DOE/RL-2008-45
Revision 0

Engineering Evaluation/Cost Analysis for the 200-MG-2 Operable Unit Waste Sites

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

United States Department of Energy
P.O. Box 550
Richland, Washington 99352

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EXECUTIVE SUMMARY

This document presents the results of a non-time-critical removal action engineering evaluation/ cost analysis (EE/CA) that addresses the disposition of contaminated soil and other materials from 34 waste sites in the Hanford Site 200-MG-2 Operable Unit (OU). This EE/CA was prepared in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*[1] (CERCLA).

The thirty-four 200-MG-2 OU waste sites are located in the 200 East and 200 West Areas, hereafter referred to as the "200 Areas." These waste sites include French drains, trenches, cribs, ditches, and retention basins that received potentially hazardous and/or radioactive liquids and are considered to have shallow contamination (generally less than 4.6 m [15 ft] deep). If the removal action levels are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the removal action work plan. This EE/CA addresses only those waste sites anticipated to have a direct exposure to human health and ecological receptors, from zero to 4.6 m (15 ft). These waste sites are not expected to have a threat to groundwater. The U.S. Department of Energy has determined that the thirty-four 200-MG-2 OU waste sites contain the potential for release of CERCLA hazardous substances, and that a non-time-critical removal action, pursuant to authority delegated under Executive Order 12580, *Superfund Implementation*,[2] and as recognized in Section 7.2.4 of Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*,[3] is warranted to mitigate the threat of release.

If action is delayed or not taken, waste site contaminants in soil largely at or near the surface may result in direct exposure threat to human health and ecological receptors. The potential threat for worker, public, and environmental exposures, as well as removal costs, increases.

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[1] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq. http://www.epa.gov/oecaagct/lcla.html#Hazardous%20Substance%20Responses

[2] Executive Order 12580, 1987, *Superfund Implementation*, Ronald Reagan, January 23. http://www.archives.gov/federal-register/executive-orders/1987.html

[3] 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. http://www.hanford.gov/?page=117&parent=92

The purpose of this EE/CA is to document the evaluation of removal action alternatives with respect to their ability to mitigate threats to human health and the environment posed by the contaminated soil and other materials in the 200-MG-2 OU. This EE/CA evaluates the following three removal action alternatives for each site:

- No action
- Confirmatory sampling/no further action for this removal action
- Removal, treatment, and disposal.

The no-action alternative provides a baseline assumption that waste sites pose no current or potential threat to human health or the environment. The confirmatory sampling/no further action alternative assumes that the waste site does not presently pose a threat to human health and the environment, and sampling and analysis will be conducted to confirm that no further action is required. Finally, the removal, treatment, and disposal alternative includes removal and disposal of the soil and other materials, with treatment (if required) for disposal. If the removal action levels are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft), to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the removal action work plan.

After summarizing the known site characteristics, providing a site description, and establishing removal action objectives, each removal action alternative was evaluated for each site in terms of effectiveness, implementability, and cost.

The preferred alternative for each waste site is recommended based on its overall ability to protect human health and the environment and its effectiveness in maintaining protection for both the short and the long term. These alternatives reduce the potential for further releases to the environment; provide the best balance of protecting the health of the workers and the public; protect environment; and provide an end state that is consistent with future cleanup actions and commitments of Ecology et al., 1989a, *Hanford Federal Facility Agreement and Consent Order*.[4] The final remedial action selected for the thirty-four 200-MG-2 OU waste sites will be submitted for public review in a proposed plan and documented in a record of decision.

[4] Ecology, EPA, and DOE, 1989a, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. http://www.hanford.gov/?page=91&parent=0.

Table ES-1 summarizes the present-worth costs of the preferred removal actions across the thirty-four 200-MG-2 OU waste sites, where the preferred removal actions have a present-worth cost of $26,663,000.

Table ES-1. Summary of the Thirty-Four 200-MG-2 OU Waste Sites Preferred Removal Actions.

Preferred Alternative	Number of Waste Sites	Present Worth
No action	0	$0
Confirmatory sampling/no further action	16	$2,832,000
Removal, treatment, and disposal	18	$23,831,000
Total	**34**	**$26,663,000**

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APPENDICES

FIGURES

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TERMS

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CA	contaminated area
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COPC	contaminant of potential concern
cpm	counts per minute
CS/NFA	confirmatory sampling/no further action
DOE	U.S. Department of Energy
dpm	disintegrations per minute
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
NA	no action
NEPA	*National Environmental Policy Act of 1969*
NPL	"National Priorities List" (40 CFR 300, Appendix B)
OU	operable unit
RAL	removal action level
RAO	removal action objective
RAWP	removal action work plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RL	U.S. Department of Energy, Richland Operations Office
RTD	removal, treatment, and disposal
TMV	toxicity, mobility, or volume
Tri-Party Agreement	Ecology et al., 1989a, *Hanford Federal Facility Agreement and Consent Order*
URM	underground radioactive material

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METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If you know	*Multiply by*	*To get*	*If you know*	*Multiply by*	*To get*
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0394	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles (statute)	1.609	kilometers	kilometers	0.621	miles (statute)
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.0929	sq. meters	sq. meters	10.764	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.591	sq. kilometers	sq. kilometers	0.386	sq. miles
acres	0.405	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces (avoir)	28.349	grams	grams	0.0353	ounces (avoir)
pounds	0.453	kilograms	kilograms	2.205	pounds (avoir)
tons (short)	0.907	ton (metric)	ton (metric)	1.102	tons (short)
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.034	ounces (U.S., liquid)
tablespoons	15	milliliters	liters	2.113	pints
ounces (U.S., liquid)	29.573	milliliters	liters	1.057	quarts (U.S., liquid)
cups	0.24	liters	liters	0.264	gallons (U.S., liquid)
pints	0.473	liters	cubic meters	35.315	cubic feet
quarts (U.S., liquid)	0.946	liters	cubic meters	1.308	cubic yards
gallons (U.S., liquid)	3.785	liters			
cubic feet	0.0283	cubic meters			
cubic yards	0.764	cubic meters			
Temperature			**Temperature**		
Fahrenheit	(°F-32)*5/9	Centigrade	Centigrade	(°C*9/5)+32	Fahrenheit
Radioactivity			**Radioactivity**		
picocurie	37	millibecquerel	millibecquerel	0.027	picocurie

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1.0 INTRODUCTION

This chapter first discusses the purpose and scope of this document. This discussion is followed by sections that describe the document's organization, background of the 200-MG-2 Operable Unit (OU) with a list of its sites, a regulatory overview, and the approach to OU removal actions.

1.1 PURPOSE AND SCOPE

This document presents the results of a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) non-time-critical removal action engineering evaluation/cost analysis (EE/CA) that was conducted to evaluate removal action alternatives for a portion of the 200-MG-2 OU waste sites. There are 69 waste sites in the 200 East and 200 West Areas of the Hanford Site, hereafter referred to as the "200 Areas," which represent the 200-MG-2 OU. These waste sites potentially received hazardous and/or radioactive liquids and are considered to be low-risk with shallow contamination (generally less than 4.6 m [15 ft]). These sites include French drains, trenches, cribs, ditches, and retention basins along with a few sites contaminated from historic leaks or spills. This EE/CA addresses only those waste sites anticipated to have a direct exposure to human health and ecological receptors, from zero to 4.6 m (15 ft). Thirty-four waste sites meet these conditions. If the removal action levels (RALs) are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the removal action work plan (RAWP). These waste sites are not expected to have a threat to groundwater. Additional detail regarding these waste sites is provided in Section 1.3. The determination for these waste sites regarding their potential threat to groundwater will be evaluated as part of the final remedy.

Final remedial decisions for the 200-MG-2 OU have not been made. Some of the sites have been characterized and found to contain CERCLA hazardous substances[5] that pose a threat to human health and the environment. Because most of the sites have not been characterized and may contain hazardous substances, removal actions that include characterization are warranted before final remedial decisions can be documented.

This EE/CA identifies the objectives of the removal actions[6] and analyzes the removal action alternatives in terms of cost, effectiveness, and implementability for the 200-MG-2 OU waste sites. Figure 1-1 shows the location of the Hanford Site in south-central Washington State, where the 200-MG-2 OU waste sites are located. Figure 1-2 shows the 34 200-MG-2 OU EE/CA waste sites that are located in the 200 Areas. The alternatives considered in this EE/CA provide a range of potential response actions that are appropriate to address site-specific conditions.

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[5] "Hazardous substances" are defined in 40 CFR 300.5, "Definitions," and include both radioactive and chemical substances.

[6] The terms "remove" or "removal"' mean the cleanup or removal of released hazardous substances from the environment, such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release (40 CFR 300.5).

Figure 1-1. Location of the Hanford Site in Washington State.

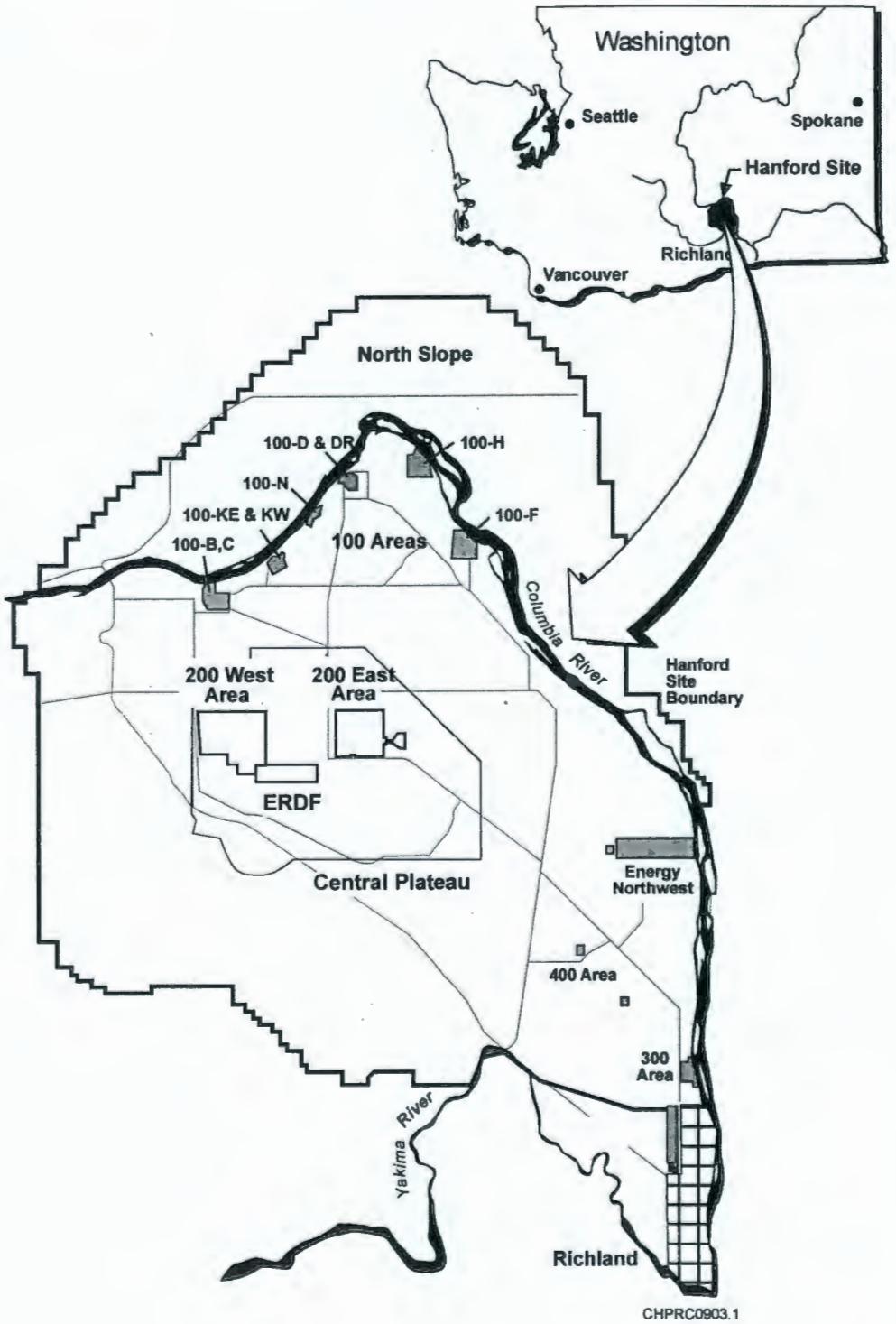
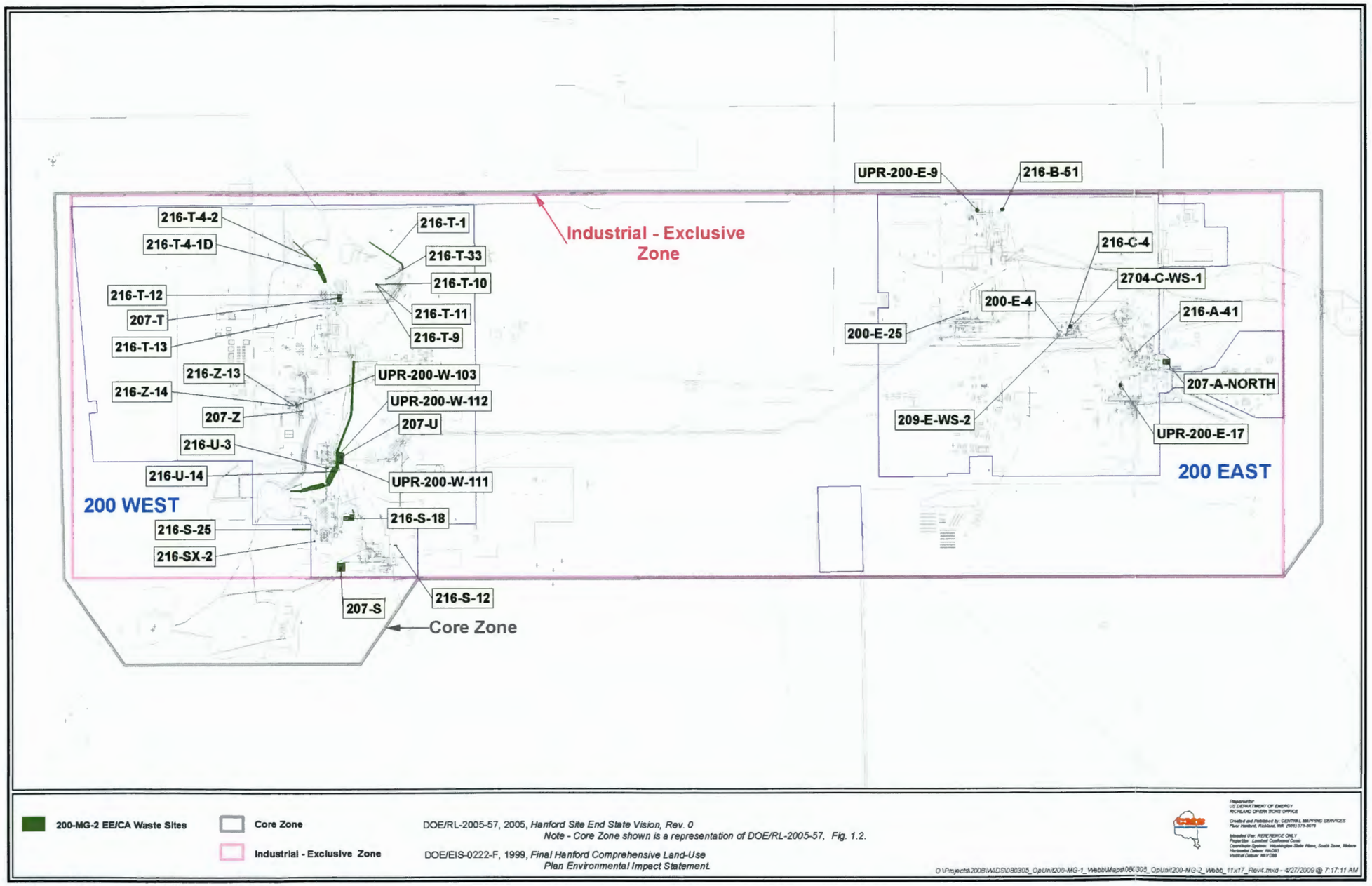


Figure 1-2. 200-MG-2 Operable Unit EE/CA Waste Sites.



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The U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) will use this EE/CA report as the basis for selecting removal actions to mitigate potential risks to human health and the environment. This EE/CA also will be presented to the public for review and comment. An action memorandum, which will document and authorize implementation of the removal action for each waste site, will be developed from this EE/CA. An RAWP will be prepared to document the removal action decision(s), RALs for this cleanup activity, and removal action methods.

The final remedial action selected for the 200-MG-2 OU waste sites will be submitted for public review in a proposed plan and documented in a record of decision.

1.2 REPORT ORGANIZATION

This document is organized into seven chapters as indicated below.

- Chapter 1.0, Introduction. Provides an introduction, purpose, scope, background information on 200 Area characteristics, waste site history, and overall removal action approach.
- Chapter 2.0, Site Characterization. Provides an overview of the waste sites, the waste site profiles, the waste sources, the nature and extent of contamination, and risk evaluation.
- Chapter 3.0, Removal Action Objectives (RAO) and RALs. Provides the removal action scope and purpose, justification for the proposed action, and RALs.
- Chapter 4.0, Discussion of Alternatives. Provides a description of the alternatives.
- Chapter 5.0, Analysis of Alternatives. Provides the individual analysis of alternatives, comparative analysis of alternatives and preferred removal actions.
- Chapter 6.0, Conclusions and Recommended Alternatives. Provides the summary of preferred removal actions and the removal action contingency plans.
- Chapter 7.0, References.

In addition, four appendices support these analyses.

- Appendix A, Waste Site Summary. Includes brief summaries of waste sites and their characteristics with photos and schematics of the site. References for the information are included for each waste site.
- Appendix B, Waste Site Attributes. Provides a comparative overview of the waste site information, in a tabular summary form, that was used in developing the preferred site removal actions.
- Appendix C, Present-Worth Cost Summary. Includes a summary of the costs of each preferred alternative for each waste site.
- Appendix D, Applicable or Relevant and Appropriate Requirements (ARAR). Includes description of the chemical-, location-, and action-specific ARARs and to-be-considered advisories for the OU.

A separate document (SGW-38475, *Cost Estimate for the 200-MG-2 Operable Unit Engineering Evaluation/Cost Analysis Removal Actions*) includes cost estimates and summary tables of

primary cost components for each site, with summaries of assumptions and waste site parameters.

1.3 BACKGROUND

The Hanford Site encompasses approximately 1,517 km^2 (586 mi^2) in the Columbia River Basin of south-central Washington State (Figure 1-1). In 1989, the EPA placed the 100, 200, 300, and 1100 Areas of the Hanford Site on the National Priorities List (NPL) (40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Appendix B, "National Priorities List"). 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 used for interim storage and staging of irradiated fuel (Figure 1-1).

The 200-MG-2 OU currently consists of 69 waste sites according to Appendix C of Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan* (Tri-Party Agreement Action Plan). A waste-site tracking record (SGW-38577, *200-MG-1 and 200-MG-2 Operable Units Waste Sites Tracking Record*) has been included in the Administrative Record to facilitate assignment tracking of the 200-MG-2 OU waste sites.

This EE/CA addresses only those waste sites anticipated to have a direct exposure to human health and ecological receptors, from zero to 4.6 m (15 ft). If the RALs are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the RAWP. These waste sites are not expected to have a threat to groundwater. Many of the 200-MG-2 OU waste sites meet these conditions; however, only 34 of the waste sites were evaluated in this EE/CA. The remaining 35 waste sites were removed from this EE/CA due to either a structure or contamination exceeding 4.6 m (15 ft) and/or the waste site was in an area where removal, treatment, and disposal (RTD) may not be consistent with a final remedy. Table 1-1 provides a list of all the 34 200-MG-2 OU waste sites evaluated in this EE/CA. Appendices A and B give detailed information on each of these 34 waste sites. These waste sites contain shallow contamination or contamination that presents a threat to human health and the environment and can be easily removed via a CERCLA removal action. The assumed shallow nature of these waste sites is based on the volume of liquid discharge, lack of mobility of contaminants, and shallow depth of discharge. These sites are not anticipated to impact groundwater. The DOE and EPA agree that decision making is straightforward in selecting a cleanup alternative. These sites are likely candidates for at least one of the following removal actions described in this EE/CA:

- No action (NA)
- Confirmatory sampling/no further action (CS/NFA)
- RTD.

These alternatives are discussed further in Section 1.5.1 and in Chapter 4.0.

Table 1-1. 200-MG-2 OU Waste Sites Evaluated in this EE/CA.

Waste Site Code	Waste Site Type	Waste Site Code	Waste Site Type	Waste Site Code	Waste Site Type
200-E-4	French Drain	216-S-18	Trench	216-U-3	French Drain
200-E-25	French Drain	216-S-25	Crib	216-U-14	Ditch
207-A-NORTH	Retention Basin	216-SX-2	Crib	216-Z-13	French Drain
207-S	Retention Basin	216-T-1	Ditch	216-Z-14	French Drain
207-T	Retention Basin	216-T-4-1D	Ditch	2704-C-WS-1	French Drain
207-U	Retention Basin	216-T-4-2	Ditch	UPR-200-E-9	Unplanned Release
207-Z	Retention Basin	216-T-9	Trench	UPR-200-E-17	Unplanned Release
209-E-WS-2	French Drain	216-T-10	Trench	UPR-200-W-103	Unplanned Release
216-A-41	Crib	216-T-11	Trench	UPR-200-W-111	Unplanned Release
216-B-51	French Drain	216-T-12	Trench	UPR-200-W-112	Unplanned Release
216-C-4	Crib	216-T-13	Trench	--	--
216-S-12	Trench	216-T-33	Crib	--	--

The waste site types in this EE/CA include trenches, cribs, ditches, retention basins, and French drains. This EE/CA also includes a few sites where chemical and radioactive contaminants were released as the result of leaks or spills (i.e., unplanned release sites). The 200-MG-2 OU waste sites included in this EE/CA generally have shallow, low-level radiological and/or chemical contamination and small waste volumes. In this EE/CA, the word "contamination" means the expected or known presence of at least one contaminant of potential concern (COPC), developed in Section 2.4.5, at a concentration that is greater than its RAL. The terms "contaminant" and "COPC" are used interchangeably within this document.

Previous stabilization activities, including placement of clean top soil, have been implemented at some of the sites.

All of the waste sites contained in the 200-MG-2 OU are located in the industrial-exclusive zone as defined in DOE/EIS-0222-F, *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* and within the Core Zone as defined in DOE/RL-2005-57, *Hanford Site End State Vision.* Figure 1-1 shows the boundary of the industrial-exclusive zone around the 200 Areas.

1.4 REGULATORY OVERVIEW

This section contains an overview of the Hanford Site designation as an NPL site and of the manner in which CERCLA applies to these waste sites for the 200-MG-2 OU removal action. This section also summarizes regulatory and public involvement requirements.

The waste sites contained in the 200-MG-2 OU are all on the 200 Area NPL (one of three remaining NPL sites at the Hanford Site) and subject to cleanup action under CERCLA. These waste sites are identified in Appendix C) of the Tri-Party Agreement Action Plan, under

200-MG-2 OU as waste sites on the NPL. The removal actions under this EE/CA being proposed for those designated waste sites will be consistent with the final remedial action decisions, as required by 40 CFR 300.415(d), "Removal Action." The cleanup of these waste sites will consider both CERCLA remedial action and *Resource Conservation and Recovery Act of 1976* (RCRA) corrective action requirements and will be documented in a final remedial action record of decision. Activities undertaken for cleanup of these NPL sites are performed consistent with the National Contingency Plan (40 CFR 300) and Ecology et al., 1989a, *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement).

1.4.1 Removal Action Authority

The President 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. This authority is delegated to the DOE, as CERCLA lead agency, through Executive Order 12580, *Superfund Implementation*.

This EE/CA was prepared in accordance with CERCLA Section 104 and 40 CFR 300.415 as a proposal for a non-time-critical removal action (DOE/EH-143-9811, *Non-Time-Critical Removal Actions*). After the public has had an opportunity to comment on the alternatives and the recommended approach presented in this document, DOE will issue an action memorandum to authorize the removal action.

1.4.2 Regulatory Involvement

The EPA is the lead regulatory agency for the 200-MG-2 OU. DOE is voluntarily seeking EPA review and concurrence in this removal action to help ensure that it will be consistent with ongoing or subsequent related remedial actions.

1.4.3 Stakeholder Involvement

Removal actions taken pursuant to this EE/CA will be conducted in compliance with Ecology et al., 2002, *Hanford Site Tri-Party Agreement Public Involvement Community Relations Plan*, and public participation requirements established in 40 CFR 300.415(n), "Community Relations in Removal Actions." 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 40 CFR 300.820(a), "Administrative Record File for a Removal Action."

1.5 APPROACH TO REMEDIATION

The remediation approach to the 200-MG-2 OU has in part been determined by the following:

- Removal action alternatives consistent with the logic behind the creation of this OU
- Preference for RTD, whenever practicable
- Extensive use of the observational approach because of limited site information, particularly for nonengineered structures (e.g., spills, unplanned releases, and windblown contamination) to support rapid adjustments to field implementation

- Procedure for easy addition of new sites to existing remedy (i.e., plug-in approach), as well as assignment of sites to other OUs if the waste sites do not fit the 200-MG-2 OU conceptual model or the removal action alternatives.

The 200-MG-2 OU site removal action approach builds on the experience and processes obtained from DOE/RL-94-61, *100-KR-1 Operable Unit Focused Feasibility Study Report*, Appendix N. The methods discussed below are used in this EE/CA and removal action implementation, which is described in detail in Chapter 6.0.

1.5.1 Removal Action Alternatives

Because the waste sites in this OU are shallow and simple removal efforts would effectively remove the contaminant exposure pathway to human and environmental receptors, the range of alternatives considered is limited. The 200-MG-2 OU removal action alternatives considered in this EE/CA are consistent with the logic behind the creation of this OU, and include NA, CS/NFA, and RTD. Sites determined to require other alternatives will be identified for transfer to other OUs.

The applicability of the removal action alternatives is discussed below.

- NA. This alternative applies to waste sites that pose no current or potential threat to human health or the environment.
- CS/NFA. Sampling and analysis confirm that soil is at or below RALs and that no further action is required. This alternative may be used when empirical data indicate that RTD of the waste site is not required. If the results of confirmatory sampling indicate that the CS/NFA is inappropriate (i.e., greater than RALs), then the RTD action will be implemented or the waste site will be removed from this EE/CA and will be evaluated as part of the remaining 200-MG-2 OU.
- RTD. Sampling and analysis confirm that soil contains contamination above RALs and requires removal. However, removal actions may be conducted without prior confirmation sampling, or where process knowledge and information are available to make this determination. Soil and other materials above RALs will be removed and disposed of with treatment as required for disposal. Through verification sampling and analysis, remaining in situ soils will be demonstrated to be at or below RALs.

  In this alternative, contamination will be removed up to 4.6 m (15 ft), including contamination that may have migrated away from the original site, to levels at or below the established RALs. The RALs will be established in the RAWP. Excavated waste will be treated if necessary and disposed of at the Environmental Restoration Disposal Facility (ERDF). RTD waste sites typically are shallow sites where the depth of contamination is not expected to extend nominally more than 4.6 m (15 ft) below ground surface (bgs). The depth is not restricted to 4.6 m (15 ft), but that depth will be used as a general guideline for RTD waste sites. If the RALs are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the RAWP. The pathway may include removal of soils, debris, and contaminated structures. In certain cases, using the observational approach, to depths slightly greater than 4.6 m (15 ft) bgs, removal may be performed if necessary to reduce contaminants to levels below RALs. If results of confirmatory sampling

indicate that the RTD is inappropriate (i.e., at or below RALs), then the CS/NFA action will be implemented.

1.5.2 Plug-in Approach

The waste site remedy selection will be documented in the action memorandum. The "plug-in approach" has been developed to analyze removal alternatives for groups of sites with similar characteristics, designated as the site profile. The action memorandum will identify remedies based on the site profiles. If it is determined that a new waste site(s) is sufficiently similar to, or compatible with, a site group for which the alternatives already have been developed and analyzed, then the site will "plug-in" to that group. Confirmatory sampling may be required to determine whether a particular waste site fits the criteria for plug-in. The plug-in approach eliminates the time and cost required to produce multiple, redundant site-specific EE/CAs (DOE/EH-413-9903, *The Plug-In Approach: A Generic Strategy to Expediting Cleanup*).

An action memorandum will document the preferred removal alternatives for the applicable 200-MG-2 OU waste sites. An RAWP will detail anticipated work activities as well as define a sampling and analysis process. However, if the preferred removal alternative for a site (developed in Chapter 5.0) is found to be inappropriate during its implementation, then a different removal alternative that is more appropriate to the site conditions will be chosen through consultation with the DOE, Richland Operations Office (RL) and EPA. This approach allows alternative remedies to be implemented to best achieve site remediation.

In addition, sampling and analysis may be conducted, as necessary, for those 200-MG-2 OU waste sites currently not identified with this removal action, to support a final remedy decision, based on information learned during this removal action.

1.5.3 Observational Approach

The observational approach is a method of planning, designing, and implementing a removal action that uses a limited amount of initial characterization data. Additional information gathered during removal actions will be used to make "real-time" decisions in the field to guide the direction and scope of removal actions, based on contingent planning. The observational approach in removal actions provides the flexibility in the field necessary to adapt the removal action to observed site conditions. Removal actions will proceed until it can be demonstrated through field screening and verification sampling that the RALs have been met. This method of streamlining is faster and more cost-effective than traditional approaches that require substantial site characterization and detailed planning before taking removal actions.

1.5.4 Prioritization

The implementation of the preferred removal actions for the 200-MG-2 OU waste sites will be prioritized in the RAWP. This prioritization may be based on several considerations, including the following:

- Expected contamination depth
- Proximity of a waste site to other waste sites or structures

- Ease of access to the waste site
- Potential integration of waste site removal action with other nearby site remedial actions.

Prioritization of waste sites and coordination with other CERCLA response actions will be discussed with EPA on a regular basis.

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2.0 SITE CHARACTERIZATION

This chapter first provides a general background and site description for the 200 Areas, including the flora, fauna, climate, geology, and hydrogeology. This is followed by sections on the available waste information and the waste site attributes, which is a compilation of information relating to waste sites in the 200-MG-2 OU, including waste site history, physical characteristics (e.g., lateral dimensions and depth) and site types (e.g., French drains, injection/reverse wells, cribs, trenches). The final three sections describe the sources, nature, and extent of contamination, as well as a streamlined risk evaluation.

2.1 BACKGROUND AND SITE DESCRIPTIONS

This section provides general background of the 200 Areas, the sites, flora and fauna, climate, and the geology and hydrogeology of the area.

2.1.1 General Description

The 200 Areas were 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 Areas, 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 DOE/RL-2001-54, *Central Plateau Ecological Evaluation*. Waste site types in the 200-MG-2 OU are discussed in Section 2.3.

2.1.2 Flora and Fauna

The 200 Areas are a mature shrub-steppe ecosystem, dominated by sagebrush and Sandberg's bluegrass. The native shrub-steppe is interspersed with disturbed areas in which the primary vegetation is made up of annual grasses and forbs. Many sites in the 200 Area are covered with gravel or asphalt, or stabilized with non-native wheatgrass (DOE/RL-2001-54). Species of mammals common to the 200 Areas include coyotes, Great Basin pocket mice, northern pocket gophers, and deer mice. The most widely distributed bird species are meadowlarks, horned larks, and mourning doves. Gopher snakes and side-blotched lizards are the main reptiles inhabiting the 200 Area. The most common groups of terrestrial invertebrates in these areas are darkling beetles, grasshoppers, and ants. DOE/RL-2001-54 presents a detailed account of the species of the 200 Areas.

2.1.3 Climate

The Hanford Site lies east of the Cascade Mountains and has a semiarid climate caused by the rain shadow effect of the mountains. Climatological data are monitored at the Hanford Meteorological Station and other locations throughout the Hanford Site. From 1945 through 2001, the recorded maximum temperature was 45 °C (113 °F), and the recorded minimum temperature was –30.6 °C (–23 °F) (PNNL-6415, *Hanford Site National Environmental Policy Act (NEPA) Characterization*). The two extremes occurred during August and February,

respectively. The monthly average temperature ranged from a low of –0.24 °C (31.7 °F) in January to a high of 24.6 °C (76.3 °F) in July. The annual average relative humidity is 54 percent (PNNL-6415).

Most precipitation occurs during late autumn and winter, with more than half of the annual amount occurring from November through February (PNNL-6415). Normal annual precipitation is 17.7 cm (6.98 in.). Because it typically receives less than 25.5 cm (10 in.) of precipitation a year, the climate is considered semiarid (PNNL-6415).

The prevailing wind direction at the Hanford Meteorological Station is from the northwest during all months of the year (PNNL-6415). Monthly average wind speeds are lowest during the winter months and average about 3 m/s (6 to 7 mi/h). The highest average wind occurs during the summer and is about 4 m/s (8 to 9 mi/h). The record wind gust was 35.7 m/s (80 mi/h) in 1972 (DOE/RL-2007-50, *Central Plateau Terrestrial Ecological Risk Assessment Report*).

