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MAY 17 2012

Mr. D. A. Faulk, Program Manager
Office of Environmental Cleanup
Hanford Project Office
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Dear Mr. Faulk:

TRANSMITTAL OF THE 100-F/IU-2/IU-6 AREA – SEGMENT 3 INTERIM REMEDIAL ACTION REPORT, DOE/RL-2012-14, REVISION 0

Attached for your use is the “100-F/IU-2/IU-6 Area – Segment 3 Interim Remedial Action Report,” DOE/RL-2012-14, Rev. 0. If you have questions, please contact me or your staff may contact Ellwood Glossbrenner, of my staff, at (509) 376-5828.

Sincerely,

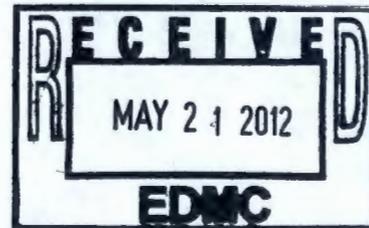
Catherine Louis for
Mark S. French, Federal Project Director
for the River Corridor Closure Project

AMRC:ETG

Attachment

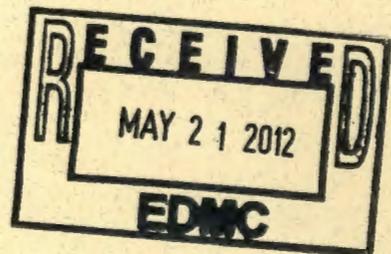
cc: w/attach:
C. J. Guzzetti, EPA
Administrative Record, H6-08

cc: w/o attach:
R. D. Cantwell, WCH
S. L. Feaster, WCH
C. H. Page, WCH
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DOE/RL-2012-14
Rev. 0

100-F/IU-2/IU-6 Area – Segment 3 Interim Remedial Action Report



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4/11/2012

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100-F/IU-2/IU-6 Area – Segment 3 Interim Remedial Action Report

April 2012



United States Department of Energy

P.O. Box 550, Richland, Washington 99352

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ACRONYMS AND ABBREVIATIONS

CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
COC	contaminant of concern
COPC	contaminant of potential concern
CVP	cleanup verification package
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
FS	feasibility study
NPL	National Priorities List
OU	operable unit
RAG	remedial action goal
RAO	remedial action objective
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RDR/RAWP	remedial design report/remedial action work plan
RI	remedial investigation
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
RTD	remove, treat, and dispose
SAP	sampling and analysis plan
Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
WAC	<i>Washington Administrative Code</i>
WIDS	Waste Information Data System
WSRF	waste site reclassification form

1.0 INTRODUCTION

The Hanford Site is a 1,517-km² (586-mi²) federal facility located in southeastern Washington State along the Columbia River (Figure 1-1). From 1943 to 1990, the primary mission of the Hanford Site was the production of nuclear materials for national defense. In 1989, the 100 Area was one of four areas at the Hanford Site placed on the National Priorities List (NPL) under the authority of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986*. In 1990 the mission of the Hanford Site changed from producing nuclear materials to cleaning up residual radioactive and hazardous wastes.

The River Corridor is a subset of the Hanford Site that encompasses approximately 570 km² (220 mi²) adjacent to the Columbia River. In 2007, the River Corridor was divided into six geographic areas, commonly referred to as decision areas, to organize the remedial investigation/feasibility study (RI/FS) process for the River Corridor and support development of six final action records of decisions (RODs). These decision areas encompass both the 100 Area and 300 Area NPL sites. Each of the areas includes source and groundwater operable units (OUs). These include the 100-B/C Area, 100-K Area, 100-D/H Areas, 100-N Area, 300 Area, and the 100-F/IU-2/IU-6 Area. The 100-F/IU-2/IU-6 Area includes the 100-FR-1, 100-FR-2, 100-IU-2, and 100-IU-6 OUs and separate sub-areas referred to as segments (Figure 1-2). This report focuses on 100-F/IU-2/IU-6 – Segment 3, hereafter referred to as “Segment 3.”

1.1 PURPOSE AND SCOPE

Interim remedial actions in Segment 3 have been implemented to mitigate potential impacts from hazardous chemical and radioactive releases to the soil column. This report has been prepared in accordance with U.S. Environmental Protection Agency (EPA) guidance in OSWER Directive 9320.2-22, *Close Out Procedures for National Priorities List Sites*, and documents cleanup actions performed on the Hanford Site. The report is a remedial action report that is being prepared to document the remedial actions that were conducted under interim action RODs and is not associated with interim remedial action reports that are generally used to document long-term remedies where it is anticipated that remedial action objectives (RAOs) will be achieved over a long period of time. This report also provides a summary of the background and history of the Hanford Site (inclusive of Segment 3), construction information, and performance data.

Figure 1-1. Hanford Site Location Map.

