-1 OU via the same three wells identified in Alternative 2 and treating the water at the 200 West P&T. The extracted perched water is transferred by truck to the 200 West P&T, where it is treated and injected into the aquifer below the 200 West Area. Figure 7 shows the location of the 200 West P&T, the perched water extraction well in the 200 East Area, and the location of ETF in the 200 East Area.

In 1989 EPA listed the entire Hanford 200 Area as a single new Superfund Site on the National Priorities List (NPL). In the HFFACO, the EPA and DOE agreed, in "Article XVIII. Permits", that "under CERCLA sections 121(d), 121(e)(1) and the NCP, portions of the response actions called for by this Agreement and conducted entirely on the Hanford Site are exempted from the procedural requirements to obtain federal, state, or local permits, but must satisfy all the applicable or relevant and appropriate federal and state standards, requirements, criteria or limitations which would have been included in any such permit."

The EPA agreed with DOE that the entire Hanford Site is a single "site" under CERCLA, an exercise of EPA's authority under CERCLA Section 104(d)(4), and of DOE's authority under Section 121. The 200-DV-1 OU is therefore "onsite" with the 200 West P&T CERCLA groundwater treatment facility, and transportation of the water to the treatment facility, and treatment there, is a CERCLA "onsite" response action within the preemptive authority of CERCLA Section 121.

The 200 West P&T was constructed in 2012 and designed for cleanup of the 200-ZP-1 Groundwater OU in the 200 West Area. The 200 West P&T is designed to capture and treat contaminated groundwater in order to reduce the mass of carbon tetrachloride, total chromium (trivalent and hexavalent), nitrate, trichloroethene, iodine-129, and technetium-99. The system design also includes provisions for future treatment of groundwater from the 200-UP-1 Groundwater OU, including removal of uranium. It is expected that the uranium treatment capability will be installed at the 200 West P&T by mid-fiscal year (FY) 2015.

The initial treatment flow rate of the 200 West P&T is 9,464 L/min (2,500 gpm) of extracted groundwater. It was determined that the flow rate from perched water pumping can be accommodated by the 200 West P&T. An evaluation was performed to determine the capability of the 200 West P&T to meet treatment requirements for the perched water. Based on calculations, the net increases in concentrations of uranium, technetium-99, and nitrate for two different feed-blending scenarios are within the design envelope for the 200 West P&T once the uranium ion-exchange system is installed. The concentrations of all constituents in the treated effluent are expected to be well below the MCLs.

The EE/CA (DOE/RL-2013-37) recommended Alternative 3, Treatment at the 200 West P&T, as the preferred removal action for the perched water in the 200-DV-1 OU. The following subsections provide information applicable to this alternative.

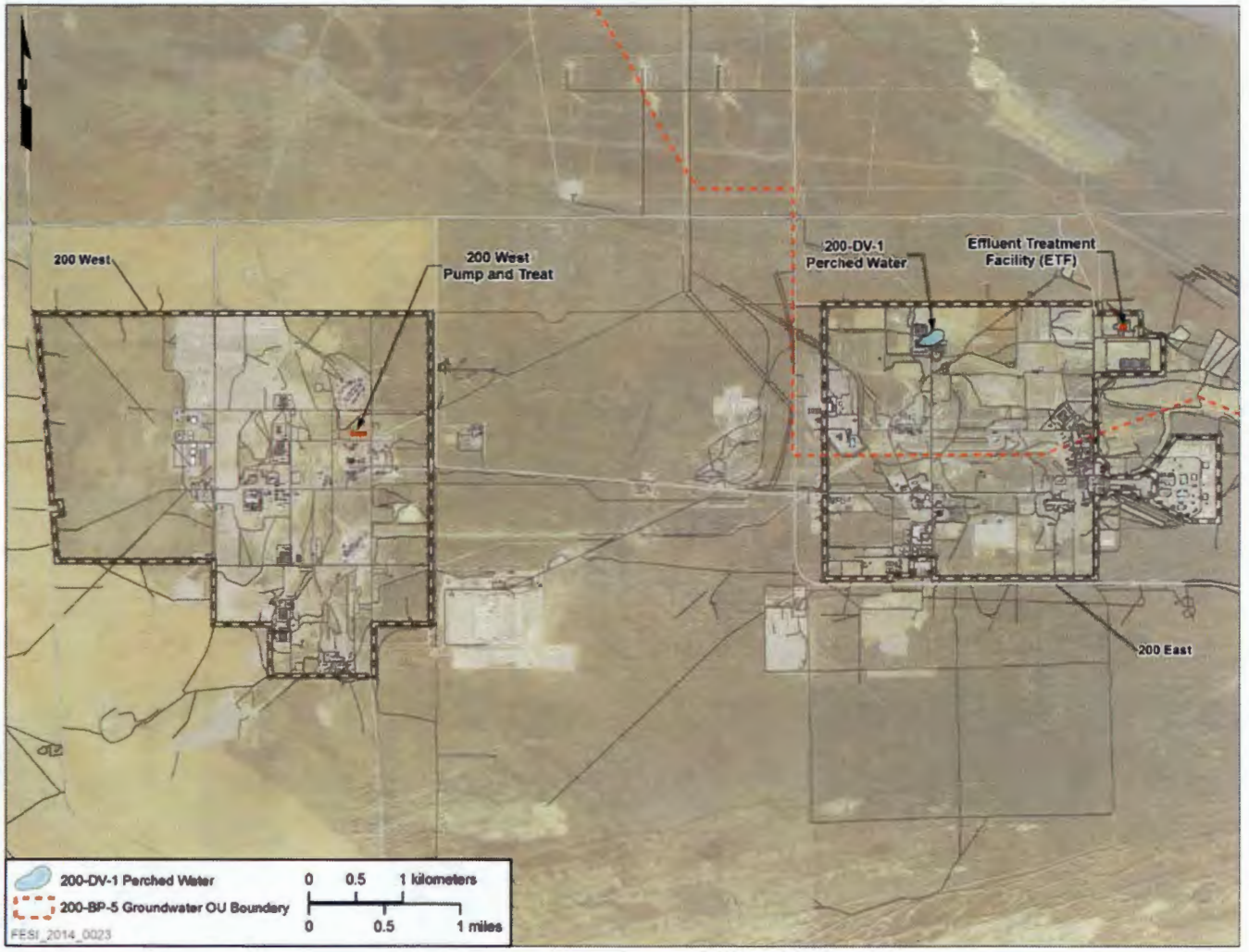

Figure 7. Locations of the Perched Water Extraction System and the Treatment Facilities

5.3 Compliance with Environmental Regulations, Including Those That Are Applicable or Relevant and Appropriate Requirements

Section 121 of CERCLA requires the responsible CERCLA implementing agency to ensure that the substantive standards of the *Washington State Hazardous Waste Management Act of 1976* (RCW 70.105, "Hazardous Waste Management"), the *Resource Conservation and Recovery Act of 1976* (RCRA), and other applicable laws will be incorporated into the federal agency's design and operation of its long-term remedial actions and into its more immediate removal actions. DOE is the implementing agency for this NTCRA. Both Ecology and EPA concur that this NTCRA is warranted to protect human health and the environment.