2.1.4 Geology and Hydrogeology

The average depth from ground surface to groundwater beneath the 200 Areas ranges from 50 m (164 ft) to greater than 100 m (328 ft). Additional details on the geology and hydrogeology underlying the 200 Areas and the 200-MG-2 OU are not provided in this EE/CA because the OU waste sites are assumed not to be a threat to groundwater quality. This assumption is made because of the volume of liquid discharged, lack of mobility of contaminants, and shallow depth of the discharge. In addition, the geological and hydrological conditions that exist beneath the 200 Areas are well understood and are described in a number of technical documents, some of which are included as references to this EE/CA (WHC-SD-ER-TI-003, *Geology and Hydrology of the Hanford Site - A Standardized Text for use in WHC Documents & Reports*; PNNL-14187, *Hanford Site Groundwater Monitoring for Fiscal Year 2002*; PNNL-13641, *Uncertainty Analysis Framework – Hanford Site-Wide Groundwater Flow and Transport Model*; PNNL-13116, *Hanford Site Groundwater Monitoring for Fiscal Year 1999*; PNNL-6415; PNL-5506, *Hanford Site Water Table Changes 1950 Through 1980, Data Observations and Evaluation*; and Lindsey, 1996, *The Miocene to Pliocene Ringold Formation and Associated Deposits of the Ancestral Columbia River System, South-Central Washington and North-Central Oregon*).

The DOE, EPA, and the Washington State Department of Ecology (Ecology) created the 200-MG-2 OU through Tri-Party Agreement Milestone M-015-06-02 and Tri-Party Agreement Change Request C-06-02. The 200-MG-2 OU waste sites have shallow vadose zone (4.6 m [15 ft bgs]) contamination and are not considered a threat to groundwater quality. If confirmation sampling or the observational approach shows that a site is more than a shallow contamination problem, the site will be reevaluated and other alternatives considered.

The radionuclide inventory for this conceptual model group does not include transuranic isotopes at or near 100 nCi/g. Examples of 200-MG-2 OU waste sites are unplanned releases, shallow releases or leaks, and contamination spread by burrowing wildlife.

2.2 AVAILABLE WASTE SITE INFORMATION

The Waste Information Data System database was the primary source of site information for the 200-MG-2 OU. The waste sites comprising the 200-MG-2 OU previously had been part of other

OUs. Data-gathering activities and evaluations were completed with the prior OU activities for a few of the waste sites. Detailed waste site information is presented in Appendices A and B.

- Appendix A contains an information brief for each waste site, including the site history, its known or estimated dimensions and depth, and assumptions concerning potential contaminants and their distribution. References for the information also are provided. Engineering diagrams, if available, are included in each brief where a structure is a component of the waste site. The briefs also contain current site photographs for many of the sites. The preferred remedy and estimated cost for the remedy also is shown for each waste site.
- Appendix B includes a large waste site summary table identifying primary attributes of the waste sites, organized by waste site type. These attributes were used in selecting preferred removal actions. This table permits a direct comparison of all similar waste sites, including their physical features, waste release mechanisms, potential contaminant types (i.e., radiological or nonradiological), and potential contaminant depth.

Limited data exist for waste sites addressed in this EE/CA. However, five waste sites in the 200-MG-2 OU were characterized while previously assigned to the 200-MW-1 OU (200-E-4 French Drain, 216-T-13 Trench, 216-T-33 Crib, and 216-U-3 French Drain) and the 200-CW-5 OU (216-U-14 Ditch). For the remaining sites, available information generally is based on descriptions of the process operations that may have resulted in the release of a radiological or hazardous constituent. Radiological surveys and prior cleanup activities are described for some of the waste sites. Previous cleanup actions include decontamination operations, removal of impacted soils or materials, and/or covering the affected area with clean soil.

2.3 WASTE SITE ATTRIBUTES

The 200-MG-2 OU contains several different types of waste sites as shown in Table 2-1. Site areas range from tens of square feet to acres in size. Most of the waste sites are relatively small. Generally, the small area waste sites are associated with an engineered structure (e.g., French drain, injection/reverse well, crib) or an unplanned release of limited extent. Larger area sites include some retention basins and ditches. Some of the engineered structures that have been in direct contact with a process waste stream (i.e., French drains, reverse wells, cribs, and retention basins) may be contaminated, and include materials such as concrete, steel, and wood.

2.4 CONCEPTUAL EXPOSURE MODEL

An exposure pathway is the physical course that a COPC takes from the point of release to a receptor. The route of exposure is the means by which a COPC enters a receptor. For an exposure pathway to be complete, all of the following components must be present:

- Source of contamination
- Release mechanisms and environmental transport media
- Potentially complete human exposure pathways and receptors
- Potentially complete ecological exposure pathways.

Table 2-1. 200-MG-2 OU Waste Site Attributes.

Waste Site Type	Number of Sites	Site Areas (ft^2)	Potential Contaminants	Potential Contaminant Intervals (depth bgs ft) [Number of Sites in Interval]	Primary Contaminated Media	Secondary Contaminated Media	Waste Site Characteristics
Waste sites associated with small volume liquid releases (potential contaminant depth – less than 6 ft)							
Unplanned releases	2	Unknown for all sites	Radiological and nonradiological	0-3 [1]; 2-6 [1]	Soil	None	Leaks and spills.
Total	**2**						
Waste sites associated with small volume liquid releases (potential contaminant depth – less than 15 ft)							
Retention basins	5	550 – 30,261	Radiological and nonradiological	0-8 [1]; 0-15 [2]; 0-15 (spotty) [1]; 7-15 [1]	Concrete	Soil	Concrete basins used to store contaminated effluent temporarily for sampling and analysis before discharge to ditches and ponds.
Unplanned releases	3	150 – 600	Radiological and nonradiological	0-15 [2]; 7-15 [1]	Soil	None or piping	Includes two trenches containing contaminated soil and a pipeline leak.
Total	**8**						
Waste sites associated with larger volume waste stream discharges (potential contaminant depth – less than 15 ft)							
Ditches	4	4,401 – 45,444	Primarily radiological	10-15 [1]; 4-15 localized [3]	Soil	None	Includes one representative site transferred from the 200-CW-5 OU to the 200-MG-2 OU. Received cooling water waste streams. Contamination may be localized along ditches.
Cribs	3	100 – 2,281.6	Primarily radiological	7-15 [2]; 11-15 [1]	Soil	Piping	Includes one representative site transferred from the 200-MW-1 OU to the 200-MG-2 OU. Received condensate and decontamination wastes.
Total	**7**						
Waste sites associated with small volume waste stream discharges from an engineered structure (potential contaminant depth – less than 15 ft deep)							
French drains	5	2.5 – 91; one site has unknown area	Radiological or nonradiological	0-15 [2]; 9-10 [1]; 12-15 [1]; 8-9 [1]	Rock or gravel-filled conduit or concrete casing	Soil	Includes two representative sites transferred from the 200-MW-1 OU to the 200-MG-2 OU. Primarily received steam condensate.
Trenches	7	150 – 2,000	Radiological or nonradiological	0-15 [2]; 7-10 [2]; 10-11 [1]; 0-11 [1]; 10-15 [1]	Soil	None	Includes one representative site transferred from the 200-MW-1 OU to the 200-MG-2 OU. Generally received miscellaneous liquid effluents; consisting of decontamination waste; some received contaminated soil or sludge.
Total	**12**						

Table 2-1. 200-MG-2 OU Waste Site Attributes.

Waste Site Type	Number of Sites	Site Areas (ft^2)	Potential Contaminants	Potential Contaminant Intervals (depth bgs ft) [Number of Sites in Interval]	Primary Contaminated Media	Secondary Contaminated Media	Waste Site Characteristics
Waste sites associated with small volume waste stream discharges from an engineered structure (potential contaminant depth – greater than 15 ft deep)							
French drains	3	7.1 – 19.6	Radiological and/or nonradiological	9-17 [2]; 0-20 [1]	Generally concrete or tile casing with gravel drainage material	Soil	Generally received steam condensate or floor and sink drainage.
Total	**3**						
Waste sites associated with larger volume waste stream discharges (potential contaminant depth – greater than 15 ft)							
Cribs	2	100 – 200	Primarily radiological	10-20 [1]; 16-20 [1]	Soil, crib fill material	Discharge piping	Received various waste streams including process wastes, steam condensate, laundry wastewater, equipment decontamination water, and floor drainage.
Total	**2**						

In the absence of any one of these components, an exposure pathway is considered incomplete and, therefore, creates no risk or hazard. This section examines the release mechanisms and environmental transport media, potentially complete human-exposure pathways and receptors, and potentially complete ecological exposure pathways.

Section 2.4.5 includes a summary of the information on the existing waste sites and the process that was used to select the COPCs.

2.4.1 Source of Contamination

The primary sources of contamination for the thirty-four 200-MG-2 OU waste sites include the following:

- Discharge of liquid effluent waste streams to cribs, French drains, trenches, ditches, and retention basins
- Unplanned release of liquid waste streams to shallow zone soils.

Confirmed depth of potential contamination in the 200-MG-2 waste sites is not available. This information, however, is needed to estimate the removal action costs. To fill this data gap, the contaminant depth for each site was estimated based on the following considerations.

- The known or estimated volume of a release. The volume of waste released is not known with a high degree of certainty for many of the waste sites. For those waste sites where a leak or spill occurred, the amount of material released generally was estimated to be relatively small. For those waste sites involving the discharge of process waste streams, such as cribs and ditches, the effluent volumes may have been large. Effluent discharge volume data for engineered liquid disposal waste sites, if available, are summarized in RPP-26744, *Hanford Soil Inventory Model, Rev. 1*).
- Depth at the point of release. The 34 waste sites in this EE/CA are the result of either surface or subsurface liquid discharges. Process waste streams, such as cooling water, were discharged at the surface into ditches, trenches, and retention basins. Cribs and certain French drains were designed to discharge liquids into the subsurface.
- Mobility of the potential contaminants associated with the release. Available information concerning the process waste streams indicates that the primary contaminants released at the waste sites in this OU have low mobility.

The estimated contaminant depths and potential contaminants at each waste site are presented in Appendices A and B. A summary of this assessment and other site attributes also is provided in Table 2-1. The waste sites in Table 2-1 were grouped into three potential depth categories: less than 1.8 m (6 ft), less than 4.6 m (15 ft), and greater than 4.6 m (15 ft). The conceptual contaminant distribution model for the thirty-four 200-MG-2 OU waste sites is shallow contamination with no potential for impact to groundwater. However, waste sites may be encountered during removal actions that do not fit the conceptual model (i.e., sites with contamination greater than 4.6 m [15 ft]). If the RALs are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the RAWP.

The estimated volumes of contaminated soil that resulted from direct contact with a liquid release are presented in Appendices A and B. The estimated lateral extent of contamination is based on the lateral dimensions of the waste site that held the liquid. The estimated vertical extent of contamination is based on potential contaminant volumes discharged and low contaminant mobility.

2.4.2 Release Mechanisms and Environmental Transport Media

The primary release mechanisms transporting COPCs from the source, via environmental media, to potential receptors include the following:

- Direct contact with soil containing COPCs (direct contact with soils that have been disturbed or excavated, and made accessible to receptor)
- Generation of dust from shallow zone soils (i.e., wind blown erosion, or dust generation during maintenance or removal/remediation activities at the site).

Infiltration, percolation, and leaching of contaminants to groundwater are not considered principal release mechanisms due to the assumed shallow nature of these waste sites, volume of liquids discharged, and lack of contaminant mobility.

2.4.3 Potentially Complete Human Exposure Pathways and Receptors

All of the waste sites contained in the 200-MG-2 OU are located in the industrial-exclusive zone as defined in DOE/EIS-0222-F and within the Core Zone as defined in the DOE/RL-2005-57. The most plausible exposure pathways are considered for characterizing human-health risks. A worker within the industrial-exclusive area will be used to calculate RALs inside the industrial-exclusive zone.

The potential human-health exposure pathways are as follows:

- Inhalations of dust or particulates
- Ingestion of soil
- Dermal contact
- External radiation exposure.

2.4.4 Potentially Complete Ecological Exposure Pathways

The most plausible potential ecological exposure pathways for the 200-MG-2 OU waste sites stem from direct contact with shallow zone soil that contains suitable habitat for terrestrial wildlife.

Ecological RALs that are protective of terrestrial ecological receptors will be established for use on 200 Areas waste sites. These values will be presented in the RAWP.

2.4.5 Selection of COPCs

A COPC is defined as a constituent suspected of being associated with site-related activities, which represent a potential threat to human health or the environment, and whose data are of sufficient quality for use in a quantitative baseline risk assessment. The 200-MG-2 OU waste sites originate from many different waste-generating processes and release mechanisms.

The first step in the COPC selection process was to query the Hanford Environmental Information System database for potential risk-driver contaminants located in the Central Plateau as shown in Figure 2-1. The maximum detected concentrations were obtained for constituents in soil samples taken from wells, boreholes, and waste sites.

The query identified 332 constituents, and the maximum detected value of each constituent was compared to human-health and ecological-screening values, using the following sources:

- **Human Health**
  - Method C of Ecology's cleanup levels and risk calculation table (Ecology, 2007, *Cleanup Levels & Risk Calculations [CLARC]*)
  - Radiation soil preliminary cleanup levels of 15 mrem/yr (DOE/RL-2006-50, *200-UR-1 Unplanned Release Waste Group Operable Unit Sampling and Analysis Plan*, Table 3)
- **Ecological**
  - WAC 173-340-900, "Tables," and WAC 173-340-7493, "Site-Specific Terrestrial Ecological Evaluation Procedures," Table 749-3
  - DOE-STD-1153-2002, A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota and DOE/EH-0676, RESRAD-BIOTA: A Tool for Implementing a Graded Approach to Biota Dose Evaluation, User's Guide, Version 1, ISCORS Technical Report 2004-02

Only those constituents with maximum detected values greater than the human health and ecological screening values are shown in Table 2-2 with an asterisk. Polynuclear aromatic hydrocarbons, aroclors, and metals also have been added to the list of COPCs because they may be present as a result of Hanford Site operations based on current information from other waste sites.

To ensure an effective means for detecting and reporting constituents that may not have been identified in the process described above, a method-based approach will be used for reporting analytical results and a COPC screening approach will be developed to identify those analytes that are the most likely to contribute to risk from exposure. Process knowledge, where available, will be used to guide sampling and analysis. Where no process knowledge exists, samples will be analyzed using analytical methods representing the preliminary list of COPCs shown in Table 2-2.

2.5 RISK EVALUATION AND SITE CONDITIONS THAT JUSTIFY A REMOVAL ACTION

If action is delayed or not taken, waste site contaminants in soils largely at or near the surface may result in risk to human health and ecological receptors. The potential threat for worker, public, and environmental exposures, as well as removal costs, increases.

Figure 2-1. Boundary of Central Plateau Information Query.

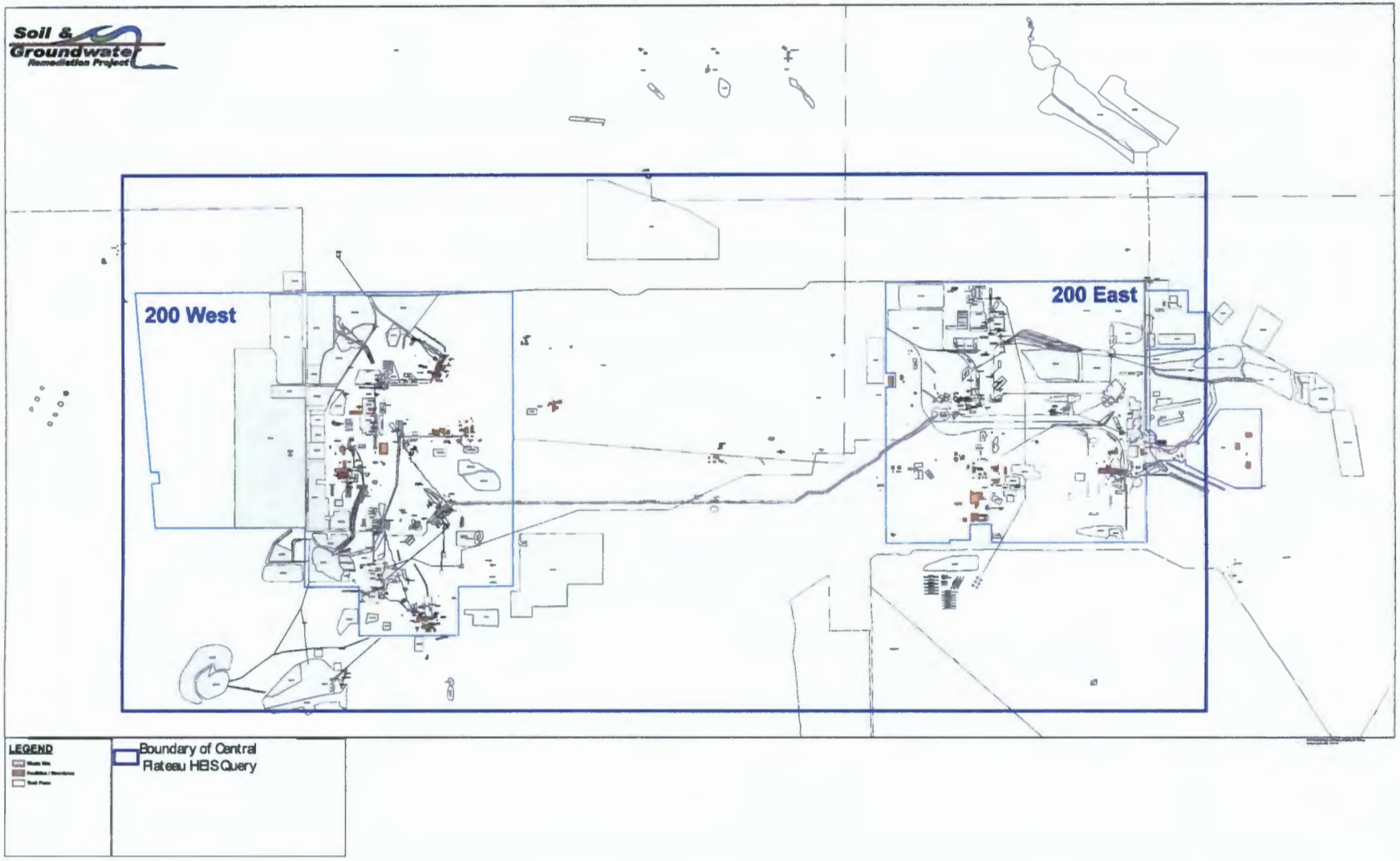

Table 2-2. Preliminary COPCs.

Metals		
Antimony*	Copper*	Silver
Arsenic*	Lead*	Thallium*
Barium*	Manganese	Uranium*
Beryllium	Mercury*	Vanadium*
Chromium*	Nickel*	Zinc*
Cobalt	Selenium*	
Radionuclides		
Americium-241*	Europium-155*	Uranium-235*
Cesium-137*	Strontium-90*	Uranium-233/234*
Europium-152*	Plutonium-238*	Uranium-238*
Europium-154*	Plutonium-239/240*	
Polynuclear Aromatic Hydrocarbons		
Acenaphthene	Benzo(b)fluoranthene	Fluorene
Acenaphthylene	Benzo(ghi)perylene	Naphthalene
Anthracene	Chrysene	Phenanthrene
Benzo(a)anthracene	Dibenz(a,h)anthracene	Pyrene
Benzo(a)pyrene	Fluoranthene	
Polychlorinated Biphenyls		
Aroclor-1016	Aroclor-1242	Aroclor-1260*
Aroclor-1221	Aroclor-1248	
Aroclor-1232	Aroclor-1254*	
Total Petroleum Hydrocarbons		
Total petroleum hydrocarbons (diesel range)*	Total petroleum hydrocarbons (kerosene range)*	

*Constituents identified were determined by the screening process identified in Section 2.4.5.

The DOE has determined that the 200-MG-2 OU waste sites either have released or have the potential to release CERCLA hazardous substances. The DOE also has determined that a non-time-critical removal action, pursuant to authority delegated under Executive Order 12580 and the Tri-Party Agreement Action Plan, Section 7.2.4, is warranted to mitigate the direct exposure threat.

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3.0 RAOs AND RALs

Waste site contaminants in soils largely at or near the surface may result in direct exposure to human health and ecological receptors. The potential threat of direct exposure justifies a CERCLA non-time-critical removal action. This chapter discusses the RAOs and RALs to be attained by the removal actions for the 200-MG-2 OU. The development of the RAOs and RALs identified in this EE/CA are consistent with preliminary CERCLA remedial investigation/feasibility study processes for the 200-MG-2 OU and for the other 200 Area OUs.

3.1 RAOs

RAOs provide a basis for evaluating specific removal alternatives to achieve compliance with potential ARARs (specified in Appendix D) and RALs, to the extent practicable. Based on previous remedial action objectives developed for the 200 Area OUs, the RAOs for this EE/CA are listed below.

- RAO 1. Prevent unacceptable risk to human health and ecological receptors from exposure to soils and/or debris contaminated with nonradiological constituents to 4.6 m (15 ft) bgs at concentrations above the RALs.
- RAO 2. Prevent unacceptable risk to human health and ecological receptors from exposure to soils and/or debris contaminated with radiological constituents to 4.6 m (15 ft) bgs at concentrations above the RALs.
- RAO 3. Prevent adverse impacts to cultural resources and threatened or endangered species, and minimize wildlife habitat disruption.

Achieving these RAOs can be accomplished by reducing concentrations (or activities) of contaminants to RALs or by eliminating potential exposure pathways/routes. The DOE will excavate certain waste sites within the industrial-exclusive zone, using an observational approach. This initially will be demonstrated using field instruments that detect beta- or gamma-ionizing radiation.

Verification sampling and analysis will be performed to assist in closing out the removal action at individual sites. If the RALs are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the RAWP. Protection of human health and the environment is met when risks from residual contamination are within the CERCLA 10^{-6} to 10^{-4} excess lifetime cancer risk range or when the hazard index is less than 1.0 for noncarcinogenic effects (EPA, 1991, *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*, OSWER Directive 9355.0-30).

3.2 RALs

The conceptual site model in this EE/CA consists of sites with a shallow contamination profile that do not pose a risk to groundwater. Cleanup levels for this contamination will be based on the RAOs and ARARs (Section 3.1 and Appendix D, respectively). The cleanup levels will protect human health and the environment and will be consistent with final remedial cleanup levels that are being developed for the Central Plateau OU remedial actions. RALs for the waste sites identified in this EE/CA are based on the CERCLA risk ranges for carcinogenicity and

toxicity and protection of the ecology. These RALS will be developed and documented in the RAWP. These RALs will be based on attainment of acceptable levels of human health and ecological risk for waste sites to the extent practicable. The RALs for waste sites inside the industrial-exclusive area boundary are based on anticipated future land use and protection of wildlife.

Attainment of the RALs is intended to meet the first two RAOs identified in Section 3.1 and is expected to satisfy the remedial action objectives established in a final record of decision.

4.0 DISCUSSION OF ALTERNATIVES

Provided below are summaries of each of the three removal action alternatives for the 200-MG-2 OU waste sites. The alternatives are discussed in general terms as they will be applied to the 200-MG-2 OU waste sites.

4.1 NA ALTERNATIVE

CERCLA requires the NA alternative as a baseline for comparison with other removal action alternatives. No legal restrictions, institutional controls, or active measures are applied to the waste site.

4.2 CS/NFA ALTERNATIVE

Under the CS/NFA alternative, sampling and analysis confirm that soil is at or below RALs and that no further action is required. Radiological surveys will be included in the initial site investigation as appropriate for site conditions to support the selection of sampling locations. A sampling and analysis plan will be prepared as part of the RAWP development. The sampling and analysis plan will contain the necessary information to support chemical and radionuclide data collection at a sufficient quantity and quality to determine whether RALs have been met.

This alternative will be considered for waste sites that meet one or more of the following conditions.

- Prior cleanup activities have been performed, but insufficient data are currently available to close out the waste site.
- COPC concentrations are not expected to exceed RALs.
- The contamination status of the site is uncertain and a strong possibility exists that the site is not contaminated.

If the results of confirmatory sampling indicate that the CS/NFA is inappropriate (i.e., greater than RALs), then the RTD action will be implemented or the waste site will be removed from this EE/CA and will be evaluated as part of the remaining 200-MG-2 OU.

4.3 RTD ALTERNATIVE

This alternative applies sampling and analysis to confirm that soil contains contamination above RALs and requires removal. However, removal actions may be conducted without prior confirmation sampling, where process knowledge and information are available to make this determination. Soil and other materials above RALs will be removed and disposed of with treatment as required for disposal. Through verification sampling and analysis, remaining in situ soils will be demonstrated to be at or below RALs. This alternative will be considered for waste sites that meet one or more of the following conditions.

- Contaminant concentrations are known or expected to exceed RALs
- Contaminants will not naturally attenuate below RALs by 2050

- This alternative provides a greater amount of risk reduction than other alternatives (applying cost as a discriminator for deciding between similar protective and implementable alternatives for a specific site).

The observational approach will guide the cleanup of sites under the RTD alternative. The observational approach is a method of planning, designing, and implementing a removal action that relies on information (e.g., field instrument readings and/or field-screening samples) collected during the removal process to guide the direction and scope of the activity. Initial screening and sampling data are used for an ERDF profile, to assess the extent of contamination and to make real-time decisions in the field. Following some excavation, the extent of contamination may be further assessed by additional screening and sampling. The extent of removal is then adjusted based on those results. Targeted removals will be conducted under this alternative if contamination is localized in only a portion of a waste site.

In this alternative, soils will be removed until the RALs are achieved, generally up to a depth of 4.6 m (15 ft). For human exposures via soil contact, a depth of 4.6 m (15 ft) is the point of compliance under WAC 173-340-745(7), "Point of Compliance." This depth represents a reasonable estimate of the depth of soil that is normally excavated and distributed at the surface as a result of development activities. If the RALs are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the RAWP. If results of confirmatory sampling indicate that the RTD is inappropriate (i.e., at or below RALs), then the CS/NFA action will be implemented.

5.0 ANALYSIS OF ALTERNATIVES

CERCLA requires that non-time-critical removal action EE/CA alternatives be evaluated against three criteria: effectiveness, implementability, and cost (EPA, 1993, *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA*, OSWER Directive 9360.0-32). Table 5-1 provides the criteria against which each removal action alternative is evaluated.

Table 5-1. Description of CERCLA Evaluation Criteria.

CERCLA Evaluation Criteria	Description of CERCLA Evaluation Criteria
Effectiveness	This criterion refers to the ability to meet the removal objectives within the scope of the removal action and in terms of overall protection of human health and the environment.
Overall protection of human health and the environment	Evaluates whether implementation of an alternative achieves adequate protection of risks to human health and the environment posed by the likely exposure pathways. The evaluation of this criterion is based on qualitative analysis and on assumptions regarding the contaminants present at the waste site.
Compliance with ARARs	Implementation actions for any selected alternative will be designed to comply with ARARs cited in this document, to the extent possible. ARARs are any appropriate standards, criteria, or limitations under any federal environmental law or more stringent state requirement that must be either met or waived for any hazardous substance, pollutant, or contaminant that will remain on site during or after completion of a removal action. Each alternative is assessed for compliance against these ARARs.
Long-term effectiveness and permanence	The long-term effectiveness and permanence criterion addresses the risk after the removal action is completed. This criterion also refers to the ability of the removal action to maintain reliable long-term protection of human health and the environment after RAOs have been met.
Reduction of TMV through treatment	This criterion refers to an evaluation of the anticipated performance of treatment technologies that might be employed in a removal action. The criterion assesses whether a removal action alternative significantly and permanently reduces the TMV of a hazardous substance through treatment. Significant overall reduction can be achieved by destroying toxic contaminants or by reducing total mass, contaminant mobility, or total volume of contaminated media.
Short-term effectiveness	This criterion refers to potential adverse effects on human health and the environment during the removal action implementation phase(s). This criterion also evaluates the speed with which an alternative achieves protection.
Implementability	This criterion addresses the technical and administrative feasibility of implementing the removal action alternative and the availability of the required services and materials.
Cost	This criterion considers the cost of implementing a removal action alternative, including capital costs, operation and maintenance costs, and monitoring costs, to the extent that costs can be quantified. The cost evaluation also includes monitoring of any restoration or mitigation measures for natural, cultural, and historical resources.

TMV = toxicity, mobility, or volume.

Information on contaminant concentrations is limited for the 200-MG-2 OU waste sites. In many cases, process knowledge concerning the characteristics of the waste stream released, materials present, or historical radiological hand-held instrument survey results provide the only indication as to whether the site currently may be contaminated. Qualitative information suggests that COPC concentrations are below RALs for many of the waste sites; therefore, site conditions are presumed in the absence of quantitative data.

Two base assumptions were considered in the alternatives analysis and are repeated as each alternative is evaluated against the criteria in Sections 5.1 and 5.2. The first assumption is that the waste site is assumed to be contaminated (i.e., at least one COPC concentration is greater than its RAL). The second assumption is that the COPC concentrations are all below RALs at a given waste site. The preferred alternative was selected by matching the available site information with the appropriate assumption and CERCLA evaluation criteria. The following sections explain each criterion.

5.1 EFFECTIVENESS

The effectiveness criterion refers to the ability to meet the removal objectives outlined in Chapter 3.0 in terms of overall protection of human health and the environment.

5.1.1 Overall Protection of Human Health and the Environment

This criterion was used to evaluate whether implementation of an alternative achieves adequate protection of human health and the environment from risks through the likely exposure pathways. Reducing the potential threat to acceptable levels is a CERCLA threshold requirement and is the primary objective of the removal action. The evaluation of this criterion was based on a qualitative analysis and the current assumptions regarding the contamination status of the 200-MG-2 OU waste sites.

NA. The NA alternative was retained for detailed analysis as a baseline description of the effects of taking no action as required by CERCLA regulations. This alternative cannot be considered for the 200-MG-2 OU waste sites because of limited characterization data. In addition, assuming that COPC concentrations exist above their RALs, this alternative does not provide acceptable levels of protection because exposure pathways would remain intact for Hanford Site personnel, the local environment, and/or the public. This alternative is provided for comparison to the other alternatives in the analysis even though it is not selected as a removal action alternative.

CS/NFA. The CS/NFA alternative would protect human health and the environment if confirmatory sampling and analysis show contaminant levels below RALs, and appropriate risk levels are met. This alternative cannot be applied to waste sites when sampling and analysis show contaminant concentrations above RALs, because additional actions would not be taken and residual contaminants could lead to unacceptable exposures to human or ecological receptors.

RTD. The RTD alternative is protective of long-term human health and the environment because the contaminants are removed from the waste sites. However, this alternative has greater potential to expose workers to contamination and safety hazards than the other alternatives.

5.1.1.1 Contaminant Levels Exceed RALs

The RTD alternative is most protective for the 200-MG-2 OU waste sites with contaminant levels above RALs because contaminants are removed and exposure pathways are eliminated. The CS/NFA alternative is not protective for sites where contaminants exceed RALs because actions would not be taken to control exposure pathways, and appropriate risk levels would not be met. The NA alternative is least protective of human health and the environment because no action would be taken to confirm exposure risks or control exposure pathways.

5.1.1.2 Contaminant Levels Below RALs

Each alternative requires certain actions to determine that the site contaminants are below RALs. The CS/NFA alternative is most appropriate for 200-MG-2 OU waste sites that have COPCs at levels below RALs, because no actions beyond sampling and analysis are needed after the risks are determined. The RTD alternative would be protective, but not necessary because the site poses no risk to human health or the environment. The NA alternative cannot demonstrate protectiveness in the absence of characterization data.

5.1.2 Compliance with ARARs

Implementation actions for any selected removal alternative will comply, to the extent practicable, with ARARs. ARARs are environmental regulations that have been evaluated to potentially be pertinent to the removal action. Response actions conducted onsite are required to comply with the substantive aspects of ARARs, not with corresponding administrative requirements (40 CFR 300.400[e], "Permit Requirements"). Permit applications and other administrative procedures (e.g., administrative reviews and reporting and recordkeeping requirements) are considered administrative for actions conducted entirely onsite and therefore not required. The purpose of this section is to identify the key ARARs proposed for the alternatives addressed in this EE/CA. ARARs, which will be followed during implementation of the selected removal action, will be documented in the CERCLA action memorandum.
The proposed ARARs are discussed generally in the following sections and are documented in detail in Appendix D. In addition, to-be-considered 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. As appropriate, this information should be considered while determining the removal action necessary for protection of human health and the environment.

NA. The NA alternative does not comply with ARARs because no actions would be taken to comply with federal or state requirements, as described in Section 5.1.1.

CS/NFA. The CS/NFA alternative complies with ARARs for sites where confirmatory sampling verifies that the appropriate risk levels have been met. Sites where confirmatory sampling shows contaminant levels to be above RALs and appropriate risk levels have not been met would not comply because no action would be taken to meet federal or state requirements.

RTD. The RTD alternative complies with ARARs for sites where contaminants exceed RALs because contaminated soils and structures would be removed from the waste sites and appropriate risk levels would be met. The alternative also would comply for sites where contaminants are below RALs.

5.1.2.1 Contaminant Levels Exceed RALs

The RTD alternative would comply with ARARs because both radiological and nonradiological contaminated soils would be removed from the waste sites. More potential ARARs would need to be met with this alternative because of excavation, emission controls, waste transportation, and waste management action-specific requirements. The CS/NFA alternative does not comply with ARARs for sites where contaminants exceed RALs because the appropriate risk levels would not be met and no action would be taken to meet any federal or state regulations. The NA alternative does not comply with ARARs because no action would be taken to meet any federal or state regulations.

5.1.2.2 Contaminant Levels Below RALs

Each alternative requires certain actions to determine that the site contaminants are below RALs. For the CS/NFA and RTD alternatives, confirmatory sampling would be used to demonstrate that appropriate risk levels have been met by attaining RALs. The NA alternative does not comply with ARARs because no action would be taken to identify risk or meet any federal or state regulations.

