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

14-AMRP-0092

JAN 2 4 2014

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Addressees:

ENGINEERING EVALUATION/COST ANALYSIS FOR PERCHED WATER PUMPING/PORE WATER EXTRACTION, DOE/RL-2013-37, REVISION 0

This letter transmits the Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction, DOE/RL-2013-37, Revision 0 to the U.S. Environmental Protection Agency and State of Washington Department of Ecology. Your comments have been reviewed and incorporated.

If you have any questions, please contact me, or your staff may contact, Briant Charboneau, of my staff, on (509) 373-6137.

Sincerely,

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

AMRP:NMJ

Attachment

cc: See Page 2

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EDMC

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cc w/attach:
G. Bohnee, NPT
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DOE/RL-2013-37 Rev 0

ENGINEERING EVALUATION/COST ANALYSIS FOR 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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Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction

Date Published
October 2013

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
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Release Approval

APPROVED
By Janis D. Aardal at 9:11 am, Jan 21, 2014

Date

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Executive Summary

This engineering evaluation/cost analysis (EE/CA) has been prepared for public and Tribal comment and evaluates approaches for the extraction of water from the perched water zone located north of B Tank Farm in the 200 East Area of the Hanford Site in Richland, Washington. This EE/CA is based on the results of the *Field Test Plan for the Perched Water Pumping/Pore Water Extraction Treatability Test* (DOE/RL-2011-40), which was conducted in support of the remedial investigation/feasibility study work plan for the 200-BP-5 and 200-DV-1 Groundwater Operable Units. The perched zone, which is part of the 200-DV-1 Operable Unit (OU), is in the vadose zone above the main water table aquifer. The aquifer is in the 200-BP-5 groundwater OU in the 200 East Area of the Hanford Site. Under the treatability test plan, contaminated water is being extracted from the perched zone and is being treated at the Effluent Treatment Facility (ETF) on the Hanford Site. The results of this EE/CA will be used to continue the extraction of contaminated water as a non-time-critical removal action (NTCRA). The information in this EE/CA and results from implementing the selected removal action also will be used to support the 200-BP-5 OU and 200-DV-1 OU remedial investigations. This EE/CA identifies the scope of work for the NTCRA and the proposed alternatives and analyzes these alternatives for effectiveness, implementability, and cost. The U.S. Department of Energy (DOE), with concurrence from the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) will use this EE/CA as the basis for determining the best method for control of contaminants in the extracted groundwater to minimize potential risks to human health and the environment. This EE/CA was prepared in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*[1] (CERCLA). Although access to groundwater on the Hanford Site is controlled, contaminant levels in the perched water currently exceed federal and state drinking water standards and have the potential to adversely impact the 200-BP-5 groundwater.

This EE/CA evaluates three alternatives to treat the extracted perched water from the contaminant plume in the 200-DV-1 OU.

[1] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq. Pub. L. 107-377, December 31, 2002. Available at: http://epw.senate.gov/cercla.pdf.

- Alternative 1: No Action
- Alternative 2: Extracted perched water will be sent to the ETF in the 200 East Area, (the same as the existing treatability test)
- Alternative 3: Extracted perched water will be sent to the 200 West Pump and Treat (P&T) Facility for treatment.

Alternative 1, the No Action Alternative provides a baseline for comparing the other alternatives. Under Alternative 1, it is assumed that all current action would be ceased and no legal restrictions, institutional controls, or active measures are applied to perched water zone.

Alternative 2, Treatment at ETF. Extraction of water from the 200-DV-1 OU perched zone and transferring the extracted perched water by truck to ETF where it will be treated and injected back into the aquifer. This is the same method being used for the treatability test.

Alternative 3, Treatment at the 200 West P&T. Extraction of water from the 200-DV-1 OU perched zone and treatment of the water at the 200 West P&T Facility is an alternative where water is transferred by truck to the 200 West P&T Facility where it would be treated and injected back into the 200 West aquifer. In this alternative, the extracted water will initially continue to be treated at ETF until the uranium treatment train is installed in the 200 West P&T Facility. It is expected that uranium treatment at 200 West P&T Facility will be available by mid fiscal year (FY) 2015 and is specified in the 200-UP-1 remedial action work plan. The capability of the 200 West P&T Facility to treat and re-inject the water is evaluated in Chapter 5.0.

These alternatives were evaluated in terms of effectiveness, implementability, and cost.

Alternative 1 (No Action) would not eliminate, reduce, or control risks to human health and the environment. The DOE is required by federal orders and state and federal laws to protect the public from unacceptable exposures, and Hanford currently has administrative and physical controls in place to prevent unacceptable exposures to ionizing radiation and other chemical hazards from contamination. DOE cannot implement a "no action" alternative (e.g., no controls) for the perched water because it would put the public and the environment at risk and would not meet the requirements of state and federal laws. Therefore, the "no action" alternative cannot be considered a viable alternative as it is not protective of human health and the environment.

Alternative 2 would meet applicable or relevant and appropriate requirements (ARARs) and is implementable; however, the cost associated of implementing Alternative 2 is excessive in comparison to the cost of implementing Alternative 3.

The recommended alternative is Alternative 3, treatment at the 200 West P&T Facility. This selection is based on its overall ability to protect the environment and its effectiveness in maintaining protection for both short and long terms. The proposed action is necessary to protect human health and the environment by preventing further migration of contaminants and to avoid a foreseeable threat. Treatment of the perched water under this proposed removal action is consistent with and would not impede any planned or existing remedial actions on the Central Plateau.

The current cost estimate for Alternative 2 is $6,400,000 and the cost estimate for the recommended Alternative 3 is $1,594,350.

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APPENDIX

FIGURES

TABLES

TERMS

ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
COPC	contaminants of potential concern
CY	calendar year
DOE	U.S. Department of Energy
DOE/RL	U.S. Department of Energy, Richland Operations Office
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 Facility
FBR	fluidized bed bio reactor
FY	fiscal year
gpm	gallons per minute
HEIS	Hanford Environmental Information System
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
IX	Ion Exchange
MCL	maximum contaminant level
NCP	"National Oil and Hazardous Substances Pollution Contingency Plan"
NPL	National Priorities List
NTCRA	non-time-critical removal action
OU	operable unit
P&T	pump-and-treat
RAO	removal action objective
TPA	Tri-Party Agreement (*Hanford Federal Facility Agreement and Consent Order*)
VER	vacuum enhanced recovery

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1.0 INTRODUCTION

This engineering evaluation/cost analysis (EE/CA) has been prepared in accordance with "National Oil and Hazardous Substances Pollution Contingency Plan" (NCP), "Removal Action" (40 CFR 300.415(b)(4)(i)), to assist the U.S. Department of Energy (DOE) in initiating the non-time-critical removal action (NTCRA) and identifying the most effective alternative for treatment of the extracted perched water in the 200-DV-1 operable unit (OU) located at Hanford Site, Richland, Washington.

The development of this EE/CA satisfies environmental review requirements and provides for stakeholder involvement while providing a framework for alternative selection. The approach also establishes an Administrative Record for documentation of the removal action which will be referenced in the 200-DV-1 Administrative Record. This EE/CA identifies the objectives of the removal action and analyzes the effectiveness, implementability, and estimated cost of the proposed action to satisfy these objectives. DOE is seeking U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) review and concurrence in this removal action to help ensure consistency with ongoing or subsequent related remedial actions. Public involvement activities conducted pursuant to this EE/CA will be performed according to the *Hanford Federal Facility Agreement and Consent Order Hanford Public Involvement Plan* (Ecology et al. 2012) and public participation requirements established in 40 CFR 300.415(n), "Community Relations in Removal Actions," and any applicable DOE policies. The EE/CA will undergo a 30-day public comment period. As the agency implementing this action, DOE will consider the comments received from the public and confer with EPA and Ecology in the issuance of the Action Memorandum. The Action Memorandum will identify the selected alternative, whether the one recommended (Alternative 3) or one of the other alternatives, for the perched water in the 200-DV-1 OU.

In support of this evaluation, this document also presents the results of the *Field Test Plan for the Perched Water Pumping/Pore Water Extraction Treatability Test* (DOE/RL-2011-40) for the perched water in the 200-DV-1 OU.

1.1 PURPOSE AND SCOPE

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

actions for the perched water in the 200-DV-1 OU. This EE/CA identifies alternatives and analyzes for effectiveness, implementability, and cost. DOE, EPA and Ecology (Tri-Party Agencies) will use this EE/CA as the basis for determining the best method for control of contaminants, in the vicinity of the Perched Water Zone in the B Area Complex, to minimize potential risks to human health and the environment.

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. The actions being proposed in this EE/CA for the perched water will, to the extent practicable, contribute to the efficient performance of any final remedial action(s) that will be proposed for the 200-BP-5 groundwater OU and 200-DV-1 OU, as required by 40 CFR 300.415(d).