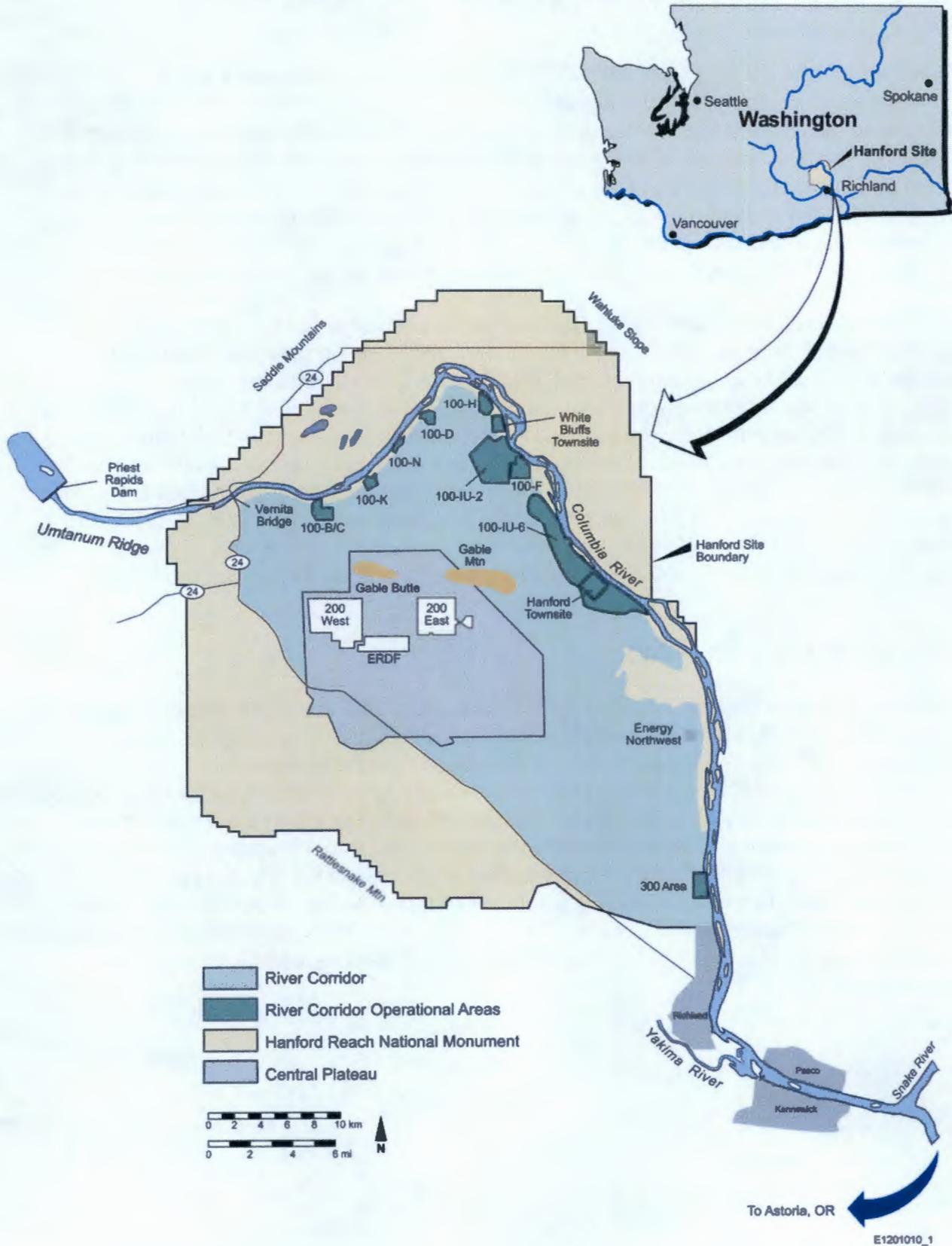
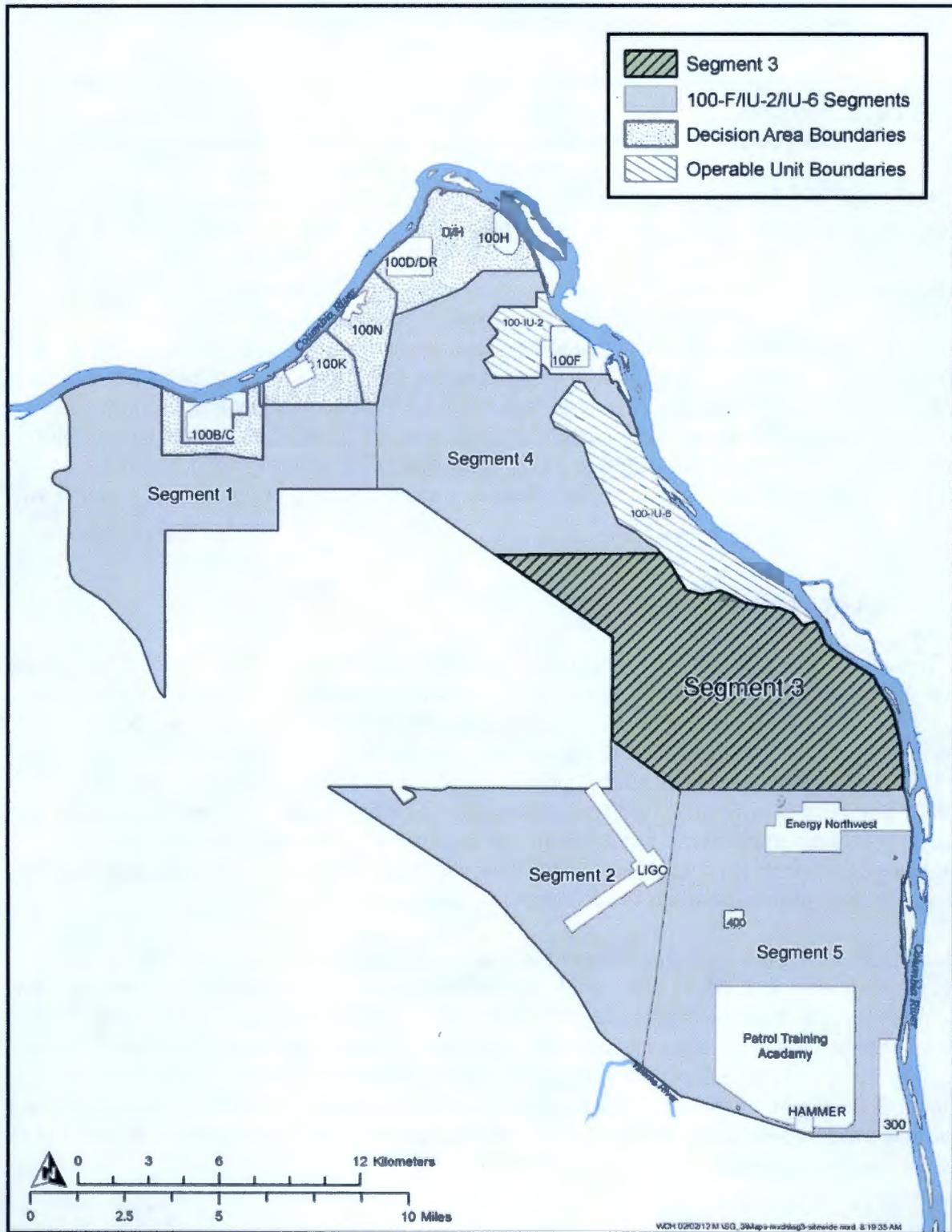


Figure 1-2. 100-F/IU-2/IU-6 Area Segments.



Introduction

Information provided herein presents input for future decision making, and evaluation of technology. This report addresses the Segment 3 waste sites identified in the following decision documents, where RAOs and remedial action goals (RAGs) have been achieved:

- EPA, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*
- EPA, 2000, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington.*

If new sites are identified, the 2009 *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (EPA 2009) authorized that newly discovered waste sites in OUs included in the Remaining Sites ROD that meet the ROD requirements for plug-in or candidate sites should proceed in accordance with the provisions stated in the EPA 2009 ESD without publication of an additional ESD. Additions of plug-in and candidate sites are documented in the Hanford Site Administrative Record and published in a U.S. Department of Energy (DOE), Richland Operations Office (RL)-issued annual fact sheet that identifies the plug-in and candidate waste sites.

1.2 100-F/IU-2/IU-6 SEGMENT 3

The Segment 3 area is located in the southeasternmost portion of the 100-F/IU-2/IU-6 Area and covers approximately 9,908 ha (24,483 ac). As shown in Figure 1-2, Segment 3 is part of the larger 100-F/IU-2/IU-6 geographical area within the River Corridor and does not contain any historical reactor or operational areas. In contrast to reactor/operational areas, the 100-F/IU-2/IU-6 Area segments consist primarily of areas that have no known Hanford Site-related or Manhattan Project-defined areas where past operations occurred except for several military anti-aircraft batteries and encampments. There are no documented or organized waste burial practices, limited below-grade engineered systems and underground piping, and no liquid disposal areas such as ponds and retention basins.

