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

11-AMCP-0246

SEP 29 2011

Mr. D. A. Faulk, Program Manager
Office of Environmental Cleanup
Hanford Project Office
U.S. Environmental Protection Agency
309 Bradley Boulevard, Suite 115
Richland, Washington 99352

Dear Mr. Faulk:

WASTE SITE RECLASSIFICATION FORMS (CONTROL NUMBERS 2011-079 AND 2011-080), AND RESPONSE ACTION REPORT FOR THE 200-MG-1 OPERABLE UNIT WASTE SITES 216-S-26 AND 200-W-148-PL, DOE/RL-2011-88, REVISION 0

This letter transmits signed copies of the Waste Site Reclassification Forms (Control Numbers 2011-079 and 2011-080), and the approved Response Action Report for the 200-MG-1 Operable Unit Waste Sites 216-S-26 and 200-W-148-PL, DOE/RL-2011-88, Revision 0.

If you have any questions, please contact me, or your staff may contact, Al Farabee, of my staff, on (509) 376-8089.

Sincerely,

Jonathan A. Dowell, Assistant Manager
for the Central Plateau

AMCP:PGE

Attachments

cc: See Page 2

cc w/attachs:
G. Bohnee, NPT
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L. C. Buelow, EPA
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S. L. Leckband, HAB
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WASTE SITE RECLASSIFICATION FORM

Date Submitted: 09/21/2011	Operable Unit(s): 200-MG-1	Control Number: 2011-079
Originator: N. Chandran	Waste Site Code: 216-S-26	
Phone: 373-4716	Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	

This form documents agreement among parties listed authorizing classification of the subject unit as Closed Out, Interim Closed Out, No Action, RCRA Postclosure, Rejected, or Consolidated. This form also authorizes backfill of the waste management unit, if appropriate, for Closed Out and Interim Closed out units. Final removal from the NPL of No Action and Closed Out waste management units will occur at a future date.

Description of current waste site condition:
(Summarize status of investigation/remediation of the waste sites.)

The 216-S-26 waste site is described as a 128 m (420 ft) long, 3.1 m (10 ft) wide crib that was posted as an underground radioactive material area and was marked with cement posts and chains. A 15 cm (6 in) vitrified clay, perforated distribution pipe ran the length of the unit, 46 cm (18 in) above the bottom of the crib. Eight cm (4 in) of gravel covered a membrane barrier and the crib was covered with 2.9 m (9.5 ft) of soil. The site was part of the underground effluent discharge system of the 222-S complex. The selected alternative authorized by DOE/RL-2009-86, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit* (Action Memorandum) was removal, treatment, and disposal (RTD). Available historical information and process knowledge substantiated the implementation of the RTD alternative, in accordance with DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP). Following RTD, verification and characterization sampling was performed in accordance with DOE/RL-2009-60, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*, which demonstrated that soil remaining at the 216-S-26 waste site had achieved compliance with the RALs and corresponding removal action objectives (RAOs).

The results show that residual soil concentrations of COPCs less than or equal to the RALs supports a reclassification of the 216-S-26 waste site to interim closed out. The current site conditions achieve the RALs and the corresponding RAOs established in the RAWP (DOE/RL-2009-53). *The results of waste site sampling are used to make reclassification decisions for the 216-S-26 waste site in accordance with the TPA-MP-14* (DOE-RL 2007) process. Finalization of a backfill concurrence form provided to the agency(ies) constitutes concurrence that the waste site has achieved the established RAOs and thus backfill and/or contouring may occur at the 216-S-26 waste site with minimal risk. A Backfill Concurrence Form for the 216-S-26 has been approved by the regulatory agency(ies), and backfill at the waste site has been completed.

Basis for reclassification:
(For interim closeout, reference supporting documentation, as listed in Table 3.)

The current site conditions meet RALs and the corresponding RAOs specified in the Action Memorandum. The results show that the residual soil concentrations support reasonably anticipated future land uses recognized in DOE/RL-2008-44, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites*, and the Action Memorandum (DOE/RL-2009-86). The results also demonstrate that residual concentrations of COPCs in soil support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft] below ground surface) and that COPC concentrations remaining in the soil are protective of groundwater and the Columbia River. There is no deep zone for the 216-S-26 waste site therefore no institutional controls are required. The basis for reclassification to interim closed out is described in detail in DOE/RL-2011-88, *Response Action Report for 200-MG-1 Operable Unit Waste Sites 216-S-26 and 200-W-148-PL*, U.S. Department of Energy, Richland Operation Office, Richland, Washington.

Waste Site Controls:
Engineered Controls: Yes ☐ No ☒ Institutional Controls: Yes ☐ No ☒ O&M requirements: Yes ☐ No ☒
If any of the Waste Site Controls are checked Yes specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents.

O. A. Farabee	[signature]	9/21/11
DOE Federal Project Director (printed)	Signature	Date
D.R. Einan for L. Buelow	[signature]	9/21/11
EPA Project Manager (printed)	Signature	Date

WASTE SITE RECLASSIFICATION FORM

Date Submitted: 09/21/2011 Originator: N. Chandran Phone: 373-4716	Operable Unit(s): 200-MG-1 Waste Site Code: 200-W-148-PL Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2011-080

This form documents agreement among parties listed authorizing classification of the subject unit as Closed Out, Interim Closed Out, No Action, RCRA Postclosure, Rejected, or Consolidated. This form also authorizes backfill of the waste management unit, if appropriate, for Closed Out and Interim Closed out units. Final removal from the NPL of No Action and Closed Out waste management units will occur at a future date.

Description of current waste site condition:
(Summarize status of investigation/remediation of the waste sites.)

The 200-W-148-PL waste site is described in WIDS as a 15.2 cm (6 in) vitrified clay pipe that connects the west end of the 216-S-26 crib to pipeline 200-W-147-PL-A. The site was part of the underground effluent discharge system of the 222-S complex. The selected alternative authorized by DOE/RL-2009-86, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit* (Action Memorandum) via TPA-CN-350, *Tri-Party Agreement Change Notice Form: DOE/RL-2009-86 Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit, Rev. 0*, was removal, treatment, and disposal (RTD). Available historical information and process knowledge substantiated the implementation of the RTD alternative, in accordance with DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP). Following RTD, verification and characterization sampling was performed in accordance with DOE/RL-2009-60, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*, which demonstrated that soil remaining at the 200-W-148-PL waste site had achieved compliance with the RALs and corresponding removal action objectives (RAOs).

The results show that residual soil concentrations of COPCs less than or equal to the RALs supports a reclassification of the 200-W-148-PL waste site to interim closed out. The current site conditions achieve the RALs and the corresponding RAOs established in the RAWP (DOE/RL-2009-53). The results of waste site sampling are used to make reclassification decisions for the 200-W-148-PL waste site in accordance with the TPA-MP-14 (DOE-RL 2007) process. Finalization of a backfill concurrence form provided to the agency(ies) constitutes concurrence that the waste site has achieved the established RAOs and thus backfill and/or contouring may occur at the 200-W-148-PL waste site with minimal risk. A Backfill Concurrence Form for the 200-W-148-PL has been approved by the regulatory agency(ies), and backfill at the 200-W-148-PL waste site has been completed.

Basis for reclassification:
(For interim closeout, reference supporting documentation, as listed in Table 3.)

The current site conditions meet RALs and the corresponding RAOs specified in the Action Memorandum. The results show that the residual soil concentrations support reasonably anticipated future land uses recognized in DOE/RL-2008-44, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites*, and the Action Memorandum (DOE/RL-2009-86). The results also demonstrate that residual concentrations of COPCs in soil support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft] below ground surface) and that COPC concentrations remaining in the soil are protective of groundwater and the Columbia River. There is no deep zone for the 200-W-148-PL waste site therefore no institutional controls are required. The basis for reclassification to interim closed out is described in detail in DOE/RL-2011-88, *Response Action Report for 200-MG-1 Operable Unit Waste Sites 216-S-26 and 200-W-148-PL*, U.S. Department of Energy, Richland Operation Office, Richland, Washington.

Waste Site Controls:
Engineered Controls: Yes ☐ No ☒ Institutional Controls: Yes ☐ No ☒ O&M requirements: Yes ☐ No ☒
If any of the Waste Site Controls are checked Yes specify control requirements including reference to the Record of Decision, TSD Closure Letter, or other relevant documents.

O.A. Farabee DOE Federal Project Director (printed)	Signature	9/21/11 Date
D.R. Einan for L. Buelow EPA Project Manager (printed)	Signature	9/21/11 Date

DOE/RL-2011-88
Revision 0

Response Action Report for 200-MG-1 Operable Unit Waste Sites 216-S-26 and 200-W-148-PL

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

U.S. DEPARTMENT OF ENERGY

Richland Operations Office

P.O. Box 550
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

DOE/RL-2011-88
Revision 0

Response Action Report for 200-MG-1 Operable Unit Waste Sites 216-S-26 and 200-W-148-PL

Date Published
September 2011

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

U.S. DEPARTMENT OF ENERGY
Richland Operations Office

P.O. Box 550
Richland, Washington 99352

Release Approval Date 09/21/2011

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Further Dissemination Unlimited

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Approval Page

Title: *Response Action Report for 200-MG-1 Operable Unit Waste Sites 216-S-26 and 200-W-148-PL*

O. A. Farabee
U.S. Department of Energy, Richland Operations Office

Signature

9/21/11
Date

Executive Summary

This response action report documents the successful completion of the removal action conducted at the 216-S-26 and 200-W-148-PL waste sites, also known as the 216-S-19 Replacement Facility and the 216-S-26 Crib Pipeline, respectively. The alternative proposed for the 216-S-26 waste site in DOE/RL-2008-44, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites* (EE/CA)[1] and selected in DOE/RL-2009-86, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in 200-MG-1 Operable Unit*[2] (Action Memorandum) was removal, treatment, and disposal (RTD). The selected alternative of RTD proposed for the 200-W-148-PL waste site was selected in the Action Memorandum (DOE/RL-2009-86) via TPA-CN-350,[3] *Tri-Party Agreement Change Notice Form: DOE/RL-2009-86 Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit, Rev. 0.*

The available 216-S-26 and 200-W-148-PL waste site historical information and process knowledge was sufficient, per the provisions of the Action Memorandum (DOE/RL-2009-86), to proceed directly to implementation of the RTD alternative in accordance with DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit*[4] without requiring additional field observations or sampling to determine the nature and extent of contaminants of potential concern (COPCs) present in the waste site soils. Removal of soil to 4.6 m (15 ft) below ground surface, along with sampling conducted after RTD activities in accordance with DOE/RL-2009-60, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*[5], confirmed that the

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[1] DOE/RL-2008-44, 2009, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=0096350.

[2] DOE/RL-2009-86, 2010, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=0084449

[3] TPA-CN-350, 2010, *Tri-Party Agreement Change Notice Form: DOE/RL-2009-86, Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit, Rev. 0*, dated October 10, U.S. Department of Energy, Richland Operations Office, and Washington State Department of Ecology, Richland, Washington. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=1010270164.

[4] DOE/RL-2009-53, 2011, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=1010180132.

[5] DOE/RL-2009-60, 2011, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www5.hanford.gov/pdw/fsd/AR/FSD0001/FSD0064/0084054/11-AMCP-0080 - Letter [1102030315] - 1.pdf.

waste site achieved compliance with the established removal action objectives without further removal action.

The results show that the residual soil concentrations of COPCs support reasonably anticipated future land use described in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86). These results also support reclassification to "interim closed out" status in accordance with the process described in RL-TPA-90-0001, *Tri-Party Agreement Handbook Management Procedures*, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS)."[6]

This waste site and the data obtained from the subject sampling evolutions will be included in the risk assessment and the remedial investigation/feasibility study for final remedial decisions for the Outer Area.

[6] RL-TPA-90-0001, 2007, *Tri-Party Agreement Handbook Management Procedures*, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS)," Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/hanford/files/TPA-MP14.pdf.

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Terms

bgs	below ground surface
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COPC	contaminant of potential concern
DOE	U.S. Department of Energy
DQA	data quality assessment
Ecology	Washington State Department of Ecology
EE/CA	*Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites*
EPA	U.S. Environmental Protection Agency
HEIS	Hanford Environmental Information System
N/A	not available
NPL	National Priorities List
O&M	operations and maintenance
OU	operable unit
QA	quality assurance
QC	quality control
RAL	removal action level
RAO	removal action objective
RAWP	*Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit*
RCRA	*Resource Conservation and Recovery Act of 1976*
RDL	required detection limit
RESRAD	RESidual RADioactivity (dose model)
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RTD	removal, treatment, and disposal
RV	random verification

SAP	*Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*
SARA	*Superfund Amendments and Reauthorization Act of 1986*
TPH	total petroleum hydrocarbon
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
VSP™	Visual Sample Plan™
WIDS	Waste Information Data System

1 Introduction

This report documents the successful completion of a non-time-critical removal action conducted at the 216-S-26 and 200-W-148-PL waste sites. The removal action alternative of removal, treatment, and disposal (RTD) was selected for these waste sites, as proposed in DOE/RL-2008-44, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites* (EE/CA) and authorized by DOE/RL-2009-86, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit* (Action Memorandum) via TPA-CN-350, *Tri-Party Agreement Change Notice Form: DOE/RL-2009-86, Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit, Rev. 0* for 200-W-148-PL. Using the methodology prescribed in the Action Memorandum (DOE/RL-2009-86), waste site historical information and process knowledge substantiated the implementation of the RTD alternative. This report provides the basis for the successful completion of the RTD action performed at the 216-S-26 and 200-W-148-PL waste sites. This documentation has been prepared based on U.S. Environmental Protection Agency (EPA) guidance provided in EPA 540-R-98-016, *Close Out Procedures for National Priorities List Sites*.