Potentially contaminated solid wastes, not to include liquid wastes, generated during the implementation of this NTCRA will be disposed of at a secure long-term management facility, the Environmental Restoration Disposal Facility (ERDF).

Following public comment, an Action Memorandum, which will document and authorize implementation of the removal action, will be developed on the basis of this EE/CA. Upon issuance of the Action Memorandum, a removal action work plan will be prepared to document the removal action decision(s), removal action levels, removal action methods and implementation schedule.

1.2 REGULATORY OVERVIEW

The President of the United States is given authority by Section 104 of CERCLA, when there is a threat to public health or welfare of the United States or to the environment, to take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release of contaminants into the environment. This authority is delegated to DOE, as the CERCLA Lead Agency, through Executive Order 12580, *Superfund Implementation*. Expedited response actions are addressed by the TPA Action Plan, Section 7.2.4, which cites and is consistent with Executive Order 12580.

This EE/CA was prepared in accordance with CERCLA and 40 CFR 300.415 to evaluate alternative treatment options for the perched water. After the public has had an opportunity to

comment on the alternatives and the recommended approach presented in this document, the agencies will review those comments. After public comments are considered, DOE will issue an Action Memorandum to authorize the removal action.

The 200 Area is listed on the *National Priorities List* (NPL); consequently, both the 200-DV-1 OU and the 200-BP-5 OU are subject to cleanup action under CERCLA. Cleanup activities are performed in accordance with the NCP (40 CFR 300) and the HFFACO (Ecology et al. 1989a). Appendix C of the *Hanford Federal Facility Agreement and Consent Order Action Plan* (Ecology et al. 1989b, hereinafter referred to as the TPA Action Plan) identifies the 200-DV-1 OU and the 200-BP-5 OU as potentially needing remedial action. The actions being proposed in this EE/CA for perched groundwater will, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action as required by the NCP (40 CFR 300.415(d), "Removal Action").

1.3 PUBLIC INVOLVEMENT

Perched water actions taken pursuant to this EE/CA will be conducted in compliance with CERCLA requirements and any applicable DOE policies and in accordance with the HFFACO Hanford Public Involvement Plan (Ecology et al. 2012). This EE/CA will undergo a 30-day public comment period. After the public comment period, a written response to significant comments will be provided in accordance with the NCP (40 CFR 300.820(a), "Administrative Record File for a Removal Action") in the established Administrative Record for Hanford.

2.0 SITE CHARACTERIZATION

This chapter provides information pertaining to the 200-DV-1 OU. It describes the background of the 200-DV-1 OU as well as known and potential groundwater contamination.

The Hanford Site encompasses approximately 1,517 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 2-1 shows the location of the Hanford Site in Washington State. 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 (two reactors), 100-K (two reactors), 100-N, 100-D (two reactors), 100-H, and 100-F.

In 1989, EPA placed the 100, 200, 300, and 1100 Areas of the Hanford Site on the 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan" Appendix B, "National Priorities List" (NPL) pursuant to CERCLA. The 200 Area NPL site contains the 200 East and 200 West Areas, which include waste management facilities and inactive irradiated fuel-reprocessing facilities and the 200 North Area formerly was used for interim storage and staging of irradiated fuel. The 200 Area was the center of activity for processing plutonium at the Hanford Site starting in the mid-1940s. Five general plant process groupings exist in the 200 Area, including fuel processing, plutonium isolation, uranium recovery, cesium/strontium recovery, and waste storage/treatment. Liquid wastes are considered the most significant type of discharge to the environment in terms of volume and numbers of constituents. Detailed information on the historical operations and waste generation mechanisms is provided in the *Central Plateau Ecological Evaluation* (DOE/RL-2001-54).

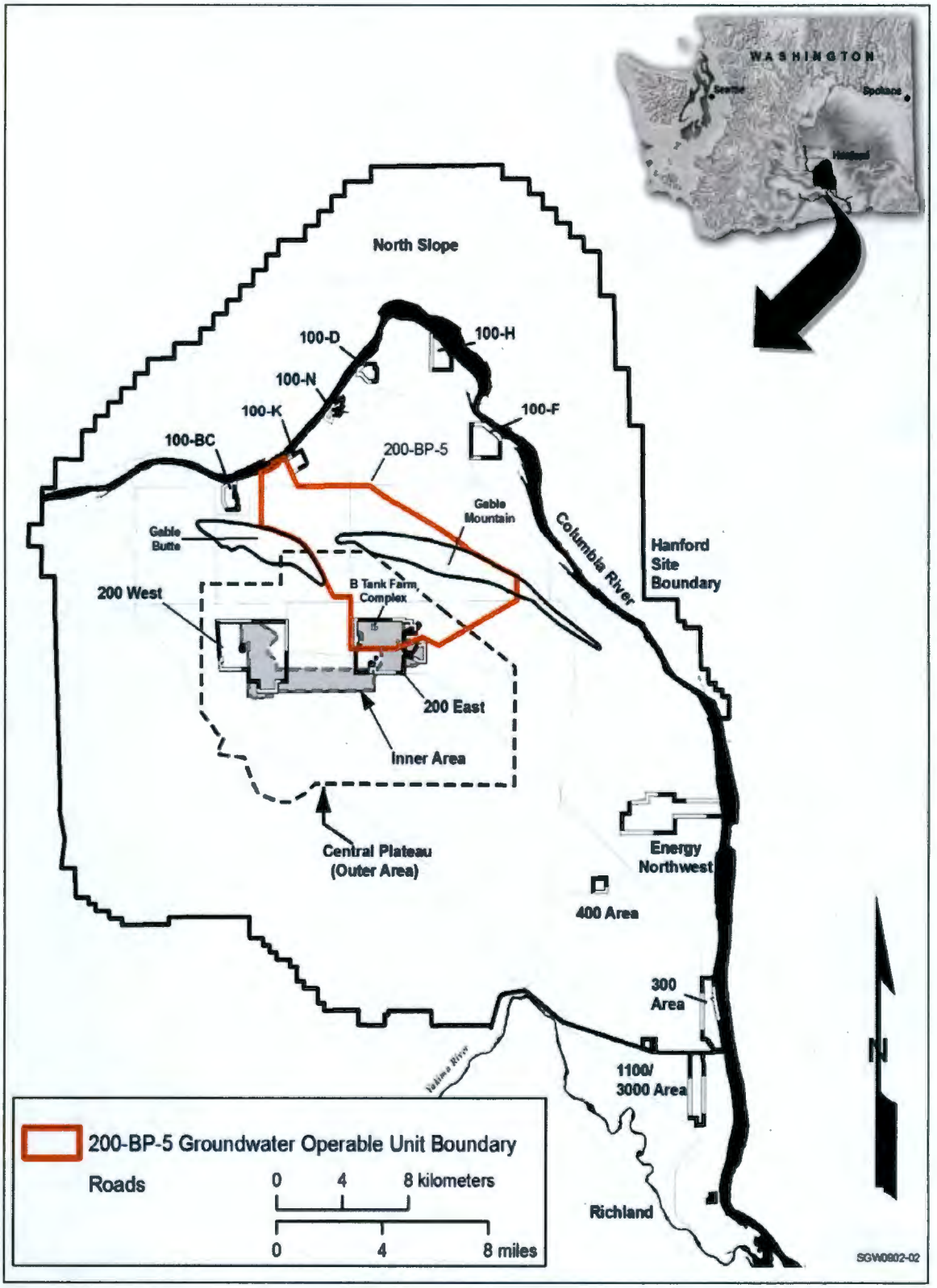

Figure 2-1. Location of 200-BP-5 Operable Unit on the Hanford Site.

2.1 SITE DESCRIPTION AND BACKGROUND

The perched water zone within the 200-DV-1 OU is located above the area encompassed by the 200-BP-5 groundwater OU, which extends from the 200 East Area northwest to the Columbia River and to the eastern flank of the Gable Mountain (Figure 2-1). The 200-BP-5 groundwater OU includes groundwater beneath the B, BX, and BY Tank Farm complex and associated cribs, trenches and unplanned releases, which are identified as the source of contamination associated with the perched water layer within the 200-DV-1 OU.

The 299-E33-344 Well, which is screened in a perched water zone, is located on the north side of B Tank Farm (Figure 2-2). Pumping of the water from the perched zone is currently being conducted as a treatability test as part of the 200-DV-1 OU to support remedy selection for waste sites with deep vadose zone contamination and the underlying groundwater. The elevation contours shown in the shaded area represent the elevation of the bottom of the perched zone.