Historical activities that typically occurred within the Segment 3 area prior to 1943 (pre-Hanford) were limited, as indicated by a small number of debris features and two concrete structures that may have been associated with livestock activity. No apparent farming (i.e., row crops and orchards) occurred in this area probably due to poor soil conditions, which primarily consist of loose dry sands associated with dune formations that are prevalent in Segment 3. No railroad features were located in Segment 3 prior to 1943; a railroad line was constructed through Segment 3 after 1943 to support Hanford Site operations. Segment 3 also does not contain any areas of past military activity.

Introduction

1.3 ENVIRONMENTAL SETTING

The Hanford Site is located within the semiarid Pasco Basin in the northern portion of the Columbia Plateau. Average annual precipitation on the Hanford Site is 16 cm.

PNL-10285, *Estimated Recharge Rates at the Hanford Site*, estimated 2.6 to 17.3 mm/yr recharge in the 100 Area.

The 100 Area is located in the northern part of the Hanford Site along the south shore of the Columbia River. The topography within the 100-F/IU-2/IU-6 segments varies widely from relatively flat with areas of sand dunes to large land features that include Gable Butte and Gable Mountain. These features are the highest land forms within the Hanford Site, rising approximately 60 m (200 ft) and 180 m (590 ft) above surrounding land, respectively (DOE/RL-2008-46-ADD4, *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan Addendum 4: 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units*). The landscape is dominated by a semiarid (steppe) environment with a sparse covering of cold-desert shrubs and drought-resistant grasses.

Bedrock beneath the site is basalt of the Columbia River Basalt Group. The top of the basalt in the 100 Areas ranges in elevation from 46 m above sea level near the 100-H Area to 64 m below sea level near the 100-B/C Area (DOE/RL-2008-46-ADD4). The Ringold Formation and Hanford formation cover the basalt throughout the 100 Area. These units are dominated by poorly consolidated, river-deposited, well-drained sands, gravels, cobbles, and boulders. The Ringold Formation is an interstratified sequence of unconsolidated clay, silt, sand, and gravel-to-cobble gravel deposited by the ancestral Columbia River. The Hanford formation (informal designation) consists of uncemented gravels, sands, and silts deposited by Pleistocene cataclysmic flood waters. Groundwater from the Hanford Site discharges to the Columbia River, the dominant surface-water body of the Hanford Site. The uses of the Columbia River include the production of hydroelectric power, irrigation, drinking water, recreation (i.e., hunting and fishing), and natural resources.

Groundwater across the northern part of the 100-F/IU-2/IU-6 Area flows northward between the Gable Mountain and Gable Butte gap, and then towards the river. In the southern part of the 100-F/IU-2/IU-6 Area, the groundwater flows to the east towards the river (DOE/RL-2008-46-ADD4).

2.0 100-F/IU-2/IU-6 AREA - SEGMENT 3 BACKGROUND

In contrast to the reactor/operational areas of the River Corridor, the 100-F/IU-2/IU-6 Area segments consist primarily of land that has limited Hanford Site-related or Manhattan Project-defined areas where past operations occurred, except for several military batteries and encampments. There are no documented or organized waste burial practices, limited below-grade engineered systems and underground piping, and no liquid disposal areas such as ponds or retention basins.

2.1 INTEGRATION WITH CERCLA CLEANUP ACTIONS

Source OU cleanup actions in the River Corridor are performed in accordance with several interim action RODs that provide a regulatory framework, establish cleanup objectives, and identify selected remedies. New waste sites identified and accepted in the Waste Information Data System (WIDS) as waste sites by the Tri-Parties (DOE, EPA, and Washington State Department of Ecology [Ecology]) may be added to the interim action ROD as “plug-in” sites to the 2009 *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (EPA 2009) if they meet the criteria for ROD sites for subsequent characterization and determination for additional remedial action.

2.2 REMEDIAL ACTION DECISIONS

In order to expedite the decision-making process to allow cleanup to begin as soon as possible, in 1991, the Tri-Parties adopted a “bias-for-action” approach for the remediation of the Hanford Site called the *Hanford Past-Practice Strategy* (DOE/RL-91-40). The “Past Practice Strategy” streamlined the RI/FS process for contaminated waste sites to allow remediation to begin earlier than is typically allowed under the traditional CERCLA process. The decision documents authorizing remediation for the 600-23, “Dumping Area Within Gravel Pit #11” waste site in Segment 3 include the following.

- EPA, 1999, *Interim Action Record of Decision for the 100-B/C-1, 100-B/C-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1 and 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*
- EPA, 2000, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*.

The decision documents described above also direct remedial action at waste sites within other 100 Area OUs. However, this report only documents remedial actions completed for the 600-23 waste site along with a discussion of three other waste sites addressed as either “not accepted” or “no action” located in Segment 3.

100-F/IU-2/IU-6 Area - Segment 3 Background

A classification of "not accepted" indicates that an assessment of the waste site was conducted and a determination was made that the site did not meet the criteria of a waste management unit. Candidate sites confirmed not to exceed the RAGs for any constituents are reclassified as "no action" or "rejected" (based on quantitative or qualitative data, respectively) per the waste site reclassification guidelines identified in RL-TPA-90-0001, *Tri-Party Agreement Handbook Management Procedures*, Guideline Number TPA-MP-14, "Maintenance of the Waste Information Data System [WIDS]". Regulator approval is documented on a waste site reclassification form (WSRF), which is accompanied by a regulator-reviewed site-specific informal report discussing the reasons and justification for reclassification. The WIDS database serves as formal notification to the public that the site is no longer a candidate for remedial action and does not exceed RAGs and RAOs established in the Remaining Sites ROD (EPA 1999).

Upon demonstration that the RAGs in the applicable interim action ROD have been attained for a given waste site, the status of the waste site is reflected on a WSRF. In cases where a waste site is shown to meet the RAOs without any remedial actions, it is reclassified in WIDS from an "accepted" to a "no action" site. If a waste site meets the RAGs and RAOs specified in an interim action ROD following remedial actions, then the site is reclassified as "interim closed out." The use of the term "close out" in this context referring to individual waste sites should not be confused with the "close out reports" used for deleting NPL sites (OSWER Directive 9320.2-22).

A total of four waste sites in Segment 3 are specifically identified in the scope of this report and are described in Table 2-1. The locations of the Segment 3 waste sites are shown in Figure 2-1.