This report provides a summary of the actions taken and resulting data to support a determination that, through performance of the RTD alternative, conditions remaining at the 216-S-26 and 200-W-148-PL waste sites have met the removal action objectives (RAOs) provided in the Action Memorandum (DOE/RL-2009-86). The documentation process is consistent with the U.S. Department of Energy (DOE) *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) *Remedial Action Site Closure Guidance* (DOE, 2010).

Statutory authority for the action taken is in accordance with CERCLA (as amended by the *Superfund Amendments and Reauthorization Act of 1986* [SARA]), Executive Order 12580, *Superfund Implementation,* the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989), also known as the Tri-Party Agreement, and 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan."

In August 2011, the non-time-critical removal action for the 216-S-26 and 200-W-148-PL waste sites was completed in accordance with DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP). This report provides the following information relative to the completion of the subject removal action:

- Background, historical information, regulatory enforcement history, and environmental setting pertinent to this removal action
- Descriptions of the selected alternative, RAOs, and exposure and land use assumptions provided in the related regulatory documents
- A summary of the completed actions, the resulting data collected in support of completion of that removal action, a comparison of that data against objectives, and demonstration that RAOs have been met.

1.1 Site Description

General information on the Hanford Site and the 200-MG-1 Operable Unit (OU), described in the following subsection, provides the background and development of the removal action for the 216-S-26 and 200-W-148-PL waste sites.

1.1.1 Hanford General Site Information

The Hanford Site, which is part of the DOE nuclear weapons complex, occupies approximately 1,517 km^2 (586 mi^2) along the Columbia River in Benton County, northwest of the City of Richland in the Lower Columbia Basin in southeastern Washington State (Figure 1-1). From the early 1940s to approximately 1989, the Hanford Site mission included building the world's first large-scale plutonium production facility and, until the 1980s, the site was used to produce plutonium for nuclear weapons. Other activities included nuclear research, development, and nuclear materials production. These activities created a wide variety of chemical and radioactive wastes that were released into the environment. The Hanford Site mission is now focused on the cleanup of those wastes and ultimate closure of the Hanford Site.

1.1.2 200-MG-1 Operable Unit

The Washington State Department of Ecology (Ecology), DOE, and EPA created the 200-MG-1 OU through the Tri-Party Agreement Milestone M-015-06-02 and Tri-Party Agreement Change Request C-06-02 (Ecology et al., 1989). The 200-MG-1 OU is made up of waste sites in the 200 East and 200 West Areas, and the 600 Area of the Hanford Site. The 600 Area encompasses those areas south of the Columbia River that are not part of another designated area (i.e., 300 Area, 200 East Area, and 100-K) and are not specifically identified (Figure 1-1). The 200-MG-1 OU waste sites consist of French drains, trenches, cribs, ditches, and retention basins with shallow contamination (generally less than 4.6 m [15 ft] deep), and where chemical and radioactive contaminants were released during material transfers (i.e. unplanned release sites). Additionally, some 200-MG-1 OU sites were produced by airborne dissemination of radioactive particles, or biodegradation and dispersion of plant or animal matter. For those sites containing radionuclides, the radionuclide inventory for this conceptual model group does not include transuranic isotopes greater than or equal to 100 nCi/g.

All of the waste sites contained in the 200-MG-1 OU are located within the Central Plateau, as described in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86). The 216-S-26 and 200-W-148-PL waste sites, also known as the 216-S-19 Replacement Facility and the 216-S-26 Crib Pipeline, respectively, are located approximately 3.6 km (2.2 mi) north of the Rattlesnake Barricade, just south of the 200 West area (Figure 1-2).

1.2 Regulatory and Enforcement History

CERCLA was enacted to enable the federal government to conduct cleanup of hazardous substances released into the environment. In 1986, CERCLA was amended by SARA, which included Section 120 (42 USC 9620, "Federal Facilities"), developed specifically for federal facility cleanup. Presidential Executive Order 12580, *Superfund Implementation*, delegated to DOE the primary authority to conduct removal and remedial actions under authority of CERCLA Section 104, "Response Authorities." In 1987, the federal government determined that waste that included a mixture of radioactive and hazardous chemical components was subject to regulation under the *Resource Conservation and Recovery Act of 1976* (RCRA) and its Washington State counterpart. In 1989, DOE, EPA, and Ecology signed the Tri-Party Agreement (Ecology et al., 1989). The Tri-Party Agreement implemented DOE's exercise of CERCLA remedial action authority under EPA oversight, in accordance with CERCLA Section 120, and also included an Ecology Consent Order containing a schedule for bringing all current Hanford Site hazardous waste operations into compliance with RCRA under the new mixed waste requirements. DOE's authority to conduct removal actions under CERCLA Section 104 is independent of the Tri-Party Agreement, but is exercised cooperatively with the respective oversight authorities of EPA and Ecology.

As discussed in Chapter 1, statutory authority for this removal action is taken in accordance with CERCLA. Further governing requirements for compliance with CERCLA and the (RCRA) activities at

the Hanford Site are in accordance with the Tri-Party Agreement. The Hanford Site was proposed for inclusion in 53 FR 23988, "National Priorities List for Uncontrolled Hazardous Waste Sites – Update 7," hereafter referred to as the National Priorities List (NPL), and was placed on the NPL on November 3, 1989 (54 FR 41015, "National Priorities List for Uncontrolled Hazardous Waste Sites – Final Rule 10/04/89") by EPA. EPA placed the four aggregate areas (i.e. the 100, 200, 300, and 1100 Areas) on the NPL. The 200 Area NPL site consists of the 200 West and 200 East Areas, which contain waste management facilities and inactive irradiated fuel reprocessing facilities. The site also includes the 200 North Area, formerly used for interim storage and staging of irradiated fuel, and the waste sites assigned to the 200-MG-1 OU.

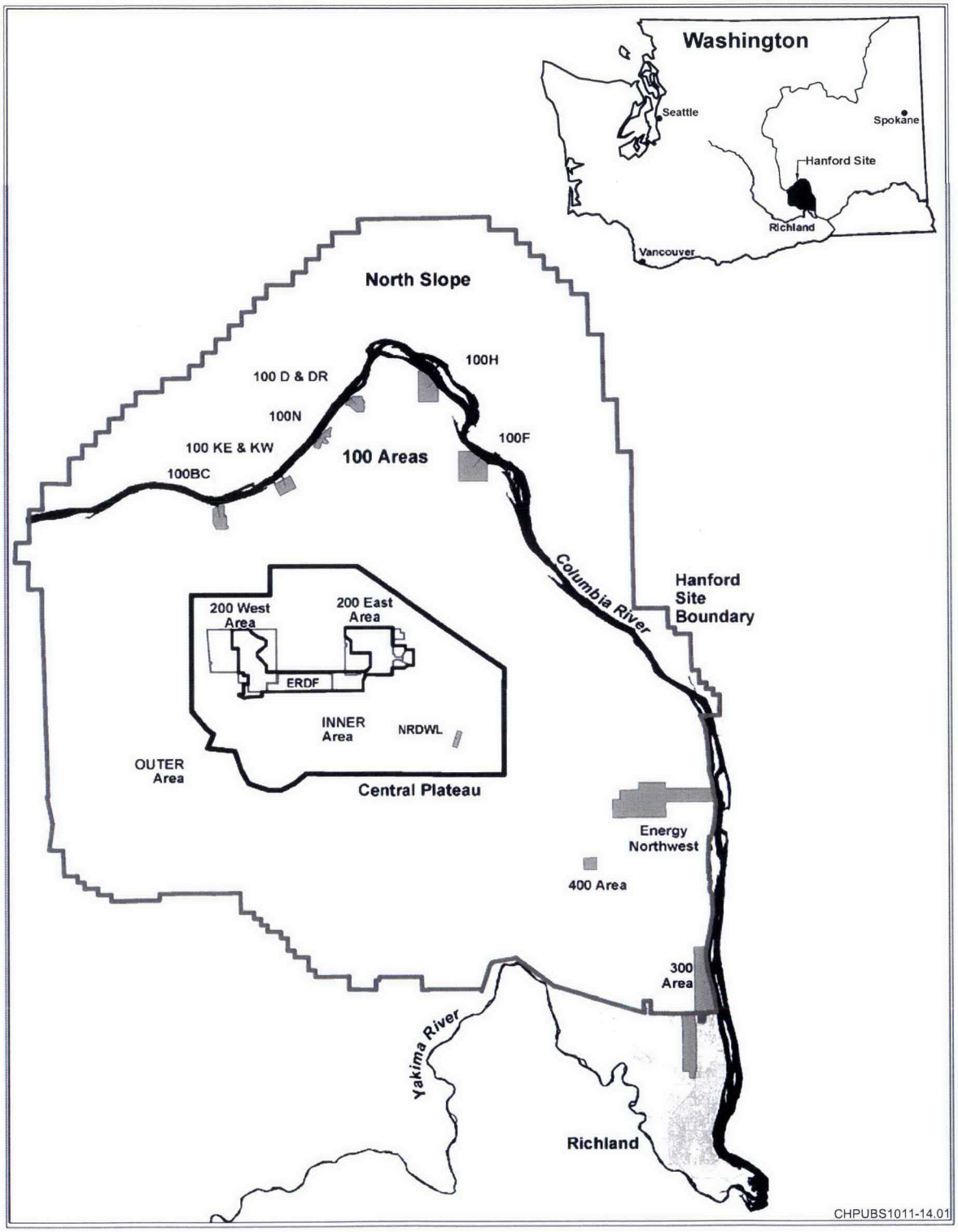

Figure 1-1. Location of the Hanford Site in Washington State

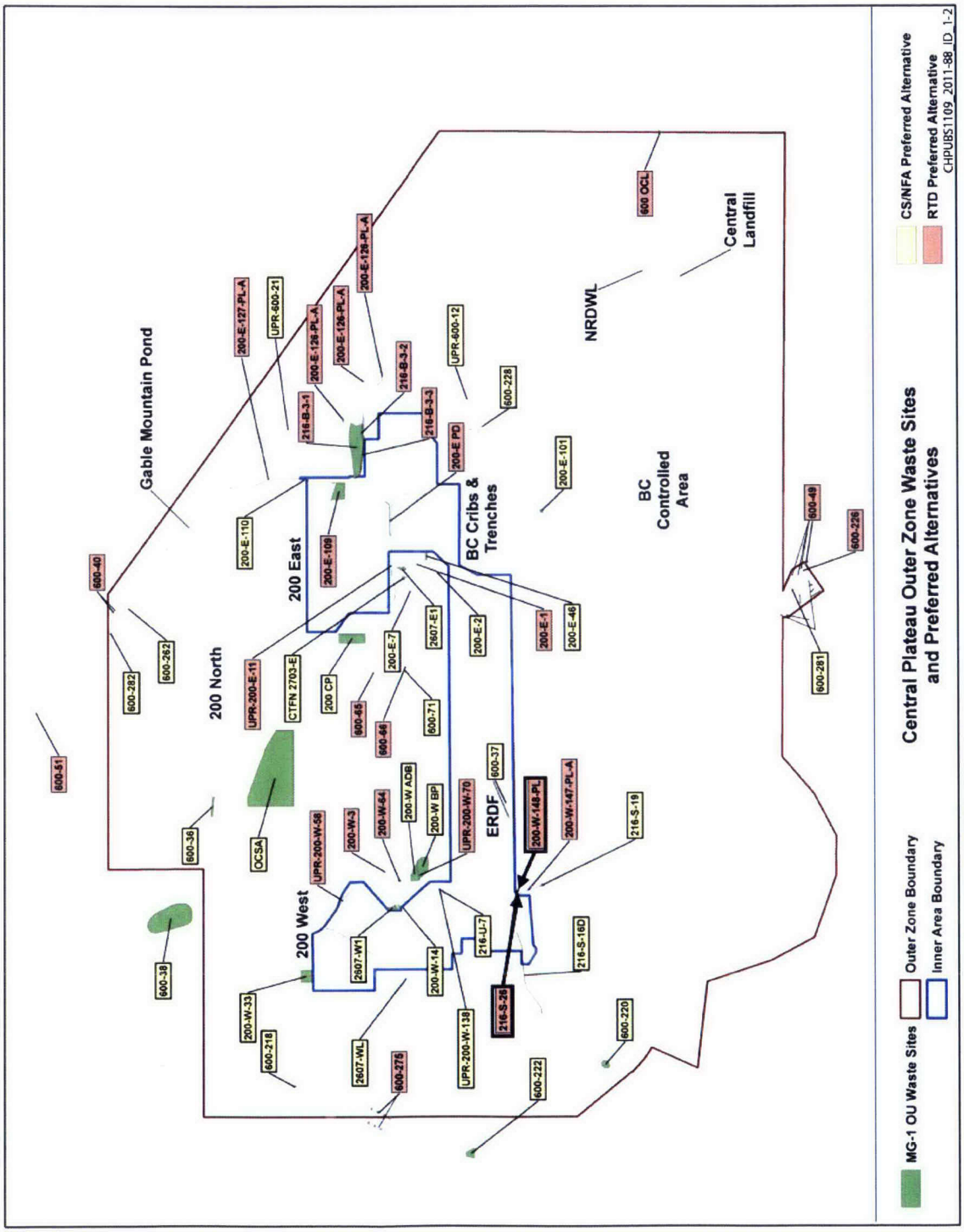

Figure 1-2. 200-MG-1 Operable Unit and the 216-S-26 and 200-W-147-PL Waste Sites

1.3 Environmental Setting

The Hanford Site is located within the semiarid Pasco Basin in the northern portion of the Columbia Plateau. Normal annual precipitation is 17.7 cm (7 in). According to PNL-10285, *Estimated Recharge Rates at the Hanford Site*, there is an estimated 2.6 to 17.3 mm (0.1 to 0.7 in.) per year of recharge in the 100 Area. Bedrock beneath the site is basalt of the Columbia River Basalt Group.