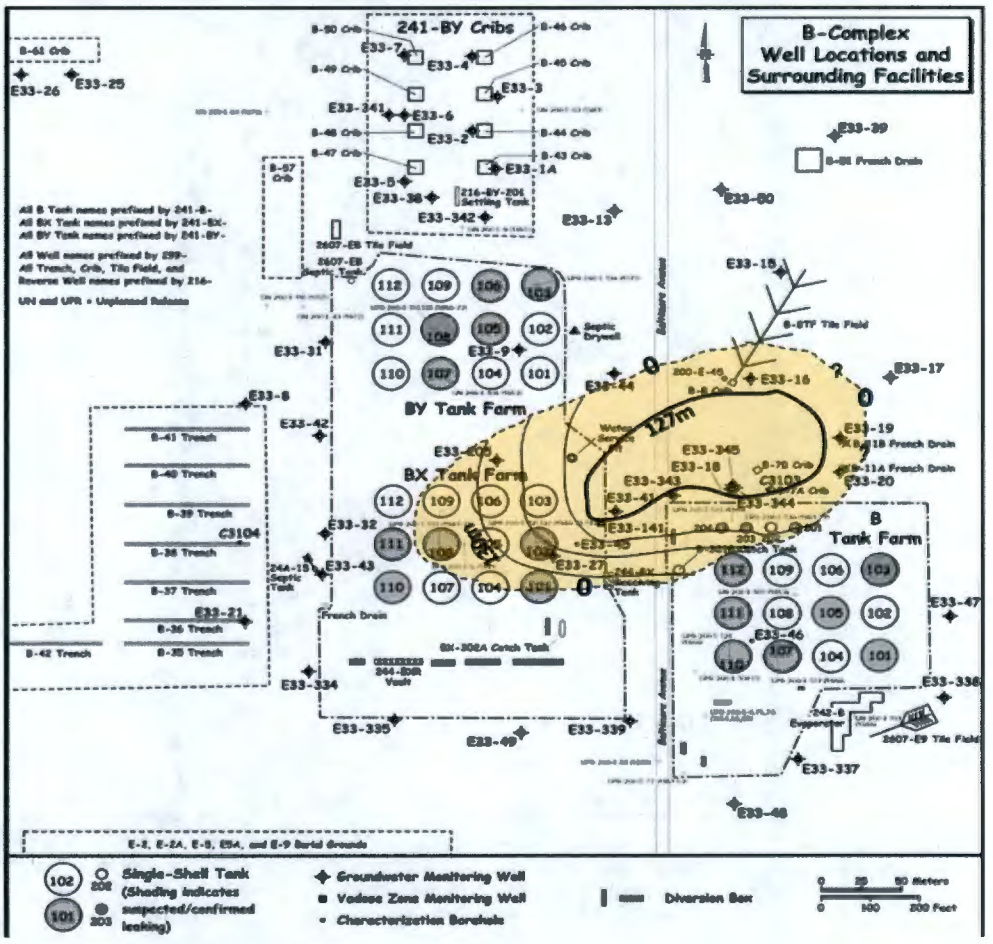

Figure 2-2. Location of Perched Zone and Well 299-E33-344 Berm of B Farm.

2.2 PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS

The current treatability test (DOE/RL-2011-40) is the only investigation that has been conducted for the perched layer. Groundwater monitoring and sampling from the well in the perched layer has been ongoing for several years. Data collected is presented in annual groundwater reports. The data is maintained in the Hanford Environmental Information System (HEIS) data base.

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

2.3 SOURCE, NATURE AND EXTENT OF CONTAMINATION

The perched water, which contains uranium, technetium-99 (Tc-99) and nitrate at concentrations that have exceeded 71,000 µg/L, 50,000 pCi/L, and 140,000 µg/L, respectively, is a continuing source of contamination to groundwater in the underlying unconfined aquifer. The inferred distributions of uranium and Tc-99 in groundwater near the B Tank Farm Complex are shown for the annual groundwater report calendar years (CY) 2007 to 2009 in Figure 2-3 and Figure 2-4, respectively. 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 layer resulting in the buildup of water on top of the layer. The contaminated water built up on the perched layer migrates downward and contaminates the groundwater underneath the layer.

Table 2-1 provides the analysis of perched water samples. The table includes the target analytes uranium, Tc-99 and nitrate plus radioactive (Rad) constituents and non-radioactive (Non-Rad) constituents. These represent the contaminants of potential concern (COPC) identified in the Perched Water Treatability Test Plan that have been sampled during the treatability test. From Table 2-1 the target analytes uranium, Tc-99 and nitrate are significantly higher in concentration than their respective maximum contaminant levels (MCLs). Uranium is more than 2000 times the MCL. Tc-99 is more than 50 times the MCL and nitrate is as much as 18 times the MCL. The highest value for tritium is a little more than twice the MCL and the other constituents are below or only slightly above an MCL. The target analytes therefore represent the primary risk to the underlying groundwater and to human health and the environment.

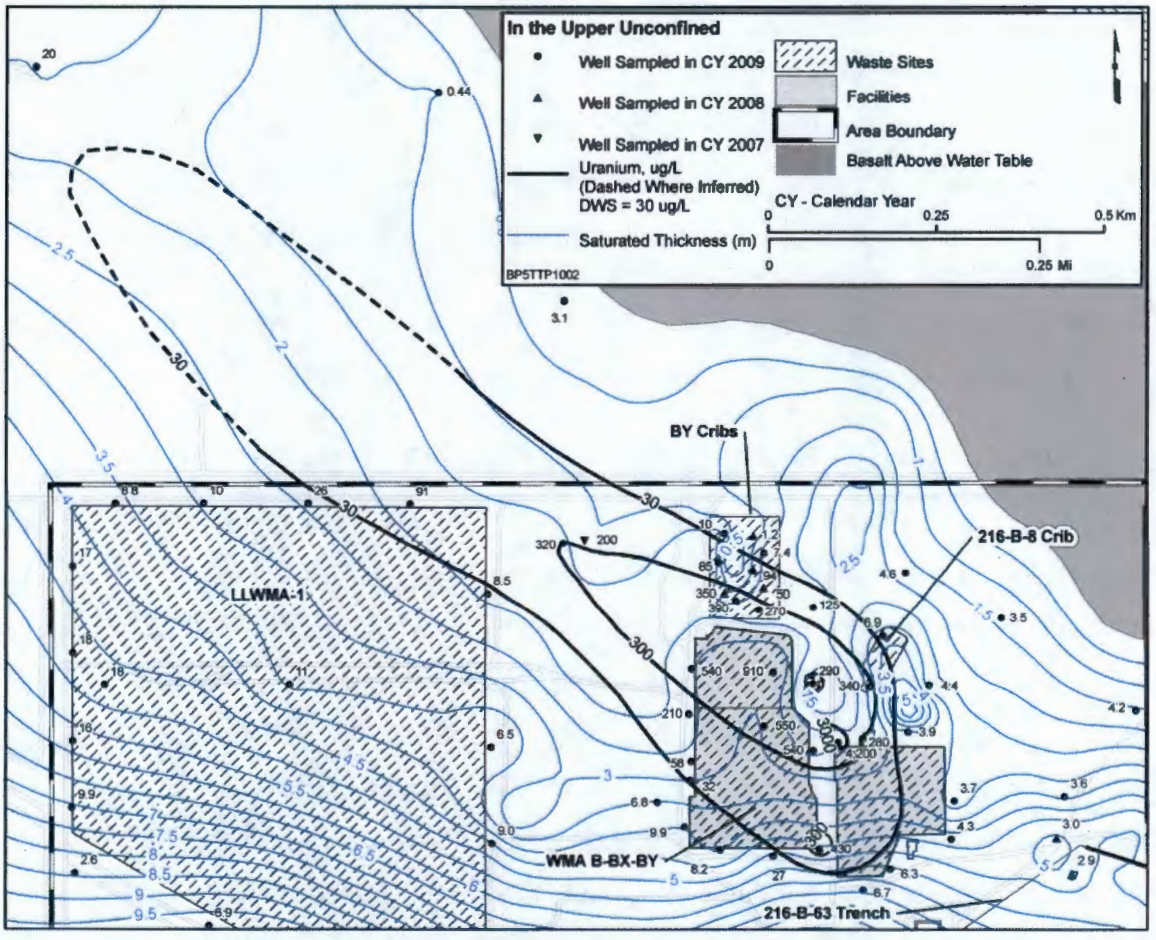

Figure 2-3. Saturated Thickness of the Unconfined Aquifer near the B Tank Farm Complex with Inferred Uranium Distribution.