5.1.2.3 Waste Management Standards

A variety of waste streams may be generated under the proposed removal action alternatives. It is anticipated that most of the waste will be designated as low-level, dangerous waste, or mixed waste in a solid form and result from implementation of the RTD alternative. Radioactive waste is governed under the authority of the *Atomic Energy Act of 1954*. The identification, storage, treatment, and disposal of hazardous waste and the hazardous component of mixed waste are governed by RCRA. The State of Washington, which implements RCRA requirements under WAC 173-303, "Dangerous Waste Regulations," has been authorized by the EPA to implement most elements of the RCRA program. The dangerous waste standards for generation and storage will apply to the management of any dangerous or mixed waste generated at the 200-MG-2 OU waste sites. Treatment standards for dangerous or mixed waste subject to RCRA land-disposal restrictions are specified in WAC 173-303-140, "Land Disposal Restrictions," which incorporates 40 CFR 268, "Land Disposal Restrictions," by reference.

Waste that is designated as low-level waste that meets ERDF acceptance criteria (WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*) is assumed to be disposed at the ERDF, which is engineered to meet appropriate performance standards. ERDF is considered to be onsite for management and/or disposal of waste from removal actions proposed in this document[7]. There is no requirement to obtain a permit to manage or dispose of CERCLA

[7] CERCLA Section 104(d)(4) states that, where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these facilities as one for the purpose of this section. The preamble to the "National Oil and Hazardous Substance Pollution Contingency Plan" (40 CFR 300) clarifies the stated EPA interpretation 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. Therefore, the ERDF is considered to be onsite for response purposes under this removal action. It should be noted that the scope of work covered in this removal action is for a facility and waste contaminated with hazardous substances. Materials encountered during implementation of the selected removal action that are not contaminated with hazardous substances will be dispositioned by DOE.

waste at the ERDF. It is expected that the great majority of the waste generated during the removal action proposed in this document can be disposed onsite at ERDF. In accordance with the ERDF record of decision (ROD) (EPA et al., 1996), authorization to dispose at ERDF of waste generated during this removal action will be granted with the issuance of the Action Memorandum resulting from this EE/CA and through EPA approval of the sampling and analysis plan. Waste that must be sent offsite will be sent to a facility that has been or could be approved by EPA in accordance with 40 CFR 300.440 for receiving CERCLA waste.

Waste designated as dangerous or mixed waste would be treated as appropriate to meet land-disposal restrictions and ERDF acceptance criteria and disposed at the ERDF. ERDF is an engineered facility that provides a high degree of protection to human health and the environment and meets RCRA minimum technical requirements for landfills, including standards for a double liner, a leachate collection system, leak detection, monitoring, and final cover. Construction and operation of ERDF was authorized using a separate CERCLA ROD (EPA et al., 1995). The *U.S. Department of Energy Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Differences* (ESD) (EPA et al., 1996) modified the ERDF ROD (EPA et al., 1995; 2002) to clarify the eligibility of waste generated during cleanup of the Hanford Site. Per the ESD, ERDF is eligible for disposal of any LLW, missed waste, and hazardous/dangerous waste generated as a result of cleanup actions (e.g., removal action waste and IDW), provided the waste meets ERDF waste acceptance criteria and appropriate CERCLA decision documents are in place.

It is anticipated that CS/NFA and RTD alternatives can be performed in compliance with the waste management ARARs. Waste streams will be evaluated, designated, and managed in compliance with the potential ARAR requirements. Before disposal, waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

5.1.2.4 Standards Controlling Emissions to the Environment

The proposed removal action alternatives have the potential to generate both radioactive and nonradioactive airborne emissions. The RTD alternative would have the greatest potential for generation of airborne emissions.

RCW 70.94, "Washington Clean Air Act," requires regulation of radioactive air pollutants. The state implementing regulation WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," sets standards that at a minimum meet the federal *Clean Air Act of 1990* and 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." EPA partial delegation of the 40 CFR 61 authority to the State of Washington includes all substantive emissions monitoring, abatement, and reporting aspects of the federal regulation. The state standards protect the public by conservatively establishing exposure standards applicable to even the maximally exposed public individual, be that individual real or hypothetical. To that end, the standards address any member of the public, at the point of maximum annual air concentration in an unrestricted area where any member of the public may be. All combined radionuclide airborne emissions from the DOE Hanford Site facility are not to exceed amounts that would cause an exposure to any member of the public of greater than 10 mrem/yr effective dose equivalent. The state implementing regulation WAC 246-247, "Radiation Protection – Air Emissions," which adopts the WAC 173-480 standards and the 40 CFR 61, Subpart H standard,

requires verification of compliance with the 10 mrem/yr standard, and potentially would apply to the removal action.

WAC 246-247 further addresses emission sources emitting radioactive airborne emissions by requiring monitoring of such sources. Such monitoring requires physical measurement of the effluent or ambient air. The substantive provisions of WAC 246-247 requiring the monitoring of radioactive airborne emissions potentially are applicable to the removal action.

The above state implementing regulations further address control of radioactive airborne emissions where economically and technologically feasible (WAC 246-247-040(3) and -040(4), "General Standards," and associated definitions). To address the substantive aspect of these potential requirements, best or reasonably achieved control technology could be addressed by ensuring that applicable emission control technologies (those successfully operated in similar applications) would be used when economically and technologically feasible (i.e., based on cost/benefit). Once the ARARs are finalized and it is determined that substantive aspects of the requirement exist for control of radioactive airborne emissions, then controls will be administered as appropriate using the best methods.

The CS/NFA and RTD alternatives are expected to comply with these standards.

5.1.3 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence criterion refers to the magnitude of remaining risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, after the removal action alternative has been completed and cleanup goals have been met. The completion of the removal action alternative for RTD it is defined as the day the removal is complete.

NA. The NA alternative was retained for detailed analysis as a baseline description of the effects of taking no action as required by CERCLA regulations as described in Section 5.1.1. This alternative cannot be considered for the 200-MG-2 OU waste sites because of limited characterization data. In addition, for contaminated sites the NA alternative does not provide any measure of long-term effectiveness and permanence because no actions would be taken to mitigate risks or maintain long-term protection.

CS/NFA. The CS/NFA alternative would provide long-term effectiveness and permanence for sites where confirmatory sampling shows that contaminant levels do not exceed RALs. The alternative would not be effective or provide permanent protection for human health and the environment at sites where confirmatory sampling shows contaminant levels that exceed RALs.

RTD. The RTD alternative provides long-term effectiveness and permanent protection of human health and the environment, because contaminants would be removed from the waste sites and exposure pathways would no longer be present.

5.1.3.1 Contaminant Levels Exceed RALs

The RTD alternative provides the most effective, permanent, long-term protection for human health and the environment because contaminant removal eliminates exposure pathways. The CS/NFA alternative would provide long-term effectiveness and permanence because waste site sampling would show that no contaminants are present above RALs. The NA alternative is not effective and permanent because no action is taken to identify or eliminate risk.

5.1.3.2 Contaminant Levels at or Below RALs

Each alternative requires certain actions to determine that the site contaminants are at or below RALs. The CS/NFA alternative is effective and permanent in the long-term for 200-MG-2 OU waste sites that have contaminant levels that are at or below RALs, because confirmatory sampling and analysis results provide data indicating that no surface exposure risk is present. The RTD alternative also would be effective, but unnecessary, because the waste site poses no unacceptable risk. The NA alternative cannot demonstrate protectiveness in the absence of characterization data.

5.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion evaluates performance of anticipated treatment technologies in the removal action. It also assesses the potential reduction of toxicity, mobility, or volume (TMV) of a hazardous substance through treatment. Reduction characteristics include destruction of toxic contaminants, mass reduction, immobilization of contaminants, or reduction of the contaminated media volume.

This criterion focuses on the following factors for each alternative:

- Treatment processes used and the materials treated
- Recycling, reuse, and/or waste minimization used in a given treatment process
- Types and quantities of residuals that remain following treatment
- Possibility that further treatment actions may be needed for residuals
- Extent to which the alternative satisfies the statutory preference for treatment as a principal element.

NA. The NA alternative was retained for detailed analysis as a baseline description of the effects of taking no action as required by CERCLA regulations as described in Section 5.1.1. This alternative cannot be considered for the 200-MG-2 OU waste sites because of limited characterization data. In addition, the NA alternative does not provide reduction in TMV because no treatment is implemented.

CS/NFA. The CS/NFA alternative does not provide reduction in TMV because no treatment is implemented at the waste site.

RTD. The RTD alternative does not provide reduction in TMV because no treatment is implemented at the waste site. However, TMV is reduced through removal.

5.1.4.1 Contaminant Levels Exceed RALs

The NA, CS/NFA, and RTD alternatives do not provide reduction in TMV because no treatment is implemented at the waste site.

5.1.4.2 Contaminant Levels at or Below RALs

Each alternative requires certain actions to determine that the site contaminants are below RALs. The NA, CS/NFA, and RTD alternatives do not provide reduction in TMV because no treatment is implemented at the waste site.

5.1.5 Short-Term Effectiveness

This criterion refers to potential adverse effects on human health and the environment during the removal action implementation phase(s). The factors considered for each alternative are listed as follows.

- Health and safety of remediation workers and reliability of protective measures taken. Specifically, this involves any risk resulting from implementation, such as fugitive dust, transportation of hazardous materials, or air-quality impacts from off-gas emissions.
- Physical, biological, and cultural impacts that might result from the construction and implementation of the removal action, and whether the impacts can be controlled or mitigated.
- The amount of time required to meet RAOs.

Short-term environmental impacts generally relate to the extent of physical disturbance of a site and its associated habitat. Risks also can be associated with the potential disturbance of sensitive species because of increased human activity in the area.

NA. The NA alternative was retained for detailed analysis as a baseline description of the effects of taking no action as required by CERCLA regulations as described in Section 5.1.1. This alternative cannot be considered for the 200-MG-2 OU waste sites because of limited characterization data. In addition, the NA alternative does not apply for this criterion.

CS/NFA. The CS/NFA alternative would have negligible short-term impact to workers for sites where confirmatory sampling shows contaminant levels do not exceed RALs. The alternative would pose minimal risk to workers for sites where confirmatory sampling shows contaminant levels exceed the RALs during the sampling process.

RTD. The RTD alternative could result in short-term risks to workers and the environment during the implementation phase if contaminant levels exceed RALs. The excavation of contaminated soil would inherently increase the potential for a release to the environment, especially to the air. Adherence to appropriate environmental regulations and use of control technologies would mitigate the potential for releases. Risk would be lower at sites where contaminant levels are below RALs and only related to site worker hazards and impacts to the environment associated with site disturbances.

5.1.5.1 Contaminant Levels Exceed RALs

The RTD alternative has the greatest potential short-term impacts to human health and the environment during implementation for 200-MG-2 OU waste sites where contaminant levels exceed RALs. Potential worker and environmental impacts are associated with excavation, fugitive dust, and transportation of contaminated material. The CS/NFA alternative may have the potential for a short-term impact (through exposure) on workers collecting samples. This alternative would not involve any additional actions that would pose a risk to workers or the environment. The NA alternative does not apply, as discussed previously.

5.1.5.2 Contaminant Levels at or Below RALs

Each alternative requires certain actions to determine that the site contaminants are below RALs. The CS/NFA alternative would have minimal short-term impacts on human health and the environment for waste sites where contaminant levels are at or below RALs, because no

exposure pathways will be present and the site disturbance is minimal. The RTD alternative would have more short-term risk to human health and the environment than the other alternatives because excavation involves construction worker hazards and more disturbance of the site. The NA alternative does not apply, as discussed previously.

5.2 IMPLEMENTABILITY

This criterion addresses the technical and administrative feasibility of implementing the removal action alternative and the availability of the required services and materials.

The following factors are considered for each alternative:

- Technical feasibility:
  - Likelihood of technical difficulties in constructing and operating the alternative
  - Likelihood of delays because of technical problems
  - Uncertainties related to innovative technologies (e.g., failures).
- Administrative feasibility:
  - Ability to coordinate activities with other offices and agencies
  - Potential for regulatory constraints to develop (e.g., because of uncovering buried cultural resources or encountering endangered species).
- Availability of services and materials:
  - Availability of adequate onsite or offsite treatment storage capacity, and disposal services, if necessary
  - Availability of necessary equipment, specialists, and provisions to ensure obtaining any additional resources, if necessary
  - Source for backfilling excavated areas (e.g., surrounding soils, borrow pit) to be specified in the RAWP.

NA. The NA alternative was retained for detailed analysis as a baseline description of the effects of taking no action as required by CERCLA regulations as described in Section 5.1.1. This alternative cannot be considered for the 200-MG-2 OU waste sites because of limited characterization data. In addition, the NA alternative would not be feasible, because regulatory constraints would prevent its implementation.

CS/NFA. The CS/NFA alternative is relatively easy to implement for all 200-MG-2 OU waste sites because it is technically and administratively straightforward. The potential for failure or development of new regulatory constraints would be low, because the only activity would be sampling and analysis. The alternative may have technical challenges at sites that require special sampling equipment (e.g., accessing potentially contaminated soils below thick concrete retention basins or below building foundations).

RTD. While the RTD alternative typically will employ proven and standard techniques to safely handle materials, the RTD alternative also poses the greatest technical and administrative implementation challenge because it requires the most planning, commitment of equipment and personnel, and project coordination.

5.2.1 Contaminant Levels Exceed RALs

The CS/NFA alternative would be easiest to implement where contamination levels exceed RALs, because the only activity would be sampling and analysis. However, this alternative would not provide a reduction in the risk posed by a contaminated waste site. The RTD alternative would be the most difficult to implement due to the requirements for planning, equipment and personnel requirements for excavation and demolition activities, and worker safety. The NA alternative is not applicable, as described in Section 5.1.1.

5.2.2 Contaminant Levels at or Below RALs

Each alternative requires certain actions to determine that the site contaminants are below RALs. The CS/NFA alternative would be easy to implement for waste sites where contamination levels are at or below RALs, because the only activity required would be sampling and analysis. The RTD alternative would require the greatest commitment of personnel, equipment, and administrative coordination. The NA alternative is not applicable, as described in Section 5.1.1.

5.3 COST

This criterion considers the cost of implementing a removal action alternative, including capital costs, operation and maintenance costs, and monitoring costs, to the extent that costs can be quantified assuming that the site contaminants are above RALs. The cost evaluation also includes monitoring of any restoration or mitigation measures for natural, cultural, and historical resources. The costs provide a discriminator for deciding between similar protective and implementable alternatives for a specific site. Therefore, the costs are not absolute costs, but rather relational costs for the evaluation of the alternatives.

The cost reference document for this EE/CA (SGW-38475) presents the cost estimates in both 2008 nondiscounted and present-worth terms. Only the present-worth costs are used for comparative purposes in the alternatives analysis. The target accuracy for the cost estimates is –30 to +50 percent. The cost estimates were prepared from information available at the time of this study. The actual cost of the project will depend on additional information gained during the removal action phase. Although the exact dollar estimates were prepared, present-worth estimates in this EE/CA have been rounded to the nearest thousand dollars.

The present-worth cost for each applicable alternative has been estimated for each waste site to allow for comparison among alternatives; these costs are summarized in Appendix C of this report. The cost shown for a particular alternative only would be applicable if the waste site met all the conditions for its use (Chapter 4.0). In some cases, because of the specific characteristics of a waste site, an alternative and its associated costs would not apply. The CS/NFA alternative generally has the lowest cost of the three alternatives that could be implemented (it is assumed that the NA alternative would not be implemented). The RTD alternative is generally higher in cost than the CS/NFA alternative. However, the RTD costs are highly dependent on site size and waste volume.

5.4 APPLICATION OF ALTERNATIVE SELECTION PROCESS

Tables 5-2 and 5-3 present a summary showing the application of the CERCLA evaluation criteria. The two base assumptions considered for each alternative are that contaminant concentrations at the waste site exceed RALs and that contaminant concentrations at the waste site do not exceed RALs.

The preferred alternative selection was based on the CERCLA evaluation criteria and the decision logic shown in Figure 5-1. When comparing and selecting a preferred alternative, present-worth cost was used as the final factor in the analysis. Generally, if one alternative offered a greater amount of protection than another for approximately the same cost of implementation, the most protective alternative was selected. As the cost difference increased between RTD and CS/NFA, CS/NFA became the preferred alternative, particularly when the site was most likely below RALs.

Removal action alternative selection involved review of available information for specific waste site attributes as shown in Appendix B. Table 5-4 presents the outcome of this evaluation for each waste site, including removal action costs.

Table 5-2. Comparison of CERCLA Evaluation Criteria to Removal Action Alternatives: Site COPCs Expected to Exceed RALs.

CERCLA Evaluation Criteria	Summary of Comparison of CERCLA Evaluation Criteria Among Alternatives		
	NA	**CS/NFA**	**RTD**
Effectiveness			
Protective of human health and the environment See Section 5.1.1.1	☒ Not protective because no action taken to characterize risk or control exposure pathways.	☒ Not protective because no action taken to control exposure pathways.	❶ Most protective because COPCs are removed to levels below RALs.
Complies with ARARs See Section 5.1.2.1	☒ Cannot demonstrate compliance with ARARs in the absence of characterization data or removal actions.	☒ Not compliant with ARARs because sampling data do not confirm the site poses no risks and because no action taken to meet federal or state cleanup regulations.	② Would comply with ARARs. More potential ARARs need to be met with this alternative because of excavation, emission controls, and waste management requirements.
Long-term effectiveness and permanence See Section 5.1.3.1	☒ Does not apply. There are no characterization data and removal actions not taken.	☒ No long-term effectiveness because protective measures are not taken to control exposure pathways.	❶ Effective and permanent because COPCs would be removed to levels below RALs at completion of the removal action.
Reduction of TMV through treatment See Section 5.1.4.1	☒ Does not reduce TMV because active treatment actions are not taken.	☒ Does not result in a reduction in TMV because active treatment actions are not taken.	☒ Does not result in a reduction in TMV because active treatment actions are not taken at the waste site.
Short-term effectiveness See Section 5.1.5.1	☒ Does not apply. There are no characterization data and removal actions not taken.	② Minor potential impact to workers or environment during implementation.	③ Greatest potential for impacts to workers and releases to the environment.
Implementability See Section 5.2.1	☒ Cannot achieve regulatory acceptability in the absence of characterization data.	❶ Easily implementable because only activity is sampling and analysis.	③ Technically and administratively the most difficult alternative to implement.
Cost See Section 5.3	Not applicable – No associated cost.	Generally lowest cost alternative.	Generally intermediate cost alternative.

❶②③ Circles indicate the criterion is met. The numbers within the circles designate the relative ranking in meeting the criterion among the alternatives. A ranking of #1 indicates all aspects of the criterion are best met by the alternative. Criteria of relatively equal ranking receive the same numeric value.

☒ Does not meet the criterion.

Table 5-3. Comparison of CERCLA Evaluation Criteria to Removal Action Alternatives: Site COPCs Expected Below RALs.

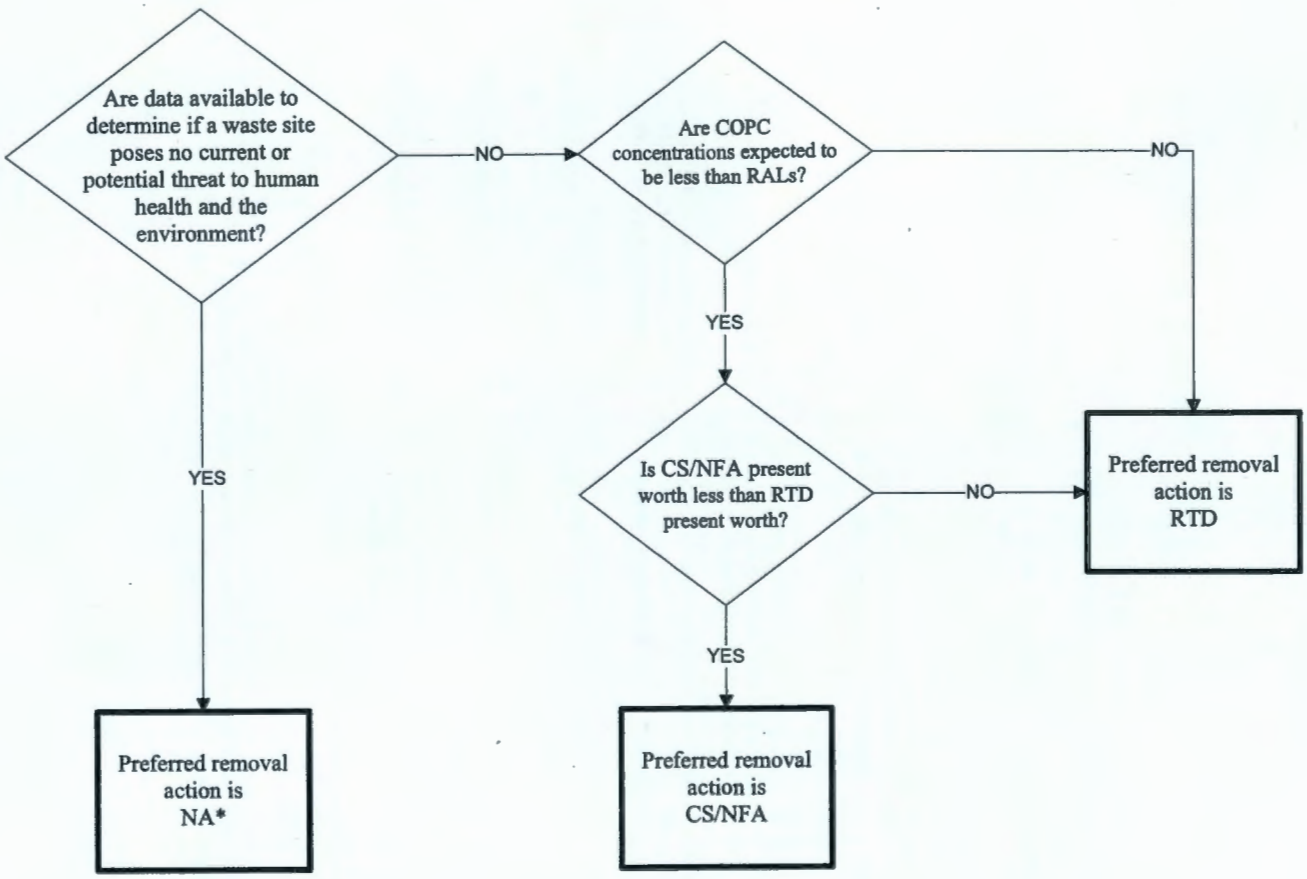
CERCLA Evaluation Criteria	Summary of Comparison of CERCLA Evaluation Criteria Among Alternatives		
	NA	**CS/NFA**	**RTD**
Effectiveness			
Protective of human health and the environment See Section 5.1.1.2	☒ Cannot demonstrate protectiveness in the absence of characterization data.	❶ Meets the criterion because data are gathered to confirm that the waste site poses no risk and no further action is needed.	⊘ Not evaluated because COPCs are below RALs.
Complies with ARARs See Section 5.1.2.2	☒ Cannot demonstrate compliance with ARARs in the absence of characterization data	❶ Complies with ARARs because sampling data confirm the site poses no risks and meets federal or state cleanup regulations.	⊘ Not evaluated because COPCs are below RALs.
Long-term effectiveness and permanence See Section 5.1.3.2	☒ Does not apply. There are no characterization data and removal actions not taken.	❶ Meets the criterion. Sampling data verify no further actions are needed at the waste site.	⊘ Not evaluated because COPCs are below RALs.
Reduction of TMV through treatment See Section 5.1.4.2	☒ Cannot demonstrate reduction of TMV without active treatment.	⊘ Does not apply because COPCs are below RALs.	⊘ Not evaluated because COPCs are below RALs.
Short-term effectiveness See Section 5.1.5.2	☒ Does not apply. There are no characterization data and removal actions not taken.	⊘ Does not apply. Removal actions not taken	⊘ Not evaluated because COPCs are below RALs.
Implementability See Section 5.2.2	☒ Cannot achieve regulatory acceptability in the absence of characterization data.	❶ Easily implementable since only activity is sampling and analysis.	⊘ Not evaluated because COPCs are below RALs.
Cost See Section 5.3	Does not apply. There are no characterization data and removal actions not taken.	Low-cost alternative.	Not evaluated because COPCs are below RALs.

❶ Circles indicate the criterion is met. A ranking of #1 indicates all aspects of the criterion are best met by the alternative.

⊘ The circle with the diagonal bar indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.

☒ Does not meet the criterion.

Figure 5-1. Decision Logic Diagram.



*NA is included as a CERCLA requirement of the assessment, but is not the preferred removal action for any 200-MG-1 OU waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
200-E-4	French Drain	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$393,000		■		Available information indicates that this site is a dry well or French drain that is covered by a metal lid painted yellow. The French drain is connected to the 209-E Critical Mass Laboratory via an underground pipe (200-E-249-PL). Nonhazardous liquid waste in the form of steam condensate from the steam trap in the valve pit and the equipment room has been reported to have been dispositioned at this location. An auger hole was drilled and sampled 6.2 m (20.5 ft) into the center of the drain as part of the 200-MW-1 OU characterization project in 2004. Barium and copper exceeded wildlife-screening values. CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
200-E-25	French Drain	☒	☒	❶	☒	☒	②	☒	☒	❶	☒	☒	☒	☒	②	③	☒	❶	③	See note	$180,000	$401,000			■	Available information indicates that this site is a dry well that is associated with the 272-BB Insulation Shop and the 200-E-209-PL Pipeline. The site is located 6 m (20 ft) north of the northeast corner of 272-BB Building. The site is not visible from the surface (2.7 m [9 ft] deep), but is marked with a sign. Materials that could have been flushed into an associated floor drain include asbestos, calcium silicate, fiberglass, silicate, Airball, and latex paint, organic chemicals, oil, and grease. The site is no longer in use and the sink and drain (which provided the conduit from the shop to the dry well) were removed and plugged with concrete. Based on the potential for asbestos and other insulation materials to be present, the RTD alternative is most protective of potential receptors and best meets other CERCLA criteria.
207-A NORTH	Retention Basin	☒	☒	❶	☒	☒	②	☒	☒	❶	☒	☒	☒	☒	②	③	☒	❶	③	See note	$180,000	$1,711,000			■	Available information indicates this retention basin consists of three concrete hypalon-lined basins surrounded with chain and posts. The site is located east of the 242-A Evaporator in the 200 East Area. The site is associated with the 242-A Evaporator, 216-A-25 Pond, 216-B-3 Pond, 200-E-234-PL Pipeline, and 200-E-235-PL Pipeline. Nonhazardous liquid waste in the form of steam condensate is reported to have been dispositioned at this location from the 242-A Evaporator since 1977. A polyurethane sealant was added to the basin walls in 1982. Before the installation of the hypalon liner, the basins had been posted as a CA. The basins were physically isolated and ceased to operate in 1999. The depth of the site is approximately 2.1 m (7 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

❶②③ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
207-S	Retention Basin	☒	☒	❶	☒	☒	❶	☒	☒	❶	☒	⊘	⊘	☒	②	③	☒	❶	③	See note	$318,000	$1,227,000			■	Available information indicates this retention basin consists of a concrete basin that has been backfilled to grade with dirt. The site is posted as a URM area. The site is located west of the 222-S Laboratory in the 200 West Area and is associated with the 202-S Facility, 216-S-17 Pond, UPR-200-W-13, UPR-200-W-15, UPR-200-W-95, and the 200-W-152-PL Pipeline. Nonhazardous liquid waste in the form of process cooling water and steam condensate is reported to have been dispositioned at this location, from the 202-S Facility. However, several coil leaks from the 202-S Facility caused contaminated effluent to be discharged to the basin, ultimately ceasing operations to the basin in 1954. The basin then was backfilled to grade. In 1975, gravel and herbicides were spread over the site to stop radioactive weed growth. The surface is potentially contaminated with radioactive biota. In 1991, a radiation survey detected 9,000 cpm beta/gamma at the site. The depth of the site is approximately 2 m (6.8 ft). RTD is the preferred alternative because it is most protective of human and ecological receptors, and meets other CERCLA criteria.
207-T	Retention Basin	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$429,000	$2,617,000			■	Available information indicates this retention basin consists of a concrete structure divided into two sections. The basin has been backfilled with contaminated dirt and capped with 0.6 m (2 ft) of clean soil bringing the material to grade in 1996. The site is posted as a URM area (down posted from a soil contamination area). The site is located west of the 221-T Building in the 200 West Area. The site is associated with the 221-T Building, 224-T Building, 216-T-12 Trench, 200-W-53 Unplanned Release, 216-T-4-1 Ditch, 216-T-4-2 Ditch, 200-W-88-PL Pipeline, 200-W-165-PL Pipeline, 200-W-166-PL Pipeline, 200-W-167-PL Pipeline, and the 200-W-164-PL Pipeline. Radioactive and nonhazardous liquid waste in the form of cooling water effluent from the 221-T and 224-T Buildings and low-level radioactive waste from the T Plant process cooling and ventilation steam condensate is reported to have been dispositioned at this location. The depth of the site is approximately 2 m (6.5 ft). RTD is the most protective alternative and best meets other CERCLA criteria.
207-U	Retention Basin	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$429,000	$2,617,000			■	Available information indicates this retention basin consists of a concrete structure divided into two plastic-lined sections. Both sections are posted CA. The site is located west of the 221-U Building and east of the U Tank Farm. The site is associated with the 200-W-192-PL Pipeline, 200-W-222-PL Pipeline, UPR-200-W-111, UPR-200-W-112, 221-U Building, and the 224-U Building. Until 1972, the site received steam condensate and cooling water from the 224-U Building as well as chemical sewer waste from the 221-U Building. After 1972, the site only received cooling water from the 224-U Building. The depth of the site is approximately 2 m (6.5 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

❶②③ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
207-Z	Retention Basin	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$857,000			■	Available information indicates this retention basin consists of a concrete structure divided into two sections. The basins may have been filled with high-density grout. The site is located inside the Z Plant (Plutonium Finishing Plant) exclusion area fence. The site is associated with the 241-Z and 234-5Z Facilities and 200-W-209-PL Pipeline. Potentially contaminated liquid waste in the form of steam condensate and cooling water via the D-3 piping system is reported to have been dispositioned at this location. The depth of the site is approximately 3 m (10 ft). RTD is the most protective alternative and best meets other CERCLA criteria.
209-E-WS-2	French Drain	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$168,000	$186,000		■		Available information indicates this French drain is a drain in a gravel area. The drain is painted yellow and has a metal cover. The site is located on the southeast corner of the 209-E Critical Mass Laboratory (Laboratory wing). Nonhazardous liquid waste in the form of condensate is reported to have been dispositioned at this location from the Critical Mass Laboratory high-efficiency particulate air filters and heat exchange systems. The depth of the site is approximately 2.5 m (8 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-A-41	Crib	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$430,000		■		Available information indicates this crib is northwest of the 296-A-13 Stack (north of the 244-AR Vault Facility). The site is no longer marked or posted. The crib received 296-A-13 Stack condensate drainage (the stack is connected to the 244-AR Vault), which is potentially acidic and is reported to have contained less than 1 Ci of beta activity. The crib was deactivated by removing the stack drainage pipe. Drainage was rerouted to the vessel vent seal pot system in the 244-AR Building. The depth of the site is approximately 2.1 m (7 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-B-51	French Drain	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$469,000			■	Available information indicates this French drain is located north of the B Tank Farm and northeast of the 216-B-8 Crib and Tile Field. The site is within a small area posted as a URM area. The drain is a concrete structure that extends 0.3 m (1 ft) above ground and 4.2 m (14 ft) below ground. A wooden cover with vent holes covers the structure. The site is posted with fixed CA signs. The site received process waste effluent drainage from the BC Crib pipeline, which carried high salt, neutral to basic scavenged tributyl phosphate waste via or from the BY Tank Farm to the BC Crib area and is estimated to contain less than 10 Ci beta activity. The site is associated with the 216-E-114-PL Pipeline, 200-E-221-PL Pipeline, and UPR-200-E-144. The site was used from 1956 to 1958. In 2006, a radiation survey detected 18,000 dpm/100 cm^2 beta/gamma on the structure and wooden cover. The depth of the site is approximately 4.6 m (15 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

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☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
216-C-4	Crib	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$585,000		■		Available information indicates this crib is located between the double security fences surrounding the 209-E Critical Mass Laboratory. The site is marked and posted with URM signs. The crib received contaminated organic waste from the 276-C Building. The site is associated with the 200-E-170-PL Pipeline. This crib was deactivated in 1965 and surface stabilized in 2000. The depth of the site is approximately 4.9 m (16 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-S-12	Trench	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$527,000			■	Available information indicates this trench is located northeast of the 202-S Building (north of the 291 Stack). The site is marked and posted with URM signs and cement marker posts/chain. The trench was used for liquid disposal of 291-S Stack flush water. The waste is estimated to contain approximately 5 Ci of beta emitters, and 2 to 3 Ci of gamma emitters (ruthenium and zirconium-niobium). The site is associated with the 291-S Stack. The trench was deactivated by removing the aboveground piping and backfilling the location. The depth of the site is approximately 3 m (10 ft). RTD is the most protective alternative and best meets other CERCLA criteria.
216-S-18	Trench	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$644,000		■		Available information indicates this trench is located east of the S Tank Farm (southwest of the 216-S-9 Crib). The trench is posted with URM signs. The site originally was used as a steam-cleaning pit for contaminated vehicles. Later it was used to consolidate contaminated soil from the surrounding area and backfilled to grade. The site is associated with UPR-200-W-114. The soil from the unplanned release was pushed in the trench and covered with clean soil and posted as a URM area. The trench has been surface stabilized. CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-S-25	Crib	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$2,888,000		■		Available information indicates this crib is located west of the SX Tank Farm outside the 200 West Area perimeter fence (south and east of the 216-U-10 Pond). The crib is marked and posted with URM signs. The crib received 242-S Evaporator process steam condensate until 1980. In 1984, the 200-W-159-PL Pipeline was tied into the crib. In 1985, the site received effluent from the 216-U-1 and -2 groundwater pump-and-treat activity. In 1995, the site received condensate from the 241-SX Sludge Cooler Steam Heater at approximately 15 to 30 L/h. The site is associated with the 242-S Evaporator and the 200-W-161-PL Pipeline. The depth of the site is approximately 3 m (10 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