The Ringold Formation and the Hanford formation cover the basalt throughout the Central Plateau. Poorly consolidated, river-deposited, well-drained sands, gravels, cobbles, and boulders dominate these units. The Ringold Formation is an interstratified sequence of unconsolidated clay, silt, sand, and gravel-to-cobble sediment deposited by the ancestral Columbia River. The Hanford formation consists of uncemented gravels, sands, and silts deposited by Pleistocene cataclysmic floodwaters. Groundwater from the Hanford Site discharges to the Columbia River, which is the dominant surface water body of the Hanford Site. The direction of groundwater flow beneath the Central Plateau is toward the east-northeast. The uses of the Columbia River include production of hydroelectric power, irrigation, drinking water, recreation, and natural resources.

The average depth from ground surface to groundwater beneath the 200 Area ranges from 50 m (164 ft) to greater than 100 m (328 ft). Additional details on the geology and hydrogeology underlying the 200 Area and the 200-MG-1 OU are not provided in the base response action documents because the 200-MG-1 OU was created for shallow zone (less than 4.6 m [15 ft] in depth) waste sites which are assumed not to be a threat to groundwater quality. This assumption is based on historical and process knowledge regarding volumes of liquids discharged, lack of mobility of contaminants, and shallow depth of the discharge(s).

The nearest natural surface water body to the 216-S-26 and 200-W-148-PL waste sites is the Columbia River, located approximately 12.5 km (7.8 mi) north. The potential for natural groundwater recharge within the 200 Area is limited to precipitation infiltration. Estimates of recharge from precipitation at the Hanford Site range from 0 to 10 cm (0 to 4 in.) per year.

2 Waste Site Background

This chapter provides a description of the 216-S-26 and 200-W-148-PL waste sites and information on process and background, describes the selected alternative, and delineates the RAOs and cleanup standards applicable to this removal action as prescribed in the Action Memorandum (DOE/RL-2009-86).

2.1 Waste Sites 216-S-26 and 200-W-148-PL

The 216-S-26 and 200-W-148-PL waste sites, also known as the 216-S-19 Replacement Facility and the 216-S-26 Crib Pipeline, respectively, are located approximately 3.6 km north of the Rattlesnake Barricade just south of the 200 West Area (Figure 2-1). The sites were part of the underground effluent discharge system of the 222-S Complex.

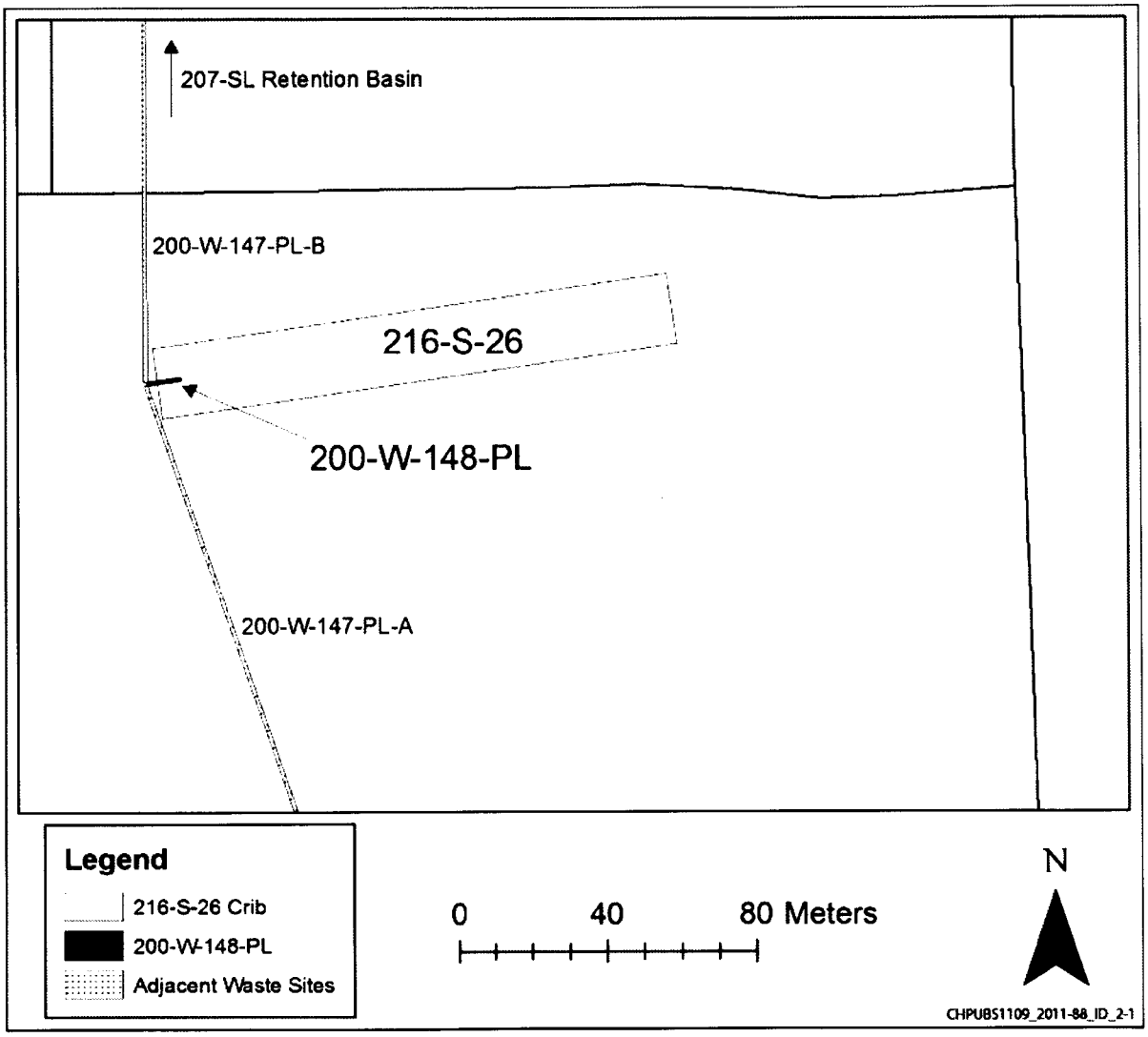

Figure 2-1. Boundaries and Operational Areas of the 216-S-26 and 200-W-148-PL Waste Sites

The 216-S-26 waste site is described in the Waste Information Data System (WIDS) as a 128 m (420 ft) long, 3.1 m (10 ft) wide crib that is posted as an underground radioactive material area and is marked with cement posts and chains. A 15 cm (6 in) vitrified clay, perforated distribution pipe runs the length of the unit, 46 cm (18 in) above the bottom of the crib. Eight cm (4 in) of gravel covers a membrane barrier and the crib is covered with 2.9 m (9.5 ft) of soil (Figure 2-2). The 200-W-148-PL waste site is described in WIDS as a 15.2 cm (6 in) vitrified clay pipe, connecting the west end of the 216-S-26 crib to the 200-W-147-PL-A pipeline.

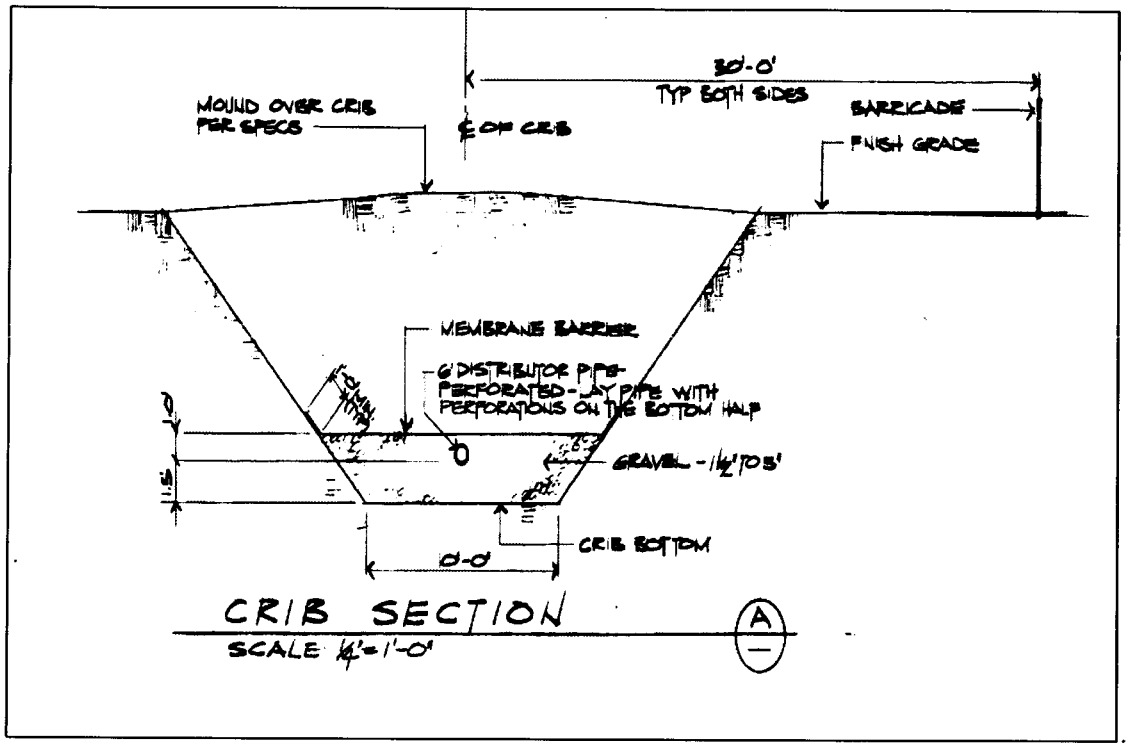

Figure 2-2. Cross Section of the 216-S-26 Waste Site

The release mechanism for these waste sites is planned and sustained release of contaminated effluent. The current form of the waste matrix is solid.

2.2 Description of the Selected Alternative

As stated in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86), the selected alternative for the subject waste sites was RTD. This alternative was selected because, due to historical activity and process knowledge, contaminants of potential concern (COPCs) had the potential to exceed the RALs. Activities involved in the RTD action set forth in the RAWP (DOE/RL-2009-53) and DOE/RL-2009-60, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites* (SAP) include soil excavation, pipe removal, and sampling to demonstrate that concentrations of COPCs in soil are less than or equal to established RALs, and that no additional removal action is required. The general removal action sampling design criteria are provided in this section followed by a summary of waste site history, specific sampling design and methodology, and analytical results for the 216-S-26 and 200-W-148-PL waste sites.

The following key features relevant to the 216-S-26 and 200-W-148-PL waste sites were considered during development of the sample design:

- During excavation, direct visual inspection of the site surface was performed, using available site information as a guide for visual cues such as staining, discoloration, absence of vegetation, presence of debris, and other anomalies.
- Radiological field screening was performed at the excavation surface of the waste site to provide an indication of the presence of radiological COPCs.
- Statistical sampling with a parametric random approach was performed, per the methodology prescribed in the SAP (DOE/RL-2009-60), in the excavated areas for the verification sampling evolutions.

Based on these key design features, implementation of the selected RTD alternative was performed. Soils and the pipes themselves were removed from the two waste sites, and a verification sampling evolution was conducted. The results of the verification and characterization sampling evolutions confirmed that remaining in-situ soils were less than or equal to RALs for COPCs applicable to the waste sites. Table 5-2 provides the maximum concentrations for each COPC from the sampling analytical data. Tables A-1 through A-5 provide detailed summaries of all analytical data results for sampling conducted at the 216-S-26 and 200-W-148-PL waste sites (Appendix A).

Personnel with current training and qualifications performed field radiological surveying of the samples and sampling locations during the sampling evolutions. Survey methods and practices were performed in accordance with established contractor methods and protocols. Of the radiological surveys performed for the 216-S-26 and 200-W-148-PL waste sites, no radiological dose readings were greater than the measured background and no radiological contamination was discovered during radiological survey activities.

2.2.1 Removal Action Objectives

The removal action alternatives for the 200-MG-1 OU waste sites were evaluated based on their overall ability to protect human health and the environment and their effectiveness in maintaining both short-term and long-term protection. The selected alternative must meet the following RAOs established in the Action Memorandum (DOE/RL-2009-86):

- **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) below ground surface (bgs) at concentrations above the appropriate 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 appropriate RALs.
- **RAO 3**–Control the sources of groundwater contamination to minimize impacts to groundwater resources, protect the Columbia River from adverse impacts, and reduce the degree of groundwater cleanup that may be required under future action.
- **RAO 4**–Prevent adverse impacts to cultural resources and threatened or endangered species, and minimize wildlife habitat disruption.