The NCP (40 CFR 300) requires that the removal action described in this AM complies with ARARs to the extent practicable. The ARARs are substantive requirements of environmental standards incorporated in promulgated regulations that have been evaluated and determined to be pertinent to the removal action. Appendix A identifies and describes specific regulatory requirements that are ARARs for this removal action. To-be-considered (TBC) information also is included in Appendix A for this removal action. The TBC information includes nonpromulgated advisories or guidance issued by federal or state governments. The TBC information is not binding legally and does not have the status of ARARs.

5.4 Compliance with 200 West Pump and Treat Acceptance Criteria

Extracted perched water will be sent to the 200 West P&T. The *200 West Pump and Treat Operations and Maintenance Plan* (DOE/RL-2009-124) provides acceptance criteria for receiving wastewater at this treatment facility. Perched water has been evaluated and determined to meet the criteria for acceptance at the 200 West P&T. Periodic re-evaluation of the perched water will be performed as needed.

5.5 Project Costs

Cost estimates were evaluated for the three alternatives and documented in the EE/CA (DOE/RL-2013-37). The estimates were prepared in accordance with *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 540-R-00-002). In accordance with EPA guidance, the costs for the alternatives over time were calculated as present net-worth costs, which are sometimes referred to as net present value, to represent the costs in 2013 dollars.

The information in the cost estimate summary is based on the best available information regarding the anticipated scope of the selected alternative. Changes in the cost elements are likely to occur due to new information and data collected during the engineering design and performance of the removal action. Major changes will be documented in the form of a memorandum placed into the Administrative Record file. The engineering cost estimate is expected to be within -30 to +50 percent of actual project cost. The present-worth cost estimates for the two P&T alternatives are presented in Table 2. The costs are based on present-day (2013) dollars.

Table 2. Summary of Present-Worth Cost Estimates for Alternatives 2 and 3

Alternative	Present-Worth Cost*
Alternative 2: Treatment at 200 East Area Effluent Treatment Facility	$6,400,000
Alternative 3: Treatment at the 200 West pump and treat	$1,594,350

* Accuracy of the cost estimate is -30 to +50 percent.

5.6 Project Schedule

The removal action project is scheduled to begin in mid-FY 2015. As specified in the *200-UP-1 Groundwater Operable Unit Remedial Design/Remedial Action Work Plan* (DOE/RL-2013-07), the 200 West P&T will have the uranium treatment capability installed by mid-FY 2015. Until then, perched water from the 200-DV-1 OU will be treated at the ETF in the 200 East Area under the existing treatability test.

5.7 National Environmental Policy Act Values

In accordance with a voluntary DOE policy stated in DOE O 451.1B Chg 1, *National Environmental Policy Act Compliance Program*, and the *National Environmental Policy Act of 1969* (NEPA), DOE CERCLA Removal and Remedial Action documents will, to the extent practicable, address and incorporate NEPA values (e.g., socioeconomic, ecological, offsite, and cumulative impacts).

None of the proposed alternatives for this NTCRA would have socioeconomic impacts to the offsite distant populations. Archeological, cultural, and ecological impacts are not expected because the proposed actions are being considered on the previously disturbed soil and existing structures at existing locations.

6 Expected Change in the Situation Should Action Be Delayed or Not Taken

Perched water is currently being investigated, pumped, and treated in accordance with the field test plan for the treatability test (DOE/RL-2011-40). The results obtained from the treatability test were used to develop the proposed alternatives for this removal action. If a removal action is delayed or not implemented, contaminants in the perched water will continue to migrate to the 200-BP-5 Groundwater OU, which, in turn, will continue to pose an unacceptable risk to human health and the environment.

7 Statutory and Regulatory Authority

The proposed removal action is being undertaken by DOE as the lead agency pursuant to CERCLA Section 104(a) and Executive Order 12580 (*Superfund Implementation*), as recognized by Section 7.2.4 of the *Hanford Federal Facility Agreement and Consent Order Action Plan* (Ecology et al., 1989b). In accordance with 40 CFR 300.415(j) and DOE guidance, onsite removal actions conducted under CERCLA are required to meet ARARs to the extent practicable considering the exigencies of the situation. The DOE will comply with the ARARs as set forth in Appendix A.

8 Outstanding Policy Issues

There is no outstanding policy issue associated with this NTCRA.

9 Enforcement

The DOE is conducting this removal action as the lead agency under the authority of 40 CFR 300.5, "Definitions," and 40 CFR 300.415(b)(1).

10 Recommendations

This AM documents the intent to implement the selected removal action (Alternative 3) for P&T of the contaminated perched water in the 200-DV-1 OU. This decision document is developed in accordance with CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986*, and is consistent with the NCP (40 CFR 300). The conditions of the perched water meet the criteria specified in 40 CFR 300.415(b)(2) of the NCP. The decision is based on the Administrative Record for the removal action.

The recommended removal action alternative identified in the EE/CA (DOE/RL-2013-37) is Alternative 3, extraction of the perched water and treatment at the 200 West P&T. This alternative has been selected for implementation because it best meets the proposed RAOs regarding long-term risk, minimizes short-term worker risk and radiation exposure, provides a cost-effective approach, and provides a safe and stable configuration that is environmentally sound. DOE also considers Alternative 3 to be consistent with and a contributor to the efficient performance of Hanford Site long-term remedial actions. Furthermore, this alternative promotes protection of ecological resources and restoration of the environment, consistent with goals identified in the Tri-Party Agreement (Ecology et al., 1989a).

At the completion of the NTCRA, a completion report will be issued that provides summary information, including volume and concentration of perched water extracted, treatment results, and 200-BP-5 Groundwater OU monitoring data.