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■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
216-SX-2	Crib	☒	☒	❶	☒	☒	②	☒	☒	❶	☒	☒	☒	☒	②	③	☒	❶	③	See note	$180,000	$519,000			■	Available information indicates this crib is located south of the 241-SX-701 Compressor House and west of the SX Tank Farm fence. The crib is marked with light posts/chain and URM signs. The crib received waste from and is connected to the 241-SX-701 Compressor House. In 2000, the crib's vent risers were sealed to prevent passive radioactive emissions. The site is associated with the 241-SX-701 Compressor House and the 200-W-162-PL Pipeline. The depth of the site is approximately 2 m (6.8 ft). Because of the potential for the presence of shallow radionuclides, RTD is the most protective alternative and best meets other CERCLA criteria.
216-T-1	Ditch	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$1,326,000		■		This ditch is located on the north side of the 221-T Building. The site is marked and posted with URM signs. The ditch received cooling water and steam condensate discharge from the 221-T and 271-T Buildings. It also received sodium hydroxide wash water waste solution from the Sodium-Air Water Reaction Emergency Air Cleaning Development-Hanford Engineering Development Laboratory. The site ran from 1956 to 1970. It was isolated permanently in 1995 by filling the manholes with concrete and cutting/capping the discharge pipes as well as backfilling and stabilizing the location. The site is associated with the 221-T Building and 200-W-180-PL Pipeline. The depth of the site is approximately 3 m (10 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-T-4-1D	Ditch	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$1,607,000			■	This ditch is located west of the 221-T Building and northwest of the T Tank Farm. It is marked and posted with URM signs. The ditch received T Plant cooling water and condensate waste via the 207-T Retention Basin. Total plutonium discharge to the site is estimated at 1.41 g. The site was contaminated to the maximum allowance by 1971 (20,000 cpm). The ditch was backfilled in 1972. The site ran from 1944 to 1972, and was surface stabilized in 1995. The site is associated with the 216-T-4A Pond, 216-T-4-2 Ditch, 207-T Retention Basin, and 200-W-164-PL Pipeline. The depth of the site is approximately 1.2 m (4 ft). RTD is the most protective alternative and best meets other CERCLA criteria.
216-T-4-2	Ditch	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$2,784,000			■	This ditch is located north of the T Tank Farm. It is marked and posted with URM signs. The site is covered in grass. The ditch received steam condensate and condenser cooling water from the 242-T Evaporator and nonradioactive wastewater from the 221-T Building air conditioning filter units and floor drains. Total plutonium discharged to the site is estimated at 1.41 g. The site replaced the 216-T-4-1 Ditch. The site was backfilled and surface stabilized in 1995. The site is associated with the 216-T-4B Pond, 207-T Retention Basin, and 200-W-164-PL Pipeline. The depth of the site is approximately 1.2 m (4 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

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⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
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Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
216-T-9	Trench	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$168,000	$408,000		■		Available information indicates this trench is located west of the 221-T Building and southwest of the 216-T-33 Crib. The site is no longer marked or posted. The site originally was used for subsurface liquid disposal of vehicle decontamination waste for heavy equipment and other vehicles. Contaminated soil at the site was removed (maximum of 3,000 cpm) and taken to the 200 West Area Dry Waste Burial Ground, and the site was backfilled in 1954. The site is associated with the 216-T-10 and 216-T-11 Trenches. The depth of the site is approximately 0.6 m (2 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-T-10	Trench	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$168,000	$408,000		■		Available information indicates this trench is located west of the 221-T Building and southwest of the 216-T-33 Crib. The site is no longer marked or posted. The site originally was used for subsurface liquid disposal of vehicle decontamination waste for heavy equipment and other vehicles. Contaminated soil at the site was removed (maximum of 3,000 cpm) and taken to the 200 West Area Dry Waste Burial Ground, and the site was backfilled in 1954. The site is associated with the 216-T-9 and 216-T-11 Trenches. The depth of the site is approximately 2.1 m (7 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-T-11	Trench	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$168,000	$408,000		■		Available information indicates this trench is located west of the 221-T Building and southwest of the 216-T-33 Crib. The site is no longer marked or posted. The site originally was used for subsurface liquid disposal of vehicle decontamination waste for heavy equipment and other vehicles. Contaminated soil at the site was removed (maximum of 3,000 cpm) and taken to the 200 West Area Dry Waste Burial Ground, and the site was backfilled in 1954. The site is associated with the 216-T-10 and 216-T-11 Trenches. The depth of the site is approximately 2.1 m (7 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-T-12	Trench	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$413,000			■	Available information indicates this trench is located near the northeast corner of the 207-T Retention Basin. The site is not marked or posted. The area around the 207-T Retention Basin has been backfilled and stabilized (including the spot where the trench should be located). The trench received sludge from the 207-T Retention Basin. The sludge at the time of burial (1954) has a radiation survey instrument-reading maximum of 15 mR/h. Surface readings at the time ranged between 2 and 5 mR/h. The trench was used only once before being backfilled. The depth of the site is approximately 2.5 m (8 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

❶②③ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
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Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
216-T-13	Trench	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$392,000		■		Available information indicates this trench is located on the north side of the TY Tank Farm, north of the perimeter fence. The site is not marked or posted. The site was used to clean contaminated vehicles with water or steam. Contaminated soil was removed in 1972 and taken to the 200 West Area Dry Waste Burial Ground. Two characterization test pits were dug at the site in 2005 with analytical results showing only low-level concentrations of a few organic constituents. The site has been associated with the 269-W Regulated Garage (currently demolished). The depth of the site is approximately 3 m (10 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-T-33	Crib	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$470,000			■	This crib is located west of the 221-T Canyon Building and southwest of the 2706-T Building. It is marked with light posts/chain and URM signs. The crib received equipment decontamination waste from the 2706-T Decontamination Building. The site only ran for one month in 1963 and has been surface stabilized. The site is associated with the 2706-T Decontamination Building and the 200-W-173-PL Pipeline. The depth of the site is approximately 3.3 m (10.8 ft). A characterization borehole was drilled through the site in 2004 and showed low levels of Cs-137 (33.1 pCi/g) and Sr-90 (49 pCi/g) in the 3.9 to 4.7 m (13 to 15.5 ft) sampling interval. RTD is the most appropriate alternative and meets the other CERCLA criteria.
216-U-3	French Drain	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$396,000		■		Available information indicates this French drain is located south of the U Tank Farm on the south side of 16th Street. The drain is marked with light steel posts/chain and posted with URM signs. The site received condensate from the steam condensers on the 241-U-104 and 241-U-110 Tanks, which held Reduction-Oxidation Plant boiling waste. The French drain operated from 1954 to 1955. The site was deactivated in 1955 when the contents of the tanks were no longer boiling. Sometime before 1985, the site was backfilled. It was noticed that the backfill may have caved in, so in 1985 the site and cave-in were backfilled again. The site is associated with the 241-U-104 and 241-U-110 Tanks and the 200-W-169-PL Pipeline. The depth of the site is approximately 3.7 m (12 ft). A characterization borehole was drilled through the site in 2004, with analytical results showing only low concentrations of several organic constituents. CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

❶❷❸ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
216-U-14	Ditch	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$717,000	$6,007,000			■	This ditch originates west of the 284-W Powerhouse and extends southward, terminating at the 216-U-10 Pond. The site received powerhouse wastewater; laundry wastewater; chemical sewer waste from the 221-U Building; and steam condensate and cooling water from the 221-U Building, 241-U-110 Condenser Tank, 224-U Building, and 242-S Evaporator. All effluent discharges were ceased by 1995. The site was backfilled and stabilized in stages between 1984 and 1995. The site is associated with the 284-W Powerhouse; 2723-W, 2724-W, 221-U, 224-U, and 271-U Buildings; 242-S Evaporator; 241-U-110 Tank; and 200-W-102-PL, 200-W-168-PL, 200-W-222-PL, and 200-W-223-PL Pipelines. In 1981, a soil sample was taken; results detected Cs-137, Sr-90, U-238, Co-60, Pu-239/240, and Tc-99. In 1997, a radiation survey was performed on tumbleweeds at the site. Contamination was detected at 4,000 to 10,000 dpm. The depth of the site is approximately 3 m (10 ft). RTD is the most protective alternative and best meets other CERCLA criteria.
216-Z-13	French Drain	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$415,000		■		Available information indicates this French drain is located northeast of the 291-Z Stack. The French drain is visible from the ground and is adjacent to a single cement marker post and metal plate labeled with the site name. The site received emergency condensate from the ET-8 Exhaust Fan Turbine and 291-Z Stack steam condensate and floor drainage. The effluent source has been isolated. The site is associated with the ET-8 Exhaust Fan Turbine, 291-Z Stack, and 200-W-214-PL Pipeline. The depth of the site is approximately 4.9 m (16 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
216-Z-14	French Drain	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$415,000		■		Available information indicates this French drain is located northwest of the 291-Z Stack. The top of the French drain has been paved over, but is adjacent to a single cement marker post and metal plate labeled with the site name. The site received emergency condensate from the ET-9 Exhaust Fan Turbine and 291-Z Stack steam condensate and floor drainage. The site is associated with the ET-9 Exhaust Fan Turbine, 291-Z Stack, and 200-W-215-PL Pipeline. The depth of the site is approximately 4.9 m (16 ft). CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
2704-C-WS-1	French Drain	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$405,000		■		Available information indicates this French drain is located on the southwest corner of the 2704-C Building (demolished) in the 200 East Area. The drain is located within a larger gravel area that is posted as a URM area. The drain is not visible from the ground surface. The site received steam condensate drainage from an unknown source. The site is associated with the 2704-C Building, 200-E-250-PL Pipeline, and the UPR-200-E-41 area. The depth of the site is unknown. CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

❶②③ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
UPR-200-E-9	Unplanned Release	☒	❶	⊘	☒	❶	⊘	☒	❶	⊘	☒	⊘	⊘	☒	⊘	⊘	☒	❶	⊘	See note	$180,000	$394,000		■		Available information indicates this unplanned release is located adjacent to the 216-BY-201 Flush Tank, north of the BY Tank Farm. The site has been surface stabilized and posted as a URM area. The release is described as a flush tank that leaked supernatant waste from the tributyl phosphate process to the ground. In 1955, most of the contaminated soil was removed. The remaining contamination was covered with 3 m (10 ft) of clean soil. This unplanned release is associated with the 216-BY-201 Flush Tank and the 216-B-43 through 216-B-50 Cribs. The depth of the site is unknown. CS/NFA is the most appropriate alternative and meets the other CERCLA criteria.
UPR-200-E-17	Unplanned Release	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$168,000	$192,000			■	Available information indicates this unplanned release affected the top of the 216-A-22 Crib, located north of Plutonium-Uranium Extraction Plant, north of the 203-A Building, near the 216-A-28 French Drain. The release is not separately marked due to being inside the 203-A Building radiation zone from the 216-A-22 Crib. The release is described to be uranium (from uranyl nitrate hexahydrate storage) contamination that was dispositioned to the ground surface due to the failed crib inlet at the 216-A-22 Crib. The site is associated with the 216-A-22 Crib and the 203-A Building. RTD is the most protective alternative and best meets other CERCLA criteria.
UPR-200-W-103	Unplanned Release	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$411,000			■	Available information indicates this unplanned release occurred within the Z Plant exclusion area 1.9 m (6 ft) south and 3.7 m (12 ft) west of the southwest corner of the 236-Z Building. The release is not visible from the ground surface. The release is described to have contained approximately 10 g of plutonium with gross alpha contamination greater then 6,000,000 dpm. The site of release was covered over with clean soil (contamination remains under cover). The site is associated with the 216-Z-18 Crib, 234-5 Building, and 236-Z Building. The depth of the site is approximately 2.1 (7 ft). RTD is the most protective alternative and best meets other CERCLA criteria.
UPR-200-W-111	Unplanned Release	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$501,000			■	Available information indicates this unplanned release is located approximately 3 m (10 ft) from the concrete wall on the south side of the 207-U South Retention Basin. In 1997, the area was surface stabilized. The release is described to have been sludge from the 207-U South Retention Basin that was buried in a one-use-only trench adjacent to the retention basin. The contaminated soil then was covered with clean backfill. The site went from a soil contamination area to a URM area. The site is associated with the 207-U South Retention Basin. The depth of the site is approximately 3 m (10 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

Ranking of Alternatives for Individual CERCLA Criteria:

❶②③ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Table 5-4. Assessment of Alternatives Using CERCLA Evaluation Criteria and Selection of the Preferred Removal Action Alternative for each Waste Site.

Waste Site Code	Site Type	Overall Protection			Compliance with ARARs			Long-Term Effectiveness			Reduction in TMV			Short-Term Effectiveness			Implementability			Present Worth			Alternative Analysis Outcome			
		No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	No Action	CS/NFA	RTD	Key Site Information and Rationale for Selected Alternative
UPR-200-W-112	Unplanned Release	☒	⊘	❶	☒	⊘	❶	☒	⊘	❶	☒	⊘	⊘	☒	②	③	☒	②	③	See note	$180,000	$501,000			■	Available information indicates this unplanned release is located approximately 3 m (10 ft) from the concrete wall on the north side of the 207-U North Retention Basin. In 1997, the area was surface stabilized. The release is described to have been sludge from the 207-U North Retention Basin that was buried in a one-use-only trench on the north side of the retention basin. The contaminated soil then was covered with clean backfill. The site went from a soil contamination area to a URM area. The site is associated with the 207-U North Retention Basin. The depth of the site is approximately 3 m (10 ft). RTD is the most protective alternative and best meets other CERCLA criteria.

NOTE: The NA alternative was retained for detailed analysis as a baseline description of the effects of taking no action as required by CERCLA regulations. This alternative cannot be considered for the 200-MG-2 OU waste sites because of the absence of characterization data. Hence, there is no cost listed for this alternative.

Airball is a trademark of Airball Products, LLC, S. Glastonbury, Connecticut.

CA = contaminated area.
cpm = counts per minute.
dpm = disintegrations per minute.
URM = underground radioactive material.

Ranking of Alternatives for Individual CERCLA Criteria:

❶②③ Circles indicate the criterion is met. The numbers designate the relative ranking in meeting the criterion among the alternatives.
⊘ Indicates an alternative that was not evaluated because COPC concentrations are expected to be below RALs.
☒ Does not meet the criterion.
■ Indicates the preferred alternative for the waste site.

Symbols were used in Tables 5-2, 5-3, and 5-4 to illustrate graphically whether the alternatives met the CERCLA evaluation criteria. The symbols also relay the relative ranking of each alternative against the criteria. The symbols in Tables 5-2 and 5-3 demonstrate the general guidelines of how the alternatives ranked against each other for each criterion.

5.5 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

While the US Department of Justice has determined that the *National Environmental Policy Act of 1969* (NEPA) does not have jurisdiction over CERCLA response actions, DOE has adopted a voluntary policy to "incorporate NEPA values (e.g., transportation, cumulative, offsite, ecological, and socioeconomic impacts) to the extent practicable" in DOE CERCLA documentation. None of the removal alternatives, CS/NFA or RTD, would be expected to create any significant transportation impacts. All waste transportation would occur on the Hanford Site, primarily on roads where public access is restricted.

Cumulative impacts might occur in both the short and long term because of the interrelationships between the removal action and other 200 Areas activities, such as remediation of waste sites and groundwater, deactivation, decontamination and decommissioning of surrounding facilities, and operation of waste treatment or disposal facilities. For this action, short-term cumulative impacts were considered in terms of air quality and resource allocation. With appropriate work controls, airborne releases from the 200-MG-2 OU waste sites are expected to be minor under all of the removal action alternatives, so the contribution to cumulative impacts on local and regional air quality would be minimal. With respect to resource allocation, the CS/NFA and RTD alternatives as well as other 200 Area activities would require resources in terms of budget, materials, and/or disposal space. The RTD alternative also would require a commitment of resources required for excavation of waste sites.

Initially, the contribution to cumulative impacts would be less for CS/NFA and greater for RTD, which would require additional budget resources as well as some disturbance to ecological resources. The disturbance to ecological resources would be minimized during removal by performing mitigation in accordance with DOE/RL-96-88, *Hanford Site Biological Resources Mitigation Strategy*.

In the long term, the overall cumulative effect of the removal action and other activities in the 200 Areas would be to enhance the protection of personnel, the public, and the environment, which is consistent with the values expressed by EPA, Ecology, stakeholders, affected Tribal Nations, and the public. CS/NFA would contribute to this enhanced protection. Finally, none of the alternatives would be expected to adversely affect existing cultural resources or to have any socioeconomic impacts.

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6.0 CONCLUSIONS AND RECOMMENDED ALTERNATIVES

Chapter 4.0 provides a description of the three alternative removal actions, and Chapter 5.0 analyzes each of the alternatives against the three CERCLA evaluation criteria for non-time-critical removal actions: effectiveness, implementability, and cost. This chapter provides a summary of the preferred removal actions and the path forward for implementing the removal actions for the 200-MG-2 OU waste sites.

6.1 SUMMARY OF PREFERRED REMOVAL ACTIONS

Table 6-1 summarizes the present-worth costs of the preferred removal alternatives across all waste sites. The 200-MG-2 OU preferred removal actions have a present-worth cost of $26,663,000. The type, size, and extent of hazardous substance contamination vary considerably across the 200-MG-2 OU waste sites.

Table 6-1. Summary of the Thirty-Four 200-MG-2 OU Waste Sites Preferred Removal Actions.

Preferred Alternative	Number of Waste Sites	Present Worth
NA	0	$0
CS/NFA	16	$2,832,000
RTD	18	$23,831,000
Total	34	$26,663,000

The preferred removal action for each site is summarized in Tables 6-2 and 6-3 for CS/NFA and RTD, respectively. As discussed earlier, the NA alternative was not selected as the preferred alternative for any of the 200-MG-2 OU waste sites.

Table 6-2. Waste Sites with CS/NFA Preferred Removal Action Alternative.

Waste Site Code	Waste Site Type	Present Worth	Waste Site Code	Waste Site Type	Present Worth
200-E-4	French Drain	$180,000	216-T-10	Trench	$168,000
209-E-WS-2	French Drain	$168,000	216-T-11	Trench	$168,000
216-A-41	Crib	$180,000	216-T-13	Trench	$180,000
216-C-4	Crib	$180,000	216-U-3	French Drain	$180,000
216-S-18	Trench	$180,000	216-Z-13	French Drain	$180,000
216-S-25	Crib	$180,000	216-Z-14	French Drain	$180,000
216-T-1	Ditch	$180,000	2704-C-WS-1	French Drain	$180,000
216-T-9	Trench	$168,000	UPR-200-E-9	Unplanned Release	$180,000
Total Present Worth for CS/NFA sites: $2,832,000					

Table 6-3. Waste Sites with RTD Preferred Removal Action Alternative.

Waste Site Code	Waste Site Type	Present Worth	Waste Site Code	Waste Site Type	Present Worth
200-E-25	French Drain	$401,000	216-T-4-1D	Ditch	$1,607,000
207-A North	Retention Basin	$1,711,000	216-T-4-2	Ditch	$2,784,000
207-S	Retention Basin	$1,227,000	216-T-12	Trench	$413,000
207-T	Retention Basin	$2,617,000	216-T-33	Crib	$470,000
207-U	Retention Basin	$2,617,000	216-U-14	Ditch	$6,007,000
207-Z	Retention Basin	$857,000	UPR-200-E-17	Unplanned Release	$192,000
216-B-51	French Drain	$469,000	UPR-200-W-103	Unplanned Release	$411,000
216-S-12	Trench	$527,000	UPR-200-W-111	Unplanned Release	$501,000
216-SX-2	Crib	$519,000	UPR-200-W-112	Unplanned Release	$501,000
Total Present Worth for RTD sites:		**$23,831,000**			

Figure 6-1 shows the 200-MG-2 OU waste sites and their preferred alternatives.

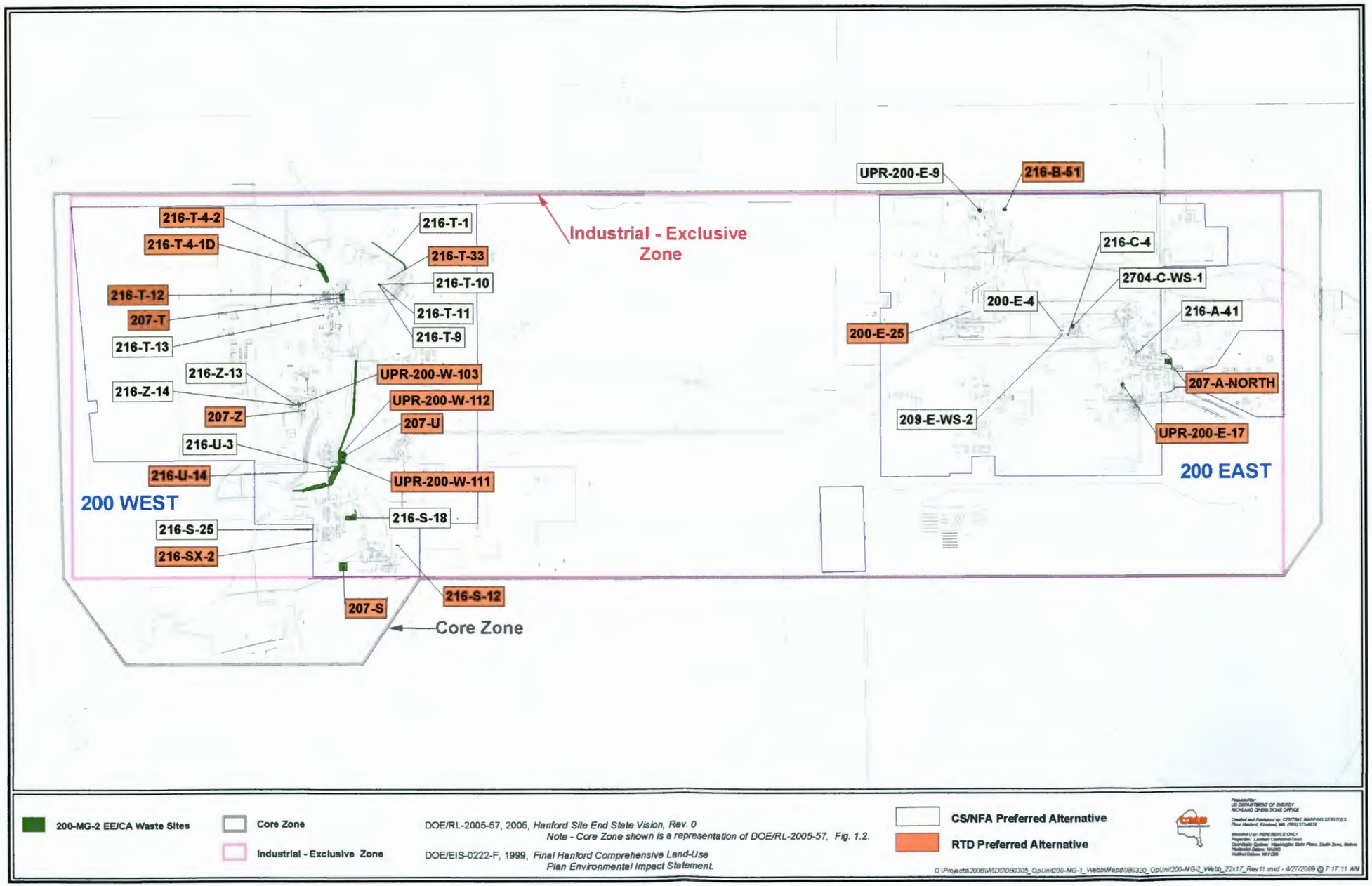
6.2 200-MG-2 OU PATH FORWARD

The path forward after public release of this EE/CA includes the following:

- Public review and comment. During this period, the public will have an opportunity to review this EE/CA, and comment on the analyses and preferred removal actions.
- Action memorandum. An action memorandum will be prepared after the public review and comment period that provides a concise written record of the decisions for the OU waste sites and removal action alternatives. The memorandum will describe the site histories, current activities, and human health and environmental risks. It will outline the proposed actions and costs, and document the approval of the proposed action by RL and EPA. Tri-Party Agreement Milestone M-015-49B-T01 makes the following commitment for the 200-MG-2 OU:

  > "A draft action memorandum for the 200-MG-2 OU will be submitted with a proposed set of M-016 series of interim milestones to establish specific schedules, adjusted to site priorities, to complete the remediation field work by 2024. The proposed set of M-016 milestones will include a process to reevaluate priorities annually."

Figure 6-1. 200-MG-2 OU EE/CA Waste Sites and Preferred Alternatives.



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- RAWP. The RAWP will provide a description of the work to be done and applicable RALs.
- Removal action implementation. The culmination of the regulatory and planning documents is the field implementation of the removal actions, including verification that RALs and RAOs have been achieved.

Removal actions at the 200-MG-2 OU waste sites may have a lower priority for cleanup than other Hanford OU waste sites because they are expected to pose relatively little potential risk to human health and the environment. Thus, the 200-MG-2 OU removal actions may be performed opportunistically or to complement other ongoing cleanup actions. The RAWP for the 200-MG-2 OU will contain more schedule details and will be submitted to DOE and EPA for review and approval.

Because characterization data are limited for most of the 200-MG-2 OU waste sites, the observational screening and excavation guidance activities may reveal different site conditions than presently understood. This necessitates the ability to change the preferred alternative as characterization data become available. If results of confirmatory sampling indicate that the CS/NFA is inappropriate (i.e., greater than the RALs), then the RTD action will be implemented or the waste site will be removed from this EE/CA and will be evaluated as part of the remaining 200-MG-2 OU. Alternatively, if results of the confirmatory sampling indicate that the RTD is inappropriate (i.e., at or below RALs), then the CS/NFA action will be implemented.

Sampling activities will be used to determine compliance with the RALs and the potential need to consider other alternatives. If the RALs are not met at 4.6 m (15 ft), then soil samples may be taken at depths greater than 4.6 m (15 ft) to characterize potential groundwater risk drivers. A decision matrix for determining the path forward in this situation will be included in the RAWP.

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7.0 REFERENCES

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APPENDIX A

WASTE SITE SUMMARY

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APPENDIX A

WASTE SITE SUMMARY

A1.0 INTRODUCTION

This appendix provides summaries of each 200-MG-2 Operable Unit waste site based on the information in the Waste Information Data System (WIDS) and other references. The summaries include the following:

- Site Code
- Representative Site Photographs and/or Schematics
- Site Name
- Site Type
- Facility
- Current and Former Operable Units
- Waste Site Description
- Related Site Structure
- Site Posting
- Release Mechanism and Release Type
- Dimensions
- Potential Contaminants
- Preferred Removal Action
- Estimated Removal Action Present Worth
- References.

Waste site descriptions and other information are quoted directly from WIDS and other references cited at the end of each summary. No modifications have been made to maintain consistent format, and references cited in those descriptions are not provided. The photos and sketches are provided to give a general orientation and site configuration for the 27 waste sites. The photos provided may not give current site conditions.

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A2.0 WASTE SITE CODES

200-E-25

Site Name: 200-E-25, 272-BB French Drain, Insulation Shop French Drain, Miscellaneous Stream #659
Site Type: French Drain
Facility: B Plant Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The dry well is located approximately 6 m (20 ft) north of the northeast corner of the 272-BB Insulation Shop. The french drain structure is not visible from the surface, but its location is marked with an old sign, "Asbestos Waste Disposal Site - Do No Excavate", mounted on two support posts. Asbestos is regulated as a hazardous substance under CERCLA. A sign, "200-E-25", is attached to one of the support posts. Material used in the 272-BB Insulation Shop that possibly could have been flushed into the sink or floor drain includes: Calcium Silicate, Fiberglass, Silicate, "Airball" (an insulation cover material) and latex paint. Prior to 1988, it is possible that organic chemicals, oils and grease may have been introduced into the french drain. The building sink and floor drain were connected to the dry well via a 5.1 cm (2 in.), schedule 40, carbon steel pipe. A 0.4 m (1.5 ft) diameter, 36 in. tall grease trap with a removable cover is located on the east side of the 272-BB building. Percolating water around the french drain was noted in 1990 indicating a broken or plugged drain line from the insulation shop. The Facility Compliance group recommended all discharges from the building be discontinued as of September 1991. The installation of a replacement drainage system was proposed. However, due to complicated regulatory issues, it was decided to remove the sink from the building and plug the floor drain with concrete. The insulation shop no longer has any water supply or any other drains.

Related Site Structure: The site is associated with the 272-BB building and the 200-E-209-PL pipeline.
Site Posting: Old sign, Mounted on two support posts. The sign says "Asbestos Waste Disposal site- Do Not Excavate" Sign

Release Mechanism: Effluent from a sink and floor drain
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	2.7 m (9.0 ft)
Site Width:	0.6 m (2.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	0.3 m^2 (3.1 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	None	None
Nonradiological	X	Asbestos, Calcium Silicate, Fiberglass, Silicate, "Airball" (an insulation cover material), Latex paint, organic chemicals, oil and grease.

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 401,251

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

200-E-4

Site Name: 200-E-4, Critical Mass Laboratory Dry Well North, 209-E North Dry Well, Miscellaneous Stream #730
Site Type: French Drain
Facility: Semi-Works Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The site is located approximately 7.6 m (25 ft) north of the northwest corner of the 209-E Critical Mass Laboratory Service Building. The site is a 1.2 m (4 ft) diameter dry well, covered with a yellow metal cover. The waste was steam condensate from the steam trap in the valve pit plus steam condensate from the equipment room.

Related Site Structure: The site is connected to 209-E Critical Mass Lab via underground piping (see site code 200-E-249-PL.
Site Posting: Not Specified

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	3.4 m (11.0 ft)
Site Width:	1.2 m (4.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	1.2 m^2 (12.5 ft^2)		

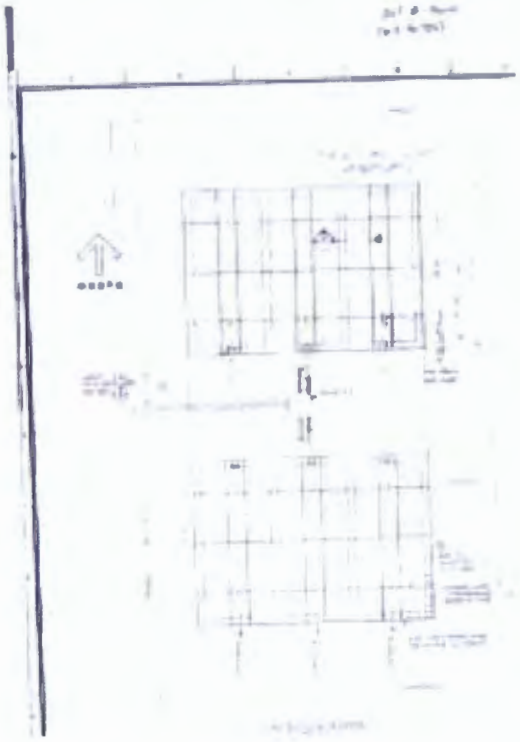
Potential Contaminants:

	Type	Constituents
Radiological	None	None
Nonradiological	X	Ba, Cu

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

207-A-NORTH



Site Name: 207-A-NORTH, 207-A, 207-A Retention Basin, 207-A-NORTH Retention Basin, 207-A North
Site Type: Retention Basin
Facility: 200 E Ponds Area
Current OU: 200-MG-2
Former OU: 200-SC-1

Waste Site Description:
The 207-A-NORTH basins are located east of 242-A Evaporator building, adjacent to the 207-A-SOUTH basin. The 207-A North basins consist of three Hypalon-lined, concrete basins that are surrounded with posts and chain. There is no radiological posting on the north basins. The basins have been receiving steam condensate from the 242-A Evaporator since 1977. Effluent was originally sent to the 216-A-25 (Gable Pond) and later to the B Pond system. When the B-Ponds became inactive, effluent was diverted to TEDF. The basins were alternately filled, sampled, and emptied when meeting specifications. The basins discharged via pipeline to the 216-B-3C pond; this was discontinued in early 1997 and the basin effluent was diverted to the 200 Area TEDF. The 207-A North Basins were physically isolated and ceased to operate in November 1999.