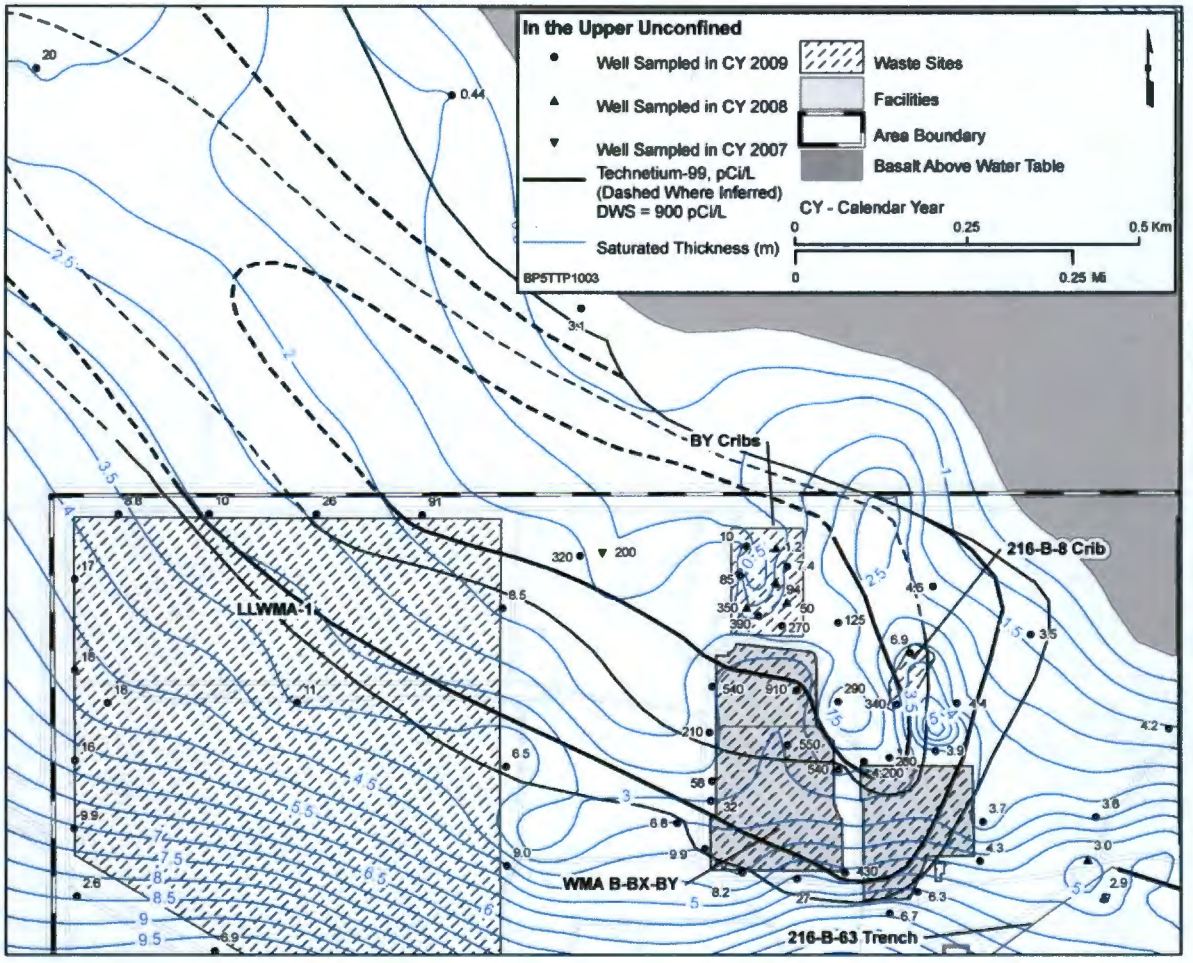

Figure 2-4. Saturated Thickness of the Unconfined Aquifer near the B Tank Farm Complex with Inferred Technetium Distribution.

Table 2-1. Perched Water Sampling Data.

Perched Water Sampling Data								
COPCs	Units	Sampling Dates						
		9/7/2011	10/4/2011	12/5/2011	4/23/2012	8/2/2012	2/5/2013	MCL
Target Analytes								
Uranium	ug/L	4500	63600	71500	51500	26600	37300	30
Technitium 99	pCi/L	5640	37800	45100	22100	12200	51000	900
Nitrate N	mg/L	90.6	136	183	103	118	144	10
Rads								
Carbon-14	pCi/L					1490	1530	2000
Iodine-129	pCi/L		U			U	U	1
Tritium	pCi/L		41300	43500	22000	29000	34000	20000
Non-Rads								
Arsenic	ug/L		9.7	7.8	7.6	6.9	5.26	10
Calcium	mg/L	37.1	193	221	155	180	208	
Chromium	ug/L		76.6	46	134	199	154	48
Iron	ug/L	169	312	340	27.7	19	23.6	300
Sodium	mg/L	66.1	366	326	288	343	275	
Chloride	mg/L	66.3	98.5	87.2	82.1	84.4	85	250
Floride	mg/L	60.2	13.1	9.4	15.1	12.2	7.9	4
Nitrite	ug/L		290	181	417	312	187	1000
Sulfate	mg/L	48.3	60.3	62.7	52.9	54	60	250

As shown on Table 2-1, the concentrations of uranium and Tc-99 in the perched water horizon rose from 4,500 pCi/L and 5,640 ug/L in September 2011 to 71,500 pCi/L and 45,100 ug/L in December 2011. The increase at the perched water in Well 299-E33-344 occurred shortly after pumping was started. The perched water extraction appears to have been pulling in the water with higher concentrations from within the perched zone. This indicated that the mass of contamination in the perched zone was higher than initially indicated. The primary source of the increase appears to be consistent with discharge concentrations of Tc-99 and uranium from the 241-BX-102 unplanned release, which occurred in the 1950s. Extracting the perched water is reducing the mass of contamination that would otherwise migrate to the groundwater.

2.4 RESULTS OF THE TREATABILITY TEST

The overall deep vadose zone treatability test plan, *Deep Vadose Zone Treatability Test Plan for the Hanford Central Plateau* (DOE/RL-2007-56), focused on actions to immobilize and/or extract contamination with potential to have an adverse impact on groundwater and proposed options for multiple treatability tests. The perched water treatability test was selected as one of

the tests. The field test plan and sampling and analysis plan are documented in the previously mentioned documents DOE/RL-2011-40 and DOE/RL-2011-37. The perched water treatability test is being conducted in the perched water region of the 200-DV-1 OU, located on the north side of the B Tank Farm. The test utilizes the existing 299-E33-344 Well with a screen that overlaps a region of perched water. Testing at this location began with traditional pumping, with the plan to use vacuum enhanced recovery (VER) of the perched water to continue extraction through the transition into unsaturated conditions. However, the traditional pumping continues to yield significant volumes of water and will be continued as part of the NTCRA. At the time the treatability test plan was written, ETF represented the most technically sound and cost-effective approach for treating extracted perched water and transferring it to an approved site for re-injection of the treated water.

The perched water is believed to be slowly entering the aquifer and contributing to groundwater contamination. For the initial phase of the treatability test, the perched water is being removed using gravity draining into the well sump and subsequent pumping to the surface to a holding tank. The water is then transported by tanker to the permitted water treatment facility, ETF. As part of the removal action covered by this EE/CA the gravity drainage and pumping will continue until the yield drops. At that time, a vacuum will be applied to the well head to increase flow to the well. Once it is determined that the perched zone is mostly in an unsaturated condition, then a higher vacuum will be applied to induce pore water extraction to maximize removal of contaminants. Because the vacuum application is integral to pore water extraction, transition from VER to pore water extraction is anticipated to be gradual, VER of drainable perched water is included in the scope of the perched water pumping/pore water extraction treatability test and would be part of the removal action. The initial pumping test provided considerable information on the pore water extraction testing. This treatability test has been successful. Testing was initiated in August 2011 with approximately 150,000 gallons (567,811 liters) pumped from the perched water region by August 2013. The test is in its second year of operation. Figure 2-5 provides a plot of the weekly and cumulative gallons extracted from the perched zone. Current estimates indicate that there is approximately 2,000,000 gallons (7,570,820 liters) of water in the perched zone that might be extractable.