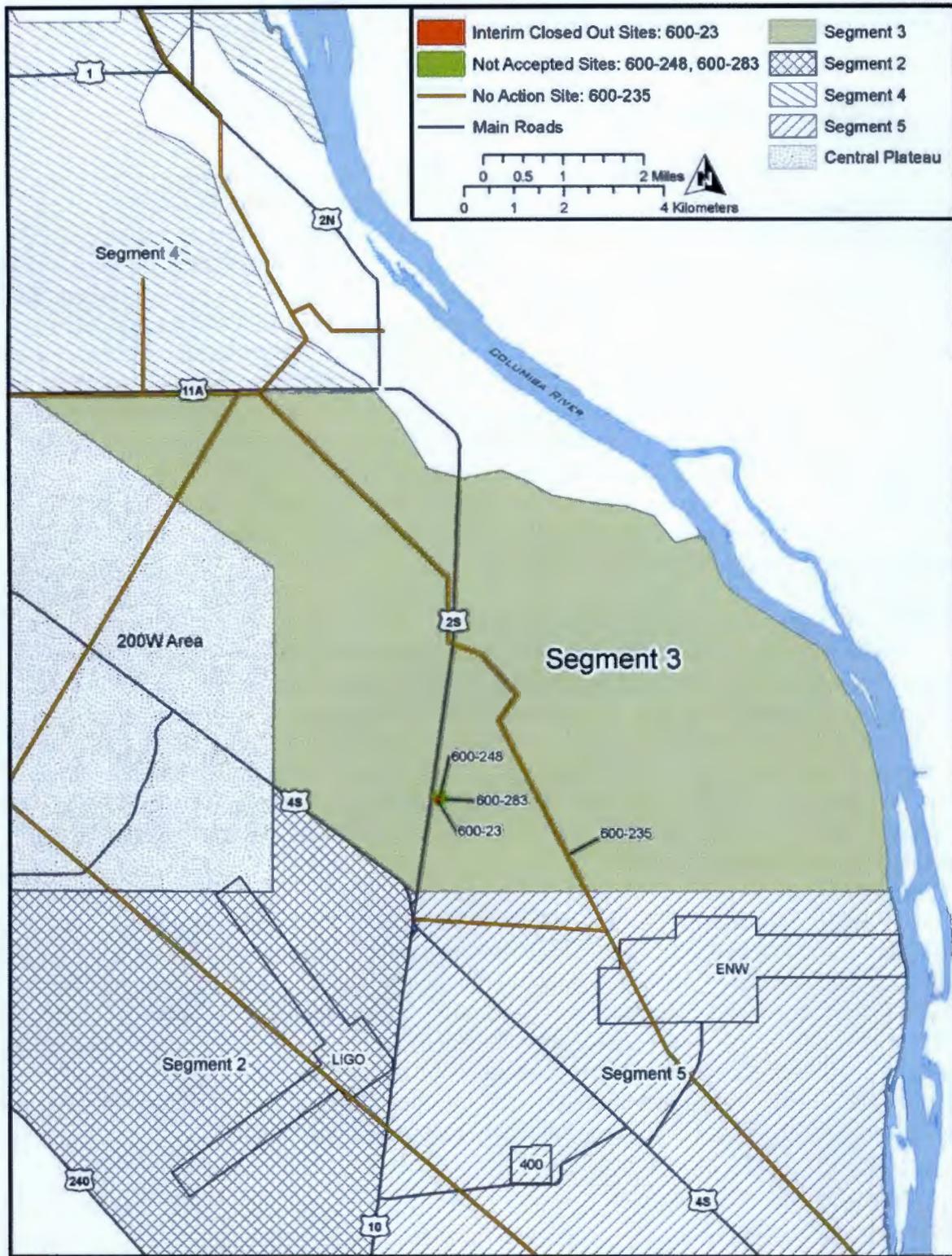
Table 2-1. 100-F/IU-2/IU-6 Segment 3 Waste Sites.

WIDS Site Code	WIDS Site Name	WIDS Site Reclassification Status	Decision Document
600-23	Dumping Area Within Gravel Pit #11	Interim Closed Out	EPA 2000
600-235	Buried Lead-Sheathed Telephone Cables	No Action	NA
600-248	Gravel Pit #11	Not Accepted	NA
600-283	Suspect Buried Equipment in Gravel Pit #11	Not Accepted	NA

NA = not applicable. Per regulatory decision, "No Action," "Not Accepted," or "Rejected" sites are not included in decision documents.

WIDS = Waste Information Data System

Figure 2-1. 100-F/IU-2/IU-6 Segment 3 Waste Sites.



In parallel with continuing the cleanup actions in other parts of the River Corridor as outlined in the existing interim action RODs, the Tri-Parties are conducting the RI/FS process to develop final action cleanup decisions for the River Corridor.

2.3 EXPOSURE AND LAND-USE ASSUMPTIONS

The reasonably anticipated land use is important in CERCLA remedial actions in determining the appropriate extent of remediation. Future land use affects the types and frequency of exposures to residual contamination for both human and ecological receptors, thereby influencing the amount of cleanup needed. Decisions on future land use at the Hanford Site had not been made at the time most of the interim action RODs for the 100 Area were issued. In the absence of such decisions, an assumption of “unrestricted use” was used for the 100 Area to select a cleanup remedy and establish cleanup goals, such that future use of the land would not be precluded by contamination left from past Hanford Site operations. The 100 Area cleanup scenario to attain unrestricted use was subsequently confirmed to be consistent with the land-use plan developed in the “Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS), Hanford Site, Richland, Washington; Record of Decision (ROD)” (64 *Federal Register* 61615). Unrestricted surface use was represented by a rural-residential scenario. The interim action RODs stated that remediation to this scenario would also be protective of ecological receptors in the 100 Area.

Under the 100 Area unrestricted surface use scenario represented by an individual in a rural-residential setting, a human living in the remediated areas is conservatively assumed to consume crops raised in a backyard garden, meat and milk from locally raised livestock, and meat from game animals and fish. The following exposure pathways are used to consider estimated dose from radionuclides in soil: inhalation; soil ingestion; ingestion of crops, meat, fish, drinking water, and milk; and external gamma exposure. Unrestricted land-use cleanup levels for chemicals or nonradionuclides are based on *Washington Administrative Code* (WAC) 173-340-740(3). The exposure pathway for residual nonradiological contamination is from ingestion of contaminated soil.

The final ROD for the 100-F/IU-2/IU-6 Area will incorporate prevailing exposure and land-use assumptions through an RI/FS. The RI/FS will incorporate applicable or relevant and appropriate requirements contained in prevailing guidance and regulations to support final remedial action decisions that are protective of human health and the environment. As a result, the assumptions that serve as the basis for establishing cleanup goals in the final ROD may be different from those reflected in the interim action RODs. Section 5.2 provides additional discussion on the final remedial action decisions for the River Corridor OUs. Once final RAOs have been met for the OU, a final remedial action report will be prepared.