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Appendix A

Applicable or Relevant and Appropriate Requirements

Tables

Terms

ALARA	as low as reasonably achievable
ALARACT	as low as reasonably achievable control technology
ARAR	applicable or relevant and appropriate requirement
BACT	best available control technology
BARCT	best available radionuclide control technology
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA	non-time-critical removal action
OU	operating unit
RACT	reasonably available control technology
T-BACT	best available control technology for toxics
TBC	to be considered

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A Applicable or Relevant and Appropriate Requirements

The "National Oil and Hazardous Substances Pollution Contingency Plan" (hereafter referred to as the National Contingency Plan [NCP]) (40 CFR 300) requires that the removal action described in this action memorandum comply with applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The ARARs are defined to include only substantive requirements of environmental standards incorporated in promulgated regulations that have been evaluated and determined to be pertinent to the removal action. ARARs do not include administrative requirements, including requirements to obtain any federal, state, or local permits. This section identifies specific regulatory sections, citations, and explanations regarding why it is an ARAR. This section also identifies a requirement that is categorized as "to be considered" (TBC). A TBC requirement pertains to information that consists of nonpromulgated advisories or guidance issued by federal or state governments. A TBC requirement is not legally binding and does not have the status of ARAR. However, regulations and guidance state that, as appropriate, TBC information should be considered in determining the removal action necessary for protection of human health and the environment.

The ARARs that are potentially pertinent to this treatability test are listed in Table A-1 (federal ARARs), Table A-2 (state ARARs), and Table A-3 (TBC criteria). Onsite activities such as this removal action must comply with ARARs, but they only need to comply with the substantive parts of those requirements. Applicable ARARs and TBC will be specified in lower tier work control documents and procedures.

Table A-1. Identification of Federal ARARs and TBC Criteria

ARAR Citation	ARAR or TBC	Requirement	Rationale for Use
Archeological and Historic Preservation Act of 1974, 16 USC 469a-1 through 468a-2(d)	ARAR	Requires that the removal action at the 200-DV-1 OU does not cause the loss of any archaeological or historic data. This act mandates preservation of the data and does not require protection of the actual historical sites.	Archeological and historic sites have been identified within the 200 Areas; therefore, the substantive requirements of this act are applicable to actions that might disturb these sites. This requirement is action-specific.
National Historic Preservation Act of 1966, 16 USC 470, Section 106 36 CFR 60, "National Register of Historic Places" 36 CFR 65, "National Historic Landmarks Program" 36 CFR 800.5, "Protection of Historic Properties"	ARAR	Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation, and mitigation processes.	Cultural and historical sites have been identified within the 200 Areas; therefore, the substantive requirements of this act are applicable to actions that might disturb these types of sites. This requirement is location-specific.
Native American Graves Protection and Repatriation Act of 1990, 25 USC 3001, et seq. 43 CFR 10, "Native American Graves Protection and Repatriation Regulations"	ARAR	Establishes federal agency responsibility for the discovery of human remains, associated and unassociated funerary objects, sacred objects, and items of cultural patrimony.	Substantive requirements of this act are applicable if remains and sacred objects are found during remediation. This is a location-specific requirement.
Endangered Species Act of 1973, 16 USC 1531 et seq., 16 USC 1536(c) 50 CFR 402, "Interagency Cooperation" *Migratory Bird Treaty Act of 1918*, 16 USC 703-712,et seq.	ARAR	Establishes requirements for actions by federal agencies that are likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. If remediation is within critical habitat or buffer zones surrounding threatened or endangered species, mitigation measures must be taken to protect the resource.	Substantive requirements of this act are applicable if threatened or endangered species are identified in areas where treatability test will occur. This is a location-specific requirement.

ARAR = applicable or relevant and appropriate requirement
OU = operable unit
TBC = to be considered

Table A-2. Identification of State ARARs and TBC Criteria

ARAR Citation	ARAR	Requirement	Rationale for Use
WAC 173-303, "Dangerous Waste Regulations"			
WAC 173-303-016, "Identifying Solid Waste"	ARAR	Identifies those materials that are and are not solid waste.	Substantive requirements of these regulations are applicable because they define which materials are subject to the designation regulations. Specifically, materials that are generated during the treatability test would, if a solid waste, be subject to the substantive requirements for evaluating solid wastes for subsequent management. This requirement is action-specific.
WAC 173-303-017, "Recycling Processes Involving Solid Waste"	ARAR	Identifies materials that are and are not solid wastes when recycled and includes provisions for exemption from WAC 173-303.	Substantive requirements of these regulations are applicable because they define which materials are subject to the designation regulations. Specifically, materials that are generated during the treatability test that qualify as solid wastes may be managed in accordance with these recycling provisions as appropriate. This requirement is action-specific.
WAC 173-303-070(3), "Designation of Dangerous Waste"	ARAR	Establishes whether a solid waste is, or is not, a dangerous waste or an extremely hazardous waste.	Substantive requirements of these regulations are applicable to materials generated during the treatability test. Specifically, solid waste that is generated during this treatability test that also designates as a dangerous waste would be subject to the substantive provisions of these dangerous waste requirements. This requirement is action-specific.
WAC 173-303-071, "Excluded Categories of Waste"	ARAR	Describes those categories of wastes that are excluded from the requirements of WAC 173-303.	This regulation is applicable to 200-DV-1 OU should wastes identified in WAC 173-303-071 be generated. This requirement is action-specific.
WAC 173-303-077, "Requirements for Universal Waste"	ARAR	This regulation provides alternate reduced standards for certain solid wastes (i.e., batteries, mercury-containing equipment, and lamps) as described in WAC 173-303-573.	There is a potential for generating materials during the NTCRA that would qualify for management under the substantive provisions of these regulations, which would be used as appropriate during the NTCRA. These standards are optional for management of universal wastes, which could alternatively be managed in accordance with WAC 173-303-170(3). This requirement is action-specific.

Table A-2. Identification of State ARARs and TBC Criteria

ARAR Citation	ARAR	Requirement	Rationale for Use
WAC 173-303-120, "Recycled, Reclaimed, and Recovered Wastes" Specific subsections: WAC 173-303-120(3) WAC 173-303-120(5)	ARAR	These regulations define the requirements for recycling materials that are solid and dangerous waste. Specifically, WAC 173-303-120(3) provides for the management of certain recyclable materials, including spent refrigerants, antifreeze, and lead acid batteries. WAC 173-303-120(5) provides for the recycling of used oil.	Substantive requirements of these regulations are applicable to certain materials that might be generated during the treatability test. Eligible recyclable materials can be recycled and/or conditionally excluded from certain dangerous waste requirements. This requirement is action-specific.
WAC 173-303-140(4), "Land Disposal Restrictions"	ARAR	This regulation establishes state standards for land disposal of dangerous waste and incorporates, by reference, federal land disposal restrictions of 40 CFR 268 to solid waste that is designated as dangerous or mixed waste in accordance with WAC 173-303-070(3).	The substantive requirements of this regulation are applicable to materials generated during the treatability test. Specifically, dangerous/mixed waste that is generated during the treatability test would be subject to the substantive requirements of the land disposal restrictions. This requirement is action-specific.
WAC 173-303-170, "Requirements for Generators of Dangerous Waste" Specific subsections: WAC 173-303-170(3) WAC 173-303-170(4)	ARAR	Establishes the requirements for dangerous waste generators.	Substantive requirements of these regulations are applicable to materials generated during the treatability test. Specifically, the substantive standards for management of dangerous/mixed waste are applicable to the management of dangerous waste that will be generated during the treatability test. For purposes of this treatability test, WAC 173-303-170(3) includes the substantive provisions of WAC 173-303-200 by reference. WAC 173-303-200 further includes certain substantive standards from WAC 173-303-630 and -640 by reference. This requirement is action-specific.

