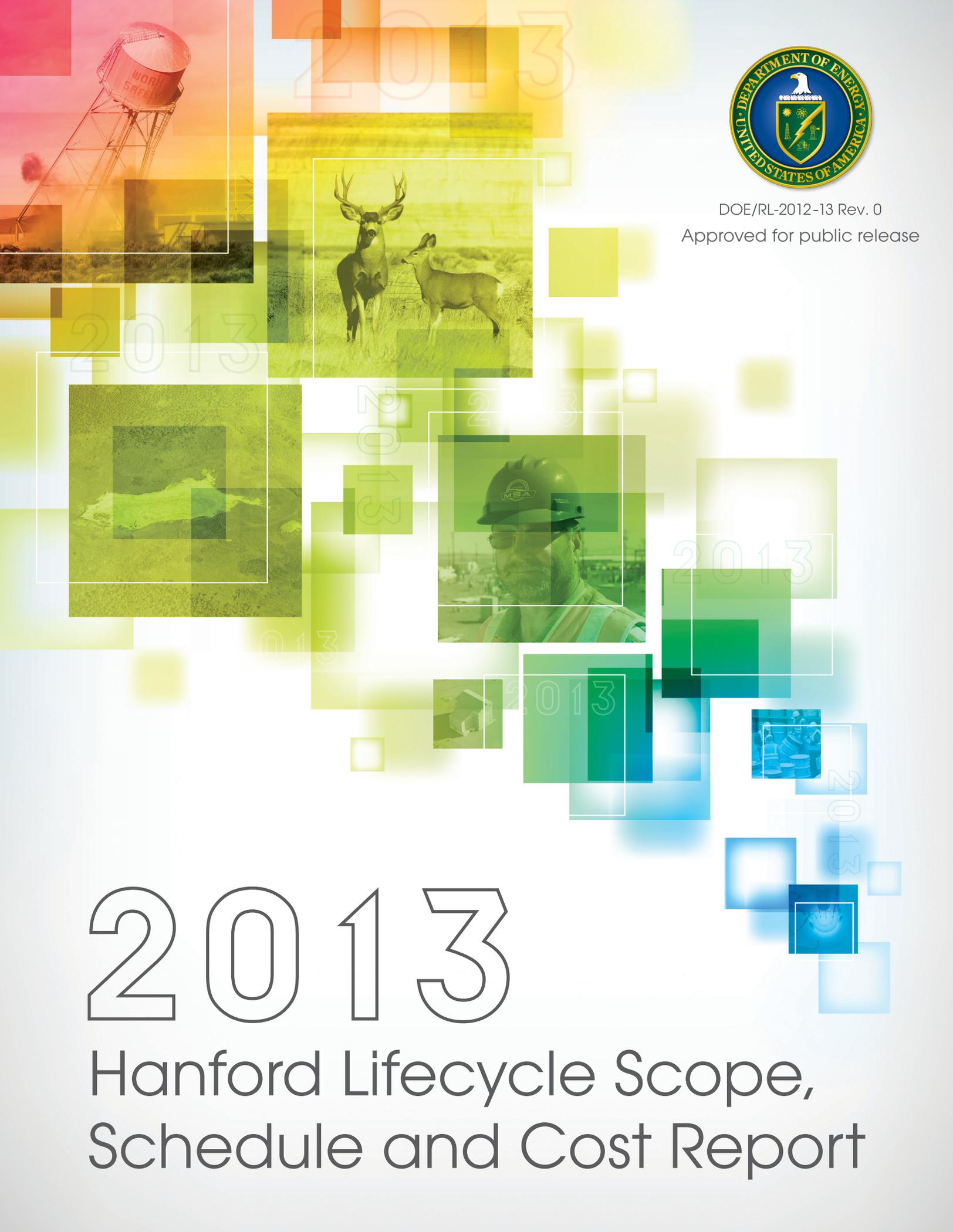




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# 2013

## Hanford Lifecycle Scope, Schedule and Cost Report

# 2013 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT

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**APPROVED**

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Release Approval

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## EXECUTIVE SUMMARY

### Purpose

This *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report) describes the scope, schedule, and cost estimates for Hanford Site cleanup. This Lifecycle Report reflects all cleanup work that is to be completed by the U.S. Department of Energy (DOE), including the Richland Operations Office (DOE-RL) and Office of River Protection (DOE-ORP).

The report will be prepared and submitted to the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) annually by January 31, in time to support DOE's annual budget process and to help inform decision makers about schedule and work prioritization.