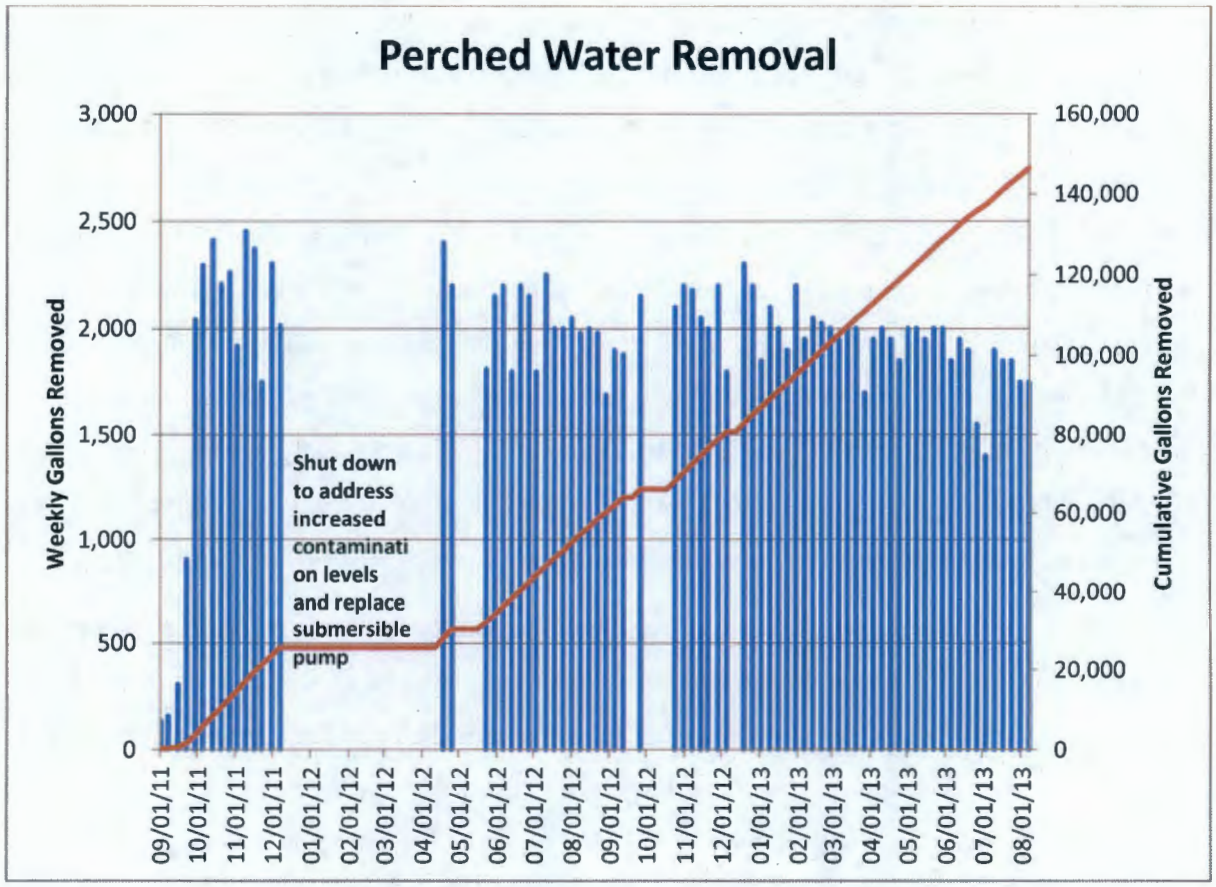

Figure 2-5. Plot of Weekly and Cumulative Gallons Removed from Perched Water Zone.

The NTCRA will include continued pumping of the perched water well followed by adding the vacuum enhanced pumping and finally the pore water extraction. Removing water from the perched zone will also be enhanced by the addition of two more perched water wells as shown on Figure 2-6. The installation of the wells will be incorporated into the remedial action plan for implementing the NTCRA. This basic scope will be followed for the NTCRA regardless of which removal alternative is being implemented.

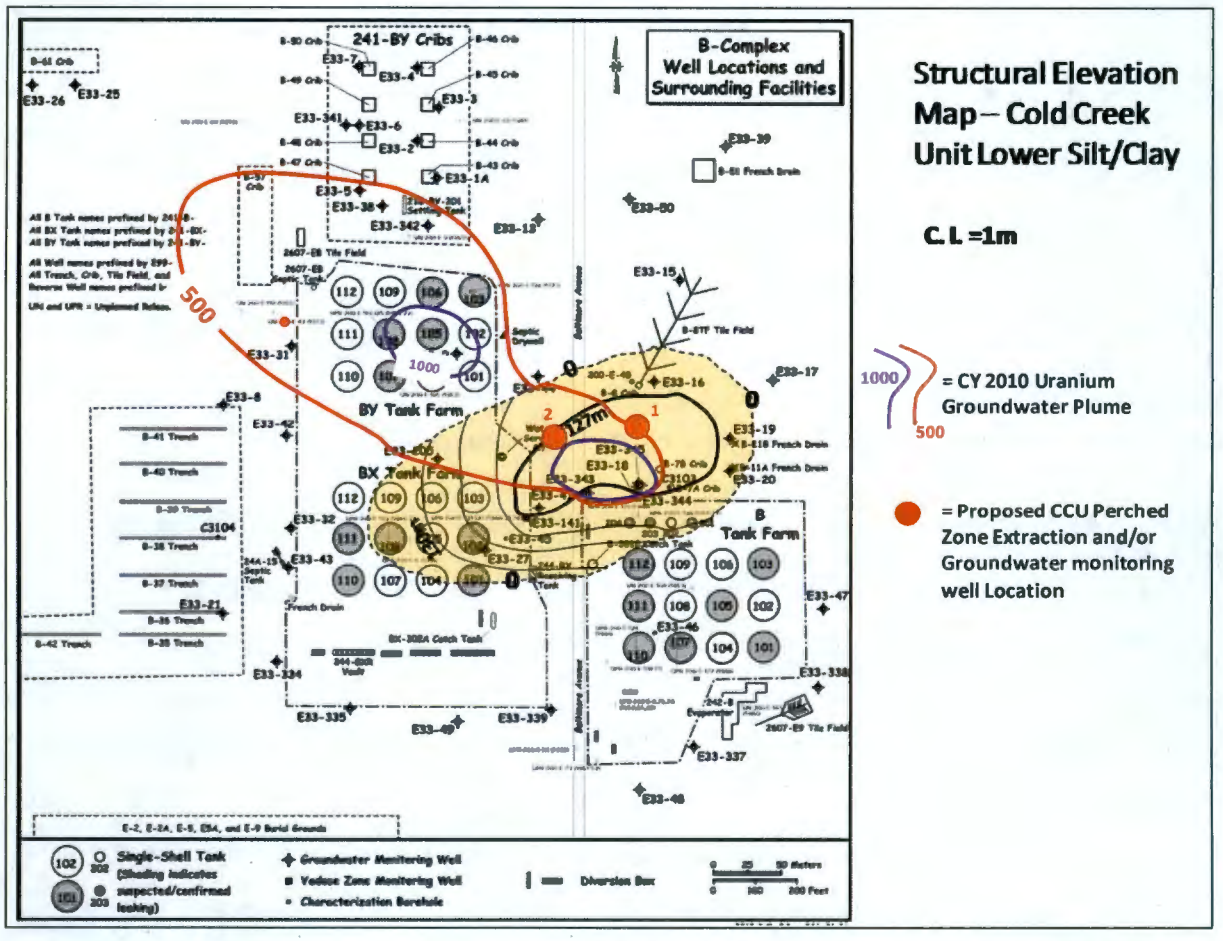

Figure 2-6. Location of Perched Water Zone and Proposed Location for Two Additional Extraction Wells. Uranium Plume in the Groundwater also Shown.

NOTE: The elevation contours are for the bottom of perched zone.

3.0 REMOVAL ACTION OBJECTIVES

The key objectives of the NTCRA are to:

- 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 and 200-BP-5 OUs
- Apply institutional controls to prevent exposure to contaminants.

3.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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 its more immediate removal actions. DOE is the implementing agency for this NTCRA. In accordance with the NCP (40 CFR 300.415(d), "Removal Action"), removal actions will, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned. 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. Appendix A provides the ARARs for the identified alternatives.

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4.0 IDENTIFICATION OF ALTERNATIVES

The removal action for the perched water must be protective of human health and the environment, and must meet the removal action objectives (RAO). Based on these considerations, the removal action alternatives are discussed in detail in the following sections.

4.1 ALTERNATIVE 1 – NO ACTION

It is assumed that the perched water would be abandoned without any further actions. All associated activities would be discontinued indefinitely. Ultimately, access to the perched water is assumed to be unrestricted. Industrial and radiological hazards would continue to exist because controls to prevent access would not be maintained. Initial risks of Alternative 1 are minimal, but risks over time are anticipated to increase. This alternative is not protective and is used as a baseline for comparison only.

4.2 ALTERNATIVE 2 – TREATMENT AT ETF

This alternative is the same as the existing treatability test. Routine groundwater monitoring would also continue. The CERCLA decision process will continue to select the final remedy, which may or may not include additional actions beyond what is selected in this EE/CA.

The main components of the treatability test are to extract perched water using gravity draining into a well sump with subsequent pumping to the surface to a holding tank. The extraction initially will be from the existing perched water well with an expected recovery of approximately 100,000 gallons (380,000 liters) a year (0.19 gallons [0.722 liters] per minute [gpm]). Two additional wells are planned to increase the extraction rate to approximately 300,000 gallons (1,140,000 liters) a year (0.57 gpm). The gravity drainage and pumping will continue until the yield drops. At that time, a vacuum will be applied to increase flow to the well. 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 a permitted water treatment facility. Under Alternative 2, the extracted water from the perched layer in the 200-DV-1 OU would be sent to the 200 Area ETF in the 200 East Area for treatment and disposal. The liquid waste from ETF is discharged to a state-approved Land Disposal Site located in the 200 West Area upgradient of the 200-BP-5 groundwater OU. The ETF has a treatment flow rate capability of approximately

50 gpm for groundwater; the 0.19 to 0.57 gpm from the perched water extraction can be handled by ETF. The contaminants in the perched water have been reviewed and also can be treated by ETF. At the time the treatability test plan was written, ETF represented the most technically sound and cost-effective approach for treating extracted perched water and transferring it to an approved site for re-injection of the treated water.