Table A-2. Identification of State ARARs and TBC Criteria

ARAR Citation	ARAR	Requirement	Rationale for Use
WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"			
WAC 173-160-161	ARAR	Identifies well planning and construction requirements.	The substantive requirements of these regulations are ARAR to actions that include construction of wells used for groundwater extraction and monitoring. The substantive requirements of WAC 173-160-161, 173-160-171, 173-160-181, 173-160-400, 173-160-420, 173-303-430, 173-160-440, 173-160-450, and 173-160-460 are relevant and appropriate to groundwater well construction and monitoring. These requirements are action-specific.
WAC 173-160-171	ARAR	Identifies the requirements for locating a well.	
WAC 173-160-181	ARAR	Identifies the requirements for preserving natural barriers to groundwater movement between aquifers.	
WAC 173-160-400	ARAR	Identifies the minimum standards for resource protection wells and geotechnical soil borings.	
WAC 173-160-420	ARAR	Identifies the general construction requirements for resource protection wells.	
WAC 173-160-430	ARAR	Identifies the minimum casing standards.	
WAC 173-160-440	ARAR	Identifies the equipment cleaning standards.	
WAC 173-160-450	ARAR	Identifies the well sealing requirements.	
WAC 173-160-460	ARAR	Identifies the decommissioning process for resource protection wells	

Table A-2. Identification of State ARARs and TBC Criteria

ARAR Citation	ARAR	Requirement	Rationale for Use
WAC 173-400 and WAC 173-460, General Regulations for Air Pollution Sources			
RCW 70.94, "Department of Ecology," and RCW 43.21A, "Washington Clean Air Act" WAC 173-400, "General Regulations for Air Pollution" Specific subsections: WAC 173-400-040(3) WAC 173-400-040(8) WAC 173-400-113	ARAR	These laws and regulations require all sources of air contaminants to meet standards for visible emissions, fallout, fugitive emissions, odors, emissions detrimental to persons or property, sulfur dioxide, concealment and masking, and fugitive dust. Requires use of RACT. WAC 173-400-113 applies to new and modified sources and requires controls to minimize the releases of associated criteria and toxic air emissions. Emissions are to be minimized through application of the BACT.	Substantive requirements of the general standards for control of fugitive emissions would be applied as appropriate to minimize the generation of dust that may occur during work under the NTCRA. These requirements are action-specific. It is unlikely that the substantive provisions of WAC 173-400-113 would be triggered during the NTCRA. However, substantive requirements of this regulation potentially would be applicable if a treatment technology that emits regulated air emissions were necessary during the implementation of the NTCRA. This requirement is action-specific.
WAC 173-460, "Controls for New Sources of Toxic Air Pollutants" Specific subsections: WAC 173-460-060 WAC 173-460-150	ARAR	These regulations apply for determination of de minimis emission values and for establishment of control technology as appropriate for new or modified toxic air pollutant emissions. Requires BACT for regulated emissions of toxic air pollutants (T-BACT) and demonstration that emissions of toxic air pollutants will not endanger human health.	It is not anticipated that work done under the NTCRA will trigger standards for T-BACT. However, substantive requirements of these regulations potentially would be applicable to activities performed onsite, if a treatment technology that emits toxic air emissions were necessary during the implementation of the NTCRA. These requirements are action-specific.
WAC 246-247, "Radiation Protection – Air Emissions"			
WAC 246-247-040(3) and WAC 246-247-040(4), "General Standards"	ARAR	These regulations require all new construction and significant modifications of emission units to use BARCT and require all existing emission units and nonsignificant modifications to use ALARACT in controlling emissions to the environment.	There is potential for encountering radionuclide contamination during the activities covered by this NTCRA. Substantive requirements of these standards are potentially applicable because fugitive, diffuse, and point source emissions of radionuclides to the ambient air may result from activities. These requirements are action-specific.

Table A-2. Identification of State ARARs and TBC Criteria

ARAR Citation	ARAR	Requirement	Rationale for Use
WAC 246-247-075, "Monitoring, Testing, and Quality Assurance" Specific subsections: WAC 246-247-075(1) WAC 246-247-075(2) WAC 246-247-075(3) WAC 246-247-075(4) WAC 246-247-075(8)	ARAR	These regulations establish the monitoring, testing, and quality assurance requirements for radioactive air emissions from major sources. These regulations also include requirements for continuous sampling and provide for periodic sampling (grab samples) in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. These regulations also provide for the waste site owner or operator to use alternative effluent flow rate measurement procedures or site selection and sample extraction procedures, as approved by the lead agency. These regulations also establish requirements to monitor nonpoint and fugitive emissions of radioactive material.	There is a potential for generating fugitive, diffuse, and/or point source emissions during the NTCRA. Substantive requirements of these standards are potentially applicable because fugitive and nonpoint source emissions of radionuclides to the ambient air may result from activities, such as operation of exhausters and vacuums, performed during the removal action. These requirements are action-specific.
WAC 173-480-050(1), "General Standards for Maximum Permissible Emissions"	ARAR	This regulation establishes general standards for all radionuclide emission units and requires emission units to meet WAC 246-247 requiring every reasonable effort to maintain radioactive materials in effluents to unrestricted areas as low as reasonably achievable (ALARA). The regulation indicates that control equipment of sites operating under ALARA shall be defined as RACT and as ALARACT.	The potential for fugitive and diffuse emissions due to demolition and excavation and related activities may require efforts to minimize those emissions by meeting WAC 246-247. This requirement is action-specific.

Table A-2. Identification of State ARARs and TBC Criteria

ARAR Citation	ARAR	Requirement	Rationale for Use
WAC 173-480-070(2), "Emission Monitoring and Compliance Procedures"	ARAR	This regulation applies for determining compliance with the radionuclide emission standard. Compliance with the public dose standard is determined by calculating exposure at the point of maximum annual air concentration in a location	Removal action activities have potential to emit radionuclides to unrestricted areas above maximum acceptable levels.

Note: The references cited in this table are provided in the reference section for this appendix.