Related Site Structure: The basins are associated with the 242-A Evaporator facility, 216-A-25 Pond and 216-B-3 Pond. The pipelines from 242-A Evaporator to the 207-A basins are site code 200-E-234-PL. The basin distribution lines are site code 200-E-235-PL.
Site Posting: None

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	16.8 m (55.0 ft)	**Site Depth:**	2.1 m (7.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	51.2 m^2 (550.0 ft^2)		

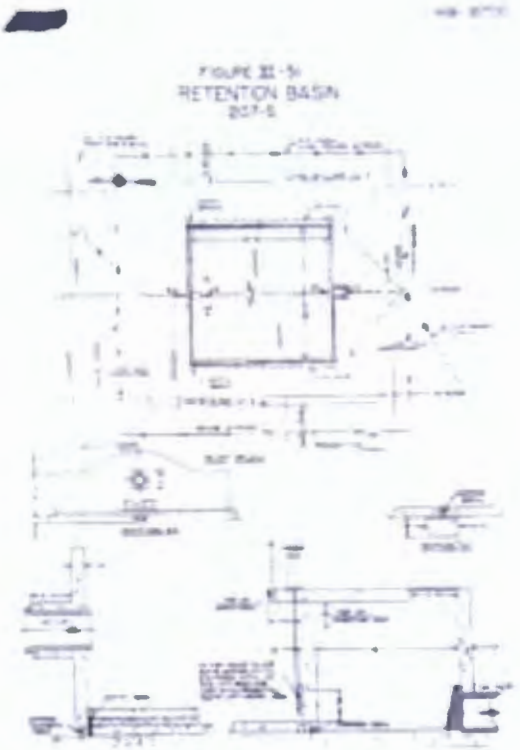
Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 1,710,839

Reference:
WIDS General Summary Report

207-S



Site Name: 207-S, REDOX Retention Basin, 207-S Retention Basin
Site Type: Retention Basin
Facility: 200 W Ponds Area
Current OU: 200-MG-2
Former OU: 200-CW-2

Waste Site Description:
The site is located west of the 222-S Laboratory buildings, north of 10th Street, and is surrounded with concrete marker posts. It is currently posted with URM signs and the basin has been backfilled to grade with dirt. The site received process cooling water and steam condensate from the 202-S Building. The water was then discharged to the 216-S-17 Pond or the 216-S-16 Pond. Coil leaks inside the 202-S facility often caused contaminated effluent to be discharged to the retention basin. In November 1952, due a cooling coil failure, contamination was found to be 20 to 200 mr/hr at two inches from the process cooling water header, from 80 mrep/hr including 40 mr/hr to 250 mrep/hr including 70 mr/hr approximately five feet above the water at 207-S. April 1954, the 207-S Retention Basin was shut down following a 202-S coil leak that contaminated the basin above permissible limits and an effluent bypass was installed. The concrete floors and walls of the basin were grossly contaminated and subsequently filled with dirt to prevent contamination from spreading. The basin was a 39.6 m by 39.6 m (130 ft by 130 ft) concrete structure with a volume of 3.23E+06 L (8.53E+05 gal). The walls are approximately 25 cm (10 in.) thick, and the floors are 20.3 cm (8 in.) thick. The system included approximately 610 m (2,000 ft) of 61-cm (24-in.) diameter vitrified clay pipe used to convey the waste water into and out of the unit. There is an overflow tank located in the center of the north end, just inside the basin wall, composed of 0.48-cm (3/16-in.) steel walls, 1.7 m (5.5 ft) high. The tank diameter was 6.1 m (20 ft). There is also an outlet weir structure adjacent to the south wall, outside the basin. In June 1975, the soil was treated with herbicides and covered with 23 cm (9 in) of gravel to stop radioactive weed growth. However, the vegetation later returned and the site became recontaminated.

Related Site Structure: The basin is associated with the 202-S facility, the 216-S-17 pond, UPR-200-W-13, UPR-200-W-15, UPR-200-W-95 and the 200-W-152-PL pipeline.
Site Posting: Concrete marker posts and URM signs.

Release Mechanism: Cooling water/Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	40.0 m (130.0 ft)	**Site Depth:**	2.1 m (6.8 ft)
Site Width:	40.0 m (130.0 ft)	**Cover Thickness:**	0.6 m (2 ft)
Site Area:	1600.0 m^2 (16900.0 ft^2)		

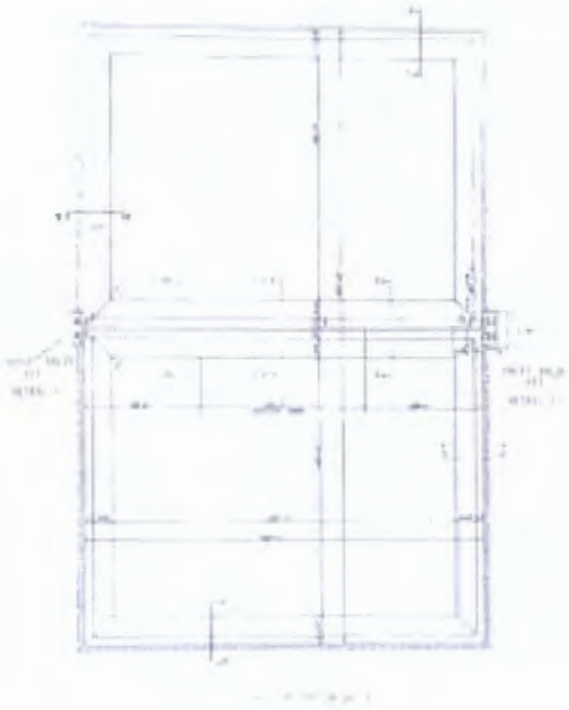
Potential Contaminants:

	Type	Constituents
Radiological	X	9000 cpm beta/gamma in September 1981.
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: $1,227,000

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

207-T



Site Name: 207-T, T Plant Retention Basin, 207-T, 207-T Retention Basin
Site Type: Retention Basin
Facility: T Farm Area
Current OU: 200-MG-2
Former OU: 200-CW-4

Waste Site Description:
The site is located west of 221-T Building and north of 23rd Street. The retention basin was backfilled to grade with dirt in 1996. T Posts mark the corners of the basin and it is posted as an URM area. The basin received cooling water effluent from 221-T and 224-T and potentially low-level radioactive waste from T Plant process cooling and ventilation steam condensate, which was discharged to the 216-T-4-1 and 214-T-4-2 Ditches. From 11/44 to 1976, the site received process cooling water from process equipment jackets in 221-T and 224-T buildings and intermittently, 242-T Evaporator cooling water. After 1976, the site received intermittent flow from 221-T, 221-TA, and 224-T 224-T buildings. The effluent discharge was rerouted to the 200 Area TEDF in 1995. The unit was a concrete structure, divided into two sections, with a 3,800,000 L (1,000,000 gal) capacity. The bottom dimensions for each basin are 32.3 by 32.3 m (106 by 106 ft). There was an inlet structure on the east side and an outlet structure on the west side, adjacent to the outside walls of the basins. Two 40.6 cm (16 in.) diameter cast iron pipes connected to two-0.9 m (3 ft) sumps, one for each basin. Approximately 1830 m (6000 ft) of 61 cm (24 in.) diameter vitrified clay pipeline was used to convey waste water to and from the basin. H-2-3019 shows a black iron pipeline that exits the east side of the basin, traveling south, connecting to a pipeline that is associated with the 216-TY-201 flush tank. Periodically the sludge that accumulated on the bottoms of the basins was cleaned out. The sludge was placed in holes (one of these holes is documented as 216-T-12) located around the perimeter of the basin and covered with clean dirt. Additional holes were probably dug and filled with sludge, but not individually documented. Over the years this unit received potentially low-level radioactive waste from T-Plant process cooling and ventilation steam condensate. Also, unit received 1900L of 5% NaOH(aq) solution from T-Plant. On September 12, 1985, 1900 liters (500 gallons) of aqueous 5% sodium hydroxide solution containing 100 kilograms (219 pounds) of sodium hydroxide was released from T Plant to the basins and subsequently to 214-T-4-2 Ditch. At the time of the release, pH was 12.5. No cleanup actions were undertaken. After 6 hours of dilution by continued condensate discharge, the pH was 7.67

Related Site Structure: The basin is associated with 221-T, 224-T, 216-T-12, 200-W-53 and 216-T-4-1 and 216-T-4-2 Ditches. The inlet pipelines associated with this basin are WIDS site codes 200-W-88-PL, 200-W-165-PL, 200-W-166-PL and 200-W-167-PL. The outlet pipeline that leads to the 216-T-4 ditch is WIDS site code 200-W-164-PL.
Site Posting: URM

Release Mechanism: Process cooling water/steam condensate/contaminated soil
Release Type: Liquid

Dimensions (estimated):

Site Length:	75.0 m (246.0 ft)	**Site Depth:**	2.0 m (6.5 ft)
Site Width:	37.5 m (123.0 ft)	**Cover Thickness:**	0.6-0.9 m (2-3 ft)
Site Area:	2811.1 m^2 (30261.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 2,616,681

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

207-U

No Image Available

No Image Available

Site Name: 207-U, 207-U Retention Basin
Site Type: Retention Basin
Current OU: 200-MG-2

Facility: T Plant Area
Former OU: 200-CW-5

Waste Site Description:
The site is located inside 200 West Area, west of 221-U Building, north of 16th Street, and east of the 241-U Tank Farm. The unit is a plastic-lined concrete basin, posted as a CA, and divided into two equal halves, with a capacity of 3.785E+06 L (1E+06 gal). The bottom dimensions for each basin are 32 by 32 m (106 by 106 ft). The total overall dimensions at the top ledge is 75 by 38 m (246 by 123 ft), 2 m deep (6.5 ft). There is an inlet structure on the east and an outlet structure on the west side, on the outside of the basins. Each basin has a 0.9 by 0.9-m (3 by 3-ft) sump. There is also a sampler cabinet and a sample vault on the east side of the basins near the inlet structure. There are two unplanned release sites (UPR-200-W-111 and UPR-200-W-112) adjacent to the basin where sludge was removed and buried. These burial sites are located within 3.1 m (10 ft) of the basin on the north side and on the south side, near the western corners. An unused sampler cabinet is located on the east side of the basin, as well as a sample vault that is a confined space. Until 1972, the unit received steam condensate and cooling water from 224-U Building and chemical sewer waste from the 221-U Building. After 1972, the unit has received only cooling water from 224-U Building. The water was held in the basin, sampled, and then discharged to the 216-U-10 Pond via the 216-U-14 Ditch until the basin outlet was plugged in 1994. The outlet was plugged so that the basins would serve as an evaporation pond for the storm water it receives. The basin was temporarily replaced by 216-U-16 Crib (1984 through 1986) but was reactivated when 216-U-16 Crib was taken out of service. Presently, the basin is receiving storm water runoff from the 224-U building and grounds. The water is allowed to evaporate in the basin. During the Uranium Trioxide (UO3) facility deactivation, the trench that runs between 224-UA and 224-U was tied into the 207-U retention basin pipeline to route the storm water buildup from the contaminated zones on the backside of the facility to the 207-U Basins for solar evaporation. The basin outlets have been isolated with concrete. The Hanford Operational Environmental Monitoring Program will continue to monitor the air and soil in the vicinity of the basins to meet NESHAP requirements for monitoring of diffuse and fugitive sources. Originally, the basin received chemical sewer waste and cooling water from the building; currently, it receives storm water runoff from building and grounds. It has two radioactive sludge barrier grounds on each side approximately 10m away. Occurrence Report 86-46 states that on August 6, 1986, 2365 L (625 gal) of recovered nitric acid, containing 39 kg (86 lbs) of uranium was discharged though the chemical sewer to the 207-U retention Basin. Prior to the discovery of the release, the outlet valves on the retention basin were open to the 216-U-14 Ditch. The acid released to the ditch was greatly diluted with the 300 gal/min flow of cooling water from the 224-U facility being processed through the chemical sewer system. The Hanford Site Waste Management Units Report (1987) reported different release values: it states that approximately 3,000 L (796 gal) of 50% reprocessed nitric acid was released to the basin and subsequently to 216-U-14 Ditch. The total release to the environment consisted of approximately 102,000 kg (225,000 lbs) of corrosive solution (pH less than 2.0) and 45.4 kg (100 lbs) of uranium.

Related Site Structure: There is an inlet structure on the east and an outlet structure on the west side, on the outside of the basins. Each basin has a 0.9 by 0.9-meter (3 by 3-foot) sump. There is also a sampler cabinet and a sample vault on the east side of the basins near the inlet structure. The chemical sewer pipeline that fed the basin is site code 200-W-192-PL. The outlet pipe to the 216-U-14 ditch is site code 200-W-222-PL.
Site Posting: CA

Release Mechanism: Chemical sewer waste/ cooling water/ stormwater runoff
Release Type: Liquid

Dimensions (estimated):

Site Length:	75.0 m (246.0 ft)	**Site Depth:**	2.0 m (6.5 ft)
Site Width:	37.5 m (123.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	2811.1 m^2 (30261.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 2,616,681

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

207-Z

No Image Available

Site Name: 207-Z, 207-Z Retention Basin, 241-Z Retention Basin, 241-Z-RB
Site Type: Retention Basin
Facility: PFP Area
Current OU: 200-MG-2
Former OU: 200-SC-1

Waste Site Description:
The concrete basins are located inside the Z Plant Exclusion Area fence, south of 236-Z building, and have been filled with high density grout. The site had been a concrete basin structure divided into two halves. The two sides were separated by a 0.3-m (1 ft) thick concrete wall. Each basin contained a sump with a sump pump. A 1.8-m (6 ft) high chain link fence surrounded the basin. The site received potentially contaminated waste. Steam condensate and cooling water, via the D-3 piping system, was sent to this holding facility then released to the 216-Z-1 and 216-Z-11 Ditches. Document HNF-30654 used historical operations records to determine an approximate volume of 152,000 L (40,000 gal) that could have leaked from the 241-Z basins. The 207-Z Retention Basin has sometimes been confused with the 216-Z-21 Seepage Pond; they are two separate waste sites. The 216-Z-21 Seepage Pond is located east of the Z Plant Exclusion Area, adjacent to Camden Ave. The 207-Z Retention Basin is inside the PFP fence.

Related Site Structure: The retention basin is associated with the 241-Z and 234-5Z facilities. Pipelines associated with the basin are discussed in site code 200-W-209-PL.
Site Posting: Not Specified

Release Mechanism: Steam condensate/ cooling water
Release Type: Liquid

Dimensions (estimated):

Site Length:	15.2 m (50.0 ft)	**Site Depth:**	3.1 m (10.0 ft)
Site Width:	12.2 m (40.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	185.8 m^2 (2000.2 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 856,926

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

209-E-WS-2

Site Name: 209-E-WS-2, Critical Mass Lab French Drain
Site Type: French Drain
Current OU: 200-MG-2
Facility: Semi-Works Area
Former OU: 200-MW-1

Waste Site Description:
The unit is located at the southeast corner of the Critical Mass Laboratory (laboratory wing). The drain is a 1.2 m (4 ft) diameter drain in a gravel area southeast of the building. The unit is a french drain that received condensate from the Critical Mass Lab HEPA filters and heat exchange system. It is painted with yellow paint and has a metal cover. The waste at the unit includes steam condensate through a collapsed rusted pipe from the Heat Exchanger located in Room 11 of 209-E and a stainless steel pipe from the clean side of the HEPA filters.

Related Site Structure: The site is associated with the 209-E Critical Mass Laboratory. The pipelines to the french drain are described in site code 200-E-247-PL.
Site Posting: Not Specified

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	2.4 m (8.0 ft)
Site Width:	1.2 m (4.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	1.1 m^2 (12.1 ft^2)		

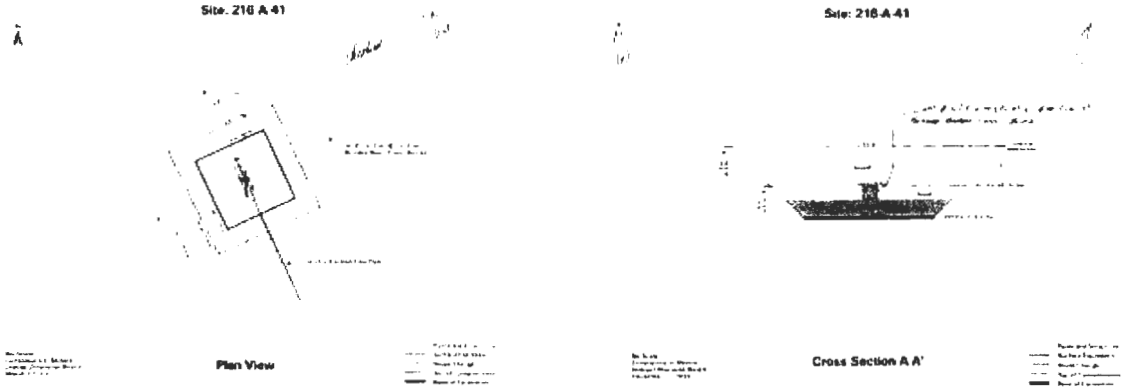
Potential Contaminants:

	Type	Constituents
Radiological	None	None
Nonradiological	None	None

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 167,966

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-A-41



Site Name: 216-A-41, Crib, 291-AR Stack Drain, 296-A-13 Stack Drain
Site Type: Crib
Facility: Purex Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The crib is located northwest of the 296-A-13 stack, west of Buffalo Ave. and north of the 244-AR Vault facility. The site is a small crib that is no longer marked or posted and is 1.8 m (6 ft) below grade. The area where the crib is assumed to be located is covered with gravel. The site received the 296-A-13 Stack condensate drainage. The stack is connected to the 291-AR Filter Building. According to RHO-CD-673, the waste was potentially slightly acidic and contained less than 1 Ci total beta activity. Potential contaminants of concern (Stenner) may be tritium, cobalt-60, strontium-90, and cesium-137. The bottom of the crib (elevation: 207 m [678.5 ft]) is filled with 0.5 m (1.5 ft) of 3.8 to 25.4-cm (1.5 to 10-in.) rock, then 20.3 cm (8 in.) of 1.9 to 3.8-cm (0.75 to 1.5-in.) gravel, and several cm of 1.9-cm (0.75-in.) gravel. This material is covered by a layer of 20 mm polyethylene and 10.2 cm (4 in) of sand (elevation: 208 m [681.0 ft]). The site was then backfilled with soil to a ground elevation of 209 m (684.0 ft) (with the crown at 212 m [696.0 ft]). The side slope is 1:1. A 10.2-cm (4-in.) vitrified clay pipe enters the crib (from the 296-A-13 Stack) at elevation 208 m (681.0 ft) and connects to the crib dispersion structure, constructed of 20.3 by 20.3 by 40.6-cm (8 by 8 by 16-in.) bond beam concrete blocks placed end-to-end. The pipeline from the stack (296-A-13) to the crib is approximately (15 ft) long and extends northwest (30 degrees west of true north) from the stack. The site is not marked in the field. The mapped center point location of the site is based on drawing coordinates from H-2-61975, "216-A-41 Crib, Plan and Profile". Drawing H-2-44501, "Area Map-200 East, A Plant Facilities", shows the crib at the same location.

Related Site Structure: The crib is associated with the 296-A-13 Stack (291-AR Filter Building Stack) (WIDS Site 296-A-13) and the 291-AR Filter Building. The Filter Building is related to the 244-AR Vault Canyon. The pipeline to the crib is 200-E-276-PL.
Site Posting: None

Release Mechanism: Stack condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	3.0 m (10.0 ft)	**Site Depth:**	2.0 m (7.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	9.3 m^2 (100.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Less than 1 curie total beta activity. Tritium, cobalt-60, strontium-90, and cesium-137 in April 1979.
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-B-51

No Image Available

No Image Available

Site Name: 216-B-51, 216-BY-9 Crib
Site Type: French Drain
Current OU: 200-MG-2

Facility: B Farm Area
Former OU: 200-TW-1

Waste Site Description:
The french drain is south of 12 Street, east of Baltimore Ave, north of the 241-B Tank Farm, and northeast of the 216-B-8 Crib and Tile Field. The site is a small URM area measuring approximately 3 m by 3 m (10 ft by 10 ft). The concrete drain structure extends approximately 0.3 m (1 ft) above the ground surface and 4.2 m (4.3?) (14 ft) below ground. The structure is approximately 1.5 m (5 ft) in diameter with a wooden lid cover with vent holes. The structure is also posted with Fixed CA signs. The site received drainage from the BC Crib pipeline which carried high salt, neutral to basic scavenged tributyl phosphate waste via or from 241-BY tank farm to the BC Crib area. The site contains less than 10 Ci total beta. The french drain (active from January 1956 to January 1958) received drainage from the pipeline that transferred tri-butyl phosphate waste from the 241-BY Tank Farm to the BC Cribs and Trenches. The pipe is filled with 4 m (13 ft) of gravel.

Related Site Structure: The french drain is associated with 216-E-114-PL, 200-E-221-PL and UPR-200-E-144.
Site Posting: URM, Fixed Contamination Area sign

Release Mechanism: Process waste effluent
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	4.6 m (15.0 ft)
Site Width:	1.5 m (5.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	1.8 m^2 (19.6 ft^2)		

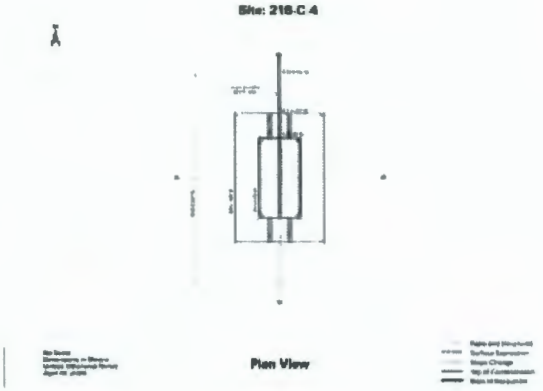
Potential Contaminants:

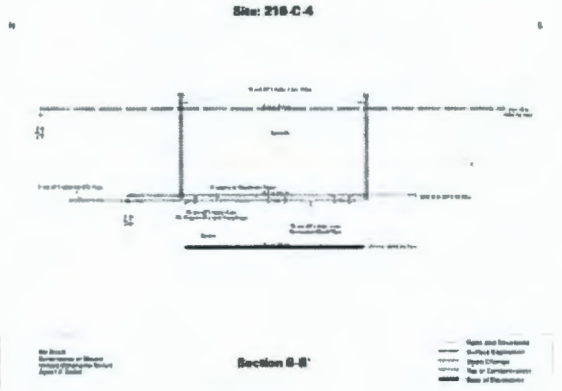
	Type	Constituents
Radiological	X	Less than 10 curries total beta/ gamma in March 1993. Maximim direct reading of 18,000 dpm /100 cm2 beta/gamma was found on concrete structure and wood cover from rad survey in April 2006.
Nonradiological	X	Tri- butyl phosphate

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 469,235

References:
WIDS General Summary Report, DOE/RL-2000-38, DOE/RL-2003-64, DOE/RL-2002-42

216-C-4





Site Name: 216-C-4, 216-C-4 Crib
Site Type: Crib
Current OU: 200-MG-2

Facility: Semi-Works Area
Former OU: 200-PW-3

Waste Site Description:
The crib is located south of 7th Street in the Hot Semiworks area, in between the double security fences surrounding the 209-E Critical Mass Laboratory. It is marked and posted with URM signs. An access area has been cut through the 209-E security fence. The site received contaminated organic waste from the 276-C Building that was low in salt and is neutral to basic. The unit is constructed of a 15-cm (6-in.) diameter galvanized, corrugated, perforated piping placed horizontally at 3.5 m (11.5 ft) below grade. Two 6.1 m (20 ft) lengths are placed perpendicularly to the inlet pipe, forming an H pattern. The side slope is 1:1. The site contains 1.8 m (6 ft) of gravel fill [74 m3 (2,600 ft3)] and has been backfilled. The waste release point is 1.5 m (5 ft) from the site bottom. The crib bottom is 4.8 m (16 ft) below ground surface and measures 3 m (10 ft) by 6 m (20 ft).

Related Site Structure: The pipeline associated with this crib is site code 200-E-170-PL.
Site Posting: URM

Release Mechanism: Contaminated effluent
Release Type: Liquid

Dimensions (estimated):

Site Length:	6.1 m (20.0 ft)	**Site Depth:**	5.0 m (16.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	18.6 m^2 (200.0 ft^2)		

Potential Contaminants:

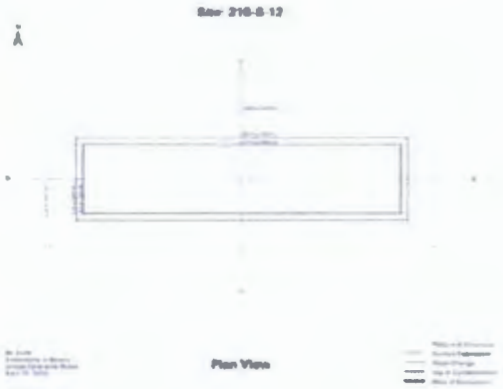
	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	170,000 L of organic waste

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:

WIDS General Summary Report, DOE/RL-2001-01, DOE/RL-2006-51

216-S-12



Site Name: 216-S-12, UPR-200-W-30, 291-S Stack Wash Sump, REDOX Stack Flush Trench
Site Type: Trench
Facility: Redox Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The site is located northeast of the 202-S (REDOX) facility, north of the 291-S Stack and consists of one, single-use liquid waste disposal trench. The site is surrounded with cement marker posts and chain, posted with URM signs. It is labeled 216-S-12. This site was used for liquid disposal of 291-S Stack flush water. In July 1954, the 291-S (REDOX) stack was flushed and approximately 68,100 L (18,000 gal) of flush water was drained into this trench. The water contained ammonium nitrate (600 kg). The material contained an estimated 5 Ci of beta particle emitters and 2-3 Ci of gamma particle emitters that were predominantly ruthenium and zirconium-niobium. Potential contaminants of concern include cobalt-60, cesium-137, strontium-90, plutonium-239/240, and uranium-238. It was fed with an overground pipeline.

Related Site Structure: The site is associated with the 291-S Stack.
Site Posting: URM

Release Mechanism: Flush water
Release Type: Liquid

Dimensions (estimated):

Site Length:	27.4 m (90.0 ft)	**Site Depth:**	3.0 m (10.0 ft)
Site Width:	6.1 m (20.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	167.2 m^2 (1800.2 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	5 curies of beta particle emitters and 2-3 curies of gamma emitters, that were predominantly ruthenium and zirconium-niobium. Cobalt-60,Strontium-90,cesium-137, plutonium 239/240, uranium 238 in May 1987.
Nonradiological	X	600 kg Ammonium nitrate

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 526,908

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-S-18

Site Name: 216-S-18, 241-SX Steam Cleaning Pit, 216-S-14 Steam Cleaning Pit
Site Type: Trench
Facility: S/U Farm Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The site is located north of 13th Street, east of 241-S Tank Farms, and southwest of 216-S-9 Crib. The site consists of one backfilled trench. It is posted with light weight chain and URM signs. This site was originally used in 1954 as a steam cleaning pit for contaminated equipment. According to RHO-CD-673 (Maxfield, 1979), the trench was excavated in October 1972. In 1972, the site was backfilled and released from radiation zone status. The contaminated material was taken to a 200 West Area burial ground. In 1995 and 1997, the open trench was used to consolidate nearby surface soil contamination. During the stabilization of UPR-200-W-165 and UPR-200-W-114 in 1995, contamination specks were found in the shallow trench excavation. The area was posted as a radiation area. The source of the contamination is assumed to be contamination specks from the operation of the 241-S Tank Farms. In 1997, a small area of contaminated soil remaining from UPR-200-W-114 was pushed into the 216-S-18 Trench depression. The 216-S-18 Trench area was then covered with clean dirt and posted as a URM area. The contaminated soil was covered with 1.8 m (6 ft) of clean dirt to bring the site up to grade.

Related Site Structure: The site is associated with UPR-200-W-114.
Site Posting: URM

Release Mechanism: Steam condensate/contaminated soil
Release Type: Solid and Liquid

Dimensions (estimated):

Site Length:	38.0 m (125.0 ft)	**Site Depth:**	2.0 m (6.0 ft)
Site Width:	4.6 m (16.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	174.8 m^2 (2000.0 ft^2)		

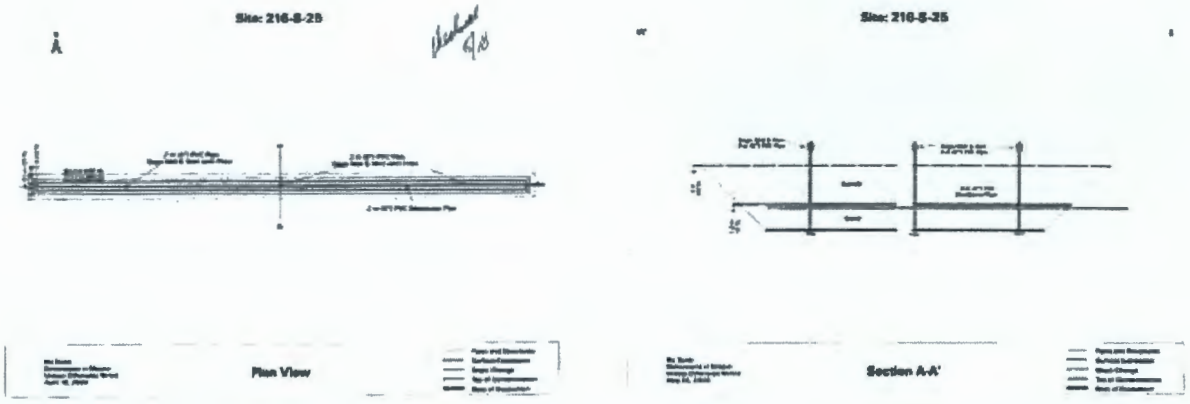
Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-S-25



Site Name: 216-S-25, 216-S-25 Crib
Site Type: Crib
Current OU: 200-MG-2

Facility: 200 W Ponds Area
Former OU: 200-SC-1

Waste Site Description:
The crib is located south of 13th Street and west of the 241-SX Tank Farm, outside the 200 West perimeter fence, south and east of 216-U-10 Pond. The site is marked with AC-540 markers and posted with URM signs. A distribution pipe is located 2.1 m (7 ft) below grade. The site contains approximately 1160 m3 (41,000 ft3) of gravel. Three gage wells and vent systems made of 20 cm (8 in.) SCH 40 PVC with a 15 cm (6 in.) SCH 40 PVC perforated distribution pipe. Until 11/80, the site received the 242-S Evaporator process steam condensate. Since 11/80, the 242-S Evaporator has been in standby mode. In 1985, this crib received the effluent from the 216-U-1 & 2 groundwater pump and treat effort. The 241-SX Sludge Cooler Steam Heater was shut off in 1992 due to leaking tubes. A new steam heater unit was installed in 1993 and scheduled to start up in 1995. It was to operate for five months (through winter and early spring) producing approximately 15 to 30 L (4-8 gal) of condensate per hour that would be discharged to the 216-S-25 crib. The crib received effluent from the 242-S Evaporator building via a 10 cm (4 in.) diameter underground pipeline (site code 200-W-161-PL). In 1984, the pipeline from 241-SX-402 (site code 200-W-159-PL) was tied into the 216-S-25 crib pipeline.

Related Site Structure: The crib is associated with the 242-S Evaporator building. The pipeline associated with this crib is site code 200-W-161-PL.
Site Posting: URM

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	175.3 m (575.0 ft)	**Site Depth:**	3.1 m (10.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	534.2 m^2 (5750.6 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	Unknown	Unknown
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

216-SX-2

Site Name: 216-SX-2, 216-SX-2 Crib
Site Type: Crib
Current OU: 200-MG-2

Facility: S/U Farm Area
Former OU: 200-MW-1

Waste Site Description:
The crib is located on the east side of Cooper Ave. adjacent to the 241-SX tank Farm. It is approximately 7.6 m (25 ft) south of the 241-SX-701 Compressor house and 23 m (75 ft) west of the 241-SX Tank Farm fence. The crib is currently surrounded by light post and chain and posted with URM signs. It is labeled "216-SX-2" on three sides with old style black and white signs. It is a gravel filled crib topped with a subsurface layer of Sisalkraft paper. The crib received waste from and is connected to the 241-SX-701 Compressor House. A comment was added to H-2-39952 in September 1965, stating the crib had been abandoned because it had ceased to percolate.

Related Site Structure: The crib is associated with the 241-SX-701 Compressor House. The pipeline associated with this crib is site code 200-W-162-PL.
Site Posting: URM

Release Mechanism: Compressor house waste
Release Type: Liquid

Dimensions (estimated):

Site Length:	22.9 m (75.3 ft)	**Site Depth:**	2.1 m (6.8 ft)
Site Width:	9.2 m (30.3 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	210.7 m^2 (2281.6 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	Unknown	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 519,083

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-T-1

Site Name: 216-T-1, 221-T Ditch, 221-T Trench, 216-T-1 Trench
Site Type: Ditch
Facility: T Plant Area
Current OU: 200-MG-2
Former OU: 200-CW-4

Waste Site Description:
The ditch is located on the north side of 221-T Building, west of Beloit Avenue. The ditch was permanently isolated by filling the manholes with concrete and cutting and capping the discharge pipes and was backfilled and stabilized in April 1995 by Tank Farm Operations. It is currently marked and posted with URM signs and the site is now inactive. The ditch received cooling water and steam condensate discharge from 221-T and 271-T. From 1944 until 6/56, the site received miscellaneous waste from pilot plant experimental work, intermittent decontamination waste, and waste from the head end of the 221-T Building. From 6/56 to 1/64 the ditch was inactive due to the production operations at T Plant being shut down. From 1/64 to 6/70, the site received cooling water from the blowdown vessel in the 271-T Building and miscellaneous waste from PNL head end operations in the 221-T Building. After 6/70, the site received condensate from steam-heated radiators at the head end of 221-T Building. During standdown of PNL operations, the discharge of 271-T and other 221-T head end waste was discontinued. The site also received sodium hydroxide wash water waste solution (less than 1,000 gal/month [3,800 L/month]) from the Sodium-Air-Water Reaction Emergency Air Cleaning Development-HEDL. This waste water was nonradioactive and generally wet only the bottom of the unit to approximately 150 ft (46 m) from the outfall.