This report will serve as an agreed upon foundation for preparing budget requests and for informational briefings to affected Tribal Nations, the State of Oregon, and Hanford stakeholders. The report supports continued discussions with EPA and Ecology on how and when DOE-RL and DOE-ORP will complete cleanup, and how milestone changes and adjustments will affect lifecycle scope, schedule and cost.

While it is important to understand what this report will do, it is just as important to understand what it does not do. This report does not make or replace any cleanup decisions, nor is it a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* or *Resource Conservation and Recovery Act of 1976* document. This report does not substitute for, nor preempt, the cleanup decision processes as set forth in the *Hanford Federal Facility Agreement and Consent Order*<sup>1</sup> (commonly referred to as the Tri-Party Agreement or TPA) and other legal requirements.

### Background

On October 25, 2010<sup>2</sup>, DOE, EPA, and Ecology (the TPA agencies) agreed to modify the TPA to incorporate a new milestone, M-036-01, requiring annual submittal of a Lifecycle Report. The Lifecycle Report reflects all actions necessary for DOE to meet all applicable environmental obligations.

The 2011 Lifecycle Report ([DOE/RL-2010-25](#)) was the first, and was prepared and submitted to EPA and Ecology on July 21, 2011. The 2012 Lifecycle Report ([DOE/RL-2011-93](#)) was submitted to EPA and Ecology on January 17, 2012.

The 2013 Lifecycle Report information reflects scope, schedule and cost status that is current as of August 31, 2012, and the costs shown have been escalated for inflation. Changes that have occurred after this date are noted in Section 1.7 and will be incorporated into future reports.

### Public Involvement Process

The TPA agencies will make the 2013 Lifecycle Report available to all interested parties on the DOE website at [www.hanford.gov](http://www.hanford.gov). Feedback regarding the 2013 Lifecycle Report will be considered as future reports are developed. Feedback can be emailed to [lcsc@rl.gov](mailto:lcsc@rl.gov).

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<sup>1</sup> Ecology, EPA and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

<sup>2</sup> Consent Decree and Tri-Party Agreement Settlement Package, order signed October 25, 2010, settling *State of Washington v. Chu*, United States District Court, Eastern District of Washington, Case No. [08-5085-FVS](#).

## **Milestone Requirements**

TPA Milestone M-036-01 requires that the Lifecycle Report include all cleanup, monitoring, and related actions necessary to complete cleanup, and that it takes critical resource availability and the practical limits of project acceleration into consideration. Information in the Lifecycle Report is to be presented at the project baseline summary (PBS) level, with costs to be provided at one level below the PBS, and at levels below that for the next 2 to 5 years (near term). The appendices of this report provide details to explain the preparation of the Lifecycle Report in addition to detailed cost and schedule information.

TPA Milestone M-036-01 also requires that, where final cleanup decisions have not yet been made, the Lifecycle Report be based on the reasonable upper bound of the range of plausible alternatives, or a range of alternative costs, including a reasonable upper bound. By considering potential future decisions, contingencies, and cost and/or schedule uncertainties, a reasonable upper bound for future cleanup work is described.

## **Summary of Lifecycle Scope, Schedule and Cost**

Hanford Site cleanup consists of three major components: River Corridor Cleanup, Central Plateau Cleanup, and Tank Waste Cleanup (located geographically within the Central Plateau). The cleanup also includes Mission Support activities that provide essential infrastructure and services to Hanford Site cleanup.

The Hanford Site's remaining cleanup schedule covers activities for cleanup and waste management, leading to transition of portions of the Hanford Site to long-term stewardship (LTS). The active cleanup schedule is from fiscal year (FY) 2013 to FY 2070, and LTS extends through FY 2090. Although the time period evaluated in this report ends at 2090, LTS extends longer because some waste sites and disposal facilities will have caps that require maintenance and institutional controls beyond that date. DOE plans on having a presence at Hanford well beyond FY 2090.

This report presents DOE-RL and DOE-ORP configuration controlled planning cases. The DOE-ORP planning case is the same as that presented in the 2012 Lifecycle Report. The Hanford remaining estimated cleanup costs total approximately \$114.8 billion (Figure ES-1). This includes the estimated cost to complete cleanup within the River Corridor, Central Plateau, Tank Waste, and the Mission Support components, as well as reasonable allowances for cost and schedule uncertainties (e.g., for activities where cleanup decisions have not been made). Table ES-1 provides a summary of total costs by PBS.

Costs are updated each year to reflect work completion, recent decision making, and other changes affecting the cleanup scope (e.g., final cleanup decisions, TPA milestone changes or infrastructure modernization to support major projects).

The remaining estimated cleanup cost does not include the upper bound cost estimates prepared in prior reports for selected future cleanup actions. These are summarized in Appendix A, Table A-5.