ALARACT = as low as reasonably achievable control technology
ARAR = applicable or relevant and appropriate requirement
BACT = best available control technology
BARCT = best available radionuclide control technology
NTCRA = non-time-critical removal action
OU = operable unit
RACT = reasonably available control technology
T-BACT = best available control technology for toxics

Table A-3. Identification of TBC Criteria

Criteria to Be Considered	TBC	Requirement	Rationale for Use
DOE/RL-2013-07, *200-UP-1 Groundwater Operable Unit Remedial Design/Remedial Action Work Plan*	TBC	This document established the criteria for perched water to be accepted at the 200 West pump and treat	Waste water must meet the treatment facility conditions and limitations.

TBC = to be considered

References

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WAC 160-161, "How Shall Each Water Well Be Planned and Constructed?"

WAC 160-171, "What Are the Requirements for the Location of the Well Site and Access to the Well?"

WAC 160-181, "What Are the Requirements for Preserving the Natural Barriers to Ground Water Movement Between Aquifers?"

WAC 160-400, "What Are the Minimum Standards for Resource Protection Wells and Geotechnical Soil Borings?"

WAC 160-420, "What Are the General Construction Requirements for Resource Protection Wells?"

WAC 160-430, "What Are the Minimum Casing Standards?"

WAC 160-440, "What Are the Equipment Cleaning Standards?"

WAC 160-450, "What Are the Well Sealing Requirements?"

WAC 160-460, "What Is the Decommissioning Process for Resource Protection Wells?"

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WAC 303-070, "Designation of Dangerous Waste."

WAC 303-071, "Excluded Categories of Waste."

WAC 303-077, "Requirements for Universal Waste."

WAC 303-120, "Recycled, Reclaimed, and Recovered Wastes."

WAC 303-140, "Land Disposal Restrictions."

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WAC 303-200, "Accumulating Dangerous Waste On-Site."

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Appendix B

Responsiveness Summary

Contents

Tables

Terms

ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DV	deep vadose
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	effluent treatment plant
LDR	land disposal restriction
MCL	maximum contaminant level
MTCA	Model Toxics Control Act
NTCRA	non-time-critical removal action
ODOE	Oregon Department of Energy
OU	operable unit
P&T	pump and treat
RAO	removal action objective
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
TBC	to be considered
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
YN	Yakama Nation

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B Responsiveness Summary

The purpose of this responsiveness summary is to document the public comments and the U.S. Department of Energy's (DOE's) responses on the *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction* (DOE/RL-2013-37).

The engineering evaluation/cost analysis (EE/CA) (DOE/RL-2013-37) was provided for public comment on February 3, 2014. The DOE announced the issuance of the EE/CA in the *Tri-City Herald* and sent a notice to approximately 1,500 people on an electronic distribution list. A 30-day public comment period was held to give the public the opportunity to read, review and submit comments on the EE/CA. The document evaluates the continued extraction of contaminated perched water (above the unconfined aquifer) from the 200-DV-1 (deep vadose [DV] zone) Operating Unit (OU). These activities are conducted under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA).

B1 Public Involvement

A newspaper advertisement was placed in the *Tri-City Herald* on February 3, 2014, announcing the availability of the EE/CA (DOE/RL-2013-37) and the start of the public comment period. Approximately 1,500 copies of a fact sheet describing the EE/CA were mailed or sent electronically. A public comment period was held from February 3 through March 3, 2014. No requests were received for a public meeting, and as a result no public meeting was held.

B2 Comments and Responses

The Oregon Department of Energy (ODOE), Washington Department of Ecology (Ecology), and the Confederated Tribes and Bands of the Yakama Nation provided written comments during the public comment period (see Tables B-1, B-2 and B-3, respectively).

Table B-1. Oregon Department of Energy Comments and Responses

Oregon Department of Energy Ken Niles, Administrator, Nuclear Safety Division
Comment: When a small perched water zone was discovered containing high levels of contaminants from either the B-BX-BY tank farms or their cribs, a small-scale treatability test was undertaken to determine whether groundwater borne uranium, technetium-99 and nitrate could be recovered before it became part of the groundwater. The Perched Water test was demonstrated to be quite successful, removing 150,000 gallons of highly contaminated water from August 2011 to August 2013. Current estimates predict that around 2 million gallons of extractable water remains. To advance on this success, an engineering evaluation/cost analysis (EE/CA) was done to evaluate approaches for disposal of extracted perched water from the central part of the Hanford Site, and this EE/CA was then issued by the Tri-Party Agencies. The EE/CA compares treatment of the pumped perched water in either the 200 Area Effluent Treatment Facility (ETF) or in the 200 West pump and treat facility. Both facilities are or will be capable of treating this water. However, the ETF is getting old and needs upgrading, and the 200-West pump and treat facility is new and is being upgraded with the installation of a uranium treatment train. The cost of treatment is predicted to be around $4.8 million dollars less for each two million gallons treated at the 200-West pump and treat facility. Oregon recognizes the success of the Perched Water Treatability Test as an important step in the advancement of groundwater cleanup for the Central Plateau. The capture of heavily contaminated water before it can mingle with groundwater is an important technology development. We would like to see this technology propagated across the deep vadose zone of the Central Plateau wherever possible. We therefore recommend that the Tri-Party Agencies aggressively explore for more locations with tight geologic stratigraphy and look for those that might provide a similar contaminant capture opportunity. We also recognize the wide margin of cost savings associated with the use of the 200 West pump and treat facility to process the perched water effluents. We urge the Tri-Parties to proceed with installation of the 200-West uranium ion-exchange train as soon as possible. The treatment of other 200 Area groundwater will also require the removal of uranium from pumped waters. Oregon shares the goal of protective and cost effective cleanup of Hanford, and welcomes the opportunity to help with this important decision with our comments. **U.S. Department of Energy Response:** The U.S. Department of Energy (DOE) appreciates the comments and support provided by ODOE on the Engineering Evaluation/Cost Analysis (EE/CA). DOE concurs with ODOE's observation that there might be other locations where perched zones might be present and if identified should be evaluated as a contaminant capture opportunity. To implement the EE/CA, an Action Memorandum and Remedial Action Plan are being prepared, two new perched water wells are being installed, and equipment upgrades will be completed by the end of 2014. As part of the UP-1 ROD, Uranium treatment is being installed in the 200 West Pump and Treat facility and is expected to be operational by the end of 2014. This will provide the treatment capability and support implementation of the EE/CA.