100-F/IU-2/IU-6 Area - Segment 3 Background

2.4 REMEDIAL ACTION REQUIREMENTS

Implementation of remedial actions at the Segment 3 waste sites in accordance with interim action RODs required implementation of the selected cleanup remedy to address actual or threatened releases.

The major components of the selected remedy, “remove, treat as required, and dispose” (RTD), include the following:

- Planning and implementation of the remedial action according to an approved remedial design report/remedial action work plan (RDR/RAWP) document
- Stockpiling uncontaminated overburden and use for backfilling excavations when feasible
- Removing contaminated soil, structures, and associated debris
- Disposing of contaminated materials at the Hanford Site’s Environmental Restoration Disposal Facility (ERDF); the Waste Isolation Pilot Plant in Carlsbad, New Mexico; or other disposal facilities approved in advance by the EPA
- Treatment, as necessary, to meet waste acceptance criteria at an acceptable disposal facility
- Recontouring and backfilling of excavated areas and restoring viable habitat by revegetating the impacted area
- Identifying institutional controls to prevent exposure to contamination by limiting land or resource uses if needed
- Demonstrating that residual contamination concentrations are protective of humans and the environment.

As outlined in the 100 Area interim action RODs, RAOs are met by implementing the selected remedy with an “observational approach.” The observational approach consists of two main steps: compilation of available data and the “characterize-and-remediate-in-one-step” methodology. The first step relies on recorded information from historical process operations and information from investigations addressing the nature and extent of contamination. This initial step of characterization is a prerequisite task to field remediation and used to develop an initial understanding of site conditions. The second step of the observational approach proceeds with characterization (i.e., sampling and analysis) and RTD as needed. The candidate waste sites identified in the Remaining Sites ROD do not proceed to RTD if confirmatory sampling for pre-remediation characterization demonstrates that the waste site conditions meet RAGs.

Remove, treat, and dispose of the 600-23 “Dumping Area Within Gravel Pit #11” waste site in Segment 3 involved removing clean and contaminated soils, debris, and anomalous waste present within the site boundaries. The materials exposed during excavation are monitored for

100-F/IU-2/IU-6 Area - Segment 3 Background

radiological and hazardous constituents as defined in DOE/RL-96-22, *100 Area Remedial Action Sampling and Analysis Plan* (100 Area SAP). During remediation of known dump sites or burial grounds, extra measures are taken for materials to be sorted for waste disposition. During excavation, soils are monitored for both radiological and chemical constituents. Activities are guided during excavation from data obtained by the in situ analytical system or in-process sampling using quick-turnaround laboratory analyses working concurrently with excavation.

Upon completion of remediation at each waste site, cleanup verification sampling and analyses are performed to verify attainment of cleanup criteria for all contaminants of concern (COCs) and contaminants of potential concern (COPCs). If analytical results indicate that cleanup criteria have not been achieved, then excavation will resume with appropriate analyses as guidance. Remediation proceeds until it can be demonstrated through a combination of field screening, in-process sampling, and verification sampling that cleanup goals have been achieved.

In focused sampling, process knowledge and professional judgment are used to limit the number of samples from a site and focus sample collection on locations that are expected to have the highest contamination levels. The subsequent evaluation is based on maximum values. Statistical sampling uses composite values and summary statistics for decision making. Based on experience to date, focused sampling is often appropriate for confirmatory sampling at remaining candidate sites, whereas statistical sampling is most often used at radioactive liquid effluent sites and remaining sites that require remedial action.

Specific RAOs associated with the selected remedy and the method for achieving the objectives through 100 Area remedial actions are discussed in the DOE/RL-96-17, *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (100 Area RDR/RAWP), and summarized in Table 2-2.

2.5 ESTIMATED COST

A cost estimate was published in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (EPA 2000) for implementation of the selected RTD remedy of the 600-23 waste site. The costs for remediation and disposal were estimated in present-value costs at \$938,000.

2.6 REMEDIAL DESIGN SUMMARY

The general design and approach for remediation of the Segment 3 waste sites is documented in the 100 Area RDR/RAWP (DOE/RL-96-17). The 100 Area RDR/RAWP describes the approach employed to remediate the Segment 3 and other waste sites. The 100 Area RDR/RAWP was prepared as specified in the 100 Area interim action RODs.

Table 2-2. Segment 3 Cleanup Objectives.

Remedial Action Objective	100 Area Compliance Methods
<p>Protect human and ecological receptors from exposure to contaminants in soils, structures, and debris by dermal exposure; inhalation; or ingestion of inorganics, or organics.</p>	<p>Achieved through excavation to State of Washington "Model Toxics Control Act – Cleanup" (WAC 173-340) levels for organic and inorganic chemical constituents in soil to support unrestricted (residential) use.</p>
<p>Control the sources of groundwater contamination to minimize the impacts to groundwater resources, protect the Columbia River from further adverse impacts, and reduce the degree of groundwater cleanup that may be required under future actions.</p>	<p>Contaminant levels in soil after remediation do not result in an adverse impact to groundwater that could exceed any nonzero maximum contaminant level goals under the <i>Safe Drinking Water Act of 1974</i> or Method B cleanup levels under WAC 173-340, "Model Toxics Control Act – Cleanup."</p> <p>Contaminants levels in the soil after remediation do not result in an impact to groundwater and the Columbia River that could exceed the ambient water quality criteria under the <i>Clean Water Act of 1977</i> for protection of fish or Method B cleanup levels under WAC 173-340, "Model Toxics Control Act – Cleanup."</p> <p>The protection of receptors (aquatic species, with emphasis on salmon) in surface waters will be achieved by reducing or eliminating further contaminant loadings to groundwater such that receptors at the groundwater discharge in the Columbia River are not subject to any additional adverse risks.</p>

WAC = Washington Administrative Code

3.0 CHRONOLOGY OF EVENTS

A chronology of major events associated with interim remedial action for the sites within Segment 3 is presented in Table 3-1. The chronology includes infrastructure documents, initiation and completion of field operations, and issuance of cleanup verification documents and WSRFs. A summary of the events by waste site is depicted in Figure 3-1.

Table 3-1. Segment 3 Interim Action Chronology.

Date	Event
1999	<i>Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County Washington (Interim Action ROD) (EPA 1999)</i> MP-14 Form for 600-248 signed as "Not Accepted" waste site
2000	<i>Explanation of Significant Difference for the 100 Area Remaining Site Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2000)</i>
2001	<i>100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, Rev. 3)</i> <i>Remedial Design Report/Remedial Action Work Plan for the 100 Area (DOE/RL-96-17, Rev. 3)</i> Excavation operations initiated and completed at the 600-23 waste site Verification sampling, regrading, and revegetation at the 600-23 waste site <i>Cleanup Verification Package for the 600-23 Dumping Area (CVP-2001-00020)</i>
2004	Confirmatory sampling conducted at the 600-235 waste site
2005	<i>Waste Site Reclassification Form 2001-091 for 600-235 Buried Lead-Sheathed Telephone Cables</i>
2010	MP-14 Form for 600-283 signed as "Not Accepted" waste site

DOE-RL = U.S. Department of Energy, Richland Operations Office
EPA = U.S. Environmental Protection Agency
ROD = record of decision
WCH = Washington Closure Hanford

Figure 3-1. Summary of Major Segment 3 Interim Action Events.