The RALs for the waste sites identified in the Action Memorandum (DOE/RL-2009-86) are based on the RAOs noted above. These RALs are based on attainment of acceptable levels of human health, ecological risk, and protection of groundwater but are not less than background levels or detection limits for waste sites. Attainment of RALs is intended to meet the first three RAOs and is expected to satisfy the remedial action objectives established in the final record of decision (ROD). The fourth RAO is met through

cultural and ecological reviews performed before starting removal action activities. Tables 2-1 and 2-2 list the radiological and nonradiological RALs applicable to the 200-MG-1 OU. The attainment of RALs and RAOs is provided in Chapter 5 of this report.

Table 2-1. Radiological Removal Action Levels

Contaminant of Potential Concern	Background Concentration[a] (pCi/g)	Direct Exposure[b] (pCi/g)	Soil Cleanup Level for Groundwater Protection[c] (pCi/g)	Required Detection Limit (pCi/g)	Removal Action Levels (pCi/g)
Americium-241	N/A	31.1	N/A[d]	1.0	31.1
Cesium-137	1.1	6.2	1,465	0.1	6.2
Cobalt-60[g]	0.008	1.4	N/A[d]	0.05	1.4
Europium-152	N/A	3.3	N/A[d]	0.1	3.3
Europium-154	0.033	3.0	N/A[d]	0.1	3.0
Europium-155	0.054	125	N/A[d]	0.1	125
Plutonium-238	0.004	38.8	N/A[d]	1.0	38.8
Plutonium-239/240	0.025	33.9	N/A[d]	1.0	33.9
Strontium-90	0.18	4.5	27.6	1.0	4.5
Technetium-99[f]	N/A	5.8	0.46	15.0	15.0
Tritium[f]	N/A	459	12.6	30.0	30.0
Uranium-233/234	1.1	1.1[e]	1.1[e]	1.0	1.1
Uranium-235	0.11	0.61	0.5[e]	0.5	0.5
Uranium-238	1.1	1.1[e]	1.1[e]	1.0	1.1

a. Hanford Site background values for radiological constituents are provided in DOE/RL-96-12, *Hanford Site Background; Part 2, Soil Background for Radionuclides*, Table 5-1.

b. Radionuclide concentrations for beta/gamma in water correspond to a 4 mrem/yr dose from EPA/540-R-00-007, *Soil Screening Guidance for Radionuclides: User's Guide*. Calculations are based on either RESRAD (ANL, 2009, RESRAD Version 6.5) or WDOH/320-015, *Hanford Guidance for Radiological Cleanup*.

c. Soil concentration for groundwater protection were calculated using RESRAD with the maximum contaminant levels calculated from NBS Handbook 69, *Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air or Water for Occupational Exposure*; or maximum permissible concentrations cited in EPA/540-R-00-007 or 40 CFR 141.66, "National Primary Drinking Water Regulations," "Maximum Contaminant Levels for Radionuclides."

d. RESRAD predicts that constituents will not reach groundwater within 1,000 years, based on 100 Area generic site model using soil column layers and depths.

e. Where removal action levels (RALs) are less than background or required detection limits (RDLs), RALs default to background or RDLs (whichever is larger).

f. Technitium-99 and tritium (H_3) are applicable only to 216-S-19 and 216-S-26 only.

g. Cobalt-60 is specific to the processes associated with sites that received specific 222-S Laboratory effluent streams such as 216-S-19 and 216-S-26.

N/A = not available

RESRAD = RESidual RADioactivity (dose model)

Table 2-2. Nonradiological Removal Action Levels

Contaminant of Potential Concern	Background Concentration[a] (mg/kg)	Direct Exposure[b] (mg/kg)	Groundwater Protection[c] (mg/kg)	Required Detection Limit (mg/kg)	Removal Action Levels (mg/kg)	Ecological Risk Screening Values (mg/kg)
Antimony	5	32	5.4	0.6	5.4	5
Arsenic	6.5	6.5[d]	6.5[d]	1.0	6.5[d]	7
Barium	132	16,000	1,650	2	1,650	102
Beryllium	1.51	160	63.2	0.5	63.2	10
Boron	N/A	16,000	210	2	210	0.5
Cadmium	0.81	80	0.81[d]	0.5	0.81[d]	4
Chromium (Total)	18.5	120,000	2,000	1	2,000	42
Chromium (VI)	N/A	240	--[e]	0.5	--[e]	N/A
Cobalt	15.7	24	15.7[d]	2	15.7[d]	20
Copper	22.0	3,200	284	1	284	50
Lead	10.2	250	3,000	5.0	250	50
Lithium	33.5	160	192	2.5	160	35
Manganese	512	3,760	512[d]	5	512[d]	1,100
Mercury	0.33	24	2.09	0.2	2.09	0.1
Nickel	19.1	1,600	130	4	130	30
Selenium	0.78	400	5.2	1	5.2	0.3
Silver	0.73	400	13.6	0.2	13.6	2
Strontium	N/A	48,000	2,920	1	2,920	N/A
Thallium	N/A	5.6	1.59	1	1.59	1
Tin	N/A	48,000	48,000	10	48,000	50
Uranium (Soluble Salts)	3.21	240	3.21[d]	1	3.21[d]	5
Vanadium	85.1	560	2,240	2.5	560	2
Zinc	67.8	24,000	5,970	1	5,970	86
Aroclor 1016	N/A	0.5	0.094	0.017	0.094	0.65
Aroclor 1221	N/A	0.5	0.017[d]	0.017	0.017[d]	0.65
Aroclor 1232	N/A	0.5	0.017[d]	0.017	0.017[d]	0.65
Aroclor 1242	N/A	0.5	0.039	0.017	0.039	0.65
Aroclor 1248	N/A	0.5	0.039	0.017	0.039	0.65
Aroclor 1254	N/A	0.5	0.066	0.017	0.066	0.65
Aroclor 1260	N/A	0.5	0.72	0.017	0.5	0.65
Acenaphthene	N/A	4,800	98	0.33	98	20

Table 2-2. Nonradiological Removal Action Levels

Contaminant of Potential Concern	Background Concentration[a] (mg/kg)	Direct Exposure[b] (mg/kg)	Groundwater Protection[c] (mg/kg)	Required Detection Limit (mg/kg)	Removal Action Levels (mg/kg)	Ecological Risk Screening Values (mg/kg)
Acenaphthylene	N/A	4,800	98	0.33	98	N/A
Anthracene	N/A	24,000	2,270	0.33	2,270	N/A
Benzo[*a*]anthracene	N/A	1.37	0.86	0.33	0.86	N/A
Benzo[*a*]pyrene	N/A	0.137	0.233[f]	0.33	0.33[d]	12
Benzo[*b*]fluoranthene	N/A	1.37	2.95	0.33	1.37	N/A
Benzo[*g,h,i*]perylene	N/A	2,400	25,700	0.33	2,400	N/A
Benzo[*k*]fluoranthene	N/A	1.37	2.95[f]	0.33	1.37	N/A
Chrysene	N/A	13.7	9.56	0.33	9.56	N/A
Dibenz[*a,h*]anthracene	N/A	1.37	4.29	0.33	1.37	N/A
Fluoranthene	N/A	3,200	631	0.33	631	N/A
Fluorene	N/A	3,200	101	0.33	101	30
Indeno[*1,2,3-cd*]pyrene	N/A	1.37	8.33	0.33	1.37	N/A
Naphthalene	N/A	1,600	4.46	0.33	4.46	N/A
Phenanthrene	N/A	24,000	1,140	0.33	1,140	N/A
Pyrene	N/A	2,400	655	0.33	655	N/A
Carbon Tetrachloride[g]	N/A	7.69	0.0031	0.005	0.005	N/A
Xylene[h]	N/A	16,000	14.6	0.01	14.6	N/A
Nitrate (as Nitrogen)	11.8	128,000	40	0.75	40	N/A
TPH-Diesel	N/A	2,000	2,000	5	2,000	200
TPH-Kerosene	N/A	2,000	2,000	5	2,000	200
Fluoride[i]	N/A	4,800	16	5	16	N/A
Asbestos	N/A	N/A[j]	N/A[j]	N/A[j]	1 %[j]	N/A

Table 2-2. Nonradiological Removal Action Levels

Contaminant of Potential Concern	Background Concentration[a] (mg/kg)	Direct Exposure[b] (mg/kg)	Groundwater Protection[c] (mg/kg)	Required Detection Limit (mg/kg)	Removal Action Levels (mg/kg)	Ecological Risk Screening Values (mg/kg)

a. If Hanford Site-specific background data are not available, values are then taken from Ecology Publication No. 94-115, *Natural Background Soil Metals Concentrations in Washington State*. Hanford Site background values are available from nonradiological background data in DOE/RL-92-24, Rev. 4, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, Table D9-2.

b. Direct contact values were calculated based on WAC 173-340-740, "Model Toxics Control Act—Cleanup," "Unrestricted Land Use Soil Cleanup Standards," using Method B methodology and assumptions.

c. The groundwater protection values were obtained using equations provided in WAC 173-340-747(4), "Model Toxics Control Act—Cleanup," "Deriving Soil Concentrations for Groundwater Protection," with the physical parameters obtained from http://www.ecy.wa.gov/.

d. Where cleanup levels are less than background or required detection limits (RDLs), cleanup levels default to background or RDLs in accordance with WAC 173-340-700(6)(d), "Model Toxics Control Act—Cleanup," "Overview of Cleanup Standards," and WAC 173-340-707(2), "Model Toxics Control Act—Cleanup," "Analytical Considerations," respectively.

e. Based on process knowledge, chromium (VI) is not expected to be present at 200-MG-1 OU waste sites. The following values are given to help guide cleanup:

- 0.2 mg/kg—calculated value using $K_d = 0$, based on PNNL-13895, *Hanford Contaminant Distribution Coefficient Database and Users Guide*, and WAC 173-340-747, equation 747-1.
- 2.1 mg/kg—based on DOE/RL-96-17, *Remedial Design Report/Remedial Action Work Plan for the 100 Area.*
- 18.4 mg/kg—based on Ecology, 2007, Cleanup Levels and Risk Calculations (CLARC) database.

f. The soil concentrations for protection of groundwater values for benzo(*a*)pyrene and benzo(*k*)fluoranthene were incorrectly reported in DOE/RL-2009-48, *Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit*, and have been corrected.

g. Carbon tetrachloride is applicable to the 11 waste sites authorized by DOE/RL-2009-48.

h. Xylene is applicable only to the 200-W-3, 216-S-19, and 216-S-26 waste sites.

i. Fluoride is added as a contaminant of potential concern for select sites, such as 216-S-19 and 216-S-26, based on process history.

j. The RAL for asbestos in soil is one percent by weight (measured using polarized light microscopy). EPA has used this value for determining if response actions for asbestos should be undertaken (Cook, 2004, "Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups"). Further evaluation of removal actions for asbestos will be conducted as needed on a site-specific basis in the Outer Area remedial investigation/feasibility study.

TPH = total petroleum hydrocarbon

Ecological screening values, which are based on WAC 173-340-900, "Model Toxics Control Act—Cleanup," "Tables," Table 749-3, are used for screening purposes only and are not considered cleanup levels for this CERCLA removal action (described more fully in Chapter 5 of the Action Memorandum [DOE/RL-2009-86]). If analytical results exceed the ecological screening values, the results will be further evaluated during the final ecological risk assessment in accordance with the remedial investigation/feasibility study (RI/FS) for the Central Plateau in order to make the final cleanup decisions.

2.2.2 Exposure and Land Use Assumptions

The 216-S-26 and 200-W-148-PL waste sites are located within the Central Plateau, as discussed in more detail in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86) for the 200-MG-1 OU. Land use for the Central Plateau is designated for reasonably anticipated future uses

recognized in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86) (for the purposes of this interim action, RAOs were selected that would support unrestricted land use).

2.2.3 Design Summary

The RTD action alternative was the selected alternative for the 216-S-26 and 200-W-148-PL waste sites based on available historical information and process knowledge. Following RTD activities at the waste sites, sampling was conducted to confirm achievement of the established RAOs. The sampling objectives for the 216-S-26 and 200-W-148-PL waste sites included visual inspection and collection of discrete soil samples from the waste site as described in Section 3.1 of this report.

Key features of the site-specific sampling design for the 216-S-26 and 200-W-148-PL waste sites included the following:

- During excavation, direct visual inspection of the site surface was performed, using available site information as a guide for visual cues such as staining, discoloration, absence of vegetation, presence of debris, and other anomalies.
- Radiological field screening was performed at the excavation surface of the waste site to provide an indication of the extent of radiological COPCs.
- Statistical sampling with a parametric random approach was performed, per the methodology prescribed in the SAP (DOE/RL-2009-60), in the excavated areas for the verification sampling evolution.