DOE = U.S. Department of Energy
EE/CA = engineering evaluation/cost analysis
ETF = Effluent Treatment Facility
ODOE = Oregon Department of Energy
ROD = Record of Decision

Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)
Page ES-iii, lines 6-8: "The current method of treating at ETF in accordance with the treatability test would continue until a removal action alternative is selected through the CERCLA process and the removal action can be implemented." **Comment:** This statement is confusing to me. I thought that this NTCRA selected alternative 3 as the removal action, which would extract the perched water, transfer it by truck to ETF, treat the water there (until 2015 when the uranium treatment train is installed) and then inject the water back into the aquifer. I am not understanding what this means when it says that treatment continues at ETF until a removal action alternative is selected…is this just stating the obvious that the treatability test would continue until the CERCLA process of selecting the NTCRA? If so, I would just delete this sentence, since it is confusing. **Response:** Confusing sentence deleted.
Page 1-1, lines 13-15: "The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency for this action, with concurrence from the Washington State Department of Ecology (Ecology)." **Comment:** I thought you said that Ecology and EPA were co-leads since Ecology is lead for the 200-DV-1 OU but the extracted water will be treated at the EPA lead 200 area? **Response:** Sentence deleted. EPA and Ecology are to review and concur on the NTCRA.
Page 1-2, lines 33-35: "DOE, EPA, and Ecology (Tri-Party Agencies) will use this EE/CA as the basis for determining the best method for control of contaminants to minimize potential risks to human health and the environment." **Comment:** This sentence implies all containments everywhere. It should specifically state where it will control contaminants. **Response:** Additional text added to clarify.
Page 1-2, lines 36-39: "The Hanford Federal Facility Agreement and Consent Order (HFFACO), also referred to as the Tri-Party Agreement (TPA) the Tri-Party Agencies have determined that a NTCRA is the appropriate means to accomplish the desired protectiveness of human health and the environment and to achieve federal and state requirements." **Comment:** I can't figure out why this is included here. This is an awkward sentence as written and I would delete this opening phrase. **Response:** Awkward sentence deleted.

Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)
Page 3-1, lines 16-19: "Three factors are applied to determine whether compliance with ARARs is practicable in a particular removal action situation: the exigencies of the situation; the scope of the removal action to be taken; and the effect of ARAR attainment on the statutory limits for removal action duration and cost." **Comment:** I don't know where this comes from in the regulation. I could only identify two factors regarding compliance with ARARs: exigency of the situation and the scope of other removal action to be taken – 40 CFR Part 415(j). **Response:** Confusing sentence deleted.
Page 5-2, lines 32-33: "This section presents the evaluation of the alternatives against the key ARARs addressed in this EE/CA." **Comment:** Where is this analysis or evaluation of how the alternatives meet the key ARARs? Is it attached somewhere else? I did not see this discussion **Response:** Text will be clarified.
Page 5-2, lines 33-34: "The ARARs will be documented in the CERCLA Action Memorandum." **Comment:** Does this mean that the Action Memorandum will specifically identify the substantive requirements that must be met and how they will be met? If so – then that will alleviate a lot of the concerns I had with the current list of ARARs in Appendix A **Response:** Text added to indicate that substantive requirements will be identified in action memorandum.
Page 5-3, lines 68-69: "A calculation for uranium is also provided based on the assumed design parameters (the uranium treatment train has not been installed yet but has been planned for)." **Comment:** What does this mean? How far along are the plans? How likely is it that the treatment train will actually be installed and ready to go in 2015 for the perched water to be treated there? Would any delay in this process trigger the need to select Alternative 2 – treatment at ETF? **Response:** Sentence clarified to indicate uranium treatment will be implemented in 2015.

Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)
Page 5-4, lines 82-85: "The extracted perched water is currently being treated at the ETF at a cost of $3/gallon. The 200 West P&T Facility currently treats Tc-99, nitrate, volatile organic compounds and metals at a cost of $0.017 (1.7 cents) a gallon." **Comment:** Why is it so much more expensive to treat the perched water at ETF ($3/gallon) versus only 17 cents at the yet to be built 200 West P&T? **Response:** No change to document. The cost difference is because ETF uses different processes to handle other radionuclides and hazardous constituents that are not present in the groundwater treated at 200 West.
Page 5-4, lines 88-90: "The costs for the uranium train are part of the implementation of the 200-UP-1 OU remedy and are not part of the alternative costs presented in this evaluation." **Comment:** So the 2015 deadline to get the uranium treatment train up and running is because of the implementation of the 200-UP-1 OU remedy? It is not being built any faster to accommodate this removal action? **Response:** Additional clarification provided.
Page 6-1, lines 2-3: "Alternative 3: Treatment at 200 West Area P&T facility." **Comment:** This alternative is really primary treatment at ETF followed by treatment at 200 West P&T in 2015… **Response:** The text is correct. No change.
Page 6-1, lines 18-19: "Until a selected removal action can be implemented, perched water will continue to be extracted and treated at ETF under the existing treatability test." **Comment:** Same comment on this sentence as I had in comment 1 **Response:** The confusing sentence is deleted.

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Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)
Page A-1, lines 18-19: "The ARARs that potentially are pertinent to this treatability test are listed in Table A-1 (Federal ARARs), Table A-2 (State ARARs), and Table A-3 (TBC Criteria)." **Comment:** Overall comment on ARARs – this table is missing a lot of information, such as the actual identification of the endangered/threatened species that are in the area; or the actual identification or review of the historic/cultural sites. Is this going to be included in the Action Memorandum or in the Work Plan? When will the substantive requirements be fleshed out in the more detail? I am ok with the EE/CA pointing out the applicable statutes/regulations, so long as the detail is provided in the subsequent documents. **Response:** This level of detail is not appropriate for the EE/CA. For the cultural/historical/ecological requirements, a survey will be conducted during the implementation phase of this activity.
Page A-1, lines 18-19: "The ARARs that potentially are pertinent to this treatability test are listed in Table A-1 (Federal ARARs), Table A-2 (State ARARs), and Table A-3 (TBC Criteria)." **Comment:** This version is filled with a lot of "if appropriate" or "might be relevant." This "maybes" need to be fleshed out and more definitive list of ARARs developed. **Response:** For an EE/CA, we identify the substantive requirements of environmental regulations that may be encountered during the removal action. A more definitive list of requirements is identified in the removal action work plan.
Page A-1, lines 18-19: "The ARARs that potentially are pertinent to this treatability test are listed in Table A-1 (Federal ARARs), Table A-2 (State ARARs), and Table A-3 (TBC Criteria)." **Comment:** In conjunction with this comment, if this will be fleshed out in the Action Memo, then I would expect to see a column entitled "Application" or something along those lines – which would specific how the ARAR is being applied to the removal action. **Response:** How the requirements will be applied to the removal action will be included in the removal action work plan and not the action memorandum.

Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)
Page A-1, lines 18-19: "The ARARs that potentially are pertinent to this treatability test are listed in Table A-1 (Federal ARARs), Table A-2 (State ARARs), and Table A-3 (TBC Criteria)." **Comment:** I also didn't see a reference to the Safe Drinking Water (MCLs are being exceeded) or MTCA or land disposal regulations (isn't that what ETF does? The perched water would be treated at ETF then sent to 200 Area for land disposal?) **Response:** Since a removal action is only an interim action and is not the final action to restore the groundwater in 200-BP-5, meeting MCLs is not pertinent to this interim action. Since this interim action, meeting the final cleanup standards, including MTCA, is not applicable or relevant and appropriate for this action. WAC 173-3030-140, "Land Disposal Restrictions," is an ARAR. Any waste that is disposed of at ERDF will meet the ERDF waste acceptance criteria, which includes treatment to meet LDR standards.
Page A-1, lines 18-19: "The ARARs that potentially are pertinent to this treatability test are listed in Table A-1 (Federal ARARs), Table A-2 (State ARARs), and Table A-3 (TBC Criteria)." **Comment:** Every reference in this Appendix A to "treatability test" should be to the "NTCRA" – the treatability test was already conducted. These ARARs need to apply to the selected removal action – in this case Alternative 3. This should be fixed throughout this appendix. **Response:** The ARAR table will be updated to remove the treatability test. The ARAR table is developed to be applied to all the alternative and not just Alternative 3. The action memorandum will identify the ARARs that will be applied to Alternative 3.
Page A-1, Table A-1, Rationale for Use: "Archeological and historical sites have been identified in the 200 Areas; therefore, the substantive requirements of this act are applicable to actions that might disturb these sites." **Comment:** If they have been identified, what are they? What are the impacts? How will you preserve data? **Response:** This statement means that archeological and historical sites have been previously identify throughout the 200 Areas, therefore this regulation is pertinent to the removal action and will be addressed during the implementation phase of the removal action.
Page A-1, Table A-1, Rationale for Use: "Cultural and historic sites have been identified within the 200 Areas; therefore, the substantive requirements of this act are applicable to actions that might disturb these types of sites." **Comment:** What are they? When will the historic/cultural review be done? **Response:** This statement means that cultural and historical sites have been previously identify throughout the 200 Areas, therefore this regulation is pertinent to the removal action and will be addressed during the implementation phase of the removal action.

Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)
Page A-2, Table A-1, Rationale for Use: "Substantive requirements of this act are applicable if remains and sacred objects are found during remediation." **Comment:** When will this investigation be done? **Response:** Text will be modified to change remediation to removal action. The activities associated with this requirement will take place during the implementation of the removal action.
Page A-2, Table A-1, ARAR Citation: "Migratory Bird Treaty Act of 1918." **Comment:** This should be separated out and not lumped under the ESA. **Response:** The *Migratory Bird Treaty Act 1918* will be separated into a new row.
Page A-2, Table A-1, ARAR Citation: "Migratory Bird Treaty Act of 1918." **Comment:** Also – what about Bald Eagle Act? **Response:** Bald eagles are not located within the area of the removal action and therefore are not pertinent to the removal action.
Page A-2, Table A-1, Rationale for Use: "Substantive requirements of this act are applicable if threatened or endangered species are identified (in areas where treatability test will occur." **Comment:** When will they be identified? I would presume that reports on the endangered/threatened species in the area (and in the Columbia if applicable) would already exist **Response:** Text will be modified to change treatability test to removal action. The activities associated with this requirement will take place during the implementation of the removal action.

Table B-2. Washington State Department of Ecology Comments and Responses

Washington State Department of Ecology **Dib Goswami, PhD, Deep Vadose Zone OU Project Manager (Nuclear Waste Division)**
Page 6-1, Table A-2, Rationale for Use: "Emission Monitoring and compliance" **Comment:** What is the rationale for this one? **Response:** The rationale will be added to this regulation.

ARAR	=	applicable or relevant and appropriate requirement	LDR	=	land disposal restriction
CERCLA	=	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*	MCL	=	maximum contaminant level
			MTCA	=	Model Toxics Control Act
DOE	=	U.S. Department of Energy	NTCRA	=	non-time-critical removal action
Ecology	=	Washington State Department of Ecology	OU	=	operable unit
EE/CA	=	engineering evaluation/cost analysis	P&T	=	pump and treat
EPA	=	U.S. Environmental Protection Agency	TBC	=	to be considered
ERDF	=	Environmental Restoration Disposal Facility	Tri-Party Agreement	=	*Hanford Federal Facility Agreement and Consent Order*
ETF	=	Effluent Treatment Facility			

Table B-3. Confederated Tribes and Bands of the Yakama Nation Comments and Responses

Confederated Tribes and Bands of the Yakama Nation Russell Jim, Project Manager (Yakama Nation ERWM)
1.1 PURPOSE AND SCOPE 1. *This document presents the results of a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) NTCRA EE/CA prepared to evaluate alternative removal.* *2. Potentially contaminated solid wastes, not to include liquid wastes, generated during the implementation of the NTCRA will be disposed of at a secure long-term management facility, the Environmental Restoration Disposal Facility (ERDF).* **Comment:** This is not protective of the human health and the environment. Taking contamination from one area and moving it to another area is not cleanup. **Response:** Disposal of CERCLA-related waste at the ERDF is one method used to reduce risks to human health and the environment since it removes waste from exposure pathways in the environment and places it in an engineered landfill specifically designed to handle such wastes. This part of the EE/CA refers to incidental waste generated during operation of the removal action. All such waste is managed in accordance with the regulatory approved waste control plan.
1.2 APPLICABLE OR RELEVANT AND APPRORIATE REQUIREMENTS *1. Section 121 of CERCLA (42 USC 9601) "Cleanup Standards" requires the responsible CERCLA implementing agency to ensure that the substantive standards of applicable laws will be incorporated into the federal agency's design and operation of its long-term remedial actions and into the federal agency's design and operation of its long-term remedial actions and into its more immediate removal action.* **Comment:** When I searched for the Section "121 CERCLA (42 USC 9601) Cleanup Standard" I didn't see this section listing "Cleanup Standard," as quoted. **Response:** Section 121 of CERCLA contains the "Cleanup Standard" requirements 121 (d) (2) (A) and includes discussions of meeting ARARs. The text above is not a direct quote from the section but a summary of the requirements.
5.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT 1. *Protective of human health and the environment - a CERCLA threshold requirement - is the primary objective of a removal action. Protectiveness is a threshold criterion that must be met to recommend an alternative. This section addresses the protectiveness for the public and the environment for each of the alternatives being evaluated.* **Comment:** The Yakama Nation objective is to obtain unrestricted use of the Hanford site, which permits full exercise of YN treaty rights while ensuring protection for the health and safety of the YN members. **Comment:** Are the Alternatives protective of the public health and community? Protective of the workers during implementation? Protective of the environment? Protective of the YN treaty resources? **Response:** Yes, Alternatives (2 and 3) are protective of the public health and community, protective of workers during implementation, protective of the environment including the natural, biological, and cultural resources in that area.