Related Site Structure: The ditch was associated with the 221-T facility operations. The pipeline associated with the ditch is 200-W-180-PL.
Site Posting: URM

Release Mechanism: Steam condensate/ cooling water
Release Type: Liquid

Dimensions (estimated):

Site Length:	447.0 m (1467.0 ft)	**Site Depth:**	3.1 m (10.0 ft)
Site Width:	0.9 m (3.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	408.7 m^2 (4401.2 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

216-T-10

No Image Available

Site Name: 216-T-10, Decontamination Trenches, Equipment Decontamination Area
Site Type: Trench
Facility: T Plant Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
This site is located west of the 221-T Building and southwest of the 216-T-33 Crib and consists of a backfilled trench. The site is no longer marked or posted. No radionuclide or chemical contamination has been documented for this site according to DOE/RL-91-61. However, ARH-2757 states that all contamination (maximum 3000 cpm) was buried in the 200 West Dry Waste Burial Ground. Although no cleaning agents are listed, the possibility of hazardous chemical contamination exists. This site was used for subsurface liquid disposal of heavy equipment and vehicle decontamination waste. The site operated from June 1951 to March 1954. Maxfield (1979) states the site operated from June 1951 to March 1957, but this ending date is believed to be in error. In 1954, the unit was backfilled. The vehicle decontamination operations were transferred to the 269-W garage facility that discharged waste to the 216-T-13 trench.

Related Site Structure: The site is associated with trenches 216-T-9 and 216-T-11.
Site Posting: None

Release Mechanism: Vehicle decontamination waste
Release Type: Liquid

Dimensions (estimated):

Site Length:	15.2 m (50.0 ft)	**Site Depth:**	2.0 m (7.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	46.5 m^2 (500.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	None	Unknown
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 167,966

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-T-11

Site Name: 216-T-11, Decontamination Trenches, Equipment Decontamination Area
Site Type: Trench
Facility: T Plant Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
This site is located west of 221-T and southwest of the 216-T-33 Crib. This site consists of a backfilled trench. The site is no longer marked or posted. The site received heavy equipment and vehicle decontamination waste. No radionuclide or chemical contamination has been documented for this site according to DOE/RL-91-61. However, ARH-2757 states that all contamination (maximum 3000 cpm) was buried in the 200 West Dry Waste Burial Ground. Although no cleaning agents are listed, the possibility of hazardous chemical contamination exists. This site was used for subsurface liquid disposal of heavy equipment and vehicle decontamination waste. The unit operated from June 1951 to March 1954. Maxfield (1979) states the site operated from June 1951 to March 1957, but this end date is believed to be in error. In 1954, the unit was backfilled, and decontamination operations were transferred to the 269-W garage facility that discharged to the 216-T-13 trench.

Related Site Structure: The site is associated with the 216-T-9 and 216-T-10 trenches..
Site Posting: None

Release Mechanism: Vehicle decontamination waste
Release Type: Liquid

Dimensions (estimated):

Site Length:	15.2 m (50.0 ft)	**Site Depth:**	2.0 m (7.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	46.5 m^2 (500.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	None	Unknown
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 167,966

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-T-12

Site Name: 216-T-12, 207-T Sludge Grave, 207-T Sludge Pit, 216-T-11
Site Type: Trench
Facility: T Farm Area
Current OU: 200-MG-2
Former OU: 200-CW-4

Waste Site Description:
This site is located at the northeast corner of the 207-T Retention Basin. There is no visible evidence of this waste site. The area around the 207-T Retention Basin, including the northeast corner where this pit was located, has been stabilized with clean backfill material and posted with URM signs. The sludge pit is not separately marked. The site received contaminated sludge from the 207-T Retention Basin. The waste is low in salt and is neutral to basic. The site was a small trench that was dug November 1954 with a backhoe at the northeast corner of the 207-T Retention Basin. Sludge dredged from the 207-T Retention Basin was put into the trench and covered. A maximum of 15 mR/hr was detected on the sludge at the time of the burial (1954). The majority of the surface readings taken were in the range of 2 to 5 mR/hr. The pit was used only once. The site was backfilled when drudging operations were complete.

Related Site Structure: The associated structure is the 207-T Retention Basin.
Site Posting: URM

Release Mechanism: Contaminated sludge
Release Type: Solid and Liquid

Dimensions (estimated):

Site Length:	4.6 m (15.0 ft)	**Site Depth:**	2.4 m (8.0 ft)
Site Width:	3.1 m (10.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	14.3 m^2 (150.0 ft^2)		

Potential Contaminants:

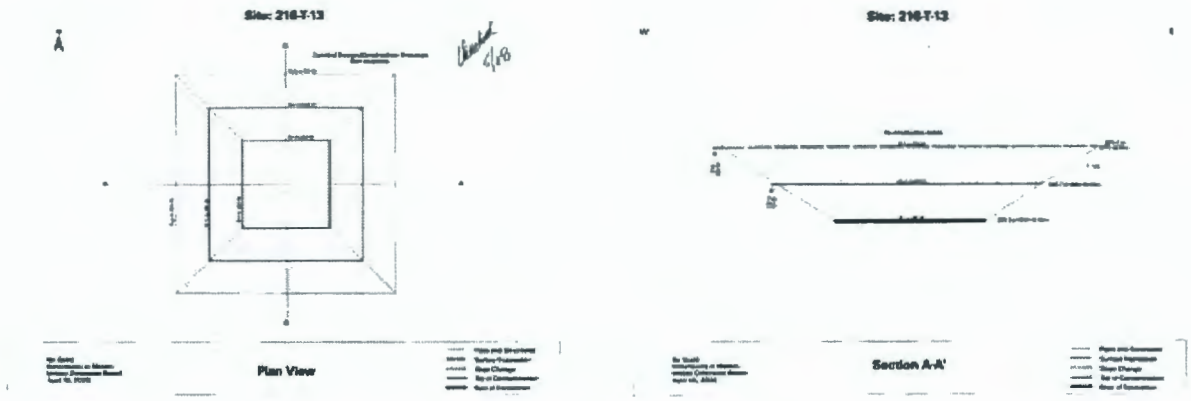
	Type	Constituents
Radiological	X	Up to 0.015 rad/hour in 1954.
Nonradiological	Unknown	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 413,027

References:

WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

216-T-13



Site Name: 216-T-13, 269-W Regulated Garage, 269-W Decontamination Pit or Trench, 216-T-12, 269-W Regulated Garage Decontamination Pit
Site Type: Trench
Facility: T Farm Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
This site is located on the north side of the 241-TY Farm, north of the tank farm perimeter fence. The site has been shown at two locations on different maps. Drawing H-2-1495 (originally made in 1952) shows the location of the trench adjacent to the 269-W garage and northwest of the 241-TY Tank Farm, while a later drawing (H-2-32526, 1967 Rev 3) shows the trench due north of the 241-TY Tank Farm. The mapped location in HGIS is due north of the Tank Farm as of December 2001. The site consisted of a single open trench located west of the 269-W Regulated Garage (now demolished). Currently, there is a concrete ramp covered with 0.6 m (2 ft) of gravel that is visible near the site of the garage. The trench is no longer marked or posted. This site was used to clean contaminated vehicles. A Tip Rack was located in the bottom of the open trench. Vehicles were driven into the trench and onto the rack. The vehicles were then sprayed with water or steam to remove the contamination. The decontamination was often required prior to vehicles being serviced at the 269-W Garage. The site received vehicle decontamination liquid waste. The inventory prior to the removal of 3.06 m3 (4 yds3) of soil was estimated through 1972 as follows. ARH-2757, part 3 states the volume was 0.98E+05 L; <0.100E+00 g - plutonium; 0.840E+02 Ci - beta; 0.100E00 Ci - strontium-90; 0.400E+02 Ci - ruthenium-106; 0.100E+00 Ci - cesium-137; < 0.100E+00 Ci - cobalt-60; <0.500E-01 kg - uranium. ARH-1608 states the volume was 0.026E+06 Liters; <0.100E+00 g - plutonium; 60 Ci - beta; 1.00E+00 Ci - strontium-90; 40 Ci - ruthenium-106; 1.00E+00 Ci - cesium-137; < 0.100E+00 Ci - cobalt-60; <.1 lbs of uranium. Readings up to 1,500 cpm were measured in the excavated soil. Although no cleaning agents are listed, the possibility of hazardous chemical contamination exists. The site operated from June 1954 to June 1964. The site was deactivated when all vehicle decontamination operations were transferred to the 2706-T Building (also known as 2706-W). In 1964, the pit was deactivated by backfilling with soil. Although a dirt unloading ramp is located in the vicinity of this trench, the ramp was used to unload equipment and is not associated with the decontamination activities at 216-T-13. The trench is shown at different locations on two drawings. Drawing H-2-1495 (created in 1952) shows the trench adjacent to the southwest side of the 269-W garage. A conversation with a retired 200 West Area employee indicates the location north of the 241-TY Tank Farm is the correct location. Ground Penetrating Radar and Electromagnetic Induction scans done in December 2001 were not able to define the covered trench location. The older drawing, H-2-1495, appears to have depicted the 269-W garage further north of the location where the building foundations that are still visible. The shape of the building was also inverted on this drawing. Conversions to Washington State Plane coordinates for the trench shown on H-2-1495 distort the site location with respect to the known cement building foundations.

Related Site Structure: The site was associated with activities at the 269-W Regulated Garage, but the garage was not physically connected to the vehicle decontamination trench.
Site Posting: None

Release Mechanism: Vehicle decontamination waste
Release Type: Liquid

Dimensions (estimated):

Site Length:	6.1 m (20.0 ft)	**Site Depth:**	3.0 m (10.0 ft)
Site Width:	6.1 m (20.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	37.2 m^2 (400.0 ft^2)		

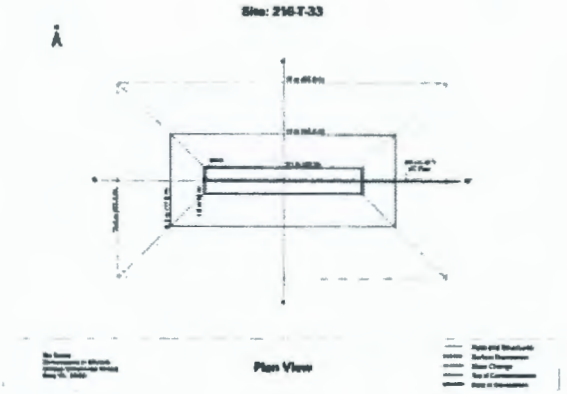
Potential Contaminants:

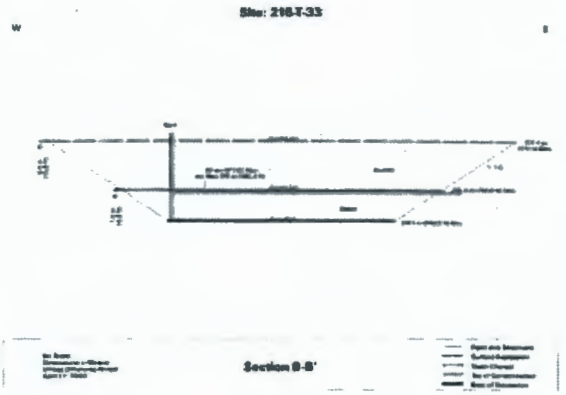
	Type	Constituents
Radiological	None	None
Nonradiological	None	None

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-T-33





Site Name: 216-T-33, 216-T-33 Crib
Site Type: Crib
Current OU: 200-MG-2

Facility: T Plant Area
Former OU: 200-MW-1

Waste Site Description:
This unit is located west of 221-T Canyon Building and southwest of 2706-T. The site is surrounded with light metal posts and chain, posted with URM signs, and consists of a rectangular crib with perforated vitreous clay inlet pipe set into a gravel layer. A layer of plastic sheeting, clean sand, and backfill are above the pipe. The site received equipment decontamination waste from the 2706-T Building. The waste is low in salt, neutral to basic, and contains sodium hydroxide. The total effluent discharged to the crib is questionable, due to the fact that the discharge line plugged shortly after the crib became active. This site provided subsurface liquid disposal for the 2706-T Building. After the line plugged, the 2706-T waste was routed to the 216-T-28 crib, via the 241-T-112 tank. The site was only active from January to February 1963, when the line to the unit plugged. There is some question as to the amount of liquid that actually reached the unit. Operating management believed the line to the unit retained all of the waste. Sections of the tile line were removed and the building effluent was rerouted to the 216-T-28 Crib via the 241-T-112 Tank in the 241-T Tank Farm. The top dimensions are 12.2 m (40 ft) by 6.1 m (20 ft).

Related Site Structure: The site is associated with the 2706-T Decontamination Building. The pipeline associated with this crib is 200-W-173-PL.
Site Posting: URM

Release Mechanism: Equipment decontamination waste
Release Type: Liquid

Dimensions (estimated):

Site Length:	9.1 m (30.0 ft)	**Site Depth:**	3.3 m (10.8 ft)
Site Width:	2.0 m (7.0 ft)	**Cover Thickness:**	2.1 m (7 ft)
Site Area:	18.3 m^2 (210.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Cs-137, Sr-90
Nonradiological	None	None

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-T-4-1D

Site Name: 216-T-4-1D, 216-T-4 Ditch, 216-T-4 Swamp
Site Type: Ditch
Current OU: 200-MG-2
Facility: T Farm Area
Former OU: 200-CW-4

Waste Site Description:
The site was located north of 23rd Street, west of the 221-T Building and northwest of the 241-T Tank Farm. The original ditch is not currently visible. The ditch was replaced by the 216-T-4-2 Ditch in 1972. The first 15 m (50 ft) of the original (216-T-4-1D) ditch was reused in the replacement ditch construction.The ditch received T Plant cooling water and condensate waste via the 207-T Retention Basin. The 216-T-4-1 Ditch was surface stabilized along with the 216-T-4-2 replacement ditch in 1995. The area is posted as a URM. From 1944 to September 1951 and July 1955 to August 1956, the site received process cooling water from the 221-T and 224-T Buildings via the 207-T Retention Basin and steam condensate from 221-T Building. From September 1951 to July 1955, the site received the above listed streams plus condenser cooling water and steam condensate from 242-T Evaporator. From August 1956 to June 1957, the site received steam condensate from 221-T. From June 1957 to July 1964, the site was on standby. From July 1964 to December 1965, the site received decontamination waste from 2706-T. From December 1965 to November 1970, the site received the above listed streams plus condenser cooling water from 242-T Building. After November 1970, the site received condenser cooling water from 242-T Building. The total plutonium is 1.41 g (3.1E-3 lbs) according to Hanford Defense Waste Environmental Impact Statement data. B y 1971, the unit had become contaminated to a maximum of 20,000 cpm at the bottom and was badly overgrown with aquatic plants, shrubs, and small willow trees. It was an attractive nuisance for area waterfowl. The berm from the new 216-T-4-2 Ditch was used to cover this unit in 1972. The radionuclide inventory is included in the 216-T-4A Pond inventory. The start date was November 1944 and the end date was May 1972.

Related Site Structure: The ditch is associated with the 216-T-4A Pond and the 216-T-4-2 Ditch. The pipeline from 207-T that fed the ditch is site code 200-W-164-PL.
Site Posting: URM

Release Mechanism: Steam condensate/ cooling water
Release Type: Liquid

Dimensions (estimated):

Site Length:	259.1 m (850.0 ft)	**Site Depth:**	1.2 m (4.0 ft)
Site Width:	2.4 m (8.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	631.7 m^2 (6800.7 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Plutonium
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 1,606,700

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

216-T-4-2

Site Name: 216-T-4-2, 216-T-4-2 Ditch
Site Type: Ditch
Current OU: 200-MG-2

Facility: WM Area
Former OU: 200-CW-4

Waste Site Description:
The site is located north of 23rd Street and north of the 241-T Tank Farm. The first 15 m (50 ft) from the fallout (head of unit) was part of the original 216-T-4-1 Ditch. At that point, it made a 90-degree turn to the north, paralleling the old 216-T-4-1 Ditch where it went through a culvert under the railroad tracks and continued to the 216-T-4B Pond. The ditch has been backfilled and surface stabilized. It is currently marked and posted with URM signs. It has a grass cover. The site received steam condensate and condenser cooling water from the 242-T Evaporator and nonradioactive wastewater from 221-T air conditioning filter units and floor drains. Total Pu is 1.41 g (3.1E-3 lb) for this unit according to the Hanford Defense Waste Environmental Impact Statement data. This unit was dug as a replacement for the 216-T-4-1 Ditch in May 1972. The first 15 m (50 ft) of the new ditch is common with the original ditch. It received T Plant cooling water and condensate waste via the 207-T Retention Basin. A 1978 radiological survey found the first 15 m (50 ft) to be contaminated, but the remainder of the ditch was not radiologically contaminated. The ditch was constructed with riprap at head end. A 76 cm (30 in) diameter, 12-gauge corrugated galvanized inlet pipe was located 0.9 m (3 ft) below grade. The width provided is a bottom dimension.

Related Site Structure: The site is associated with the 207-T Retention Basin and the 216-T-4B Pond. The pipeline from 207-T that fed the ditch is site code 200-W-164-PL.
Site Posting: URM

Release Mechanism: Steam condensate/ cooling water
Release Type: Liquid

Dimensions (estimated):

Site Length:	533.8 m (1750.0 ft)	**Site Depth:**	1.2 m (4.0 ft)
Site Width:	2.4 m (8.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	1301.6 m^2 (14000.7 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Plutonium
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 2,784,112

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

216-T-9

Site Name: 216-T-9, Decontamination Trenches, Equipment Decontamination Area
Site Type: Trench
Facility: T Plant Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
This site is located west of the 221-T Building and southwest of the 216-T-33 Crib and consists of a backfilled trench. The site is no longer marked or posted. This site was used for subsurface liquid disposal of vehicle decontamination waste from heavy equipment and other vehicles. No radionuclide or chemical contamination has been documented for this site according to DOE/RL-91-61. However, ARH-2757 states that all contamination (maximum 3000 cpm) was buried in the 200 West Dry Waste Burial Ground. Although no cleaning agents are listed, the possibility of hazardous chemical contamination exists. The site operated from February 1951 to March 1954. Maxfield (RHO-CD-673) states the site operated from July 1965 to January 1969; however, these dates are believed to be in error based on other reference material. The unit was backfilled in 1954. Decontamination operations were transferred to the 269-W garage facility that discharged to the 216-T-13 trench.

Related Site Structure: The site is associated with trenches 216-T-10 and 216-T-11.
Site Posting: None

Release Mechanism: Vehicle decontamination waste
Release Type: Liquid

Dimensions (estimated):

Site Length:	15.2 m (50.0 ft)	**Site Depth:**	2.0 m (7.0 ft)
Site Width:	3.0 m (10.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	46.5 m^2 (500.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	None	None
Nonradiological	Unknown	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 167,966

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-U-14

No Image Available

No Image Available

Site Name: 216-U-14, 216-U-14 Ditch, Laundry Ditch
Site Type: Ditch
Current OU: 200-MG-2
Facility: T Plant Area
Former OU: 200-CW-5

Waste Site Description:
The ditch originated west of the 284-W Powerhouse, west of Bridgeport Avenue and extended southward, terminating at the 216-U-10 Pond. The 216-U-14 ditch was excavated in 1944 and was the original effluent route to the 216-U-10 Pond. It received 284-W Powerhouse waste water, laundry waste water (until 1981) via 200-W-102 Pipeline, chemical sewer waste from 221-U, and steam condensate and cooling water from 221-U, 241-U-110 condenser tank, 224-U and the 242-S Evaporator. The 221-U and 224-U effluent entered the ditch after passing through the 207-U Retention Basin. Near the head end of the ditch, a 0.6 m (2 ft) diameter pipe allowed 284-W Powerhouse and laundry effluent to flow under 19th Street and connect to the main portion of the ditch. The ditch also had a 1.22 m (4 ft) diameter culvert that allowed effluent to flow under 16th Street to the portion of the ditch located north of the 242-S Evaporator and also flowed under Cooper Ave. to terminate at 216-U-10 Pond. The 200 West Area Powerhouse Pond was constructed over the location of the head end of the 216-U-14 Ditch after that section was deactivated. The depth varied slightly along the length of the ditch. The 216-U-16 crib was built in 1984 to accept 224-U effluent that had previously been discharged to the ditch. However, the 216-U-16 crib failed in 1985 when a pooling of waste on an underground caliche layer caused a lateral movement of the liquid that eventually reached groundwater by seeping around a well casing. Some 224-U effluent was diverted back to the 216-U-14 Ditch until November 1994, when the outlet pipe to the 207-U Retention Basin was permanently isolated and filled with concrete. The portion of the ditch located west of Cooper Ave. received effluent from the 242-S Evaporator and remained active until April 1995. Discharge from the 242-S Evaporator was eliminated in 1995 ending all discharges to this unit. A variety of wastewater releases have occurred over 50 years. Occurrence Report 86-46 states that on August 6, 1986, 2365 L (625 gal) of recovered nitric acid, containing 39 kg (86 lbs) of uranium was discharged though the chemical sewer to the 207-U retention Basin. Prior to the discovery of the release, the outlet valves on the retention basin were open to the 216-U-14 Ditch. The acid released to the ditch was greatly diluted with the 1140 L (300 gal) per minute flow of cooling water from the 224-U facility being processed through the chemical sewer system. The outlet valves from the retention basin were closed shortly after the discovery of the release and the remainder of the acid release was contained in the retention basin. The effluent in the retention basin was neutralized with 270 kg (600 lbs) of sodium carbonate. The Hanford Site Waste Management Units Report (1987) reported different release values. It stated approximately 3000 L (796 gal) of 50% reprocessed nitric acid was released to the unit. The total release to the environment consisted of approximately 101,250 kg (225,000 lbs) of corrosive solution (pH less than 2.0) and 45.4 kg (100 lbs) of uranium. Sediment, soil and vegetation samples were collected to characterize the 216-U-14 Ditch several times. In 1981, contamination levels found in sediment at the head end of the ditch, to a depth of 175 cm (70 in), were above background levels for all radionuclides analyzed. The average concentration for all depths was 76.6 pCi/g cesium- 137, 113.4 pCi/g per gram cobalt-60, 101.6 pCi/g strontium-90, and 89.1 pCi/g plutonium 239/240. The highest concentrations of cobalt-60 were found in the head end of the ditch. The highest concentration of cesium-137 was found near where the ditch entered U-Pond. Core samples were collected in 1987 to determine the effects of the accidental nitric acid and uranium release that occurred in 1986. A maximum of 185 pCi/g of uranium was found at a depth of 15 to 30 cm (6 to 12 in). Test pits were excavated in the ditch in 1992 to support the Groundwater Impact Assessment for the 216-U-14 Ditch. The test pits were located in the portion of the ditch west of Cooper Ave and east of the 216-U-10 pond. Data indicated the contaminants were concentrated within a few feet of the bottom of the ditch.

Related Site Structure: The ditch is associated with the 284-W Powerhouse, 2723-W (old laundry facility), 2724-W (new laundry facility), 221-U, 224-U, 271-U the 242-S Evaporator building and the 241-U-110 tank. The 200 West Area Powerhouse Pond was constructed over the location of the head end of the 216-U-14 Ditch. The pipeline from 2724-W is 200-W-102-PL. A pipeline from 241-U tank farm to the 216-U-14 ditch is site code 200-W-168-PL. The

outlet pipe from 207-U is site code 200-W-222-PL. The effluent discharge pipe from 242-S Evaporator to the 216-U-14 ditch is site code 200-W-223-PL.
Site Posting: URM

Release Mechanism: Multiple miscellaneous effluent releases
Release Type: Liquid

Dimensions (estimated):

Site Length:	1731.3 m (5680.3 ft)	**Site Depth:**	3.1 m (10.0 ft)
Site Width:	2.4 m (8.0 ft)	**Cover Thickness:**	minimum 0.61 m (minimum 2.0 ft)
Site Area:	4221.5 m^2 (45444.4 ft^2)		

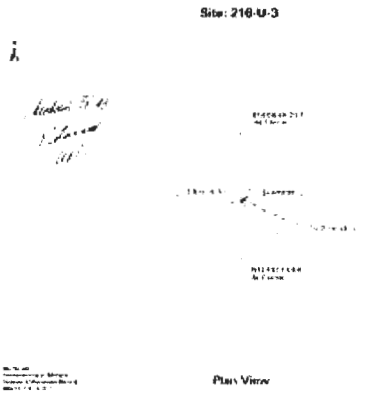
Potential Contaminants:

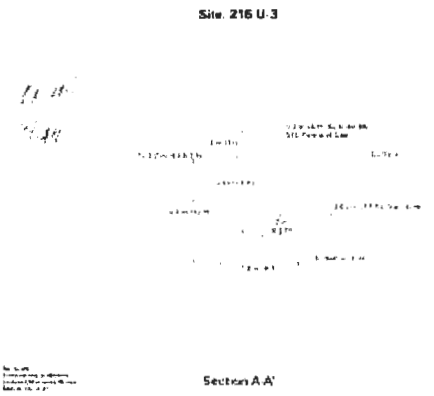
	Type	Constituents
Radiological	X	Radiological survey showed collected tumbleweeds with 4000 to 10,000 dpm in 1997. 1981 sampling detected Cs-137, Sr-90, U-238, Co-60, Pu-239/240. (Tn and Tc-99)
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 6,006,623

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

216-U-3





Site Name: 216-U-3, 216-U-11, 216-U-3 French Drain
Site Type: French Drain
Current OU: 200-MG-2
Facility: S/U Farm Area
Former OU: 200-MW-1

Waste Site Description:
This site is located south of the 241-U Tank Farm on the south side of 16th Street and consists of a french drain with light steel posts and chain with URM signs. The drain is a 3.6 m (12 ft) deep, 1.8 m (6 ft) diameter, rock-filled excavation with sloping sides and a 10 cm (4 in) diameter vent riser. This 216-U-3 crib received condensate from the steam condensers on the 241-U-104 and 241-U-110 tanks. The 241-U-104 and 241-U-110 tanks held REDOX boiling waste. The site waste contains nitrate. The closed loop cooling water for the condensers was discharged to the 216-U-14 ditch. Most reference documents mention this site receiving waste from 241-U-110, but drawing H-2-44004 also shows the 241-U-104 tank having a condenser that is attached to the same pipeline as the 241-U-110 tank. This site operated from May 1954 to August 1955. The site was deactivated by valving out the condenser piping, when the tank contents were no longer boiling. Although the drain was a gravel filled excavation, a large cave-in depression was noticed at this site in 1985. It is assumed that a subsurface wash out had occurred. An area of contaminated soil, located adjacent to the 216-U-3 site, was surface stabilized in 1998 (See 200-W-67). The site had a 1.8 m (6 ft) bottom diameter and a 1:1 side slope. The surface diameter of the excavation was 5.5 m (18 ft).

Related Site Structure: The french drain is associated with the 241-U-104, 241-U-110 Tanks and the 200-W-169-PL pipeline.
Site Posting: URM

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	3.7 m (12.0 ft)
Site Width:	1.8 m (6.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	2.5 m^2 (28.3 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	None	None
Nonradiological	X	Hg, Se

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-Z-13

No Image Available

No Image Available

Site Name: 216-Z-13, 234-5 Dry Well #1, 216-Z-13 Dry Well, Miscellaneous Stream #261, 216-Z-13 A and B
Site Type: French Drain
Facility: PFP Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The french drain is located northeast of the 291-Z stack and consists of two drain systems. The visible french drain is actually the upper portion of a two-part drain system. It receives condensate from the steam turbine exhaust stack. The lower french drain is constructed of two tile culverts placed end-to-end, and backfilled beneath 9 ft (2.7 m) of gravel and is located approximately 6 m (20 ft) south of the drain marked on the surface. The covered top of the upper french drain is visible on the surface, adjacent to a single cement marker post with a metal plate labeled 216-Z-13 (also seen in 1985 photograph 122440-250cn). The effluent source has been isolated. This french drain received emergency condensate from the turbine of the ET-8 exhaust fan, and 291-Z building steam condensate and floor drainage. Due to the french drain's location, low levels of vadose zone contamination are assumed. Two pipes discharged to the lower french drain, but the miscellaneous stream (#261) to the drain has been eliminated. The culvert is filled with cobbles. Due to the common nature of the discharge to the upper and lower drain systems, there is a potential for historical documentation related to the drains to be confusing.

Related Site Structure: This french drain is associated with include two effluent discharge pipes, the ET-8 exhaust fan turbine, and the 291-Z Building. The pipeline to the french drain is 200-W-214-PL.
Site Posting: None

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	5.0 m (16.0 ft)
Site Width:	1.0 m (3.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	0.8 m^2 (7.1 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	None	None
Nonradiological	None	none

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

216-Z-14

No Image Available

No Image Available

Site Name: 216-Z-14, 234-5 Dry Well #2, 216-Z-14 Dry Well, Miscellaneous Stream #262, 216-Z-14 A and B
Site Type: French Drain
Facility: PFP Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The french drain is located northwest of the 291-Z Stack. The site consists of two drain systems. The upper drain is marked with a single cement marker post, but the top of the drain has been paved over. The lower drain system is not visible from the surface. It is located approximately 6 m (20 ft) southeast of the cement marker post. The lower french drain is constructed of two tile culverts placed end to end, and backfilled beneath 9 ft (2.7 m) of gravel. Two pipes discharge to the french drain. The culvert is filled with cobble. The french drain receives emergency condensate and steam condensate from the turbine of the ET-9 exhaust fan along with 291-Z building steam condensate and floor drainage. Due to the french drain's location, low levels of vadose zone contamination are assumed. The lower french drain receives steam condensate from the turbine of the ET-9 exhaust fan and 291-Z floor drainage. The condensate discharged to the upper drain system has been disconnected and now discharges to the ground. Due to the common nature of the discharge to the upper and lower drain systems, there is a potential for historical documentation related to the drains to be confusing. The site is miscellaneous stream number 262 in the some revisions of Inventory of Miscellaneous Streams report (DOE/RL-95-82) and 263 in other revisions. The site is also addressed in the Miscellaneous Streams Best Management Practices Report, as a b stream (a stream discharging in a surface contaminated area). However, in 2001, no posted SCA existed. Based on process history, the drains received non contaminated effluent.

Related Site Structure: The lower french drain is associated with two effluent discharge pipes, the ET-9 exhaust fan turbine, and the 291-Z Building. The pipeline to the french drain is 200-W-215-PL.
Site Posting: Not Specified

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	None m (None ft)	**Site Depth:**	5.0 m (16.0 ft)
Site Width:	1.0 m (3.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	0.8 m^2 (7.1 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

2704-C-WS-1

No Image Available

No Image Available

Site Name: 2704-C-WS-1, 2704-C French Drain, Gatehouse French Drain
Site Type: French Drain
Facility: Semi-Works Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
This site is located in 200 East, at the southwest corner of the site of the 2704-C Building (demolished in 1998). The area where the french drain was located is now within a larger gravel area that is posted URM. The drain is no longer visible at the location described. The drain could be covered with gravel or by the two dumpsters located in the area. A 1991 site visit reported the drain cover was painted yellow and posted with a tri-foil, indicating radioactive contamination. However, in 1993, the site was described as having no radiological posting or markings. Currently (1999), the former location of 2704-C building is located within a larger posted URM area and surrounded with a post and chain fence. There is a possibility that this site is the same site as that identified in HW-22955 as a quench tank. The description follows. Steam condensate drained to a quench tank at the southwest corner of the building (2704C). Sanitary waste drains through a 10.2 cm (4 in) cast iron line running beneath the floor slab from the toilet room to a point 1.5 m (5 ft) west of the building where it connects to a 10.2 cm (4 in) tile drain. The overflow from the quench tank also flows into this tile drain which runs to the sanitary waste disposal field. The sanitary waste disposal field is part of the 2607-E7 Septic System. (Drawings H-2-4033, H-2-4012, and H-2-4013 identify a quench tank. Drawing H-2-77665 identifies a french drain). The 2704-C building was originally built in 1949 to support the Hot Semiworks operations. It was a one story wooden structure, on a cement slab foundation, that contained the security office (Gate House), a lunch room and a toilet. Building steam condensate drained to a quench tank located at the southwest corner of the building. During the 1980s, 2704C housed the 200 East Tank Farms Health Physics (HPT) Offices. Prior to demolition by BHI, the building was designated a contaminated facility. Although the drain received building steam condensate, periodically the drain was labeled with radioactive postings.

Related Site Structure: The site was related to the 2704-C, Office and Gate House. The pipeline associated with this french drain is site code 200-E-250-PL. The Hot Semiworks surface stabilized area is known as 200-E-41. The demolished 2704-C building and drain are adjacent to the Hot Semiworks stabilized area.
Site Posting: Located within a large URM area.

Release Mechanism: Steam condensate
Release Type: Liquid

Dimensions (estimated):

Site Length:	Irregular m (Irregular ft)	**Site Depth:**	Unknown m (Unknown ft)
Site Width:	Irregular m (Irregular ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	Unknown m^2 (Unknown ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

UPR-200-E-17

No Image Available

No Image Available

Site Name: UPR-200-E-17, Overflow at 216-A-22, UN-200-E-17
Site Type: Unplanned Release
Facility: Purex Area
Current OU: 200-MG-2
Former OU: 200-MW-1

Waste Site Description:
The release effected the ground on top of the 216-A-22 Crib, located north of PUREX, north of the 203-A facility, near the 216-A-28 French Drain. The 216-A-22 crib is marked with a single cement post and posted with URM signs. The unplanned release is not separately marked or posted. The release cannot be visually identified. The release consisted of uranium (from UNH storage) contamination on the ground surface from the failed 216-A-22 Crib inlet. The 203-A tank farm was used for storage and shipping of UNH product and concentration of UNH waste. It consisted of 460,000 L (100,000 gal) stainless steel tanks for UNH storage and three smaller nitric acid tanks. HW-60807, issued in 1959, stated that the covered release area was not separately posted because it was located within the 203-A stack radiation zone. This statement was copied into many later documents. Site visits and conversations with previous PUREX workers cannot identify a stack at the 203-A tank farm. It is believed that author of HW-60807 intended to state the spill was located within the 203-A tank radiation zone.