4.0 REMEDIATION ACTIVITY SUMMARY

Field operations supporting remedial actions in Segment 3 began and were completed in 2001. The cleanup actions resulted in the disposal of approximately 16,330 metric tons (18,000 US tons) of contaminated soil and debris at ERDF from Segment 3. Summaries of the remedial action approach and waste disposal activities for the 600-23 "Dumping Area Within Gravel Pit #11" waste site are presented in Tables 4-1 and 4-2, respectively. Table 4-3 lists sites that were not accepted as waste sites, did not require remedial action, or were rejected as waste sites. Detailed information about each waste site and related remediation activities is presented in the following subsections. Waste site locations are shown in Figure 2-1.

Table 4-1. Remedial Action Approach.

WIDS Site Code	Site Type	WIDS Site Name and Aliases	Excavation Approach	Personal Protective Equipment
600-23	Dumping area	Dumping Area Within Gravel Pit #11	Stockpile, sort, loadout ^a	Level D ^a

^a Information was not available. The excavation approach and/or personal protective equipment used during waste site remediation were assumed based on analogous waste site approaches.

WIDS = Waste Information Data System

Table 4-2. Environmental Restoration Disposal Facility Waste Disposal Summary for Segment 3.

WIDS Site Code	Site Type	Mass of Contaminated Soil/Debris Removed (Direct Disposal) (US tons)	Hazardous or Mixed Soil (Stabilization) (US tons)	Hazardous or Mixed Debris (Macroencapsulation) (US tons)	Total Mass Disposed to ERDF ^a (US tons)
600-23	Dumping area	18,000	0	0	18,000
Totals		18,000	0	0	18,000

^a Identified waste quantities were obtained from cleanup verification packages or the Waste Management Information System.

ERDF = Environmental Restoration Disposal Facility

WIDS = Waste Information Data System

Remediation Activity Summary

Table 4-3. Disposition of 100-F/IU-2/IU-6 Segment 3 Waste Sites.

WIDS Site Code	WIDS Site Name	WIDS Site Reclassification Status	Decision Document
600-23	Dumping Area Within Gravel Pit #11	Interim Closed Out	EPA 2000
600-235	Buried Lead-Sheathed Telephone Cables	No Action	NA
600-248	Gravel Pit #11	Not Accepted	NA
600-283	Suspect Buried Equipment in Gravel Pit #11	Not Accepted	NA

NA = not applicable. Per regulatory decision, "No Action," "Not Accepted," or "Rejected" sites are not included in decision documents.

WIDS = Waste Information Data System

4.1 600-23, DUMPING AREA WITHIN GRAVEL PIT #11

4.1.1 History

The 600-23 site is located north of the Wye Barricade, just to the east of Route 2 South. This area is in the east-central part of the Hanford Site and is approximately 4.9 mi (7.9 km) from the Columbia River. It is a former dump site used for the disposal of construction debris, equipment, and drums. The east, southeast, and southwest portions of the pit were used for dumping, and the northeast portion of the site has been used as a gravel backfill material source.

4.1.2 Excavation Operations

Remedial began on February 1, 2001. Approximately 16,330 metric tons (18,000 US tons) of material were excavated from the 600-23 site and transported to ERDF for disposal. In addition, approximately 60 drums of tar/asphaltic-like material were removed and sent to an offsite facility for treatment and disposal. Material excavated from the site included soil, concrete, equipment (1706-KE laboratory material), drums, and debris (batteries, elemental lead debris, chromium contaminated debris, vitrified glass).

4.1.3 Verification Samples

Cleanup verification sampling of the site excavation and overburden was conducted in May 2001. The final verification samples were submitted to offsite laboratories for analysis using approved EPA analytical methods, as required per the 100 Area SAP (DOE/RL-96-22). A shallow zone decision unit was established to represent the 600-23 remediation. A deep zone decision unit was not required for this site because none of the areas of the site excavation were greater than 4.6 m (15 ft) below ground surface.

The excavation contained two decision subunits, which were divided into eight sampling areas. Final cleanup verification samples were composites, each formed by combining samples collected at four randomly selected nodes within each sampling area.

Remediation Activity Summary

4.1.4 Statement of Protectiveness

The verification sampling data demonstrate that the 600-23 waste site meets the objectives established in the interim action ROD (EPA 1999) and have been reclassified in WIDS as “interim closed out.” These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]) and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. The sites do not have a deep zone; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the sites are not required. The sites were verified to be remediated in accordance with the interim action ROD (EPA 1999) and were backfilled and revegetated.

4.2 600-235, BURIED LEAD-SHEATHED TELEPHONE CABLES

4.2.1 History

The 600-235, Buried Lead-Sheathed Telephone Cables waste site includes lead-sheathed telephone cable that was installed from the 1940s to the mid-1950s and was abandoned when the Integrated Voice Data Telephone System was installed. In some cases the Integrated Voice Data Telephone System reused portions of the old lead-sheathed cables, but in most cases the old cable was abandoned in place. An estimated 204 km (127 mi) of lead-sheathed telephone communications cable buried at a depth of approximately 0.6 to 0.9 m (2 to 3 ft) has been left in place at the Hanford Site. Based on reviews of the site history and confirmatory sampling results, the 600-235 waste site was reclassified as a “no action” waste site.

4.2.2 Investigation

The 600-235 waste site was sampled on September 8, 16, and 29, 2004, in accordance with BHI-01714, *Sampling and Analysis Plan for Evaluation of Buried Lead-Sheathed Telephone Communications Cable*. Samples of soil below the cable were collected from six sample locations that were selected by DOE and EPA for sampling and represented a variety of environmental conditions. To assess the potential leaching of the lead-sheathed cable into the adjacent soil, samples were collected in the vicinity of the cable at each of the six locations. Two soil horizons were sampled at each location: one immediately beneath/adjacent to the cable to a depth of 15.2 cm (6 in.), and a second from a depth of 15.2 to 30.5 cm (6 to 12 in.) beneath the cable.

4.2.3 Statement of Protectiveness

The confirmatory sampling results for the 600-235 waste site show that the buried lead-sheathed cable does not present a risk to human health or the environment and that current site conditions are consistent with RAOs and the corresponding RAGs for remedial action occurring in the Hanford Site 100 Area. The concentrations of metals detected in the soil associated with the

Remediation Activity Summary

lead-sheathed cable are also below or consistent with Hanford Site background and upstream Columbia River levels. The cable will require management as a dangerous waste if removed at a future date as part of excavation or construction activities.