4.3 ALTERNATIVE 3 – TREATMENT AT THE 200 WEST P&T FACILITY

The main components of the treatability test for Alternative 3 are the same as described in Alternative 2. However, perched water extracted from the 200-DV-1 OU would be treated at the 200 West P&T Facility. The extracted water would be transferred by truck to the 200 West P&T Facility where it would be treated and injected into the 200 West Area aquifer. Figure 4-1 shows the location of the 200 West P&T System, the perched water extraction well in the 200 East Area and the location of ETF in the 200 East Area. The preamble to the NCP states that when noncontiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. The 200-DV-1 OU and the 200 West P&T Facility are reasonably close to one another, and the extracted contaminated groundwater is compatible for the selected treatment approach. Therefore, these two sites are considered to be a single site for response purposes. The 200 West P&T Facility is a suitable area in close proximity to the contamination and necessary for implementation of the response action and therefore also considered onsite.

The 200 West P&T Facility was constructed in 2012 and designed for cleanup of the 200-ZP-1 groundwater OU located in the 200 West Area. The 200 West P&T Facility is designed to capture and treat contaminated groundwater to reduce the mass of carbon tetrachloride, total chromium - trivalent and hexavalent, nitrate, trichloroethylene, I-129, and Tc-99. The system design also includes provisions for future treatment of groundwater from the 200-UP-1 OU, including removal of uranium. It is expected that the uranium treatment capability will be installed at the 200 West P&T Facility by 2015. The initial treatment capacity of the system is 2,500 gpm of extracted groundwater; however, the design of the facility includes the ability to increase the design flow rate to 3,750 gpm. From a volume perspective, the flow rate from the

perched water pumping can be accommodated by the 200 West P&T Facility. An evaluation of the capability of the 200 West P&T Facility to meet treatment requirements for the perched water is provided in Section 5.2.

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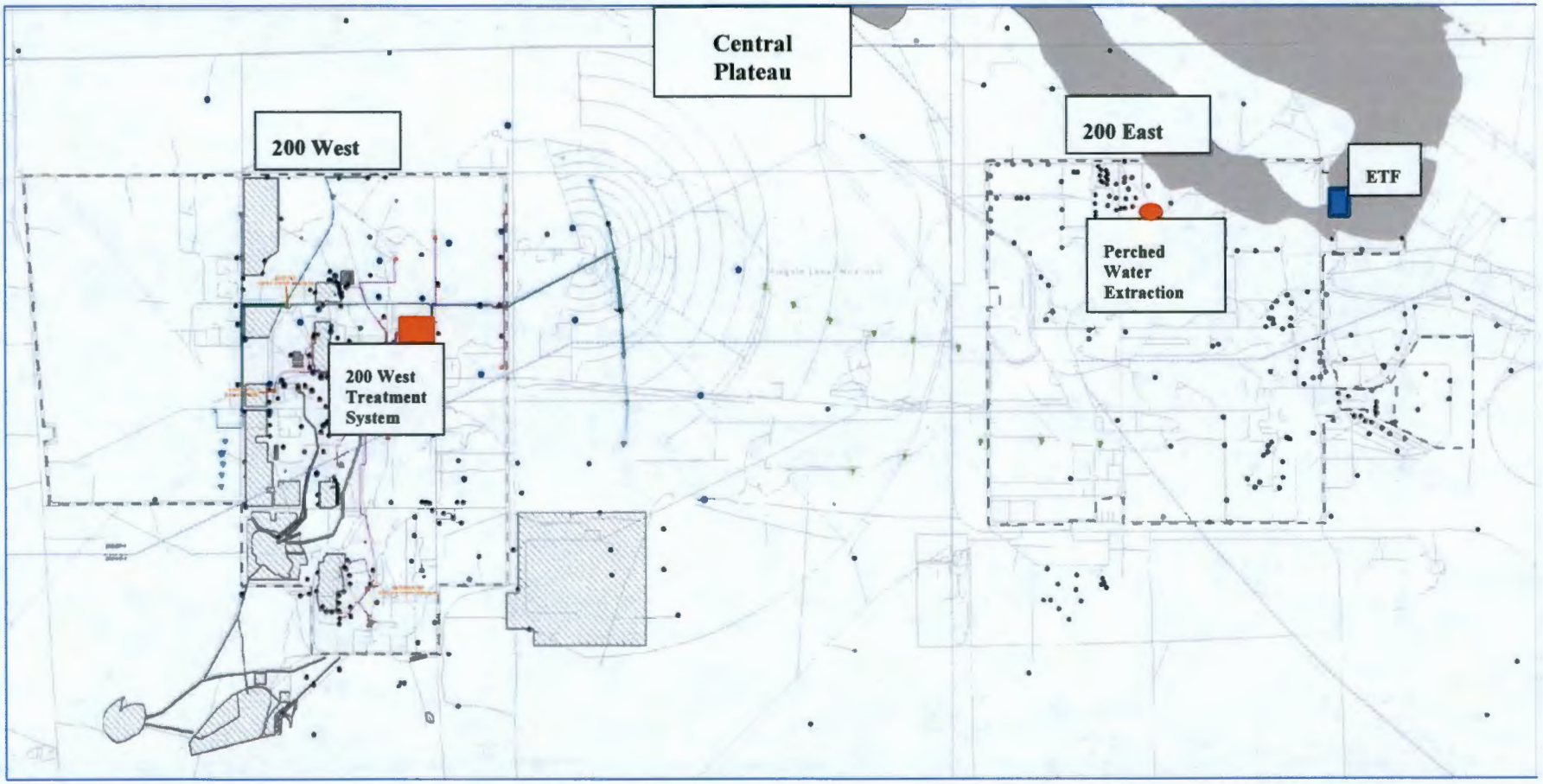

Figure 4-1. Location of Perched Water Extraction System in 200 East and 200 West P&T System on the Central Plateau.

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5.0 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

As required by CERCLA, the NTCRA alternatives identified in Chapter 4.0 will be evaluated against three criteria: effectiveness, implementability, and cost (EPA/540-R-93-057, *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA*).

Effectiveness includes two subcriteria: protectiveness and the ability to meet the RAOs. Implementability is evaluated based on technical feasibility; availability of equipment, personnel, services, and disposal facilities; and administrative feasibility. Costs are estimated, including capital costs, operations and maintenance costs, and net present worth costs.

5.1 EFFECTIVENESS OF REMOVAL ACTION ALTERNATIVES

The following sections address the criteria for evaluating protectiveness and the ability to meet ARARs.

5.1.1 Overall Protection of Human Health and the Environment

Protection 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. This criterion was used to evaluate whether implementation of an alternative achieves adequate protection of risks to human health and the environment through the likely exposure pathways.

Alternative 1, the No Action alternative, no active actions would be taken to address potential threats to human health and the environment posed by the contaminants of concern present. All existing actions would cease, including institutional controls, monitoring and the existing treatability test. Alternative 1 cannot meet the RAOs and will not be protective of human health and the environment; therefore, Alternative 1 will not be further considered.

Alternatives 2 and 3 are protective of human health and the environment and can achieve RAOs. Each alternative protects human health by preventing exposure to contaminated perched water, controlling sources of groundwater contamination, and by removing contaminant mass from perched water. Alternatives 2 and 3 are also protective of workers during implementation as

Hanford workers are experienced in handling extracted contaminated groundwater and transporting it by truck.

5.1.2 Overall Ability to Achieve ARARs

Evaluation of the developed alternatives against the identified ARARs is mandatory, to determine whether they meet the requirements. The ARARs are substantive environmental regulations that have been evaluated as potentially pertinent to the removal action. Removal actions are required to comply with ARARs to the extent practicable. This section presents the evaluation of the alternatives against the key ARARs addressed in this EE/CA. Alternative 1 does not meet the ARARs and Alternatives 2 and 3 do meet the ARARs identified in Appendix A. The ARARs will be documented in the CERCLA Action Memorandum. The Action Memorandum will specifically identify the substantive requirements and how they will be met.

5.2 IMPLEMENTABILITY OF THE ALTERNATIVES

This criterion addresses the technical and administrative feasibility of implementing the alternatives, and the availability of the required services and materials.

Alternative 2, treatment of the perched water at ETF, is currently underway as a treatability test, and has been operating since 2011. This alternative, as well as Alternative 3, would require a tanker truck to transport extracted perched water for treatment. Transportation by tanker truck has been successful. Alternative 2 is highly implementable.