Related Site Structure: The site is associated with 216-A-22 and 203-A.
Site Posting: URM

Release Mechanism: Leak/ spill
Release Type: Liquid

Dimensions (estimated):

Site Length:	Irregular m (Irregular ft)	**Site Depth:**	Unknown m (Unknown ft)
Site Width:	Irregular m (Irregular ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	Unknown m^2 (Unknown ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	460,000 L Uranyl nitrate hexahydrate

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 191,646

References:
WIDS General Summary Report, DOE/RL-2001-65, DOE/RL-2005-62

UPR-200-E-9

No Image Available

No Image Available

Site Name: UPR-200-E-9, Liquid Overflow at 216-BY-201, UN-200-E-9
Site Type: Unplanned Release
Facility: B Farm Area
Current OU: 200-MG-2
Former OU: 200-TW-1

Waste Site Description:
The location of this unplanned liquid release is adjacent to the 216-BY-201 Flush Tank, north of the 241-BY Tank Farm. A large area of surface contamination north of 241-BY Tank Farm was later named UPR-200-E-89. The site has been surface stabilized with gravel and is posted as an URM area. The 216-BY-201 Flush Tank leaked supernatant waste from the tributyl phosphate (TBP) process to the ground. The 216-BY-201 flush tank received tri-butyl phosphate waste via the 241-BY tank farm and then released it to the 216-B-43 through 49 cribs. The 216-B-50 crib did not receive tri-butyl phosphate waste.

Related Site Structure: UPR-200-E-9 is associated with 216-BY-201 and the 216-B-43 through 50 cribs.
Site Posting: URM

Release Mechanism: Leak/ Spill
Release Type: Liquid

Dimensions (estimated):

Site Length:	Irregular m (Irregular ft)	**Site Depth:**	Unknown m (Unknown ft)
Site Width:	Irregular m (Irregular ft)	**Cover Thickness:**	3.7 m (12 ft)
Site Area:	Unknown m^2 (Unknown ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Supernatant waste from the tributyl phosphate (TBP). 41,600 L tributyl phosphate process waste (before clean up)

Preferred Removal Action: CS/NA
Estimated Removal Action Present Worth: 179,554

References:
WIDS General Summary Report, DOE/RL-2000-38, DOE/RL-2003-64, DOE/RL-2002-42

UPR-200-W-103

No Image Available

Site Name: UPR-200-W-103, 216-Z-18 Line Break, UN-216-W-13, UN-200-W-103, Pipe Line Leak
Site Type: Unplanned Release
Facility: PFP Area
Current OU: 200-MG-2
Former OU: 200-PW-1

Waste Site Description:
UPR-200-W-103 occurred within the Z Plant exclusion area, approximately 1.8 m (6 ft) south and 3.7 m (12 ft) west of the southwest corner of the 236-Z Building in the 200 West Area. The release site is posted with URM warning signs. Contamination still remains under the clean soil. A WIDS number sign has been placed inside the URM to mark the approximate release location. The release contained approximately 10 g of plutonium with gross alpha contamination greater than 6,000,000 dpm.

Related Site Structure: UPR-200-W-103 is associated with the 216-Z-18 Crib line, the 234-5 Building, and the 236-Z Building.
Site Posting: URM

Release Mechanism: Pipeline release
Release Type: Liquid

Dimensions (estimated):

Site Length:	8.0 m (25.0 ft)	**Site Depth:**	2.1 m (7.0 ft)
Site Width:	2.0 m (6.0 ft)	**Cover Thickness:**	0 m (0 ft)
Site Area:	16.0 m^2 (150.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	10 g of plutonium with gross alpha contamination in April 1979. greater than 6,000,000 dpm.
Nonradiological	Unknown	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 411,226

References:
WIDS General Summary Report, DOE/RL-2001-01, DOE/RL-2006-51

UPR-200-W-111

No Image Available

No Image Available

Site Name: UPR-200-W-111, Sludge Trench at 207-U, UN-216-W-21
Site Type: Unplanned Release
Facility: T Plant Area
Current OU: 200-MG-2
Former OU: 200-CW-5

Waste Site Description:
The site, a trench, is approximately 3 m (10 ft) from the concrete wall on the south side of the 207-U South Retention Basin in the 200 West Area. The site had been posted with "Surface Contamination" signs. In 1997, contaminated soil in the vicinity of the 207-U Retention Basin was scraped and consolidated around the basin perimeter. The contaminated soil was covered with clean backfill. The radiological posting was changed to "Underground Radioactive Material." Approximately 21 m3 (27 yds3) of sludge from the 207-U South Retention Basin was buried adjacent to the Retention Basin. Until 1972, the retention basins received steam condensate and cooling water from the 224-U Building and chemical sewer waste from the 221-U Building. The exact date of this basin scraping is not known. It is assumed to have been a one time use trench dug in the 1960's. The trench was given a "UPR" designation, even though the sludge removal was a planned activity.

Related Site Structure: UPR-200-W-111 was associated with the 207-U South Retention Basin.
Site Posting: SCA, URM

Release Mechanism: Dumping Area
Release Type: Solid

Dimensions (estimated):

Site Length:	12.2 m (40.0 ft)	**Site Depth:**	3.1 m (10.0 ft)
Site Width:	4.6 m (15.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	56.1 m^2 (600.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 500,709

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

UPR-200-W-112

No Image Available

No Image Available

Site Name: UPR-200-W-112, Sludge Trench at 207-U, UN-216-W-22
Site Type: Unplanned Release
Facility: T Plant Area
Current OU: 200-MG-2
Former OU: 200-CW-5

Waste Site Description:
The site is approximately 3 m (10 ft) from the concrete wall on the north side of the 207-U North Retention Basin in the 200 West Area. The site had been posted with "Surface Contamination" warning signs. In 1997, the contaminated area in the vicinity of the 207-U Retention Basin was scraped and consolidated. The area was covered with clean soil and the radiological posting was changed to URM. Approximately 21 cubic m3 (27 yds3) of sludge from the 207-U North Retention Basin was buried adjacent to the north side of the Retention Basin. Until 1972, the retention basins received steam condensate and cooling water from the 224-U Building and chemical sewer waste from the 221-U Building. Sludge was scraped from the bottom of the north 207-U Retention Basin and placed in a narrow trench adjacent to the north basin wall. The sludge was covered with 1.2 m (4 ft) of clean soil. The exact date of this basin scraping is not known. It is assumed to be a one time use trench, dug in the 1960's. The trench was given a "UPR" designation, even though the sludge removal was a planned activity.

Related Site Structure: UPR-200-W-112 was associated with the 207-U North Retention Basin.
Site Posting: SCA, URM

Release Mechanism: Dumping Area
Release Type: Solid

Dimensions (estimated):

Site Length:	12.2 m (40.0 ft)	**Site Depth:**	3.1 m (10.0 ft)
Site Width:	4.6 m (15.0 ft)	**Cover Thickness:**	0.3-0.6 m (1-2 ft)
Site Area:	56.1 m^2 (600.0 ft^2)		

Potential Contaminants:

	Type	Constituents
Radiological	X	Unknown
Nonradiological	X	Unknown

Preferred Removal Action: RTD
Estimated Removal Action Present Worth: 500,709

References:
WIDS General Summary Report, DOE/RL-99-66, DOE/RL-2004-24, DOE/RL-2003-11

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APPENDIX B

WASTE SITE ATTRIBUTES

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APPENDIX B

WASTE SITE ATTRIBUTES

This appendix presents the attributes of each site evaluated to determine the preferred removal action alternative. Table B-1 is organized by site type, which allows a row-by-row comparison by waste site type. The table also lists the attributes of the 200-MG-2 Operable Unit waste sites. The following attributes are given in the table:

- Waste site code
- Current status
- Waste site type
- Waste site name
- Facility area
- Physical setting
- Backfill status
- Surface cover status
- Surface cover thickness
- Site area, length, width, depth
- Potential contaminant interval
- Summary of prior cleanup activities
- Release mechanism
- Release type
- Potential constituents (radioactive and nonradioactive).

Waste site descriptions and other information are quoted directly from the Waste Information Data System database and other references. No modifications have been made to maintain consistent format, and references cited in those descriptions are not provided.

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Table B-1. Waste Site Attributes.

Waste Site Code	Current Status	Waste Site Type	Waste Site Name	Facility Area	Physical Setting	Back-fill (Y/N)	Surface Cover Present (Y/N)	Surface Cover Thickness (ft)	Site Area (ft^2)	Site Length (ft)	Site Width (ft)	Site Depth (ft)	Potential Cont. Interval (ft)	Prior Cleanup Activities	Release Mechanism	Release Type (Solid and/or Liquid)	Potential Constituents	
																	Radioactive	Nonradioactive
216-A-41	Inactive	Crib	216-A-41, Crib, 291-AR Stack Drain, 296-A-13 Stack Drain	PUREX Area	Crib	N	Y	1-2	100.0	10.0	10.0	7.0	7-15	The crib was deactivated by removing the stack drainage piping from 296-A-13 Stack. The stack drainage was then rerouted to the vessel vent seal pot system of the 244-AR building.	Stack condensate	Liquid	Less than 1 curie total beta activity. Tritium, Co-60, Sr-90, and Cs-137 in April 1979.	Unk.
216-C-4	Inactive	Crib	216-C-4, 216-C-4 Crib	Semi-Works Area	Crib	N	Y	1-2	200.0	20.0	10.0	16.0	16-20	Surface stabilized in 2000 with clean backfill material in January 2000. A portion of the security fence was removed to provide access to the crib for sterilization activities and future surveillance surveys. The site was deactivated in 1965 by valving out the effluent pipeline when the specific retention capacity was reached. In 1979, the 216-C-1, 216-C-3, 216-C-4, and 216-C-5 Cribs were decontaminated and the ground surface stabilized against wind erosion and plant root invasion. The 1979 work included blading 10 cm (4 in.) of ground surface and covering with a 10 cm (4-in.) sand pad, applying ureabor herbicide at the rate of 450 kg/hectare (500 lb/acre), installing 10-mil plastic sheeting over the entire surface, adding an additional 30.5 cm (12-in.) layer of sand over the plastic and 10 cm (4 in.) of pit run gravel on the surface.	Contaminated effluent	Liquid	Unk.	170,000 L of organic waste
216-S-25	Inactive	Crib	216-S-25, 216-S-25 Crib	200 W Ponds Area	Crib	N	N	0	5750.6	575.0	10.0	10.0	10-20	None	Steam condensate	Liquid	Unk.	Unk.
216-SX-2	Inactive	Crib	216-SX-2, 216-SX-2 Crib	S/U Farm Area	Crib	N	N	0	2281.6	75.3	30.3	6.8	6.8-15	In 2000, the vent risers were sealed to prevent potential passive radioactive emissions.	Compressor house waste	Liquid	Unk.	Unk.
216-T-33	Inactive	Crib	216-T-33, 216-T-33 Crib	T Plant Area	Crib	N	Y	7	210.0	30.0	7.0	10.8	11-15	The site has been surface stabilized.	Equipment decontamination waste	Liquid	Cs-137, Sr-90	None
216-T-1	Inactive	Ditch	216-T-1, 221-T Ditch, 221-T Trench, 216-T-1 Trench	T Plant Area	Ditch	Y	Y	1-2	4401.2	1467.0	3.0	10.0	10-15	The ditch was backfilled and stabilized in 1995. The ditch was permanently isolated by filling the manholes with concrete and cutting and capping the discharge pipes.	Steam condensate/ cooling water	Liquid	Unk.	Unk.
216-T-4-1D	Inactive	Ditch	216-T-4-1D, 216-T-4 Ditch, 216-T-4 Swamp	T Farm Area	Ditch	Y	Y	1-2	6800.7	850.0	8.0	4.0	4-15 (localized)	Ditch was backfilled and covered with clean dirt (1995). The 216-T-4-1 Ditch was surface stabilized along with the 216-T-4-2 Replacement Ditch in 1995.	Steam condensate/ cooling water	Liquid	Plutonium	Unk.
216-T-4-2	Inactive	Ditch	216-T-4-2, 216-T-4-2 Ditch	WM Area	Ditch	Y	Y	1-2	14000.7	1750.0	8.0	4.0	4-15 (localized)	Backfilled and surface stabilized in 1995. Site has grass cover. Manhole along the effluent pipeline filled with concrete. The ditch was backfilled and interim stabilized by BHI in July 1995 under a WHC Tank Farm work order. Permanent isolation was accomplished by filling the last manhole along the effluent pipeline with concrete (ECN-W-291-50 and 65).	Steam condensate/ cooling water	Liquid	Plutonium	Unk.

Table B-1. Waste Site Attributes.

Waste Site Code	Current Status	Waste Site Type	Waste Site Name	Facility Area	Physical Setting	Back-fill (Y/N)	Surface Cover Present (Y/N)	Surface Cover Thickness (ft)	Site Area (ft^2)	Site Length (ft)	Site Width (ft)	Site Depth (ft)	Potential Cont. Interval (ft)	Prior Cleanup Activities	Release Mechanism	Release Type (Solid and/or Liquid)	Potential Constituents	
																	Radioactive	Nonradioactive
216-U-14	Inactive	Ditch	216-U-14, 216-U-14 Ditch, Laundry Ditch	T Plant Area	Ditch	Y	Y	Minimum 2.0	45444.4	5680.3	8.0	10.0	10-15 (localized)	The entire ditch has been backfilled and surface stabilized (the areas were covered with a minimum of 0.61 m (2 ft) of clean dirt). Deactivation and stabilization for this site occurred in stages, beginning with the northern portion in 1984. The majority of the ditch had been backfilled and stabilized by 1995. The last portion to be eliminated was the portion located west of Cooper Avenue, where the ditch terminated into 216-U-10 Pond. It had been previously filled with large cobbles and continued to receive a small amount of effluent from 242-S until 1995. Although the effluent discharge ceased in 1995, this section was not downposted to URM status until 1997, when the cobbles were covered with "pit run" gravel. The laundry facility waste effluent was eliminated in 1981 and rerouted to a new crib (216-W-LWC). Discharge from the 224-U Facility was eliminated in 1994. The portion of the ditch that received effluent from the 207-U Retention Basin was permanently isolated by filling the 207-U Retention Basin outlet pipe with concrete in 1994. The portion of the ditch from the 207-U Basin to the east side of Cooper Ave. was interim stabilized by Tank Farms Operations in January 1995. The remaining discharge portion of the ditch west of Cooper Ave. (receiving effluent from the 242-S Evaporator) was deactivated by capping the discharge pipe capped on April 11, 1995. Outlet valves leading to the 216-U-14 ditch are locked and tagged closed. This completes both the Tri-Party and DOE-RL Agreement milestones to cease discharge to the unit.	Multiple miscellaneous effluent releases	Liquid	Radiological survey showed collected tumbleweeds with 4000 to 10,000 dpm in 1997. 1981 sampling detected Cs-137, Sr-90, U-238, Co-60, Pu-239/240. (Tn and Tc-99)	Unk.
200-E-25	Inactive	French Drain	200-E-25, 272-BB French Drain, Insulation Shop French Drain, Miscellaneous Stream #659	B Plant Area	French Drain	N	N	0	3.1	None	2.0	9.0	9-10	In the building from where the contamination came, the sink has been removed and drain was plugged with concrete.	Effluent from a sink and floor drain	Liquid	None	Asbestos, calcium silicate, fiberglass, silicate, "Airball" (an insulation cover material), latex paint, organic chemicals, oil, and grease.
200-E-4	Inactive	French Drain	200-E-4, Critical Mass Laboratory Dry Well North, 209-E North Dry Well, Miscellaneous Stream #730	Semi-Works Area	French Drain	N	N	0	12.5	None	4.0	11.0	0-15	One auger hole was drilled 6.25 m through the French drain.	Steam condensate	Liquid	None	Ba, Cu
209-E-WS-2	Inactive	French Drain	209-E-WS-2, Critical Mass Lab French Drain	Semi-Works Area	French Drain	N	N	0	12.1	None	4.0	8.0	8-9	None	Steam condensate	Liquid	None	None

Table B-1. Waste Site Attributes.

Waste Site Code	Current Status	Waste Site Type	Waste Site Name	Facility Area	Physical Setting	Back-fill (Y/N)	Surface Cover Present (Y/N)	Surface Cover Thickness (ft)	Site Area (ft^2)	Site Length (ft)	Site Width (ft)	Site Depth (ft)	Potential Cont. Interval (ft)	Prior Cleanup Activities	Release Mechanism	Release Type (Solid and/or Liquid)	Potential Constituents	
																	Radioactive	Nonradioactive
216-B-51	Inactive	French Drain	216-B-51, 216-BY-9 Crib	B Farm Area	French Drain	N	Y	1-2	19.6	None	5.0	15.0	0-20	Surface Stabilized in 1992. The 216-B-51 French Drain had been located inside a large, posted Surface Contamination Area known as UPR-200-E-144 (alias UN-216-E-44). In 1992, UPR-200-E-144 was surface stabilized. The contaminated soil on and around 216-B-51 was removed and consolidated onto the 216-B-7A/B and 216-B-11A/B cribs. The 216-B-51 French Drain was then posted "Underground Radiation Material."	Process waste effluent	Liquid	Less than 10 curies total beta/gamma in March 1993. Maximum direct reading of 18,000 dpm/100 cm^2 beta/gamma was found on concrete structure and wood cover from rad survey in April 2006.	Tri- butyl phosphate
216-U-3	Inactive	French Drain	216-U-3, 216-U-11, 216-U-3 French Drain	S/U Farm Area	French Drain	Y	N	0	28.3	None	6.0	12.0	12-15	By 1955, the waste in the 241-U-104 and 241-U-110 tanks was no longer boiling. The condensers were no longer needed so the piping to the crib was valved out. Before 1985 it was backfilled, but then the cave-in was noticed. Cave-in was backfilled later and the site was posted with URM signs. In December 2004, a characterization borehole (C4559) was drilled through the French drain.	Steam condensate	Liquid	None	Hg, Se
216-Z-13	Active	French Drain	216-Z-13, 234-5 Dry Well #1, 216-Z-13 Dry Well, Miscellaneous Stream #261, 216-Z-13 A and B	PFP Area	French Drain	Y	N	0	7.1	None	3.0	16.0	9-17	The effluent source was isolated.	Steam condensate	Liquid	None	None
216-Z-14	Inactive	French Drain	216-Z-14, 234-5 Dry Well #2, 216-Z-14 Dry Well, Miscellaneous Stream #262, 216-Z-14 A and B	PFP Area	French Drain	Y	N	0	7.1	None	3.0	16.0	9-17	None	Steam condensate	Liquid	Unk.	Unk.
2704-C-WS-1	Inactive	French Drain	2704-C-WS-1, 2704-C French Drain, Gatehouse French Drain	Semi-Works Area	French Drain	N	Y	1-2	Unk,	Irr.	Irr.	Unk.	0-15	Building demolished in 1998. The area and drain where the building stood was covered with gravel and posted with URM signs.	Steam condensate	Liquid	Unk.	Unk.
207-A-NORTH	Inactive	Retention Basin	207-A-NORTH, 207-A, 207-A Retention Basin, 207-A-NORTH Retention Basin, 207-A North	200 E Ponds Area	Retention Basin	N	N	0	550.0	55.0	10.0	7.0	7-15	Physically isolated and ceased to operate in Nov. 1999. A 4-in. (10 cm) fill line enters each basin, approximately 2 ft (0.6 m) long (inside basin structure) and a 3-in. (7.6 cm) drain line exits. A polyurethane sealant was added to the basin walls in 1982. Prior to the installation of the haplon liner, the basins had been posted as a CA. Each of the three basins is 16.8 m (55 ft) long, 3.0 m (10 ft) wide at the bottom, and 2.1 m (7 ft) deep with a total capacity of 790,000 L (210,000 gal).	Steam condensate	Liquid	Unk.	Unk.
207-S	Inactive	Retention Basin	207-S, REDOX Retention Basin, 207-S Retention Basin	200 W Ponds Area	Retention Basin	Y	Y	2	16900.0	130.0	130.0	6.8	0-8	Surface stabilized in 1993.	Cooling water/steam condensate	Liquid	9000 cpm beta/gamma in September 1981.	Unk.

Table B-1. Waste Site Attributes.

Waste Site Code	Current Status	Waste Site Type	Waste Site Name	Facility Area	Physical Setting	Back-fill (Y/N)	Surface Cover Present (Y/N)	Surface Cover Thickness (ft)	Site Area (ft^2)	Site Length (ft)	Site Width (ft)	Site Depth (ft)	Potential Cont. Interval (ft)	Prior Cleanup Activities	Release Mechanism	Release Type (Solid and/or Liquid)	Potential Constituents	
																	Radioactive	Nonradioactive
207-T	Inactive	Retention Basin	207-T, T Plant Retention Basin, 207-T, 207-T Retention Basin	T Farm Area	Retention Basin	Y	Y	2-3	30261.0	246.0	123.0	6.5	0-15	0.8 m - 0.46 m of contaminated soil was scraped from another site and deposited on the bottom of this basin, then capped with 0.46 m - 1.07 m of clean dirt. In 1996, the basin was backfilled with contaminated soil from adjacent areas and capped with 2 ft of clean dirt. An area north of the 207-T Basin was originally designated as UPR-200-W-166 (alias UN-216-W-31). The contaminated soil was scraped and placed on top of the 216-T-14 through 216-T-17 Trenches and covered with clean soil in 1992. When additional contamination was identified east of the 207-T Basins in 1994, it was assumed to be from the same source and also called UPR-200-W-166. The contaminated soil east of the 207-T Basins was scraped and placed inside the basins as fill material in 1996. To distinguish between the area remediated in 1992 and the contamination placed into the 207-T Basin in 1996, the latter has been given a separate WIDS site code of 200-W-53. Interim stabilization of the 207-T Retention Basin and an area of surface soil contamination located east of the basins (200-W-53 alias UPR-200-W-166), was completed in May 1996. Three to eighteen inches of the contaminated soil was scraped from 200-W-53 (UPR-200-W-166) and deposited in the bottom of the basin. The basin was then capped with 18 to 24 in. of clean dirt. The area was downposted from an SCA to URM.	Process cooling water/steam condensate/ contaminated soil	Liquid	Unk.	Unk.
207-U	Inactive	Retention Basin	207-U, 207-U Retention Basin	T Plant Area	Retention Basin	N	N	0	30261.0	246.0	123.0	6.5	0-8	Interim stabilization consisted of consolidating (scraping and moving) some of the contaminated soil on the east side of the basin with the soil closer to the basin perimeter. Prior to interim stabilization of the 207-U Basin, the perimeter area of the basin was posted as a CA. One area in the southwest corner was posted as URM for unknown reasons. As part of the same stabilization effort and to prepare the area for stabilization, the area was policed and small pieces of debris, old signs, and other waste materials were picked up, and the old signs referring to UO3 Plant were removed. Most of the polyvinyl chloride and rubber pipe and fittings were surveyed and removed from the area. The wood and smaller nonreleasable debris were placed into a burial box for disposal. The abandoned power poles and wire were verified as not energized, were taken down, surveyed, and removed from the area. Nine soil samples were collected from the scraped area (the area that was downposted, and not from the other areas of the project) and analyzed. Based on the sample results and a surface radiological survey, the scraped area was released from radiological control. The contaminated soil was covered with clean dirt and reposted as a URM. The interior of the basin remains posted as a CA. The stabilized area has been revegetated with wheatgrass. GPS was performed to record the new site boundaries and posting.	Chemical sewer waste/cooling water/ stormwater runoff	Liquid	Unk.	Unk.

Table B-1. Waste Site Attributes.

Waste Site Code	Current Status	Waste Site Type	Waste Site Name	Facility Area	Physical Setting	Back-fill (Y/N)	Surface Cover Present (Y/N)	Surface Cover Thickness (ft)	Site Area (ft^2)	Site Length (ft)	Site Width (ft)	Site Depth (ft)	Potential Cont. Interval (ft)	Prior Cleanup Activities	Release Mechanism	Release Type (Solid and/or Liquid)	Potential Constituents	
																	Radioactive	Nonradioactive
207-Z	Inactive	Retention Basin	207-Z, 207-Z Retention Basin, 241-Z Retention Basin, 241-Z-RB	PFP Area	Retention Basin	Y	N	0	2000.0	50.0	40.0	10.0	0-15 (spotty)	Concrete basin filled with high-density grout.	Steam condensate/ cooling water	Liquid	Unk.	Unk.
216-S-12	Inactive	Trench	216-S-12, UPR-200-W-30, 291-S Stack Wash Sump, REDOX Stack Flush Trench	REDOX Area	Trench	Y	N	0	1800.0	90.0	20.0	10.0	10-15	The site was deactivated by removing the temporary above-ground piping and backfilling the trench.	Flush water	Liquid	5 curies of beta particle emitters and 2-3 curies of gamma emitters, that were predominantly ruthenium and zirconium-niobium. Co-60, Sr-90, Cs-137, Pu-239/240, U-238 in May 1987.	600 kg ammonium nitrate
216-S-18	Inactive	Trench	216-S-18, 241-SX Steam Cleaning Pit, 216-S-14 Steam Cleaning Pit	S/U Farm Area	Trench	Y	Y	1-2	2000.0	125.0	16.0	6.0	0-15	The area has been surface stabilized. Contaminated soil was covered with 1.83 m of clean backfill and posted URM.	Steam condensate/ contaminated soil	Solid and liquid	Unk.	Unk.
216-T-10	Inactive	Trench	216-T-10, Decontamination Trenches, Equipment Decontamination Area	T Plant Area	Trench	Y	N	0	500.0	50.0	10.0	7.0	7-10	In May 1972, the site was exhumed. All contamination (max 3000 cpm) was removed. All contamination (maximum 3000 cpm) was taken to the 200 West Area Dry Waste Burial Ground. The 216-T-9, 216-T-10 and 216-T-11 Trenches were then released from radiation zone status.	Vehicle decontamination waste	Liquid	Unk.	Unk.
216-T-11	Inactive	Trench	216-T-11, Decontamination Trenches, Equipment Decontamination Area	T Plant Area	Trench	Y	N	0	500.0	50.0	10.0	7.0	7-10	In May 1972, the site was exhumed. All contamination (maximum 3000 cpm) was taken to the 200 West Area Dry Waste Burial Ground. The 216-T-9, 216-T-10 and 216-T-11 Trenches were then released from radiation zone status.	Vehicle decontamination waste	Liquid	Unk.	Unk.
216-T-12	Inactive	Trench	216-T-12, 207-T Sludge Grave, 207-T Sludge Pit, 216-T-11	T Farm Area	Trench	Y	N	0	150.0	15.0	10.0	8.0	0-15	Site was backfilled with clean soil and posted with "URM" sign. The 207-T Retention Basin was backfilled with dirt in 1996. The basin and the area surrounding the basin (where 216-T-12 was located) has been covered with clean dirt and posted with URM signs.	Contaminated sludge	Solid and liquid	Up to 0.015 rad/h in 1954.	Unk.
216-T-13	Inactive	Trench	216-T-13, 269-W Regulated Garage, 269-W Decontamination Pit or Trench, 216-T-12, 269-W Regulated Garage Decontamination Pit	T Farm Area	Trench	Y	N	0	400.0	20.0	20.0	10.0	10-11	The site was radioactive, but was excavated in April 1972. Approximately 3.06 m^3 (4 yd^3) of soil was found to be contaminated with levels of 1500 cpm. The contaminated soil was removed and taken to the 200 West Area Dry Waste Burial Ground. The site was then removed from radiological control. Two characterization test pits were dug, to a depth of approximately 25 ft in April 2005.	Vehicle decontamination waste	Liquid	None	None

Table B-1. Waste Site Attributes.

Waste Site Code	Current Status	Waste Site Type	Waste Site Name	Facility Area	Physical Setting	Back-fill (Y/N)	Surface Cover Present (Y/N)	Surface Cover Thickness (ft)	Site Area (ft^2)	Site Length (ft)	Site Width (ft)	Site Depth (ft)	Potential Cont. Interval (ft)	Prior Cleanup Activities	Release Mechanism	Release Type (Solid and/or Liquid)	Potential Constituents	
																	Radioactive	Nonradioactive
216-T-9	Inactive	Trench	216-T-9, Decontamination Trenches, Equipment Decontamination Area	T Plant Area	Trench	Y	N	0	500.0	50.0	10.0	7.0	7-10	In May 1972, the site was exhumed. All contamination (maximum 3000 cpm) was taken to the 200 West Area Dry waste Burial Ground. The 216-T-9, 216-T-10 and 216-T-11 Trenches were then released from radiation zone status.	Vehicle decontamination waste	Liquid	None	Unk.
UPR-200-E-17	Inactive	Unplanned Release	UPR-200-E-17, Overflow at 216-A-22, UN-200-E-17	PUREX Area	Crib	N	Y	1-2	Unk,	Irr.	Irr.	Unk.	2-6	In 1959, the area was covered with dirt. It was not separately marked because it was located within the 203-A chained radiation zone.	Leak/spill	Liquid	Unk.	460,000 L uranyl nitrate hexahydrate
UPR-200-E-9	Inactive	Unplanned Release	UPR-200-E-9, Liquid Overflow at 216-BY-201, UN-200-E-9	B Farm Area	Outlying Area	N	Y	1-2	Unk,	Irr.	Irr.	Unk.	0-3	In 1955, most of the contaminated soil was moved to a site south of 216-B-43 and covered with 0.6 m (2 ft) of clean soil. The contamination left near the flush tank was covered with 3 m (10 ft) of clean soil. Contamination scraped, then surveyed and released; a large Surface Contamination Area had been posted north of 241-BY Tank Farm (UPR-200-E-89). In 1991, it was scraped and the contaminated soil consolidated onto the 216-B-43 through 216-B-50 Cribs. The contamination was covered with clean dirt. The scraped areas were surveyed and released.	Leak/spill	Liquid	Unk.	Supernatant waste from the tributyl phosphate 41,600 L tributyl phosphate process waste (before cleanup)
UPR-200-W-103	Inactive	Unplanned Release	UPR-200-W-103, 216-Z-18 Line Break, UN-216-W-13, UN-200-W-103, Pipe Line Leak	PFP Area	Outlying Area	Y	N	0	150.0	25.0	6.0	7.0	7-15	An area measuring 7.6 m (25 ft) long, 1.8 m wide (6 ft), and 2.1 m (7 ft) was excavated around the line leak. Approximately one hundred 55-gal barrels of contaminated soil were removed and buried in the 200 West Area Plutonium "Storage for Recovery" Burial Ground. Gross alpha contamination in excess of 6 million dpm was identified. A considerable amount of contaminated soil still remained in the excavation after it was backfilled. The excavation was to 2.1 m depth, after it was backfilled. Contaminated soil still remains.	Pipeline release	Liquid	10 g of plutonium with gross alpha contamination in April 1979, greater than 6,000,000 dpm.	Unk.
UPR-200-W-111	Inactive	Unplanned Release	UPR-200-W-111, Sludge Trench at 207-U, UN-216-W-21	T Plant Area	Trench	N	Y	1-2	660.0	40.0	15.0	10.0	0-15	The site was surface stabilized in 1997.	Dumping area	Solid	Unk.	Unk.
UPR-200-W-112	Inactive	Unplanned Release	UPR-200-W-112, Sludge Trench at 207-U, UN-216-W-22	T Plant Area	Retention Basin	N	Y	1-2	600.0	40.0	15.0	10.0	0-15	The site was surface stabilized in 1997.	Dumping area	Solid	Unk.	Unk.

NOTE: "Backfill" is defined as soil being replaced inside a waste site to refill it to grade, however, this action is not associated with construction (e.g., cribs being backfilled with gravel) of the waste site.
"Surface Cover Present" is defined as soils that were added to a waste site above grade. The column entitled "Surface Cover Thickness" is used only when a "Y" appears in the column entitled "Surface Cover Present."

BHI = Bechtel Hanford, Inc.
CA = contaminated area.
Cont. = contaminant.
cpm = counts per minute.
DOE-RL = U.S. Department of Energy, Richland Operations Office.
dpm = disintegrations per minute.
GEA = gamma energy analysis.
GPS = Global Positioning System.
HEPA = high-efficiency particulate air.
PFP = Plutonium Finishing Plant.
PUREX = Plutonium-Uranium Extraction (Plant or process).
REDOX = Reduction-Oxidation (Plant or process).
SCA = surface contaminated area.
UNH = uranyl nitrate hexahydrate.
Unk. = unknown.
URM = underground radioactive material.
VCP = vitrified clay pipe.
WHC = Westinghouse Hanford Company.
WIDS = Waste Information Data System.

APPENDIX C

PRESENT-WORTH COST SUMMARY

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APPENDIX C

PRESENT-WORTH COST SUMMARY

This appendix contains the present-worth cost summary generated from SGW-38475, *Cost Estimate for the 200-MG-2 Operable Unit Engineering Evaluation/Cost Analysis Removal Actions.* Table C-1 provides the nondiscounted costs and total present-worth costs for the preferred alternatives (discussed in Chapter 4.0) for each waste site.

REFERENCE

SGW-38475, 2008, *Cost Estimate for the 200-MG-2 Operable Unit Engineering Evaluation/ Cost Analysis Removal Actions*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

Table C-1. Present-Worth Cost Summary.