4.3 600-248, GRAVEL PIT #11

Gravel Pit #11 is a large, rocky excavated area north of the Wye Barricade that has been used as a source of gravel for backfill. The site was classified as “not accepted.”

4.4 600-283, SUSPECT BURIED EQUIPMENT IN GRAVEL PIT #11

The site was an area within Gravel Pit #11 where a Hanford Site employee had stated that he witnessed a large piece of potentially contaminated equipment being buried in 1983. A ground-penetrating radar scan was conducted in 2006 at the suspect location and no anomalies were found. The site was classified as “not accepted.”

5.0 PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL

This section addresses the process for demonstrating achievement of performance standards, including attainment of RAGs and maintaining the required quality controls during remedial activities.

5.1 ATTAINMENT OF PERFORMANCE STANDARDS

The remedial actions described in Section 4.1 of this report were performed in order to identify and reduce potential threats to human health and the environment from Segment 3 waste site contamination. Following remediation activities at the waste site, an evaluation against identified performance standards (the RAOs in the interim action ROD) was conducted in order to verify that the residual contamination does not pose an unacceptable health risk to future users of the site.

5.1.1 Performance Standard Documentation

Attainment of the specific RAO performance standards in the interim action ROD and interim closure of individual Segment 3 waste sites are documented in a cleanup verification package (CVP) for the 600-23 waste site and in a report attached to a WSRF for the 600-235 waste site. These documents provide remediation information as described in Section 2.3 to support the formal reclassification in the WSRFs listed in Table 5-1.

Table 5-1. Summary of Segment 3 Closure Documentation.

WIDS Site Code	Document Name	WSRF Number	WIDS Site Reclassification Status
600-23	<i>Cleanup Verification Package for the 600-23 Dumping Area (CVP-2001-00020)</i>	2001-092	Interim Closed Out
600-235	<i>Report for the 600-235 Lead-Sheathed Telecommunication Cable Sampling (BHI 2005)</i>	2001-091	No Action

WIDS = Waste Information Data System
WSRF = waste site reclassification form

5.1.2 Remedial Action Objectives and Goals

Remedial action objective performance standard attainment involves comparisons of soil analytical data to RAGs (Table 5-2) and is evaluated using the following general steps:

- Identify the units within a site for cleanup verification, and conduct sample collection and analysis for COCs and COPCs
- Calculate the summary statistics for the identified units or maximum values
- Identify the appropriate RAGs to be applied to the units
- Evaluate the summary statistics or maximum values, as appropriate, for the identified units against the decision rules for achieving the appropriate RAGs.

Table 5-2. Summary of Achieved Performance Standards for Unrestricted Surface Use at Segment 3 Waste Sites.

Regulatory Requirement	Remedial Action Goals	Evaluation Method
Direct Exposure – Nonradionuclides	Attained individual COC RAGs (MTCA Method B cleanup levels for unrestricted land use). Passed the WAC 173-340-740(7)(e) three-part test.	Compared goals with verification data set values.
Risk – Nonradionuclides	Achieved hazard quotient of <1 for noncarcinogens.	Compared goal with individual hazard quotients calculated from verification data set values.
	Achieved cumulative hazard quotient of <1 for noncarcinogens.	Compared goal with cumulative hazard quotients calculated from verification data set values.
	Achieved excess cancer risk of <1 x 10 ⁻⁶ for individual carcinogens.	Compared goal with individual carcinogen risks calculated from verification data set values.
	Attained a cumulative excess cancer risk of <1 x 10 ⁻⁵ for carcinogens.	Compared goal with cumulative carcinogen risks calculated from verification data set values.
Groundwater/River Protection – Nonradionuclides	Attained individual nonradionuclide groundwater and river cleanup requirements.	Compared goals to MTCA WAC 173-340-720, WAC 173-340-730, and WAC 173-201A.

COC = contaminant of concern
 MTCA = Model Toxics Control Act
 RAG = remedial action goal
 WAC = Washington Administrative Code

Remedial action goals are specific numeric targets developed to ensure achievement of the RAOs identified in the interim action ROD. The RAGs applicable to the Segment 3 waste sites, along with the process for verifying attainment of the RAGS, are described in detail in the 100 Area RDR/RAWP (DOE/RL-96-17) and are summarized in Table 5-2.

5.1.3 Contaminant Identification

The lists of relevant contaminants are documented in the CVP for the 600-23 “Dumping Area Within Gravel Pit #11” waste site (CVP-2001-00020) to reflect constituents identified during the remediation and characterization process (Table 5-3), pursuant to the interim action ROD “observational approach.” There were no radiological COPCs for the 600-23 waste site.

Table 5-3. Summary of Waste Site Contaminants, Segment 3.

Contaminant	600-23
Inorganics	
Arsenic	X
Barium	X
Cadmium	X
Lead	X
Hexavalent chromium	X
Total chromium	X
Manganese	X
Selenium	X
Silver	X
Zinc	X
Organic	
PCBs	X

PCB = polychlorinated biphenyl

Following the process described in this section, residual soil concentrations at all of the sites addressed in this report were shown to meet the RAO performance standards established for unrestricted surface use. The waste sites individually meet the cleanup objectives for eventual unrestricted surface use summarized in Table 5-2. Closeout of individual waste sites was based on the evaluation of analytical laboratory results from verification or confirmatory soil samples that were analyzed by contract laboratories using approved EPA methods. The resulting data for each waste site were subjected to a data quality assessment and determined to be suitable for their intended use to support closure decisions.

5.2 ATTAINMENT OF FINAL REMEDIAL ACTION PERFORMANCE STANDARDS

Cleanup of waste sites in accordance with the interim action RODs is expected to continue in the River Corridor until interim remedial action decisions are replaced by final RODs. Final RODs are required (40 *Code of Federal Regulations* 300) for the 100-F/IU-2/IU-6 Area in order to identify the final remedy decision, including any adjustments to the remedy identified in the interim action RODs, if necessary, to ensure protection of human health and the environment.

In addition to the information and data that originally established the basis for remedial actions under the interim action RODs, final remedial action decisions will incorporate new information acquired through characterization of interim closed waste sites. Development of the final remedy RODs will also incorporate data and information collected during the final source and groundwater RI/FS.

The final ROD development process will also incorporate evaluation of emerging ecological protection requirements, although the interim action RODs included general objectives for protection of ecological receptors based on meeting the unrestricted land-use cleanup levels.