2.3 Decision Document Amendments, Significant Differences, or Waivers

No amendments to the EE/CA (DOE/RL-2008-44) or Action Memorandum (DOE/RL-2009-86), or technical impracticability waivers were associated with this removal action. A Tri-Party Agreement change (TPA-CN-350) has been approved for the Action Memorandum (DOE/RL-2009-86) to add sites, including the 200-W-148-PL waste site, to the scope of the removal action, as authorized by Section 1.5.2 of the EE/CA (DOE/RL-2008-44).

3 Response Activity Summary

As stated in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86), the selected alternative for the 216-S-26 and 200-W-148-PL waste sites was RTD. Available historical information and process knowledge, per the provisions of the Action Memorandum (DOE/RL-2009-86), substantiated the implementation of RTD at the waste sites without requiring additional site investigation. Upon completion of RTD activities, verification and characterization sampling was conducted which demonstrated that contaminant concentrations in soil at the 216-S-26 and 200-W-148-PL waste sites were less than or equal to the RALs, thus demonstrating that the RAOs established for this interim action were met.

3.1 Summary of Activities

The removal action at the 216-S-26 and 200-W-148-PL waste sites was conducted from March 2011 through August 2011 and included the removal of overburden soil, and the pipe itself, followed by collection of samples from locations within the excavation, as specified in Section 2.2, and per the methodologies prescribed in the SAP (DOE/RL-2009-60). The following key activities were pertinent to the removal action at the 216-S-26 and 200-W-148-PL waste sites:

- Excavation of soil, under the RTD alternative, along the 216-S-26 crib and 200-W-148-PL pipeline (Figure 3-1), and removal of the pipelines and underlying soil
- Collection of samples selected based on a statistical sampling design with a parametric random approach from the base of the excavation for verification purposes, and laboratory analysis of soil samples for COPCs
- Removal of additional soil to approximately 4.6 m (15 ft) bgs, characterization sampling at 4.6, 4.9, 5.5, and 6.1 m (15, 16, 18, and 20 ft), and evaluation of analytical results to demonstrate achievement of RAOs

3.1.1 Waste Site Initial Sampling

The selected alternative for the 216-S-26 and 200-W-148-PL waste sites was RTD, and based on available site information, excavation of the waste site soil and pipeline was performed without requiring initial sampling; therefore, this section is not applicable.

3.1.2 Waste Site Excavation

The RTD alternative was applied to the waste site areas in accordance with the Action Memorandum (DOE/RL-2009-86), and RTD activities commenced in March 2011. During implementation of RTD activities at the 216-S-26 crib and the 200-W-148-PL pipeline, the distribution pipeline within the crib boundary was removed as well as the pipeline associated with the 200-W-148-PL waste site. In addition, excavation of soil within the waste sites was conducted to remove underlying soil beneath the pipelines. The average vertical extent of excavation ranged from 4.1 to 4.4 m (13.3 to 14.5 ft) bgs; however, the vertical extent was expanded to approximately 4.6 m (15 ft) bgs at the waste sites based on the concentration of tritium in excess of the RALs. The lateral extent of excavation was determined utilizing the WIDS waste site boundaries and visual indicators.

3.1.3 Verification and Characterization Sampling

The following sections provide the basis for verification and characterization sampling at 216-S-26 and 200-W-148-PL waste sites.

3.1.3.1 Waste Site 216-S-26 Verification Sampling

Eight samples were collected from the base of excavation from the 216-S-26 waste site, designated random verification (RV) samples RV 1 through RV 8 in Figure 3-1. Sample locations were randomly chosen using Visual Sample Plan™ (VSP™) software to implement a statistically-based sample design with a parametric random approach, and the samples were analyzed for the full suite of COPCs, listed in Tables 2-1 and 2-2 of this report.

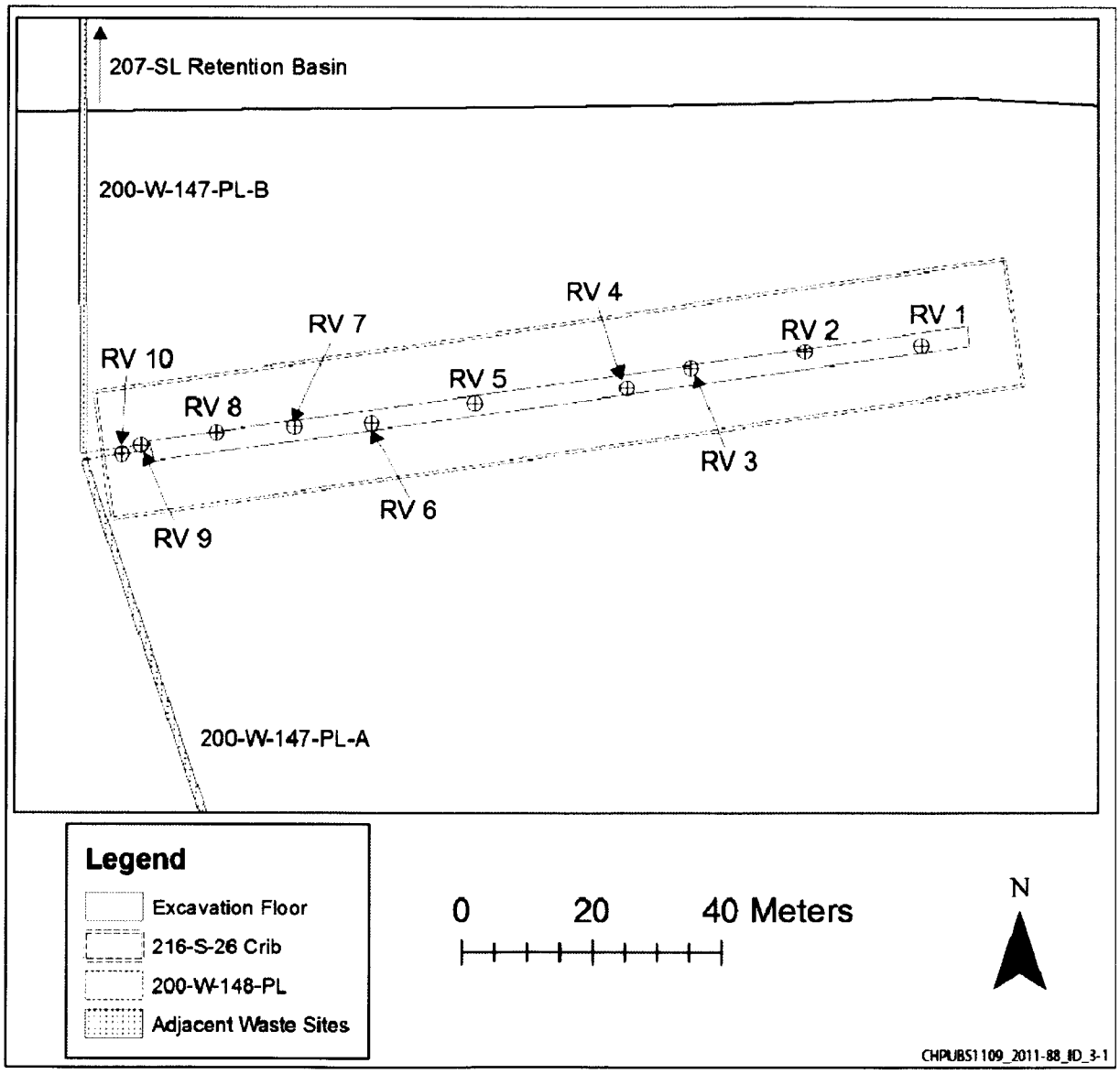

Figure 3-1. Verification Sampling Locations at the 216-S-26 and 200-W-148-PL Waste Sites

3.1.3.2 Waste Site 200-W-148-PL Verification Sampling

Two samples were collected from the base of excavation from the 200-W-148-PL waste site, designated RV 9 and RV 10 in Figure 3-1. Sample locations were randomly chosen using VSP software to implement a statistically-based sample design with a parametric random approach, and the samples were analyzed for the full suite of COPCs, listed in Tables 2-1 and 2-2 of this report.

3.1.3.3 Characterization Sampling

Analytical results of verification sampling at the 216-S-26 and 200-W-148-PL waste sites indicated concentrations of tritium in excess of the RALs. Two areas with the highest concentrations of tritium (RV 2 and RV 8 in Figure 3-1) were potholed and sampled at 4.9, 5.5, and 6.1 m (16, 18, and 20 ft) bgs to to further characterize the risk drivers to groundwater from tritium. Samples were also collected at 4.6 m (15 ft) bgs from two additional areas (RV 6 and RV 9 in Figure 3-1) where concentrations of tritium were in excess of the RALs, to document the as-left conditions of the waste site. Table 3-1 presents analytical results from the characterization sampling.

Table 3-1. Tritium Depth Samples Results at the 216-S-16 and 200-W-148-PL Waste Sites

Sample Identification	Removal Action Level (pCi/g)	Sample Depth (ft bgs)	Pothole Location	HEIS Number	Concentration in Soil (pCi/g)
Contingency 4	30	15	RV 9	B2H1P6	U
IP 1	30	16	RV 8	B2FBT1	U
IP 2	30	18	RV 8	B2FBT2	16.0
IP 3	30	20	RV 8	B2FBT3	13.7
Contingency 5	30	15	RV 6	B2H1P7	U
IP 4	30	16	RV 2	B2FBT6	U
IP 5	30	18	RV 2	B2FBT7	U
IP 6	30	20	RV 2	B2FBT8	U

HEIS = Hanford Environmental Information System
U = result is less than laboratory detection limit

3.1.4 Backfill and Revegetation

As describe in Sections 2.1 and 5.5.1 of the RAWP (DOE/RL-2009-53), backfill and/or contouring may take place at the 216-S-26 and 200-W-148-PL waste sites upon concurrence by the signing parties that the RAOs have been attained. Finalization of a backfill concurrence form provided to the agency(ies) provided concurrence that the waste site had achieved the established RAOs; therefore, backfill and/or contouring proceeded at the 216-S-26 and 200-W-148-PL waste sites. The backfill concurrence form was approved by the regulatory agency(ies) on August 22, 2011. Backfill of the 216-S-26 and 200-W-148-PL waste sites was completed on August 30, 2011.

In accordance with the ecological compliance review conducted for the 216-S-26 and 200-W-148-PL waste sites, these areas do not meet the requirements of a Level III or Level IV designation as described in DOE/RL-96-32, *Hanford Site Biological Resources Management Plan*; therefore, revegetation at the 216-S-26 and 200-W-148-PL waste sites is not required. DOE may elect to revegetate the 216-S-26 and 200-W-148-PL waste sites at a future date for aesthetic purposes.

3.1.5 Statement of Protectiveness

In accordance with the SAP (DOE/RL-2009-60), soil at the 216-S-26 and 200-W-148-PL waste sites has been sampled, analyzed, and evaluated. The results obtained through implementation of the RTD alternative demonstrate that concentrations of COPCs in the soil at the 216-S-26 and 200-W-148-PL waste sites are less than RALs (discussed in further detail in Chapter 5). These results also indicate that residual concentrations will support reasonably anticipated future land use recognized in the EE/CA (DOE/RL-2008-44) and Action Memorandum (DOE/RL-2009-86), and demonstrate that residual concentrations of COPCs in soil throughout the site are unlikely to affect groundwater or the Columbia River. As summarized in Chapter 5, a review of the sampling results showed that the removal action at the 216-S-26 and 200-W-148-PL waste sites has demonstrated achievement of the RAOs established in the Action Memorandum (DOE/RL-2009-86) and identified in the RAWP (DOE/RL-2009-53).

4 Chronology of Events

A chronology of major events associated with sampling the subject waste site is presented in Table 4-1. The chronology includes approval of the regulatory documents that form the basis of the removal action and key fieldwork activities associated with the removal action.

Table 4-1. Response Action Chronology

Date	Event
June 5, 2009	DOE/RL-2008-44, *Engineering Evaluation/Cost Analysis for the 200-MG-1 Operable Unit Waste Sites*, approved
February thru March 2010	Site evaluation of the 216-S-26 waste site completed
April 15, 2010	DOE/RL-2009-86, Revision 0, *Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1* Operable Unit, approved
April 21, 2010	Draft of DOE/RL-2009-53, Revision 1, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit*, completed and routed for approval
May 20, 2010	Draft of DOE/RL-2009-60, Revision 1, *Sampling and Analysis Plan for Selected 200-MG-1 Operable Unit Waste Sites*, completed and routed for approval
October 7, 2010	DOE/RL-2009-53, Revision 1, approved
October 20, 2010	TPA-CN-350, *Tri-Party Agreement Change Notice Form: DOE/RL-2009-86, Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit*, Revision. 0, approved
January 10, 2011	DOE/RL-2009-60, Revision 1, approved
March 17, 2011	RTD of the 216-S-26 and 200-W-148-PL waste sites commenced
May 25, 2011	Verification sampling of the 216-S-26 and 200-W-148-PL waste sites conducted
June 15, 2011	Laboratory analytical data evaluation completed
July 27, 2011	Characterization sampling of 216-S-26 and 200-W-148-PL waste sites commenced
August 10, 2011	Laboratory analytical data evaluation commenced
August 18, 2011	Additional characterization sampling of 216-S-26 and 200-W-148-PL waste sites completed
August 22, 2011	RTD of the 216-S-26 and 200-W-148-PL waste sites completed and Backfill Concurrence Form approved
August 30, 2011	Backfill of the 216-S-26 and 200-W-148-PL waste sites completed
August 31, 2011	Laboratory analytical data evaluation completed

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5 Performance Standards and Construction Quality Control

This chapter addresses the process for demonstrating achievement of performance standards, which include attaining RALs and RAOs and maintaining the required quality control (QC) during removal activities.