Table B-3. Confederated Tribes and Bands of the Yakama Nation Comments and Responses

Confederated Tribes and Bands of the Yakama Nation Russell Jim, Project Manager (Yakama Nation ERWM)
Comment: Alternative 1, the No action alternative - Does not meet the RAOs and is not protective of human health and environment. Risks overtime are "anticipated to increase," this is not protective of human health and environment. **Response:** That is correct, the No Action Alternative is not protective and is not considered further. The No Action alternative is always evaluated against the other more protective alternatives as part of the evaluation process. **Comment:** Alternative 2, treatment at Effluent Treatment Facility (ETF) - Is this Alternative able to achieve removal objectives? What level of contaminants are there? What are the residual effect concerns? **Response:** Both Alternatives 2 and 3 will meet the removal objectives the main difference is cost. Treating the extracted groundwater at the 200 West Pump and Treatment Facility is significantly less expensive that at the ETF. As identified in the EE/CA concentration of uranium in the extracted water is 30,000 to 70,000 µg/L range (30 to 70 ppm). The objective of this removal action is, to the extent practicable, mitigate the potential risk to the groundwater from the contaminated water in the perched zone. This action will support the selection and implementation of final remedial actions determined in the RI/FS and Proposed Plan for the 200-BP-5 and 200-DV-1 OUs. **Comment:** Alternative 3, Treatment at the 200 West Pump and Treat Facility - Does not currently treat Uranium, no plan detailing when in 2015 or how this treatment will occur. **Response:** The addition of Uranium Treatment to the 200 West P&T Facility is being implemented under the 200-UP-1 ROD. Uranium treatment is in the process of being installed and will be completed by the end of 2014. **Comment:** Will the Alternatives achieve removal objectives? Do they comply with the ARARs? **Response:** The Alternatives will achieve removal objectives as discussed above and comply with ARARs.

Table B-3. Confederated Tribes and Bands of the Yakama Nation Comments and Responses

Confederated Tribes and Bands of the Yakama Nation Russell Jim, Project Manager (Yakama Nation ERWM)
5.2 IMPLEMENTABILITY OF THE ALTERNATIVES 1. *This criterion addresses the technical and administrative feasibility of implementing the alternatives, and the availability of the required services and materials.* **Comment:** Is the alternatives technically feasible? (e.g., 200 West P & T Facility doesn't treat uranium, at current) 2. *The uranium treatment capability will be in place by 2015 for implementation of the NTCRA.* What is plan? What are the details specific to when, where, and how the uranium be treated? Where is the demonstrated performance/useful life? Are the Alternatives adaptable to environmental conditions? Will they be implemented in one year? **Response (to questions 1 and 2 above):** The 200 West Pump and Treat (P&T) Facility is designed to operate for at least 25 years. This is significantly longer than the projected time for the removal action of about five years. The addition of uranium treatment to the 200 West P&T Facility is being implemented under the 200-UP-1 ROD. Uranium treatment is in the process of being installed and will be completed by the end of 2014. Preferred Alternative 3 (treatment of extracted perched water at 200 West P&T) will begin as soon as the uranium treatment capability is in place in early 2015. An action memorandum and remedial action plan will be prepared in the next several months that will detail how Alternative 3 will be implemented.
A.1 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIRMENTS 1. *ARARs are defined to include only substantive requirements of environmental standards incorporated in promulgated regulations that have been evaluated to be pertinent to the removal action.* **Comment:** The section on the ARARs is missing detailed information (e.g. Cultural Review). When will the Cultural review be done? **Response:** The ARAR citation, requirement and rationale for use for evaluation of cultural resources is provided in Table A-1 [see table below]. Cultural review will be completed before disturbing the land surface; installing a pipeline for instance.

Table B-3. Confederated Tribes and Bands of the Yakama Nation Comments and Responses

Confederated Tribes and Bands of the Yakama Nation
Russell Jim, Project Manager (Yakama Nation ERWM)

Table A-1. Identification of Federal Applicable or Relevant and Appropriate Requirements and to Be Considered

ARAR Citation	ARAR or TBC	Requirement	Rationale for Use
Other Federal ARARs			
Archeological and Historic Preservation Act of 1974	ARAR	Requires that the removal action at the 200-DV-1 OU does not cause the loss of any archaeological or historic data. This act mandates preservation of the data and does not require protection of the actual historical sites.	Archeological and historic sites have been identified within the 200 Areas; therefore, the substantive requirements of this act are applicable to actions that might disturb these sites. This requirement is action specific.
National Historic Preservation Act of 1966. 16 USC 470, Section 106 36 CFR 800, "Protection of Historic Properties" Executive Order 11593, *Protection and Enhancement of the Cultural Environment* 36 CFR 65, "National Register of Historic Places"	ARAR	Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation, and mitigation processes.	Cultural and historic sites have been identified within the 200 Areas; therefore, the substantive requirements of this act are applicable to actions that might disturb these types of sites. This requirement is location specific.

Comment: The detailed information needs to be provided before making the site-specific determinations. Is there an assumption that individual ARARs will be protective?

Response: Detailed evaluation will be completed in a cultural resource review completed by a third party and documented in a letter report, which includes a Hanford cultural resource review tracking number. Substantive compliance with ARARs will provide protection of human health and the environment and include protection of cultural resources.

Comment: An assumption should be made cultural resources will be encountered.

Response: The assumption is made that cultural resources could be encountered. See "Rationale for Use" in Table A-1.

Table B-3. Confederated Tribes and Bands of the Yakama Nation Comments and Responses

Confederated Tribes and Bands of the Yakama Nation Russell Jim, Project Manager (Yakama Nation ERWM)
2. *However, regulations and guidance state that, as appropriate, TBCs should be considered in determining the removal action necessary for protection of human health and the environment. No TBCs are being considered for this removal action.* **Comment:** Why are No TBCs being considered? **Response:** Whether or not a requirement is applicable, or relevant and appropriate (ARAR), or whether or not a requirement is to be considered (TBC) is addressed in the second column of Table A-1. However, the last sentence of the first paragraph of page A-1 does state, No TBCs are being considered for this removal action." Notwithstanding, Table A-3 [see below] does address TBCs.

Table A-3. Identification of To Be Considered Criteria

Criteria To Be Considered	Rationale for Use
"Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility Waste Analysis Plan"	Establishes criteria for waste acceptance at the 200 Area ETF.

ARAR = applicable or relevant and appropriate requirement
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
EE/CA = environmental evaluation/cost analysis
ERDF = Environmental Restoration Disposal Facility
ETF = Effluent Treatment Facility
NTCRA = non-time-critical removal action
P&T = pump and treat
RAO = remedial action objective
RI/FS = remedial investigation/feasibility study
ROD = Record of Decision
TBC = to be considered
YN = Yakima Nation