The final RODs will integrate historical and current characterization information, as well as current applicable or relevant and appropriate requirements. Waste sites remediated under interim action RODs will ultimately be evaluated by the lead agency and lead regulatory agency against the decisions and requirements documented in the final RODs. Upon satisfactory completion of the final remedial actions for the 100-F/IU-2/IU-6 Area, EPA will issue a certificate of completion to DOE.

5.3 QUALITY CONTROL

The quality assurance and quality control programs used throughout the remediation activities are identified in the 100 Area RDR/RAWP (DOE/RL-96-17) and 100 Area SAP (DOE/RL-96-22). Samples that were used to demonstrate achieving the cleanup objectives for individual waste sites were collected and analyzed in accordance with these documents, which were approved by the Tri-Party agencies. The sampling and analysis plan documents contained a quality assurance project plan to establish the objectives, functional activities, methods, and quality assurance/quality control measures associated with the sampling and analysis activities. Verification data sets that were used to support waste site closure underwent a data quality assessment to ensure suitability for their intended use. Results of the data quality assessment are documented in the CVPs and remaining sites verification packages for individual waste sites.

6.0 FINAL INSPECTION AND CERTIFICATIONS

Based on evaluation of the approved interim closure documentation referenced in Table 5-1 and final inspections of the Segment 3 waste sites, interim remedial actions have been completed and RAOs have been achieved. Pursuant to the 100 Area interim action ROD and RAOs, this means that contaminated soil at the remediated site was excavated and disposed at the ERDF and the waste site was backfilled (as needed) and revegetated.

The results of confirmatory and verification sampling at interim closed out and no action Segment 3 waste sites show that residual contaminant concentrations do not preclude future uses (as bounded by the rural-residential scenario) and allow for unrestricted surface use (i.e., ground surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. If deemed necessary, final inspections of the interim remedial actions will be conducted in the future and include RL, EPA, and WCH representatives. The inspections will include only the single waste site where remedial actions occurred to verify that the sites had been backfilled with clean materials and revegetated as required by the applicable interim action RODs. The waste sites have been reclassified in WIDS as “interim closed out,” or “no-action” (RL-TPA-90-0001).

DOE/RL-2001-41, *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions*, describes institutional controls for the Hanford Site. Institutional controls are not required at the remediated 600-23 “Dumping Area Within Gravel Pit #11” waste site, and the remediated area will be available for unrestricted land use.

7.0 OPERATIONS AND MAINTENANCE ACTIVITIES

There are no CERCLA site-specific surveillance and maintenance or institutional controls associated with the Segment 3 waste sites. The DOE will continue to retain responsibility for operations and maintenance functions of Segment 3. These functions and associated landlord responsibilities cover all general infrastructure and include such things as access roads, facilities, and services. Monitoring at the Hanford Site is conducted in order to evaluate the performance of the remedies and to identify changes in conditions. In remediated areas, monitoring activities help to verify that the remedies remain effective, resources are protected, and contaminant migration is prevented. Monitoring also helps to facilitate the maintenance of remedy systems in working condition and to keep controls in working order. These activities are often defined in an operations and maintenance plan for a site, such as maintaining signs, fences, and restrictions on excavations or land use. For the Segment 3 waste sites, there are no waste-site specific operations and maintenance activities.

The DOE will continue to be responsible for the following general activities:

- Responding to emergency situations or off-normal conditions such as the deterioration of a physical control beyond predicted levels, an error that results in a “near-miss,” or the discovery of previously unidentified sources of contamination
- Notifying the appropriate regulatory agencies of regulatory threshold exceedances, releases of hazardous substances in excess of quantities reportable under CERCLA, and spills or discharges of hazardous substances or dangerous wastes to the environment
- Long-term monitoring, which will be required for source sites where residual contaminants preclude unrestricted use.

Multiple resource management plans have been developed at the Hanford Site to protect and provide the policies, goals, and objectives for the management of the site’s biological, natural, and cultural resources. These plans address the ongoing surveillance, protection, and controlled use of the resources and guide the management of resources.

CERCLA 5-year reviews will be required to assess the protectiveness of remedial actions where hazardous substances, pollutants, or contaminants are left onsite above levels that allow for unlimited use and unrestricted exposure. In addition to CERCLA, the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989) allows 5-year reviews to address regulated *Resource Conservation and Recovery Act of 1976* (RCRA) units and past-practice units that are regulated under RCRA and/or CERCLA. The third CERCLA 5-year review report for the Hanford Site was completed in November 2011.

7.1 ENVIRONMENTAL MONITORING

The 100 Area of the Hanford Site includes significant natural resources including habitat for numerous endangered, protected, and listed species. In addition to the cleanup conducted under CERCLA, environmental monitoring and reporting including Segment 3 is conducted annually in accordance with DOE O 231.1A, *Environment, Safety, and Health Reporting*. PNNL-20548, *Hanford Site Environmental Report for Calendar Year 2010*, includes a summary of cleanup performance and compliance relative to applicable federal, state, and local environmental laws and regulations; DOE orders; Secretary of Energy Notices; and DOE Headquarters and site operations office directives, policies, and guidance. It summarizes specific requirements, actions, plans, and schedules identified in the Tri-Party Agreement (Ecology et al. 1989) and other compliance or consent agreements. Although the report is written each year primarily to meet DOE reporting requirements and guidelines, it is also intended to provide a broad spectrum of environmental information to DOE managers, the public, Native Americans, public officials, regulatory agencies, Hanford Site contractors, and elected representatives.

Each annual report provides an overview of activities at the site; demonstrates the status of the site's compliance with applicable federal, state, and local environmental laws and regulations; executive orders; and DOE policies and directives. It summarizes environmental data that characterize Hanford Site environmental management performance. The report also highlights significant environmental and public protection programs and efforts.

The monitoring includes many Hanford Site activities including decommissioning, demolition, remediation, restoration, waste management, closure activities, environmental occurrences, pollution prevention, waste minimization, and monitoring activities for environmental resources. Media included in the monitoring activities are air emissions, facility effluents, surface water, river sediment, drinking water, groundwater, food/farm products, vegetation, fish and wildlife (including threatened and endangered species), radiation, and cultural resources.

There are no site-specific CERCLA monitoring requirements associated with the Segment 3 waste sites.

7.2 GROUNDWATER MONITORING

Groundwater monitoring at the Hanford Site is guided by DOE/RL-2002-59, *Hanford Site Groundwater Strategy: Protection Monitoring and Remediation*, and fulfills requirements for monitoring according to the *Atomic Energy Act of 1954*, RCRA, CERCLA, and WAC 173-303, "Dangerous Waste Regulations." The strategy focuses on protecting groundwater resources, along with groundwater monitoring and remediation. Sampling and analysis plans for the Hanford Site, including those wells located in Segment 3, are developed each fiscal year, and monitoring results are presented in annual Hanford Site groundwater monitoring reports.

No active remediation of groundwater is occurring or planned in Segment 3.

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