Waste Site Code	Site Type	No Action	RTD		CS/NFA	
			Nondiscounted Cost	Total Present-Worth Cost	Nondiscounted Cost	Total Present-Worth Cost
200-E-4	French Drain	$0	$393,301	$393,301	$180,118	$179,554
200-E-25	French Drain	$0	$401,251	$401,251	$180,118	$179,554
207-A NORTH	Retention Basin	$0	$1,710,839	$1,710,839	$180,118	$179,554
207-S	Retention Basin	$0	$1,227,169	$1,227,169	$318,877	$318,051
207-T	Retention Basin	$0	$2,616,681	$2,616,681	$430,272	$429,196
207-U	Retention Basin	$0	$2,616,681	$2,616,681	$430,272	$429,196
207-Z	Retention Basin	$0	$856,926	$856,926	$180,118	$179,554
209-E-WS-2	French Drain	$0	$185,599	$185,599	$168,530	$167,966
216-A-41	Crib	$0	$429,790	$429,790	$180,118	$179,554
216-B-51	French Drain	$0	$469,235	$469,235	$180,118	$179,554
216-C-4	Crib with Pipe	$0	$585,245	$585,245	$180,118	$179,554
216-S-12	Trench	$0	$526,908	$526,908	$180,118	$179,554
216-S-18	Trench	$0	$643,672	$643,672	$180,118	$179,554
216-S-25	Crib	$0	$2,888,231	$2,888,231	$180,118	$179,554
216-SX-2	Crib	$0	$519,083	$519,083	$180,118	$179,554
216-T-1	Ditch with Pipe	$0	$1,326,303	$1,326,303	$180,118	$179,554
216-T-4-1D	Ditch	$0	$1,606,700	$1,606,700	$180,118	$179,554
216-T-4-2	Ditch	$0	$2,784,112	$2,784,112	$180,118	$179,554
216-T-9	Trench	$0	$407,669	$407,669	$168,530	$167,966
216-T-10	Trench	$0	$407,669	$407,669	$168,530	$167,966
216-T-11	Trench	$0	$407,669	$407,669	$168,530	$167,966
216-T-12	Trench	$0	$413,027	$413,027	$180,118	$179,554
216-T-13	Trench	$0	$391,923	$391,923	$180,118	$179,554
216-T-33	Crib	$0	$469,787	$469,787	$180,118	$179,554
216-U-3	French Drain	$0	$395,850	$395,850	$180,118	$179,554
216-U-14	Ditch	$0	$6,006,623	$6,006,623	$718,849	$717,432

Table C-1. Present-Worth Cost Summary.

Waste Site Code	Site Type	No Action	RTD		CS/NFA	
			Nondiscounted Cost	Total Present-Worth Cost	Nondiscounted Cost	Total Present-Worth Cost
216-Z-13	French Drain	$0	$414,667	$414,667	$180,118	$179,554
216-Z-14	French Drain	$0	$414,667	$414,667	$180,118	$179,554
2704-C-WS-1	French Drain	$0	$404,859	$404,859	$180,118	$179,554
UPR-200-E-9	Unplanned Release	$0	$394,037	$394,037	$180,118	$179,554
UPR-200-E-17	Unplanned Release	$0	$191,646	$191,646	$168,530	$167,966
UPR-200-W-103	Unplanned Release	$0	$411,226	$411,226	$180,118	$179,554
UPR-200-W-111	Unplanned Release	$0	$500,709	$500,709	$180,118	$179,554
UPR-200-W-112	Unplanned Release	$0	$500,709	$500,709	$180,118	$179,554

CS/NFA = confirmatory sampling/no further action.
RTD = removal, treatment, and disposal.

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APPENDIX D

POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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CONTENTS

TABLES

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APPENDIX D

POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

D1.0 IDENTIFICATION OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE 200-MG-2 OPERABLE UNIT

This appendix identifies and evaluates the key potential applicable or relevant and appropriate requirements (ARAR) for the 200-MG-2 Operable Unit's (OU's) removal action.

D1.1 COMPLIANCE WITH ARARs

For a site where material will remain on-site after completion of a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) action, the level or standard of control that must be met for the hazardous substance, pollutant, or contaminant is at least that of any applicable or relevant and appropriate standard, requirement, criteria, or limitation under any federal environmental law, or any more stringent standard, requirement, criteria, or limitation promulgated pursuant to a state environmental statute. An applicable requirement is one with which a private party must comply by law if the same action was being conducted independent of CERCLA authority. All jurisdictional prerequisites of the requirement must be met for the requirement to be applicable. A relevant and appropriate requirement may omit one or more jurisdictional prerequisites for applicability but still be suitable for the site, depending on the circumstances and history of the site.

Response actions conducted onsite are required to comply with the substantive aspects of ARARs to the extent practicable, not with corresponding administrative requirements (40 CFR 300.400[e], "Permit Requirements"). Permit applications and other administrative procedures (e.g., administrative reviews and reporting and recordkeeping requirements) are considered administrative for actions conducted entirely onsite.

For the considered removal action, implementation of any selected alternative will be designed to comply with the ARARs cited in this section to the extent practicable. ARARs are selected from promulgated environmental regulations that have been evaluated to determine whether they may be pertinent to the removal action. This appendix identifies the key ARARs for the proposed alternatives. ARARs, which will be followed during implementation of the selected removal action, will be documented in the CERCLA action memorandum. To-be-considered information consists of nonpromulgated advisories or guidance issued by federal or state governments that are not binding legally and do not have the status of potential ARARs. As appropriate, to-be-considered information should be considered while determining the removal action necessary for protection of human health and the environment.

Potential ARARs were evaluated to determine if they fall into one of three categories: chemical-specific, location-specific, or action-specific. These categories are defined as follows.

- Chemical-specific requirements are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of public- and worker-safety levels and site-cleanup levels.

- Location-specific requirements are restrictions placed on the concentration of dangerous substances or the conduct of activities because they occur in special geographic areas.
- Action-specific requirements are usually technology- or activity-based requirements or limitations triggered by the removal actions performed at the site.

Tables D-1 and D-2 present potential federal and state ARARs, respectively. The chemical-specific ARARs likely to be the most relevant to the removal action of the 200-MG-2 OUs are elements of the Washington State regulations that implement WAC 173-340, "Model Toxics Control Act -- Cleanup," specifically associated with developing risk-based concentrations for cleanup (WAC 173-340-745, "Soil Cleanup Standards for Industrial Properties"). The requirements of WAC 173-340-745 help establish soil cleanup standards for nonradioactive contaminants at waste sites. The state air emission standards are likely to be important in identifying air emission limits and control requirements for any removal actions that produce air emissions. *Resource Conservation and Recovery Act of 1976* (RCRA) land-disposal restrictions will be important standards to follow during the management of wastes generated during removal actions.

D1.2 WASTE MANAGEMENT STANDARDS

A variety of waste streams may be generated under the proposed removal action alternatives. It is anticipated that most of the waste will designate as low-level waste. However, quantities of dangerous or mixed waste, polychlorinated biphenyl (PCB)-contaminated waste, and asbestos and asbestos-containing material also could be generated. The great majority of the waste will be in a solid form. However, some aqueous solutions might be generated (e.g., liquid in railcars).

Radioactive waste is managed by the U.S. Department of Energy under the authority of the *Atomic Energy Act of 1954*.

The identification, storage, treatment, and disposal of hazardous waste and the hazardous component of mixed waste are governed by RCRA. The State of Washington, which implements RCRA requirements under WAC 173-303, "Dangerous Waste Regulations," has been authorized to implement most elements of the RCRA program. The dangerous waste standards for generation and storage would apply to the management of any dangerous or mixed waste generated at the 200-MG-2 OU waste sites. Treatment standards for dangerous or mixed waste subject to RCRA land disposal restrictions are specified in WAC 173-303-140, "Land Disposal Restrictions," which incorporates 40 CFR 268, "Land Disposal Restrictions," by reference.

The management and disposal of PCB wastes are governed by the *Toxic Substances Control Act of 1976* (TSCA), and regulations at 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions." The TSCA regulations contain specific provisions for PCB waste, including PCB waste that contains a radioactive component. PCBs also are considered underlying hazardous constituents under RCRA and thus could be subject to WAC 173-303 and 40 CFR 268 requirements.

Removal and disposal of asbestos and asbestos-containing material are regulated under the *Clean Air Act of 1990* and 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," Subpart M, "National Emission Standards for Asbestos." These regulations provide for special

precautions to prevent environmental releases or exposure to personnel of airborne emissions of asbestos fibers during removal actions.

Waste that is designated as low-level waste that meets Environmental Restoration Disposal Facility (ERDF) acceptance criteria is assumed to be disposed at the ERDF, which is engineered to meet appropriate performance standards. ERDF is considered to be onsite for management and/or disposal of waste from removal actions proposed in this document[1]. There is no requirement to obtain a permit to manage or dispose of CERCLA waste at the ERDF. It is expected that the great majority of the waste generated during the removal action proposed in this document can be disposed onsite at ERDF. In accordance with the ERDF record of decision (ROD) (EPA et al., 1996), authorization to dispose at ERDF of waste generated during this removal action will be granted with the issuance of the Action Memorandum resulting from this EE/CA and through EPA approval of the sampling and analysis plan. Waste that must be sent offsite will be sent to a facility that has been or could be approved by EPA in accordance with 40 CFR 300.440 for receiving CERCLA waste.

Waste designated as dangerous or mixed waste would be treated as appropriate to meet land disposal restrictions and ERDF acceptance criteria, and disposed at the ERDF. ERDF is an engineered facility that provides a high degree of protection to human health and the environment and meets RCRA minimum technical requirements for landfills, including standards for a double liner, a leachate collection system, leak detection, monitoring, and final cover. Construction and operation of ERDF was authorized using a separate CERCLA ROD (EPA et al., 1995). The *U.S. Department of Energy Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Differences* (ESD) (EPA et al., 1996) modified the ERDF ROD (EPA et al., 1995; 2002) to clarify the eligibility of waste generated during cleanup of the Hanford Site. Per the ESD, ERDF is eligible for disposal of any LLW, missed waste, and hazardous/dangerous waste generated as a result of cleanup actions (e.g., removal action waste and IDW), provided the waste meets ERDF waste acceptance criteria and appropriate CERCLA decision documents are in place.

Some of the aqueous waste designated as low-level waste, dangerous, or mixed waste would be transported to the Effluent Treatment Facility (ETF) for treatment and disposal with an approved offsite determination. Activities authorized at the Effluent Treatment Facility (a RCRA-permitted facility) include treatment of aqueous waste streams generated on the Hanford Site and the disposal of these streams at a designated state-approved land disposal facility in accordance with applicable requirements.

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[1] CERCLA Section 104(d)(4) states that, where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these facilities as one for the purpose of this section. The preamble to the "National Oil and Hazardous Substance Pollution Contingency Plan" (40 CFR 300) clarifies the stated EPA interpretation 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. Therefore, the ERDF is considered to be onsite for response purposes under this removal action. It should be noted that the scope of work covered in this removal action is for a facility and waste contaminated with hazardous substances. Materials encountered during implementation of the selected removal action that are not contaminated with hazardous substances will be dispositioned by DOE.

Waste designated as PCB remediation waste likely would be disposed at the ERDF, depending on whether it meets the waste acceptance criteria. PCB waste that does not meet ERDF waste acceptance criteria would be retained at a PCB storage area meeting the requirements for TSCA storage and would be transported for future disposal at an appropriate disposal facility.

Asbestos and asbestos-containing material would be removed, packaged as appropriate, and disposed in the ERDF.

CERCLA Section 104(d)(4) states that where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the facilities can be treated as one for CERCLA response actions. Consistent with this, the 200-MG-2 OU waste sites and the ERDF would be considered onsite for purposes of Section 104 of CERCLA, and waste may be transferred between the facilities without requiring a permit.

All alternatives can be performed in compliance with the waste management ARARs. Waste streams will be evaluated, designated, and managed in compliance with the ARAR requirements. Before disposal, waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

D1.3 STANDARDS CONTROLLING EMISSIONS TO THE ENVIRONMENT

The proposed removal action alternatives have the potential to generate both radioactive and toxic/criteria airborne emissions.

D1.3.1 Radiological Air Emissions

RCW 70.94, "Washington Clean Air Act," requires regulation of radioactive air pollutants. The state implementing regulation WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," sets standards that at a minimum meet the federal *Clean Air Act of 1990*, and under 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." The U.S. Environmental Protection Agency's partial delegation of the 40 CFR 61 authority to the State of Washington includes all substantive emissions monitoring, abatement, and reporting aspects of the federal regulation. The state standards protect the public by conservatively establishing exposure standards applicable to the maximally exposed public individual. Under WAC 246-247-030(15), "Definitions," the "maximally exposed individual" is any member of the public (real or hypothetical) who abides or resides in an unrestricted area, and may receive the highest total effective dose equivalent from the emission unit(s) under consideration, taking into account all exposure pathways affected by the radioactive air emissions. All combined radionuclide airborne emissions from the Site are not to exceed amounts that would cause an exposure to any member of the public of greater than 10 mrem/yr effective dose equivalent. The state implementing regulation WAC 246-247, "Radiation Protection – Air Emissions," which adopts the WAC 173-480 standards, and the 40 CFR 61, Subpart H standard, require verification of compliance with the 10 mrem/yr standard, and potentially would be applicable to the removal action.

WAC 246-247 further addresses sources emitting radioactive airborne emissions by requiring monitoring of such sources. Such monitoring requires physical measurement (i.e., sampling) of the effluent or ambient air. The substantive provisions of WAC 246-247 requiring the monitoring of radioactive airborne emissions potentially are applicable to the removal action.

The above state implementing regulations further address control of radioactive airborne emissions where economically and technologically feasible (WAC 246-247-040[3] and -040[4], "General Standards," and associated definitions). To address the substantive aspect of these potential requirements, best or reasonably achieved control technology could be addressed by ensuring that applicable emission control technologies (those successfully operated in similar applications) would be used when economically and technologically feasible (i.e., based on cost/benefit). If the ARARs are finalized and it is determined that there are substantive aspects of the requirement for control of radioactive airborne emissions, then controls will be administered as appropriate using the best methods.

D1.3.2 Criteria/Toxic Air Emissions

Under WAC 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," requirements are established for the regulation of emissions of criteria/toxic air pollutants. The primary nonradioactive emissions resulting from this removal action will be fugitive particulate matter. In accordance with WAC 173-400-040, "General Standards for Maximum Emissions," reasonable precautions must be taken to (1) prevent the release of air contaminants associated with fugitive emissions resulting from excavation, materials handling, or other operations and (2) prevent fugitive dust from becoming airborne from fugitive sources of emissions. The use of treatment technologies that would result in emissions of toxic air pollutants subject to the substantive applicable requirements of WAC 173-460 are not anticipated to be a part of this removal action. Treatment of some waste encountered during the removal action may be required to meet ERDF waste acceptance criteria. In most cases, the type of treatment anticipated would consist of solidification/stabilization techniques such as macroencapsulation or grouting, and WAC 173-460 would not be considered an ARAR. If more aggressive treatment is required and results in the emission of regulated air pollutants, the substantive requirements of WAC 173-400-113(2), "Requirements for New Sources in Attainment or Unclassifiable Areas," and WAC 173-460-060, "Control Technology Requirements," would be evaluated to determine applicability.

Emissions to the air will be minimized during implementation of the removal action through use of standard industry practices such as the application of water sprays and fixatives. These techniques are considered to be reasonable precautions to control fugitive emissions, as required by the regulatory standards.

Table D-1. Identification of Potential Federal ARARs for the Removal Action.

	Requirement	Rationale for Use
National Archaeological and Historic Preservation Act of 1976, 16 USC 469aa-mm	Requires that removal actions at the 200 North Area do 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 site.	Archeological and historic sites have been identified within the 100 and 200 Areas; therefore, the substantive requirements of this act are potentially applicable to actions that might disturb these sites. This requirement is location-specific.
National Historic Preservation Act of 1966, 16 USC 470, Section 106	Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation and mitigation processes, and consultation with interested parties.	Cultural and historic sites have been identified within the 100 and 200 Areas; therefore, the substantive requirements of this act are potentially applicable to actions that might disturb these types of sites. This requirement is location-specific.
Native American Graves Protection and Repatriation Act, 25 USC 3001, et seq.	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 potentially applicable if remains and sacred objects are found during removal action and will require Native American Tribal consultation in the event of discovery. This requirement is location-specific.
Endangered Species Act of 1973, 16 USC 1531 et seq, Subsection 16 USC 1536(c)	Prohibits actions by federal agencies that are likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification or critical habitat. If the removal action 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 potentially applicable if threatened or endangered species are identified in areas where removal actions will occur. This requirement is location-specific.
"Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," 40 CFR 761		
"Applicability," Specific Subsections: 40 CFR 761.50(b)(1) 40 CFR 761.50(b)(2) 40 CFR 761.50(b)(3) 40 CFR 761.50(b)(4) 40 CFR 761.50(b)(7) 40 CFR 761.50(c)	These regulations establish standards for the storage and disposal of PCB wastes.	The substantive requirements of these regulations are applicable to the storage and disposal of PCB wastes (e.g., liquids, items, remediation waste, and bulk product waste) at $\geq$50 ppm. The specific subsections identified from 40 CFR 761.50(b) reference the specific sections for the management of PCB waste type. The disposal requirements for radioactive PCB waste are addressed in 40 CFR 761.50(b)(7). This is a chemical-specific requirement.

CFR = *Code of Federal Regulations.* USC = U.S. Code.

Table D-2. Identification of Potential State ARARs for the Removal Action.

ARAR Citation	Requirement	Rationale for Use
Regulations pursuant to the *Resource Conservation and Recovery Act of 1976* and implemented through WAC 173-303, "Dangerous Waste Regulations"		
"Identifying Solid Waste," WAC 173-303-016	Identifies those materials that are and are not solid waste.	Substantive requirements of these regulations are potentially applicable because they define how to determine which materials are subject to the designation regulations. Specifically, materials that are generated for removal from the CERCLA site during the removal action potentially would be subject to the procedures for identifying solid waste to ensure proper management. This requirement is action-specific.
"Designation of Dangerous Waste," "Designation Procedures," WAC 173-303-070(3)	Establishes the method for determining whether a solid waste is or is not a dangerous waste or an extremely hazardous waste.	Substantive requirements of these regulations are potentially applicable to materials encountered during the removal action. Specifically, solid waste generated for removal from the CERCLA site during this removal action potentially would be subject to the dangerous waste designation procedures to ensure proper management. This requirement is action-specific.
"Excluded Categories of Waste," WAC 173-303-071	Describes those waste categories that are excluded from the requirements of WAC 173-303 (excluding WAC 173-303-050).	The conditions of this requirement are potentially applicable to removal actions in the 200-MG-2 OU, should wastes identified in WAC 173-303-071 be encountered. This requirement is action-specific.
"Conditional Exclusion of Special Wastes," WAC 173-303-073	Establishes the conditional exclusion and the management requirements of special waste, as defined in WAC 173-303-040.	Substantive requirements of these regulations are potentially applicable to materials encountered during the removal action. Specifically, the substantive standards for management of special waste are potentially applicable to the interim management of certain waste that will be generated during the removal action. This requirement is action-specific.
"Requirements for Universal Waste," WAC 173-303-077	Identifies waste exempted from regulation under WAC 173-303-140 and WAC 173-303-170 through 173-303-9907 (excluding WAC 173-303-960). This waste is subject to regulation under WAC 173-303-573.	Substantive requirements of these regulations are potentially applicable to materials encountered during the removal action. Specifically, the substantive standards for management of universal waste are potentially applicable to the interim management of certain waste that will be generated during the removal action. This requirement is action-specific.
"Land Disposal Restrictions and Prohibitions," WAC 173-303-140(4)	This regulation establishes state standards for land disposal of dangerous waste and incorporates by reference the federal land disposal restrictions of 40 CFR 268 that are applicable to solid waste designated as dangerous or mixed waste in accordance with WAC 173-303-070(3).	The substantive requirements of this regulation are potentially applicable to materials encountered during the removal action. Specifically, dangerous and/or mixed waste generated and removed from the CERCLA site during the removal action for offsite (as defined by CERCLA) land disposal potentially would be subject to the identification of applicable land-disposal restrictions at the point of waste generation. The actual offsite treatment of such waste would not be ARAR to this removal action, but potentially would be subject to all applicable laws and regulations. This requirement is action-specific.

Table D-2. Identification of Potential State ARARs for the Removal Action.

ARAR Citation	Requirement	Rationale for Use
"Requirements for Generators of Dangerous Waste," WAC 173-303-170	Establishes the requirements for dangerous waste generators.	Substantive requirements of these regulations are potentially applicable to materials encountered during the removal action. Specifically, the substantive standards for management of dangerous and/or mixed waste are potentially applicable to the interim management of certain waste that will be generated during the removal action. For this removal action, 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.
"Corrective action, Requirements," WAC 173-303-64620(4)(a-g)	Established the requirements to meet RCRA corrective action.	Substantive requirements of these regulations are potentially applicable to show consistency between the removal action and RCRA corrective action requirements. This requirement is action and location-specific.
"Model Toxics Control Act -- Cleanup," WAC 173-340		
"Soil Cleanup Standards for Industrial Properties," WAC 173-340-745(5)(b) "Terrestrial Ecological Evaluation Procedures," WAC 173-340-7490 "Tables," WAC 173-340-900, Table 749-3	Establishes the process and methods used to evaluate risk and to develop cleanup standards for soil and other environmental media.	The substantive requirements of the specified subsections are ARARs to developing cleanup standards for the selected removal action for the 200-MG-2 OU. This is a chemical-specific requirement.
"General Regulations for Air Pollution Sources," WAC 173-400		
"Washington Clean Air Act," RCW 70.94 and State Government – Executive," "Department of Ecology," RCW 43.21A "General Regulations for Air Pollution – Sources," WAC 173-400 Specific subsection: WAC 173-400-040	Requires 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 reasonably available control technology. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Substantive requirements of the general standards for control of fugitive emissions are potentially applicable to removal actions at the site because of the generation of fugitive dust that occurs during excavation or other types of construction activities. These requirements are action-specific.

Table D-2. Identification of Potential State ARARs for the Removal Action.

ARAR Citation	Requirement	Rationale for Use
Specific subsections: WAC 173-400-050, "Emission Standards for Combustion and Incineration Units" WAC 173-400-060, "Emission Standards for General Process Units" WAC 173-400-070, "Emission Standards for Certain Source Categories" WAC 173-400-075, "Emission Standards for Sources Emitting Hazardous Air Pollutants"	Requires specifically identified types of emission sources to meet standards beyond the general emission standards imposed by WAC 173-400-040. Incorporates the applicable federal requirements from 40 CFR 60 and 40 CFR 63. Requires use of either reasonably available control technology, best available control technology, or maximum achievable control technology, depending on the specific type of emission source. This state regulation is as (or more) stringent than the equivalent federal program requirement.	The selected alternative may include or result in one or more defined types of emission sources that would need to be controlled in accordance with these requirements. These requirements are action-specific.
Specific subsection: WAC 173-400-113	Incorporates by reference the applicable federal requirements from 40 CFR 60 (new source performance standards), 40 CFR 61 (national emission standards for hazardous air pollutants), and 40 CFR 63 (minimum available control technology). Requires controls to minimize the release of air contaminants from new or modified sources of regulated criteria and toxic air emissions. Emissions are to be minimized through application of best available control technology. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Substantive requirements of this regulation potentially would be applicable to removal actions performed at the site if a treatment technology that emits regulated air emissions were necessary during the implementation of the removal action. This requirement is action-specific.
"Controls for New Sources of Toxic Air Pollutants," WAC 173-460		
"Controls for New Sources of Toxic Air Pollutants," WAC 173-460 Specific subsections: WAC 173-460-030 WAC 173-460-060 WAC 173-460-070 WAC 173-460-080 WAC 173-460-150 WAC 173-460-160	Requires best available control technology for regulated emissions of toxic air pollutants and demonstration that emissions of toxic air pollutants will not endanger human health or safety. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Substantive requirements of these regulations potentially would be applicable to removal actions performed at the site, if a treatment technology that emits toxic air emissions were necessary during the implementation of the removal action. These requirements are action-specific.

Table D-2. Identification of Potential State ARARs for the Removal Action.

ARAR Citation	Requirement	Rationale for Use
"Asbestos," Benton Clean Air Agency, Regulation 1, Article 8		
Section 8.02, "CFR Adoption by Reference"; Section 8.03, "General Requirements"	Incorporates the federal requirements of 40 CFR 61, Subpart M. Requires established controls and work practices for managing and disposing regulated asbestos-containing material.	The removal action may include the removal or disturbance of regulated asbestos containing material that must be conducted in accordance with the applicable requirements and work practices. This requirement is action-specific.
"Radiation Protection -- Air Emissions," WAC 246-247		
"Radiation Protection -- Air Emissions," WAC 246-247-035(1)(a)(ii)	Establishes requirements equivalent to 40 CFR 61, Subpart H, by reference. Radionuclide airborne emissions from the waste site shall be controlled so as not to exceed amounts that would cause an exposure to any member of the public of greater than 10 mrem/yr effective dose equivalent. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Substantive requirements of this standard are potentially applicable because this removal action may include activities such as excavation, demolition, decontamination, and stabilization of contaminated areas and equipment, each of which may provide airborne emissions of radioactive particulates to unrestricted areas. As a result, requirements limiting emissions potentially apply. This is a risk-based standard for the purposes of protecting human health and the environment. This requirement is action-specific.
"Radiation Protection -- Air Emissions" "Standards," WAC 246-247-040(3) WAC 246-247-040(4)	Emissions shall be controlled to ensure that emission standards are not exceeded. Actions creating new sources or significantly modified sources shall apply best available controls. All other actions shall apply reasonably achievable controls. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Substantive requirements of this standard are potentially applicable because fugitive, diffuse, and point source emissions of radionuclides to the ambient air may result from activities, such as demolition and excavation of contaminated soils and operation of exhausters and vacuums, performed during the removal action. This standard ensures compliance with emission standards. These requirements are action-specific.

Table D-2. Identification of Potential State ARARs for the Removal Action.

ARAR Citation	Requirement	Rationale for Use
"Monitoring, Testing, and Quality Assurance, "WAC 246-247-075(1), –(2), and –(4)	Establishes the monitoring, testing, and quality assurance requirements for radioactive air emissions from major sources. Effluent flow rate measurements shall be made and the effluent stream shall be directly monitored continuously with an in-line detector or representative samples of the effluent stream shall be withdrawn continuously from the sampling site following the specified guidance. The requirements for continuous sampling are applicable to batch processes when the unit is in operation. Periodic sampling (grab samples) may be used only with lead agency prior approval. Such approval may be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. In such cases, grab samples shall be collected with sufficient frequency to provide a representative sample of the emissions. When it is impractical to measure the effluent flow rate at a source in accordance with the requirements or to monitor or sample an effluent stream at a source in accordance with the site selection and sample extraction requirements, the waste site owner or operator may use alternative effluent flow rate measurement procedures or site selection and sample extraction procedures as approved by the lead agency. This state regulation is as (or more) stringent than the equivalent federal program requirement. Emissions from nonpoint and fugitive sources of airborne radioactive material shall be measured. Measurement techniques may include, but are not limited to sampling, calculation, smears, or other reasonable method for identifying emissions as determined by the lead agency.	Substantive requirements of this standard are potentially applicable because fugitive and nonpoint source emissions of radionuclides to the ambient air may result from activities, such as demolition and excavation of contaminated soils and operation of exhausters and vacuums, performed during the removal action. This standard ensures compliance with emission standards. These requirements are action-specific.
"Monitoring, Testing, and Quality Assurance," WAC 246-247-075(3)	Methods to implement periodic confirmatory monitoring for minor sources may include estimating the emissions or other methods as approved by the lead agency. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Fugitive and diffuse emissions from the demolition and excavation and related activities potentially will require periodic confirmatory measurements to verify low emissions. This requirement is action-specific.

Table D-2. Identification of Potential State ARARs for the Removal Action.

ARAR Citation	Requirement	Rationale for Use
"Monitoring, Testing, and Quality Assurance," WAC 246-247-075(8)	Site emissions resulting from nonpoint and fugitive sources of airborne radioactive material shall be measured. Measurement techniques may include ambient air measurements, or in-line radiation detector or withdrawal of representative samples from the effluent stream, or other methods as determined by the lead agency. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Fugitive and diffuse emissions of airborne radioactive material from demolition, excavation, and related activities potentially will require measurement. This requirement is action-specific.
"General Standards," WAC 246-247-040(4)	At a minimum, all emission units shall make every reasonable effort to maintain radioactive materials in effluents to unrestricted areas, ALARA. Control equipment of sites operating under ALARA shall be defined as reasonably available control technology and ALARA control technology. This state regulation is as (or more) stringent than the equivalent federal program requirement.	The potential for fugitive and diffuse emissions from demolition, excavation, and related activities potentially will require efforts to minimize those emissions. This requirement is action-specific.
"Ambient Air Quality Standards and Emission Limits for Radionuclides," WAC-173-480		
"General Standards for Maximum Permissible Emissions," WAC 173-480-050(1)	At a minimum, all emission units shall make every reasonable effort to maintain radioactive materials in effluents to unrestricted areas, ALARA. Control equipment of sites operating under ALARA shall be defined as reasonably available control technology and as low as reasonably achievable control technology. This state regulation is as (or more) stringent than the equivalent federal program requirement.	The potential for fugitive and diffuse emissions from demolition, excavation, and related activities potentially will require efforts to minimize those emissions. This requirement is action-specific.
"Emission Monitoring and Compliance Procedures," WAC 173-480-070-(2)	Determine compliance with the public dose standard by calculating exposure at the point of maximum annual air concentration in an unrestricted area where any member of the public may be. This state regulation is as (or more) stringent than the equivalent federal program requirement.	Fugitive and diffuse emissions from demolition, excavation, and related activities potentially will require assessment and reporting. This requirement is action-specific.

ALARA = as low as reasonably achievable.
CFR = *Code of Federal Regulations.*
WAC = *Washington Administrative Code.*

D2.0 REFERENCES

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations*.

- 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities."
- 40 CFR 61, Subpart M, "National Emission Standards for Asbestos."

40 CFR 63, "National Emission Standards for Hazardous Air Pollutants for Source Categories," *Code of Federal Regulation*.

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*.

40 CFR 300.400, "Permit Requirements," *Code of Federal Regulations*.

40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," *Code of Federal Regulations*.

- 40 CFR 761.50(b), "Applicability," "PCB Waste."
- 40 CFR 761.50(c), "Applicability," "Storage for Disposal."

Atomic Energy Act of 1954, 42 USC 2011, et seq.

Benton Clean Air Authority, 2005, Regulation 1, Article 8, Benton County, Washington.

Clean Air Act of 1990, 42 USC 7401, et seq., Pub. L. 101-549.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.

Endangered Species Act of 1973, 16 USC 1531, et seq.

National Archaeological and Historic Preservation Act of 1976, 16 USC 469aa-mm, et seq.

National Historic Preservation Act of 1966, 16 USC 470, et seq.

Native American Graves Protection and Repatriation Act, 25 USC 3001, et seq.

RCW 43.21A, "State Government – Executive," "Department of Ecology," *Revised Code of Washington*, Washington State, Olympia, Washington.

RCW 70.94, "Washington Clean Air Act," *Revised Code of Washington*, Olympia, Washington.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

Toxic Substances Control Act of 1976, 15 USC 2601, et seq.

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

- 173-303-016, "Identifying Solid Waste."
- 173-303-040, "Definitions."
- 173-303-050, "Department of Ecology Cleanup Authority."
- 173-303-070(3), "Designation of Dangerous Waste," "Designation Procedures."
- 173-303-071, "Excluded Categories of Waste."
- 173-303-073, "Conditional Exclusion of Special Wastes."
- 173-303-077, "Requirements for Universal Waste."
- 173-303-140, "Land Disposal Restrictions."

- 173-303-140(4), "Land Disposal Restrictions and Prohibitions."
- 173-303-170, "Requirements for Generators of Dangerous Waste."
- 173-303-200, "Accumulating Dangerous Waste On-Site."
- 173-303-573, "Standards for Universal Waste Management."
- 173-303-64620, "Corrective action," "Requirements."
- 173-303-665, "Landfills."
- 173-303-960, "Special Powers and Authorities of the Department."

WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code*, Olympia, Washington.

- 173-340-745, "Soil Cleanup Standards for Industrial Properties."
- 173-340-745(5)(b), "Standard Method C Industrial Soil Cleanup Levels."
- 173-340-900, "Tables."
- 173-340-7490, "Terrestrial Ecological Evaluation Procedures."

WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, Olympia, Washington.

- 173-400-040, "General Standards for Maximum Emissions."
- 173-400-050, "Emission Standards for Combustion and Incineration Units."
- 173-400-060, "Emission Standards for General Process Units."
- 173-400-070, "Emission Standards for Certain Source Categories."
- 173-400-075, "Emission Standards for Sources Emitting Hazardous Air Pollutants."
- 173-400-113, "Requirements for New Sources in Attainment or Unclassifiable Areas."

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, Olympia, Washington.

- 173-460-030, "Requirements, Applicability and Exemptions."
- 173-460-060, "Control Technology Requirements."
- 173-460-070, "Ambient Impact Requirement."
- 173-460-080, "Demonstrating Ambient Impact Compliance."
- 173-460-150, "Class A Toxic Air Pollutants."
- 173-460-160, "Class B Toxic Air Pollutants."

WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, Olympia, Washington.

- 246-247-030(15), "Definitions."
- 173-480-050, "Standards."
- 173-480-070, "Emission Monitoring and Compliance Procedures."

WAC 246-247, "Department of Health," "Radiation Protection - Air Emissions," *Washington Administrative Code*, Olympia, Washington.

- 246-247-040, "General Standards."
- 246-247-075, "Monitoring, Testing, and Quality Assurance."

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