Alternative 3, treatment of the perched water at the 200 West P&T Facility, would require using a tanker truck to transport extracted water to 200 West P&T Facility. Transport of the perched water by tanker truck has been demonstrated to be successful. Other requirements for using the 200 West P&T Facility include analysis of impacts to flow rate and influent concentrations for the Tc-99 Ion Exchange (IX) system and the nitrate concentrations for the fluidized bed bio reactor (FBR). Contaminants identified in the perched water are provided on Table 5-1. The 200 West P&T Facility is capable of treating these contaminants to meet cleanup criteria. The IX resins are used to remove radionuclides (Tc-99 and uranium) and the FBR reduces or removes nitrate, metals and organics. Alternative 3 is highly implementable.

A calculation of the impacts from combining the weekly volume (2,100 gallons [7,980 liters]) from the perched water with the current flow rates into the IX and FBR systems is provided in

Table 5-1. The analysis has two scenarios; 1) the perched water from the uranium treatment is pumped into the IX equalization tank over a 1-hour period, and 2) the water is pumped into the IX equalization tank over a 4-hour period. This covers a reasonable time frame over which the water would be processed by the 200 West P&T Facility. For these calculations, a flow rate of 500 gpm is assumed for the IX system and a flow rate of 1,500 gpm is assumed for the FBR system. The table also lists representative concentrations of each constituent influent stream at the 200 West P&T Facility. Using these flow rates and concentrations, the net increase in mass and the resulting increase in concentrations is calculated. For the 1-hour transfer scenario, the Tc-99 influent concentration to the IX system increases by 3 fold from 1,700 pCi/L to 4,841 pCi/L and the nitrate influent concentration to the FBR system increases from 23 mg/L to 25.8 mg/L. For the 4-hour transfer scenario, the Tc-99 influent concentration increases by 1.5 fold from 1,700pCi/L to 2,511 pCi/L and the nitrate increases from 23 mg/L to 23.7 mg/L. Table 2-1 also lists the resulting combined influent concentrations for the other perched water constituents. The primary impact is from the elevated Tc-99 and nitrate concentrations in the perched water. A calculation for uranium is also provided based on the assumed design parameters for uranium treatment. The uranium treatment capability will be in place by 2015 for implementation of the NTCRA.

75 Table 5-1. Combined Perched Water and 200 West P&T Influent Concentration Calculations.

Combined Perched Water and ZP-1 influent Concentration Calculations

			1 Hr Volume (liters)	4 Hr Volume (liters)			
Pre Ion Exchange volume		500 GPM	113562.30	454249.20			
Perched Volume		2100 Gallons	7949.36	7949.36			
		Total Volume	**121511.66**	**462198.56**			
Pre Bio Treatment		1500 GPM	340686.90	1362747.60			
Perched Volume		2100 Gallons	7949.36	7949.36			
		Total Volume	**348636.26**	**1370696.96**			
	units	Max Perched Concentration	ZP-1 Ion exchange Influent Concentration	1 hour combined Influent Concentration	4 hour combined Influent Concentration	Maximum Design influent	Clean-up Levels (MCL)
Tc-99 IX	pCi/L	51000	1700	4925.23	2547.91	14,500	900
Uranium *	pCi/L	71500	1000	5612.15	2212.53	10,000	30
		Max Perched Concentration	ZP-1 Bio treatment Influent Concentration	1 hour combined Influent Concentration	4 hour combined Influent Concentration		
Nitrate	mg/L	183	23	26.65	23.93	320	10
Tritium	pCi/L	43500	5100	5975.57	5322.70	20000	20000
Carbon-14	pCi/L	1530	2	36.84	10.86		2000
Arsenic	ug/L	9.7	2.6	2.76	2.64		10
Calcium	mg/L	221	64.6	68.17	65.51		
Chromium	ug/L	199	33	36.79	33.96		48
Iron	ug/L	340	20	27.30	21.86		300
Sodium	mg/L	366	49.5	56.72	51.34		
Chloride	mg/L	98.5	64.4	65.18	64.60		250
Floride	mg/L	15.1	0.24	0.58	0.33		4
Nitrite	ug/L	312	40	46.20	41.58		1000
Sulfate	mg/L	62.7	99.6	98.76	99.39		250

76 * Calculations for Future Uranium Treatment
77

Based on these calculations, the impact to influent nitrate concentrations is relatively minor. For Tc-99, the maximum increase for the 1-hour period to 4,841 pCi /L, although 3 times the average concentration, this is well below the maximum influent design concentration of 14,500 pCi /L. The maximum influent design concentrations are for the target parameters are listed on Table 2-1. The net increases in flow and concentrations of uranium and Tc-99 and nitrate for either the 1-hour or 4-hour transfer period are well within the design envelope for the 200 West P&T Facility. The effluent concentrations of all the constituents will be well below the cleanup criteria (MCL) listed in the table.

5.3 COST OF ALTERNATIVES

Both alternatives will require a truck to transport the extracted water for treatment. 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. In order to treat the extracted perched water at the 200 West P&T Facility, a uranium treatment train will be required. A 300 gpm IX uranium treatment train is planned for the 200 West P&T Facility and will be designed to treat water from multiple sources including the perched water and will cost approximately $3M. 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. Uranium treatment will be implemented by 2015 to support both 200-UP-1 remedy and the NTCRA for Perched Water. The aggregate average cost to treat the uranium is estimated at $0.004 (0.4 cents) a gallon. The resulting cost to treat perched water at the 200 West Area will be $0.021 (2.1 cents) a gallon. The estimated volume of extracted perched water is 2,000,000 gallons (7,600,000 liters). For ETF only (Alternative 2), the cost for treating the 2,000,000 gallons (7,600,000 liters) of perched water will be $6,400,000. For Alternative 3 (ETF initially and then 200 West P&T Facility) the estimated cost will be $1,594,350 for the 2,000,000 gallons (7,600,000 liters). The 200 West P&T Facility is 7.23 miles (11.6 kilometers) farther than ETF from the perched water well. The yearly transportation cost difference is relatively minor ($780/year). The resulting cost for Alternative 3 would be increased by approximately $3,800 over a 5-year period to $1,598,450.

6.0 RECOMMENDED ALTERNATIVE

The recommended removal action alternative is Alternative 3: Treatment at 200 West Area P&T Facility (when Uranium Treatment is implemented in 2015). The alternative satisfies the three CERCLA evaluation criteria for NTCRAs: effectiveness, implementability, and cost.

For contaminated solid wastes, not to include liquid wates, generated in support of Alternative 3, ERDF would be the recommended disposal location for wastes meeting the ERDF waste acceptance criteria. The recommended alternative is protective of human health and the environment, meets ARARs, is cost-effective, and is consistent with planned or existing remedial actions on the Central Plateau.

6.1 RECOMMENDED ALTERNATIVE FOR 200-DV-1 OU PERCHED WATER EXTRACTION

Alternative 1 (no action) does not meet protectiveness criteria and is not considered further. Alternatives 2 and 3 meet the protectiveness, effectiveness and implementability criteria.

The principal difference between the two alternatives is the cost of treatment. Treating the perched water at 200 West P&T Facility is less than ETF. The cost difference for treatment is $4,801,550 for treating the estimated 2,000,000 gallons (7,600,000 liters). Based on the comparative analyses of the removal action alternatives, the recommended removal action for the perched water extraction is at 200 West P&T Facility for treatment when the uranium treatment capability is installed. Until a selected removal action can be implemented, perched water will continue to be extracted and treated at ETF under the existing treatability test.

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7.0 REFERENCES

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_10/40cfr300_10.html.

40 CFR 300.415, "Removal Action."

40 CFR 300.820, "Administrative Record File for a Removal Action."

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq. Available at: http://www.epw.senate.gov/cercla.pdf.

DOE/RL-2001-54, 2006, *Central Plateau Ecological Evaluation Report,* Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2007-56, 2008, *Deep Vadose Zone Treatability Test Plan for the Hanford Central Plateau,* Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=0804160110.

DOE/RL-2011-37, 2011, *Sampling and Analysis Plan for the Perched Water Pumping/Pore Water Extraction Pilot Test*, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=0093356.

DOE/RL-2011-40, 2011, *Field Test Plan for the Perched Water Pumping/Pore Water Extraction Treatability Test*, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=0093355.

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

Ecology, EPA, and DOE, 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=82.

Ecology, EPA, and DOE, 2012, *Hanford Federal Facility Agreement and Consent Order Hanford Public Involvement Plan*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/files.cfm/FacAgreementand-Consent-Order_FINAL.pdf.

EPA/540-R-93-057, 1993, *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA*, OSWER Directive 9360.0-32, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://www.dem.ri.gov/brownfields/documents/ntcra.pdf

Executive Order 12580, 1987, *Superfund Implementation*, Ronald W. Reagan, January 23. Available at: http://www.archives.gov/federal-register/codification/executive-order/12580.html.