5.1 Attainment of Performance Standards

Verification and characterization sampling and analysis confirm that the 216-S-26 and 200-W-148-PL waste sites meet the RAOs identified in the Action Memorandum (DOE/RL-2009-86), and residual levels of COPCs remaining in the soil are less than or equal to the RALs. As shown in Table 5-1, RAOs 1 and 2 are achieved by preventing unacceptable risk to human health and the environment through direct exposure to soils and debris by removing soil to approximately 4.6 m (15 ft) bgs; thereby reducing the soil concentration of COPCs to less than or equal to the RALs. RAO 3 is achieved by preventing migration and/or leaching of radiological and nonradiological contamination to groundwater by reducing the soil concentration of COPCs to less than or equal to the RALs. RAO 4 is met through cultural and ecological evaluation, performed in December 2009 and January 2010, respectively, and by the implementation of considerations and recommendations during work activities. Demonstration that the soil concentration of COPCs is less than or equal to RALs (Tables 5-2 and 5-3) meets RAOs 1, 2, and 3.

Per the methodology prescribed in the RAWP (DOE/RL-2009-53) and SAP (DOE/RL-2009-60), and based on the available site historical information and process knowledge, the RTD alternative was implemented at the 216-S-26 and 200-W-148-PL waste sites. Excavation of soil to approximately 4.6 m (15 ft) bgs, along with removal of the pipeline, was conducted between March and August 2011. The maximum sampling analytical results, provided in Tables 5-2 and 5-3, demonstrate that there are no chemical or radiological COPC concentrations greater than the RALs remaining in soil at the 216-S-26 and 200-W-148-PL waste sites, thus meeting RAOs 1, 2, and 3. A complete summary of analytical results can be found in Tables A-1 through A-5 (Appendix A).

This waste site and the data obtained from the subject sampling evolutions will be included in the RI/FS for final remedial action of the Outer Area.

Table 5-1. Summary of Attainment of Cleanup Objectives

Removal Action Objective	Compliance Methods	Removal Action Objective Attained?
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 appropriate RALs.	Achieved through verification soil sampling, performed upon completion of RTD activities, which demonstrated that all individual COPC concentrations are less than the RALs.	Yes
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 appropriate RALs.	Achieved through the removal of soil to approximately 4.6 m (15 ft) bgs. Radiological survey of soils within the waste site, conducted during site evaluation and sampling evolutions, resulted in no measured dose rates greater than background for the waste site and no detectable radiological contamination. Analytical results demonstrate that COPC concentrations remaining in soil are less than the RALs.	Yes
RAO 3: Control the sources of groundwater contamination to minimize impacts to groundwater resources, protect the Columbia River from adverse impacts, and reduce the degree of groundwater cleanup that may be required under future actions.	Achieved through the removal of soil to approximately 4.6 m (15 ft) bgs. Verification and characterization soil sampling, performed upon completion of RTD activities, demonstrated that concentrations of COPCs in soil were less than established RALs.	Yes
RAO 4: Prevent adverse impacts to cultural resources and threatened or endangered species, and minimize wildlife habitat disruption.	Achieved through cultural and ecological evaluation and the implementation of considerations during removal activities to minimize wildlife habitat and cultural artifact disruption.	Yes

5.1.1 Tritium Results

Analytical results from the verification sampling evolution indicated concentration of tritium in excess of the RALs at the 216-S-26 and 200-W-148-PL waste sites. Removal of soil to approximately 4.6 m (15 ft) bgs, and characterization sampling at 4.6, 4.9, 5.5, and 6.1 m (15, 16, 18, and 20 ft) further characterize the risk drivers to groundwater from tritium, and document the as-left conditions at the waste site. Table 3-1 presents the results of characterization sampling at the 216-S-26 and 200-W-148-PL waste sites.

5.1.2 Performance Standard Documentation

This response action report addresses the 216-S-26 and 200-W-148-PL waste sites and not an OU; therefore, this section is not applicable.

5.1.3 Response Action Objectives Verification

RAO performance standard attainment involves comparisons of soil analytical data to RALs. The RALs, identified in the Action Memorandum (DOE/RL-2009-86) and RAWP (DOE/RL-2009-53), are directly

compared to the maximum results from the verification analytical data (Tables 5-2 and 5-3). The full set of analytical results from all samples collected is provided in Appendix A.

5.1.4 Contaminant Identification

Tables 5-2 and 5-3 provide a direct comparison of verification sample analytical results for each radiological and nonradiological COPC, as determined from process knowledge and historical information, against the established RALs for the 216-S-26 and 200-W-148-PL waste sites.

Table 5-2. Comparison of Verification Sample Results Against Removal Action Levels for Radiological Contaminants of Potential Concern

Contaminant of Potential Concern	Background Concentration[a] (pCi/g)	Removal Action Levels (pCi/g)	Maximum Concentration in Soil (pCi/g)	Does the Maximum Exceed Removal Action Levels?
Americium-241	N/A	31.1	0.042	No
Cesiom-137	1.1	6.2	U	No
Cobalt-60	0.008	0.05	U	No
Europium-152	N/A	3.3	U	No
Europium-154	0.033	3.0	0.18	No
Europium-155	0.054	125	0.23	No
Plutonium-238	0.004	38.8	0.011	No
Plutonium-239/240	0.025	33.9	0.02	No
Strontium-90	0.18	4.5	1.2	No
Technicium-99	N/A	15.0	U	No
Tritium	N/A	30.0	54.9[c]	No
Uranium-233/234	1.1	1.1[b]	0.22	No
Uranium-235	0.11	0.5	0.03	No
Uranium-238	1.1	1.1[b]	0.24	No

a. Hanford Site background values for radiological constituents are provided in DOE/RL-96-12, *Hanford Site Background; Part 2, Soil Background for Radionuclides*, Table 5-1.

b. Where cleanup levels are less than background or required detection limits (RDLs), cleanup levels default to background or RDLs in accordance with WAC 173-340-700(6)(d), "Model Toxics Control Act—Cleanup," "Overview of Cleanup Standards," and WAC 173-340-707(2), "Model Toxics Control Act—Cleanup," "Analytical Considerations," respectively.

c. Analytical results from characterization sampling indicated concentrations of tritium remaining in soil at the 216-S-26 and 200-W-148-PL waste sites are less than established removal action levels.

N/A = not available

U = result is less than laboratory detection limit

Table 5-3. Comparison of Sample Results Against Removal Action Levels for Nonradiological Contaminants of Potential Concern

Contaminant of Potential Concern	Background Concentration[a] (mg/kg)	Removal Action Levels (mg/kg)	Maximum Concentration in Soil (mg/kg)	Does the Maximum Exceed Removal Action Levels?
Metals				
Antimony	5	5.4	U	No
Arsenic	6.5	6.5[b]	5.95	No
Barium	132	1,650	123	No
Beryllium	1.51	63.2	0.508	No
Boron	N/A	210	1.01	No
Cadmium	0.81	0.81[b]	U	No
Chromium (Total)	18.5	2,000	9.1	No
Chromium (VI)[c]	N/A	2.1[c]	0.103	No
Cobalt	15.7	15.7[b]	12.2	No
Copper	22.0	284	16.7	No
Lead	10.2	250	7.84	No
Lithium	33.5	160	8.84	No
Manganese	512	512[b]	467	No
Mercury	0.33	2.09	U	No
Nickel	19.1	130	12	No
Selenium	0.78	5.2	0.833	No
Silver	0.73	13.6	U	No
Strontium	N/A	2,920	34.9	No
Thallium	0.1	1.59	0.139	No
Tin	N/A	48,000	0.517	No
Uranium (soluble salts)	3.21	3.21[b]	0.785	No
Vanadium	85.1	560	89.3	No
Zinc	67.8	5,970	57.4	No
Polychlorinated Biphenyls				
Aroclor 1016	N/A	0.094	U	No
Aroclor 1221	N/A	0.017[b]	U	No
Aroclor 1232	N/A	0.017[b]	U	No

Table 5-3. Comparison of Sample Results Against Removal Action Levels for Nonradiological Contaminants of Potential Concern

Contaminant of Potential Concern	Background Concentration[a] (mg/kg)	Removal Action Levels (mg/kg)	Maximum Concentration in Soil (mg/kg)	Does the Maximum Exceed Removal Action Levels?
Aroclor 1242	N/A	0.039	U	No
Aroclor 1248	N/A	0.039	U	No
Aroclor 1254	N/A	0.066	U	No
Aroclor 1260	N/A	0.5	U	No
Polynuclear Aromatic Hydrocarbons				
Acenaphthene	N/A	98	U	No
Acenaphthylene	N/A	98	U	No
Anthracene	N/A	2,270	U	No
Benzo[*a*]anthracene	N/A	0.86	U	No
Benzo[*a*]pyrene	N/A	0.33[b]	U	No
Benzo[*b*]fluoranthene	N/A	1.37	U	No
Benzo[*g,h,i*]perylene	N/A	2,400	U	No
Benzo[*k*]fluoranthene	N/A	1.37	U	No
Chrysene	N/A	9.56	U	No
Dibenz[*a,h*]anthracene	N/A	1.37	U	No
Fluoranthene	N/A	631	U	No
Fluorene	N/A	101	U	No
Indeno[*1,2,3-cd*]pyrene	N/A	1.37	U	No
Naphthalene	N/A	4.46	U	No
Phenanthrene	N/A	1,140	U	No
Pyrene	N/A	655	U	No
Anions				
Fluoride	N/A	16	U	No
Nitrate (as Nitrogen)	11.8	40	10.8	No
Total Petroleum Hydrocarbons				
Diesel	N/A	2,000	U	No
Kerosene	N/A	2,000	U	No

Volatile Organic Analytes				
Carbon Tetrachloride	N/A	0.005	U	No
Xylene	N/A	14.6	U	No

a. If Hanford Site-specific background data are not available, values are then taken from Ecology Publication 94-115, *Natural Background Soil Metals Concentrations in Washington State*. Hanford Site background values are available from nonradiological background data in DOE/RL-92-24, *Hanford Site Soil Background: Part 1, Soil Background for Nonradioactive Analytes*, Table D9-2.

b. Where cleanup levels are less than background or required detection limits (RDLs), cleanup levels default to background or RDLs in accordance with WAC 173-340-700(6)(d), "Model Toxics Control Act—Cleanup," "Overview of Cleanup Standards," and WAC 173-340-707(2), "Model Toxics Control Act—Cleanup," "Analytical Considerations," respectively.

c. Based on process knowledge, chromium (VI) is not expected to be present at 200-MG-1 OU waste sites. The following values are given to help guide cleanup:

- 0.2 mg/kg is the calculated value using Kd=0, based on PNNL-13895, Hanford Contamination Distribution Coefficient Database and Users Guide, and WAC 173-340-747, "Model Toxics Control Act—Cleanup," "Deriving Soil Concentrations for Groundwater Protection," equation 747-1.
- 2.1 mg/kg is based on DOE/RL-96-17, Remedial Design Report/Remedial Action Work Plan for the 100 Area.
- 18.4 mg/kg is based on Ecology, 2007, Cleanup Levels and Risk Calculations database.

N/A = not available

U = result is less than laboratory detection limit

5.2 Construction Quality Assurance/Quality Control

No construction related aspects were implemented as part of the selected alternative for the 216-S-26 and 200-W-148-PL waste sites; therefore, this section is not applicable.

5.3 Clean-up Verification Quality Assurance/Quality Control

A data quality assessment (DQA) review was performed to compare the sampling approach and analytical data with the sampling and data requirements specified by the SAP (DOE/RL-2009-60). This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use. The assessment review completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality process.

Level C data validation as defined in the contractor's validation procedures, which are based on EPA functional guidelines (for example, Bleyler, 1988a, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*; Bleyler, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*), was performed for the entire sampling and analysis data package for the samples collected for the 216-S-26 and 200-W-148-PL waste sites. Level C validation is a review of the QC data and specifically requires verification of deliverables and requested versus reported analyses and qualification of the results based on analytical holding times, method blank results, matrix spike/matrix spike duplicate, surrogate recoveries, duplicates, and analytical method blanks.Specific data quality objectives for the site are found in the SAP (DOE/RL-2009-60).

All of the sampling and analysis data generated from the sampling at the 216-S-26 and 200-W-148-PL waste sites are tracked through the Hanford Environmental Information System (HEIS). All of the sampling and analysis data for the 216-S-26 and 200-W-148-PL waste sites were found to be useable for decision making purposes as provided in the following summary:

HEIS Identification Numbers: B2F025, B2F026, B2F027, B2F028, B2F029, B2F031, B2F032, B2F033, B2F034, B2F035, B2F039, B2F040, B2F041, B2F042, B2F043, B2F045, B2F046, B2F047,

B2F048, B2F049, B2F053, B2F054, B2F055, B2F056, B2F057, B2F059, B2F060, B2F061, B2F062, B2F063, B2FDR1, B2FDR2, B2FDR3, B2FDR4, B2FDR5, B2FDR7, B2FDR8, BF2DR9, B2FDT0, B2FDT1, B2FBT1, B2FBT2, B2FBT3, B2FBT6, B2FBT7, B2FBT8, B2H1P6, and B2H1P7.