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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CONTENTS

TABLES

1 **TERMS**

ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DOE/RL	DOE Richland Operations Office (also known as RL)
EE/CA	Engineering Evaluation/Cost Analysis
ETF	Effluent Treatment Facility
NCP	"National Oil and Hazardous Substances Pollution Contingency Plan"
NEPA	*National Environmental Policy Act of 1969*
TBC	To Be Considered

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A.1 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The "National Oil and Hazardous Substances Pollution Contingency Plan" (NCP) (40 CFR 300) requires that the removal action described in this document comply with applicable or relevant and appropriate requirements (ARAR) to the extent practicable. 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. ARARs do not include administrative requirements, including requirements to obtain any federal, state, or local permits. This section describes how the major ARARs identified will be met during the removal action and identifies specific regulatory sections in each overarching regulation, which is an ARAR. Each citation includes an explanation as to why it is an ARAR. In addition, "To Be Considered" (TBC) information consists of nonpromulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of ARARs. 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.

The ARARs that potentially are pertinent to this Non Time Critical Removal Action 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 only need to comply with the substantive parts of those requirements.

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 16 USC 469a-1 through 468a-2(d)	ARAR	Requires that the removal action at the 200-DV-1 operable unit 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" 36 CFR. "National Historic Landmarks Program" 36 CFR 60, "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.

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
Native American Graves Protection and Repatriation Act of 1990 25 USC 3001, et seq. 43 CFR 10	ARAR	Establishes federal agency responsibility for 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, subsection 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 and relevant or appropriate requirements. TBC = to be considered.			

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Table A-2. Identification of State Applicable and Relevant or Appropriate Requirements and To Be Considered

ARAR Citation	ARAR	Requirement	Rationale for Use
"Dangerous Waste Regulations," WAC 173-303			
"Identifying Solid Waste," WAC 173-303-016	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.
"Recycling Processes Involving Solid Waste," WAC 173-303-017	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.

Table A-2. Identification of State Applicable and Relevant or Appropriate Requirements and To Be Considered

ARAR Citation	ARAR	Requirement	Rationale for Use
"Designation of Dangerous Waste," WAC 173-303-070(3)	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.
"Excluded Categories of Waste," WAC 173-303-071	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.
"Requirements for Universal Waste," WAC 173-303-077	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.
"Recycled, Reclaimed, and Recovered Wastes," WAC 173-303-120 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.
"Land Disposal Restrictions," WAC 173-303-140(4)	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.

Table A-2. Identification of State Applicable and Relevant or Appropriate Requirements and To Be Considered

ARAR Citation	ARAR	Requirement	Rationale for Use
"Requirements for Generators of Dangerous Waste," WAC 173-303-170 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.
"Minimum Standards for Construction and Maintenance of Wells," WAC 173-160			
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 Applicable and Relevant or Appropriate Requirements and To Be Considered

ARAR Citation	ARAR	Requirement	Rationale for Use
General Regulations for Air Pollution Sources, WAC 173-400 and WAC 173-460			
Washington Clean Air Act of 1967, Ch 70.94 and Ch. 43.21A RCW General Regulations for Air Pollution, WAC 173-400 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 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.
Controls for New Sources of Toxic Air Pollutants, WAC 173-460 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 best available control technology for regulated emissions of toxic air pollutants (T-BACT) and demonstration that emissions of toxic air pollutants (TAP) 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.
Radiation Protection – Air Emissions, WAC 246-247			
"Radiation Protection – Air Emissions," "Standards," WAC 246-247-040(3) WAC 246-247-040(4)	ARAR	These regulations require all new construction and significant modifications of emission units to use best available radionuclide control technology (BARCT) and require all existing emission units and nonsignificant modifications to use as low as reasonably achievable control technology (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 Applicable and Relevant or Appropriate Requirements and To Be Considered

ARAR Citation	ARAR	Requirement	Rationale for Use
"Monitoring, testing, and quality assurance: WAC 246-247-075 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.
"General Standards for Maximum Permissible Emissions" WAC 173-480-050(1)	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 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.
"Emission Monitoring and Compliance Procedures" WAC 173-480-070(2)	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 the potential to emit radionuclides to unrestricted areas above maximum acceptable levels.

ALARACT = as low as reasonably achievable control technology.
ARAR = applicable and relevant or appropriate requirement.
BACT = best available control technology.
BARCT = best available radionuclide control technology.
NTCRA = Non-Time-Critical Removal Action.
OU = operable unit.
RACT = reasonably achievable control technology.
TAP = toxic air pollutant.
T-BACT = best available control technology – toxic.

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 Effluent Treatment Facility.

A.2 NATIONAL ENVIRONMENTAL POLICY ACT VALUES

In accordance with DOE Order 451.1B Chg 1, *National Environmental Policy Act Compliance Program*, and the *National Environmental Policy Act of 1969* (NEPA), CERCLA actions must address and incorporate NEPA values such as socioeconomic, ecological, offsite, and cumulative impacts in CERCLA documents to the extent practicable.

The primary environmental effect is the positive one of cleanup of an existing or threatened release of contamination in the environment, which is analyzed in this EE/CA. Secondary effects of that cleanup are addressed through the ARARs analysis, in which the relevant substantive requirements of other environmental regulations are identified. In this way, concerns about air pollution, water pollution, impacts on sensitive plant and animal species, and archeological and cultural resources, and other matters addressed by specific regulations, are incorporated into the implemented CERCLA response action.

Depending on the circumstances, other effects on the environment may be present that are not identified and evaluated in the normal CERCLA process. Consistent with the DOE policy, these possible effects are evaluated and noted in this EE/CA if significant.

In this particular instance, the proposed response action primarily consists of modification of an already existing structure at an existing location. It appears to be analogous to actions that would, if analyzed under the DOE NEPA implementation regulation (10 CFR 1021), be considered of such minor impact on the environment that they would be categorically excluded from detailed analysis. Specifically, the action is analogous to actions that would be categorically excluded under Provision B.6.

A.3 REFERENCES

10 CFR 1021, "National Environmental Policy Act Implementing Procedures," *Code of Federal Regulations*. Available at: http://ceq.hss.doe.gov/nepa/regs/nepa1021_Revpdf

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_09/40cfr268_09.html.

Archeological and Historic Preservation Act of 1974, 16 USC 469a-1–469a-2(d). Available at: http://www.nps.gov/history/local-law/fhpl_archhistpres.pdf.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Public Law 96-510, as amended, 94 Stat. 2767, 42 U.S.C. 9601, et seq. Available at: http://www4.law.cornell.edu/uscode/42/usc_sec_42_00009601----000-.html.

DOE/RL-2009-31, 2010, *Investigation Derived Waste Purgewater Management Engineering Evaluation/ Cost Analysis,* Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=0904290333

DOE/RL-2010-74, 2010, *Treatability Test Plan for the 200-BP-5 Groundwater Operable Unit,* Rev 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=0093994

DOE O 451.B 1Chg1, *National Environmental Policy Act Compliance Program*, U.S. Department of Energy, Washington, D.C. Available at: https://www.directives.doe.gov/directives/0451.1-BOrder-bc1/view

Endangered Species Act of 1973, 16 USC 1531, et seq. Available at: http://www.fws.gov/endangered/pdfs/ESAall.pdf.

National Environmental Policy Act of 1969, 42 USC 4321, et seq. Available at: http://www.fhwa.dot.gov/environment/nepatxt.htm.

National Historic Preservation Act of 1966, 16 USC 470, et seq. Available at: http://www.achp.gov/docs/nhpa%202008-final.pdf.

Native American Graves Protection and Repatriation Act of 1990, 25 USC 3001, et seq. Available at: http://www.nps.gov/history/local-law/FHPL_NAGPRA.pdf.

RCW 70.95, "Public Health and Safety," "Solid Waste Management—Reduction and Recycling," *Revised Code of Washington*, Washington State, Olympia, Washington. Available at: http://apps.leg.wa.gov/RCW/default.aspx?cite=70.95.

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-160.

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

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

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

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

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

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

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

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

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

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

303-016, "Identifying Solid Waste."

303-017, "Recycling Processes Involving Solid Waste."

303-040, "Definitions."

303-050, "Department of Ecology Cleanup Authority."

303-070, "Designation of Dangerous Waste."

303-071, "Excluded Categories of Waste."

303-073, "Conditional Exclusion of Special Wastes."

303-077, "Requirements for Universal Waste."

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

303-140, "Land Disposal Restrictions."

303-170, "Requirements for Generators of Dangerous Waste."

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

303-573, "Standards for Universal Waste Management."

303-630, "Use and Management of Containers."

303-640, "Tank Systems."

303-960, "Special Powers and Authorities of the Department."

303-9906, "Special Waste Bill of Lading."

WAC 173-304, "Minimum Functional Standards for Solid Waste Handling," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-304.

304-190, "Owner Responsibilities for Solid Waste."

304-200, "On-Site Containerized Storage, Collection and Transportation Standards for Solid Waste."

304-460, "Landfilling Standards."

WAC 173-350, "Solid Waste Handling Standards," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-350.

350-300, "On-Site Storage, Collection and Transportation Standards."

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