Blanks: Equipment blanks (B2F069 and B2FDT4) and field transfer blank (B2F067) were received intact to the laboratory and holding times were acceptable.

Field Duplicates: The duplicate (B2F030, B2F044, B2F058, and B2FDR6) result was acceptable.

Data Completeness: Analytical reports submitted for validation and verified for completeness based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100 percent. The data has been determined to be useable for decision making purposes. The final results, the narrative supporting the sampling analysis activities and findings, and copies of chains of custody were transmitted in letter reports from the laboratory.

Field Screening: Relative to analytical data in sample media, physical data, and/or field screening results are of lesser importance in making inferences of risk. Because of the secondary importance of such data, no validation for physical property data and/or field screening results was performed. However, field quality assurance (QA) and QC were reviewed to ensure that the data are useable. Field instrumentation, calibration, and QA checks were performed in accordance with the following:

- Calibration of radiological field instruments (such as Geiger-Müeller and portable alpha meters) on the Hanford Site is performed under contract by Pacific Northwest National Laboratory, as specified in their program documentation.
- Daily calibration checks are performed and documented for each instrument used in support of waste site sampling and investigation. These checks are made on standard materials that are sufficiently like the matrix under consideration, so a direct comparison of data can be made. Daily calibration checks of radiological field instruments were performed by trained and qualified radiological control technicians in accordance with established program requirements.

The review and approval of completed field radiation surveys by the radiological controls organization represent the data validation and usability review for handheld field radiological measurements.

The DQA review for the 216-S-26 and 200-W-148-PL waste sites found the analytical results to be accurate within the standard errors associated with the methods, including sampling and sample handling. The data are of the correct type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected because of QA/QC deficiencies. All analytical data were found acceptable for decision-making purposes. All of the sampling analytical data are stored in HEIS.

5.4 Regulatory Oversight

This document provides a summary of the removal action taken at the 216-S-26 and 200-W-148-PL waste sites; it shows a comparison of the data collected to RALs authorized in approved regulatory documents and provides the basis to reclassify the waste site status (see Section 9). Though this report does not require approval by Ecology or the EPA, concurrence of those agencies is necessary, under CERCLA Section 120 and the Tri-Party Agreement (Ecology et al., 1989), for determinations concerning follow-on remedial actions. This report is, therefore, provided to the agency (or agencies) for review, in accordance with the approval process for waste site reclassification, as supporting documentation. Upon approval of the waste site reclassification, a copy of this report will be maintained in the Administrative Record. No additional regulatory oversight was required for the sampling of the 216-S-26 and 200-W-148-PL waste sites.

6 Final Inspection and Certifications

There were no final inspections or certifications required in the implementation of the selected alternative for the 216-S-26 and 200-W-148-PL waste sites; therefore, this chapter is not applicable.

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7 Operations and Maintenance Activities

This chapter discusses operations and maintenance (O&M) for the 216-S-26 and 200-W-148-PL waste sites.

7.1 Remedy Related Operations and Maintenance or Monitoring

There are no O&M activities or monitoring requirements for the 216-S-26 and 200-W-148-PL waste sites; therefore, this section is not applicable.

7.2 Institutional Controls

Based on the analyses performed and presented in this report, there are no waste site specific institutional controls required at the 216-S-26 and 200-W-148-PL waste sites; therefore, this section is not applicable.

7.3 Five-Year Reviews

Five-year reviews are required by CERCLA for post-ROD remedial actions, but do not apply to the 216-S-26 and 200-W-148-PL waste sites. This waste site and the data obtained from the subject sampling evolutions will be included in the risk assessment and RI/FS for final remedial action of the Outer Area.

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8 Summary of Project Costs

For the purposes of reporting costs of removal action for the 216-S-26 and 200-W-148-PL waste sites, costs are prorated utilizing an activity/schedule-based methodology (Table 8-1). This method is not considered to be audit quality data. Actual costs for waste site cleanup will continue to be collected for each OU or closure area in accordance with the current cost tracking methodology. These costs will then be included, in accordance with CERCLA requirements, in the response action report for the final remedial action of the OU or closure area.

Table 8-1. Cost Summary

Cost Item	Actual Cost Fiscal Year 2010 ($)	Actual Cost Fiscal Year 2011 ($)	Actual Total Cost ($)
Removal Action Capital (Construction) Costs	0	0	0
Removal Action Operating Costs	123,242.18	620,876.91	744,119.09
Total Removal Action Cost	123,242.18	620,876.91	744,119.09
Projected Yearly Operations and Maintenance Cost	0	0	0

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9 Waste Site Reclassification

The waste site reclassification forms for the 216-S-26 and 200-W-148-PL waste sites are proposed and processed in accordance with the procedures and definitions described in RL-TPA-90-001, *Tri-Party Agreement Handbook Management Procedures,* Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System (WIDS).". Reclassification forms 2011-079 and 2011-080 for the 216-S-26 and 200-W-148-PL waste sites, respectively, propose that the status of these waste sites be changed to "interim closed out." Per TPA-MP-14, "interim closed out" status indicates that a site meets the cleanup standards specified in the approved 200-MG-1 Action Memorandum (DOE/RL-2009-86) (i.e., the interim response action decision document). These sites will be evaluated under the cleanup standards established in the final ROD for these areas.

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10 Observations and Lessons Learned

There were no observations or lessons learned applicable for inclusion in this report.

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Appendix A

Sampling Results for the 216-S-26 and 200-W-148-PL Waste Sites

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A1 Introduction

This appendix contains laboratory analytical results, provided in Tables A-1 through A-5, from the sampling conducted at the 216-S-26 and 200-W-148-PL waste sites. The following information is provided in the table headings: Hanford Environmental Information System (HEIS) identification numbers, field sample identifier, and sample depth. Surface samples are collected from approximately 0 to 0.3 m (0 to 1 ft) below the base of excavation.

Tables A-1 and A-2 provide analytical results for all radiological contaminants from samples collected during verification sampling at the 216-S-26 and 200-W-148-PL waste sites.

Tables A-3 and A-4 provide analytical results for all nonradiological contaminants from samples collected during verification sampling at the 216-S-26 and 200-W-148-PL waste sites. These areas were sampled for characterization purposes for future remediation efforts

Table A-5 provides analytical results from samples analyzed for tritium only, collected at 4.6, 4.9, 5.5, and 6.1 m (15, 16, 18, and 20 ft) bgs to document as-left conditions at the 216-S-26 and 200-W-148-PL waste sites, and to provide further characterization of the risk drivers to groundwater from tritium.

Table A-1. Analytical Results for Verification Sampling of Radiological Contaminants for the 216-S-26 Waste Site

Contaminant	Removal Action Levels [a]	Required Detection Limit (pCi/g)	Maximum Reported Laboratory Method Detection Limit (pCi/g)	Background Activity[b] (pCi/g)	HEIS B2F025 B2F039 B2FDR1 RV 1 Surface	HEIS B2F026 B2F040 B2FDR2 RV 2 Surface	HEIS B2F027 B2F041 B2FDR3 RV3 Surface	HEIS B2F028 B2F042 B2FDR4 RV 4 Surface	HEIS B2F029 B2F043 B2FDR5 RV 5 Surface	HEIS B2F031 B2F045 B2FDR7 RV 6 Surface	HEIS B2F032 B2F046 B2FDR8 RV 7 Surface	HEIS B2F033 B2F047 B2FDR9 RV 8 Surface
	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
Americium-241	31.1	1.0	0.071	N/A	0.023	0.018	0.036	U	U	0.025	U	U
Cesium-137	6.2	0.1	0.054	1.1	U	U	U	U	U	U	U	U
Cobalt-60	1.4	0.05	0.056[c]	0.008	U	U	U	U	U	U	U	U
Europium-152	3.3	0.1	0.16[c]	N/A	U	U	U	U	U	U	U	U
Europium-154	3	0.1	0.18[c]	0.033	U	U	U	U	U	0.18	U	U
Europium-155	125	0.1	0.22[c]	0.054	0.23	U	U	U	U	U	U	U
Plutonium-238	38.8	1.0	0.037	0.004	U	U	U	U	U	U	U	U
Plutonium-239/240	33.9	1.0	0.021	0.025	0.011	0.016	U	U	0.011	0.016	0.016	0.011
Strontium-90	4.5	1.0	0.55	0.18	U	0.5	0.58	0.48	1	1.1	1.1	1.2
Technetium-99	15	15	0.24	N/A	U	U	U	U	U	U	U	U
Tritium	30	30	9.85	N/A	22.7	45.5	20	22.8	15	44.4	34.4	54.9
Uranium-233/234	1.1	1.0	0.027	1.1	0.13	0.22	0.21	0.15	0.17	0.22	0.16	0.18
Uranium-235	0.5	0.5	0.023	0.11	0.011	U	U	0.01	0.013	U	0.016	0.017
Uranium-238	1.1	1.0	0.021	1.1	0.16	0.17	0.18	0.18	0.16	0.24	0.16	0.22

a. Removal action levels are from DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP).

b. Hanford Site background values for radiological background data are available from DOE/RL-96-12, *Hanford Site Background: Part 2, Soil Background for Radionuclides*, Table 4.

c. Maximum reported laboratory method detection limits were greater than the required detection limit per the RAWP; however, analytical results are below the established removal action levels and meet the corresponding removal action objectives.

N/A = not available

U = results is less than laboratory method detection limit

Table A-2. Analytical Results for Verification Sampling of Radiological Contaminants for the 200-W-148-PL Waste Site

Contaminant	Removal Action Levels [a]	Required Detection Limit (pCi/g)	Maximum Reported Laboratory Method Detection Limit (pCi/g)	Background Activity[b] (pCi/g)	HEIS B2F034 B2F048 B2FDT0 RV 9 Surface	HEIS B2F035 B2F049 B2FDT1 RV 10 Surface
	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
Americium-241	31.1	1.0	0.059	N/A	U	U
Cesium-137	6.2	0.1	0.045	1.1	U	U
Cobalt-60	1.4	0.05	0.052[c]	0.008	U	U
Europium-152	3.3	0.1	0.14[c]	N/A	U	U
Europium-154	3	0.1	0.15[c]	0.033	U	U
Europium-155	125	0.1	0.2[c]	0.054	U	U
Plutonium-238	38.8	1.0	0.024	0.004	U	U
Plutonium-239/240	33.9	1.0	0.011	0.025	0.012	U
Strontium-90	4.5	1.0	0.49	0.18	1.1	0.86
Technetium-99	15	15	0.22	N/A	U	U
Tritium	30	30	9	N/A	49	26.5
Uranium-233/234	1.1	1.0	0.011	1.1	0.14	0.15
Uranium-235	0.5	0.5	0.005	0.11	0.011	0.0095
Uranium-238	1.1	1.0	0.011	1.1	0.2	0.2

a. Removal action levels are from DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP).

b. Hanford Site background values for radiological background data are available from DOE/RL-96-12, *Hanford Site Background: Part 2, Soil Background for Radionuclides*, Table 4.

c. Maximum reported laboratory method detection limits were greater than the required detection limit per the RAWP; however, analytical results are below the established removal action levels and meet the corresponding removal action objectives.

N/A = not available

U = result is less than laboratory method detection limit

Table A-3. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 216-S-26 Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F011 B2F025 B2F039 B2F053 RV 1 Surface	HEIS B2F012 B2F026 B2F040 B2F054 RV 2 Surface	HEIS B2F013 B2F027 B2F041 B2F055 RV 3 Surface	HEIS B2F014 B2F028 B2F042 B2F056 RV 4 Surface	HEIS B2F015 B2F029 B2F043 B2F057 RV 5 Surface	HEIS B2F017 B2F031 B2F045 B2F059 RV 6 Surface	HEIS B2F018 B2F032 B2F046 B2F060 RV 7 Surface	HEIS B2F019 B2F033 B2F047 B2F061 RV 8 Surface
Metals	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Antimony	5.4	0.6	0.34	5	U	U	U	U	U	U	U	U
Arsenic	6.5[c]	1	0.46	6.5	3.68	3.62	4.8	5.72	4.15	5.29	3.8	5.95
Barium	1,650	2	0.23	132	92.4	74.4	99.8	117	114	121	119	113
Beryllium	63.2	0.5	0.11	1.51	0.392	0.337	0.364	0.508	0.292	0.481	0.24	0.401
Boron	210	2	0.57	N/A	0.924	0.616	0.6	U	U	U	U	U
Cadmium	0.81[c]	0.5	0.11	0.81	U	U	U	U	U	U	U	U
Chromium (Total)	2000	1	0.57	18.5	7.83	5.65	7.62	9.1	7.32	8.92	7.26	9.01
Chromium (VI)	N/A	0.5	0.04	N/A	0.067	0.0365	0.079	0.0804	0.0654	0.053	0.0513	0.103
Cobalt	15.7[c]	2	0.11	15.7	10.9	9.63	10.5	11.3	10.9	11.2	10.3	11.2
Copper	284	1	0.11	22	15.7	13.2	16.2	16.5	13.5	16.1	15.8	16.7
Lead	250	5	0.11	10.2	5.05	3.86	5.84	6.92	5.37	6.57	4.28	7.84
Lithium	160	2.5	0.61	33.5	6.49	6.19	5.07	8.84	7.12	8.5	6.31	8.07
Manganese	512[c]	5	0.11	512	401	342	404	443	422	429	368	396
Mercury	2.09	0.2	0.057	0.33	U	U	U	U	U	U	U	U
Nickel	130	4	0.23	19.1	12	10.1	11.1	11.1	9.51	11.1	9.39	11.3
Selenium	5.2	1	0.34	0.78	0.74	0.701	0.728	0.833	0.666	0.744	0.631	0.696
Silver	13.6	0.2	0.11	0.73	U	U	U	U	U	U	U	U
Strontium	2,920	1	0.11	N/A	25.9	23.8	30.1	34.9	32.1	33.1	27.4	33.3

Table A-3. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 216-S-26 Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F011 B2F025 B2F039 B2F053 RV 1 Surface	HEIS B2F012 B2F026 B2F040 B2F054 RV 2 Surface	HEIS B2F013 B2F027 B2F041 B2F055 RV 3 Surface	HEIS B2F014 B2F028 B2F042 B2F056 RV 4 Surface	HEIS B2F015 B2F029 B2F043 B2F057 RV 5 Surface	HEIS B2F017 B2F031 B2F045 B2F059 RV 6 Surface	HEIS B2F018 B2F032 B2F046 B2F060 RV 7 Surface	HEIS B2F019 B2F033 B2F047 B2F061 RV 8 Surface
Thallium	1.59	1	0.11	0.1	0.139	0.0992	0.121	0.139	0.114	0.121	U	0.12
Tin	48,000	10	0.11	N/A	0.517	0.483	0.457	0.479	0.457	0.47	0.441	0.455
Uranium	3.21[c]	1	0.11	3.21	0.612	0.565	0.681	0.71	0.591	0.785	0.615	0.774
Vanadium	560	2.5	0.23	85.1	75.3	77	68.9	64	69	61.3	71.2	68.2
Zinc	5970	1	0.91	67.8	52.9	49.8	51.1	54	51.3	54	53.8	53.4
Anions	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Fluoride	16	5	2.2	N/A	U	U	U	U	U	U	U	U
Nitrate-N	40	0.75	1.1[d]	11.8	1.51	1.65	U	1.69	U	2.44	1.74	2.11
Polynuclear Aromatic Hydrocarbons	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Acenaphthene	98	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Acenaphthylene	98	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Anthracene	2,270	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Benzo(a)anthracene	0.86	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Benzo(a)pyrene	0.33[c]	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Benzo(b)fluoranthene	1.37	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Benzo(k)fluoranthene	1.37	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Benzo(g,h,i)perylene	2,400	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Chrysene	9.56	0.33	0.2	N/A	U	U	U	U	U	U	U	U

Table A-3. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 216-S-26 Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F011 B2F025 B2F039 B2F053 RV 1 Surface	HEIS B2F012 B2F026 B2F040 B2F054 RV 2 Surface	HEIS B2F013 B2F027 B2F041 B2F055 RV 3 Surface	HEIS B2F014 B2F028 B2F042 B2F056 RV 4 Surface	HEIS B2F015 B2F029 B2F043 B2F057 RV 5 Surface	HEIS B2F017 B2F031 B2F045 B2F059 RV 6 Surface	HEIS B2F018 B2F032 B2F046 B2F060 RV 7 Surface	HEIS B2F019 B2F033 B2F047 B2F061 RV 8 Surface
Dibenzo(a,h)anthracene	1.37	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Fluoranthene	631	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Fluorene	101	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Indeno(1,2,3-cd)pyrene	1.37	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Naphthalene	4.46	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Phenanthrene	1,140	0.33	0.2	N/A	U	U	U	U	U	U	U	U
Pyrene	655	0.5	0.2	N/A	U	U	U	U	U	U	U	U
Polychlorinated Biphenyls	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Aroclor 1016	0.094	0.017	0.005	N/A	U	U	U	U	U	U	U	U
Aroclor 1221	0.017[c]	0.017	0.01	N/A	U	U	U	U	U	U	U	U
Aroclor 1232	0.017[c]	0.017	0.005	N/A	U	U	U	U	U	U	U	U
Aroclor 1242	0.039	0.017	0.005	N/A	U	U	U	U	U	U	U	U
Aroclor 1248	0.039	0.017	0.005	N/A	U	U	U	U	U	U	U	U
Aroclor 1254	0.066	0.017	0.005	N/A	U	U	U	U	U	U	U	U
Aroclor 1260	0.5	0.017	0.005	N/A	U	U	U	U	U	U	U	U
Volatile Organic Analytes	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Carbon Tetrachloride	0.005	0.005	0.001	N/A	U	U	U	U	U	U	U	U
Xylene	14.6	0.01	0.001	N/A	U	U	U	U	U	U	U	U

Table A-3. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 216-S-26 Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F011 B2F025 B2F039 B2F053 RV 1 Surface	HEIS B2F012 B2F026 B2F040 B2F054 RV 2 Surface	HEIS B2F013 B2F027 B2F041 B2F055 RV 3 Surface	HEIS B2F014 B2F028 B2F042 B2F056 RV 4 Surface	HEIS B2F015 B2F029 B2F043 B2F057 RV 5 Surface	HEIS B2F017 B2F031 B2F045 B2F059 RV 6 Surface	HEIS B2F018 B2F032 B2F046 B2F060 RV 7 Surface	HEIS B2F019 B2F033 B2F047 B2F061 RV 8 Surface
Total Petroleum Hydrocarbons	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Diesel	2,000	5	5	N/A	U	U	U	U	U	U	U	U
Kerosene	2,000	5	5	N/A	U	U	U	U	U	U	U	U

a. Removal action levels are from DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP).

b. If Hanford Site-specific background data are not available, values are then taken from Ecology Publication 94-115, *Natural Background Soil Metals Concentrations in Washington State*. Hanford Site background values are available in DOE/RL-92-24, Rev. 1, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* Table D39-2.

c. Where cleanup levels are less than background or required detection limits (RDLs), cleanup levels default to background or RDLs per Ecology Publication 94-06, *Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC*; WAC 173-340-700(6)(d), "Model Toxics Control Act—Cleanup," "Overview of Cleanup Standards;" and WAC 173-340-707(2), "Model Toxics Control Act—Cleanup," " Analytical Considerations," respectively.

d. Maximum reported laboratory method detection limits were greater than the RDL per the RAWP; however, analytical results are below the established removal action levels and meet the corresponding removal action objectives.

N/A = not available

U = result is less than laboratory method detection limit.

Table A-4. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 200-W-148-PL Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F020 B2F034 B2F048 B2F062 B2FDT0 RV 9 Surface	HEIS B2F021 B2F035 B2F049 B2F063 B2FDT1 RV 10 Surface
Metals	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Antimony	5.4	0.6	0.31	5	U	U
Arsenic	6.5[c]	1	0.41	6.5	4.97	5.04
Barium	1,650	2	0.2	132	95.7	112
Beryllium	63.2	0.5	0.1	1.51	0.339	0.301
Boron	210	2	0.51	N/A	U	1.01
Cadmium	0.81[c]	0.5	0.1	0.81	U	U
Chromium (Total)	2000	1	0.51	18.5	6.57	7.01
Chromium (VI)	N/A	0.5	0.036	N/A	0.0529	0.0524
Cobalt	15.7[c]	2	0.1	15.7	11	11.6
Copper	284	1	0.1	22	13.8	15
Lead	250	5	0.1	10.2	4.95	4.98
Lithium	160	2.5	0.54	33.5	6.72	4.95
Manganese	512[c]	5	0.1	512	391	427
Mercury	2.09	0.2	0.051	0.33	U	U
Nickel	130	4	0.2	19.1	8.94	9.58
Selenium	5.2	1	0.31	0.78	0.626	0.631
Silver	13.6	0.2	0.1	0.73	U	U
Strontium	2,920	1	0.1	N/A	27.4	29.7
Thallium	1.59	1	0.1	0.1	U	U
Tin	48,000	10	0.1	N/A	0.426	0.47
Uranium	3.21[c]	1	0.1	3.21	0.628	0.643
Vanadium	560	2.5	0.2	85.1	74	89.3
Zinc	5970	1	0.82	67.8	51.2	57.4
Anions	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**

Table A-4. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 200-W-148-PL Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F020 B2F034 B2F048 B2F062 B2FDT0 RV 9 Surface	HEIS B2F021 B2F035 B2F049 B2F063 B2FDT1 RV 10 Surface
Fluoride	16	5	1.9	N/A	U	U
Nitrate-N	40	0.75	1.0[d]	11.8	U	U
Polynuclear Aromatic Hydrocarbons	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Acenaphthene	98	0.33	0.2	N/A	U	U
Acenaphthylene	98	0.33	0.2	N/A	U	U
Anthracene	2,270	0.33	0.2	N/A	U	U
Benzo(a)anthracene	0.86	0.33	0.2	N/A	U	U
Benzo(a)pyrene	0.33[c]	0.33	0.2	N/A	U	U
Benzo(b)fluoranthene	1.37	0.33	0.2	N/A	U	U
Benzo(k)fluoranthene	1.37	0.33	0.2	N/A	U	U
Benzo(g,h,i)perylene	2,400	0.33	0.2	N/A	U	U
Chrysene	9.56	0.33	0.2	N/A	U	U
Dibenzo(a,h)anthracene	1.37	0.33	0.2	N/A	U	U
Fluoranthene	631	0.33	0.2	N/A	U	U
Fluorene	101	0.33	0.2	N/A	U	U
Indeno(1,2,3-cd)pyrene	1.37	0.33	0.2	N/A	U	U
Naphthalene	4.46	0.33	0.2	N/A	U	U
Phenanthrene	1,140	0.33	0.2	N/A	U	U
Pyrene	655	0.5	0.2	N/A	U	U
Polychlorinated Biphenyls	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Aroclor 1016	0.094	0.017	0.004	N/A	U	U
Aroclor 1221	0.017[c]	0.017	0.009	N/A	U	U
Aroclor 1232	0.017[c]	0.017	0.004	N/A	U	U
Aroclor 1242	0.039	0.017	0.004	N/A	U	U

Table A-4. Analytical Results for Verification Sampling of Nonradiological Contaminants for the 200-W-148-PL Waste Site

Contaminant	Removal Action Levels[a]	Required Detection Limit	Maximum Reported Laboratory Method Detection Limit	Background Concentration[b]	HEIS B2F020 B2F034 B2F048 B2F062 B2FDT0 RV 9 Surface	HEIS B2F021 B2F035 B2F049 B2F063 B2FDT1 RV 10 Surface
Aroclor 1248	0.039	0.017	0.004	N/A	U	U
Aroclor 1254	0.066	0.017	0.004	N/A	U	U
Aroclor 1260	0.5	0.017	0.004	N/A	U	U
Volatile Organic Analytes	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Carbon Tetrachloride	0.005	0.005	0.001	N/A	U	U
Xylene	14.6	0.01	0.001	N/A	U	U
Total Petroleum Hydrocarbons	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
Diesel	2,000	5	4	N/A	U	U
Kerosene	2,000	5	4	N/A	U	U

a. Removal action levels are from DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit* (RAWP).

b. If Hanford Site-specific background data is not available, values are then taken from Ecology Publication 94-115, *Natural Background Soil Metals Concentrations in Washington State*. Hanford Site background values are available in DOE/RL-92-24, Rev. 1, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* Table D39-2.

c. Where cleanup levels are less than background or required detection limits (RDLs), cleanup levels default to background or RDLs per Ecology Publication 94-06, *Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC*; WAC 173-340-700(6)(d), "Model Toxics Control Act—Cleanup," "Overview of Cleanup Standards;" and WAC 173-340-707(2), "Model Toxics Control Act—Cleanup," "Analytical Considerations," respectively.

d. Maximum reported laboratory method detection limits were greater than the RDL per the RAWP; however, analytical results are below the established removal action levels and meet the corresponding removal action objectives.

N/A = not available

U = result is less than laboratory method detection limit.

Table A-5. Analytical Results for Characterization Sampling for Tritium for the 216-S-26 and 200-W-148-PL Waste Sites

Contaminant	Removal Action Levels [a]	Required Detection Limit (pCi/g)	Maximum Reported Laboratory Method Detection Limit (pCi/g)	Background Activity[b] (pCi/g)	HEIS B2H1P6 RV 9 4.6 m (15 ft)	HEIS B2H1P7 RV 6 4.6 m (15 ft)	HEIS B2FBT1 RV 8 IP 1 4.9 m (16 ft)	HEIS B2FBT2 RV 8 IP 2 5.5 m (18 ft)	HEIS B2FBT3 RV 8 IP 3 6.1 m (20 ft)	HEIS B2FBT6 RV 2 IP 4 4.9 m (16 ft)	HEIS B2FBT7 RV 2 IP 5 5.5 m (18 ft)	HEIS B2FBT8 RV 2 IP 6 6.1 m (20 ft)
	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
Tritium	30	30	12.7	N/A	U	U	U	16.0	13.7	U	U	U

a. Removal action levels are from DOE/RL-2009-53, *Removal Action Work Plan for 48 Waste Sites in the 200-MG-1 Operable Unit.*

b. Hanford Site background values for radiological background data are available from DOE/RL-96-12, *Hanford Site Background: Part 2, Soil Background for Radionuclides*, Table 4.

N/A = not available

U = result is less than laboratory method detection limit

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