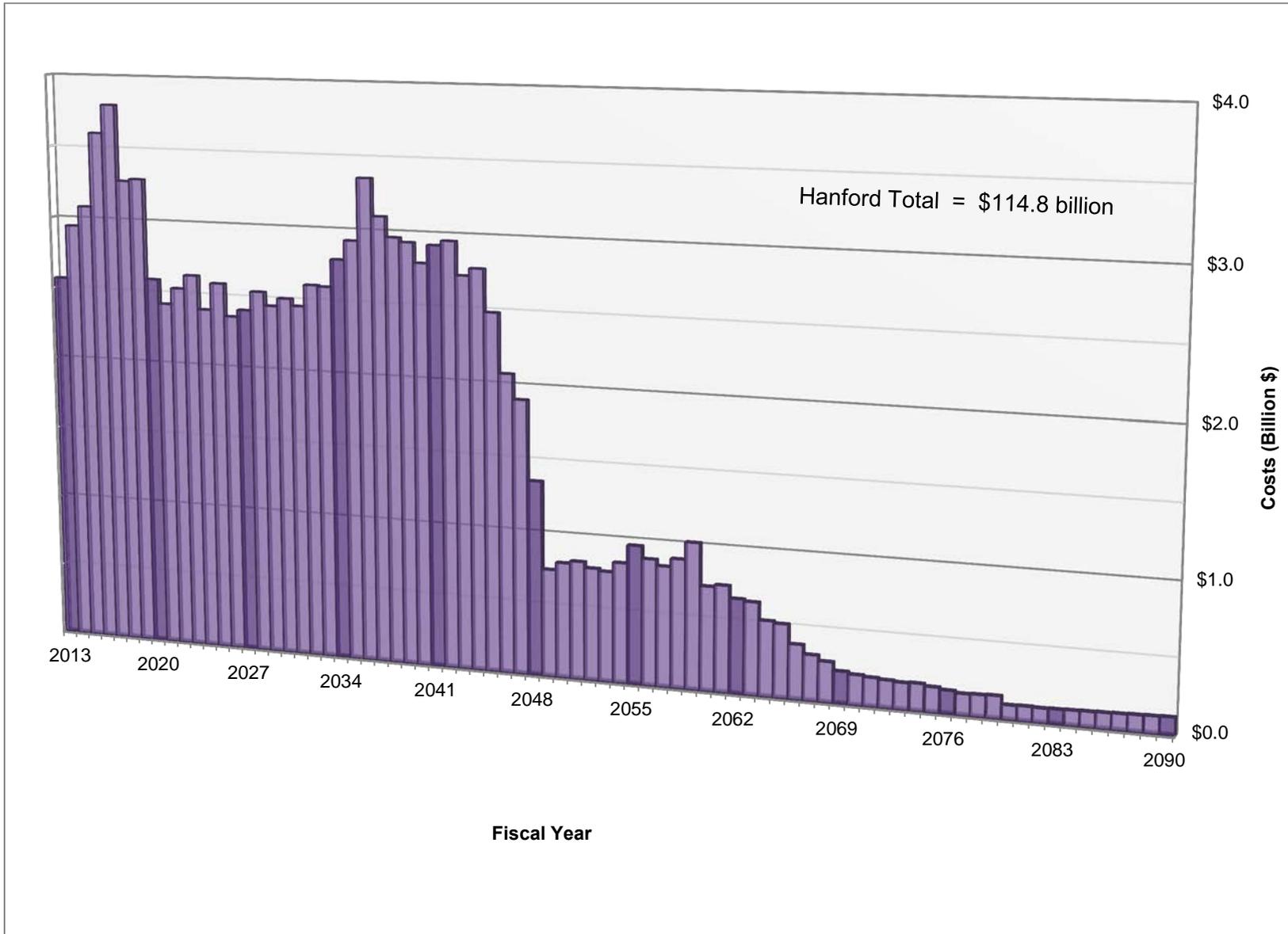


Figure ES-1. Hanford Site Remaining Estimated Cleanup Costs by Fiscal Year (includes both DOE-RL and DOE-ORP).

**Table ES-1. Hanford Site Remaining Cleanup Cost Estimates by PBS.**

<b>Project Work Scope</b>	<b>Estimated Cleanup Costs<sup>1</sup> (Billion \$)</b>
NM Stabilization and Disposition – PFP (PBS RL-0011)	\$0.5 - \$0.8
SNF Stabilization and Disposition (PBS RL-0012)	\$0.4
Solid Waste Stabilization and Disposition - 200 Area (PBS RL-0013C)	\$9.5 - \$9.8
Safeguards and Security (PBS RL-0020)	\$3.6
Soil and Water Remediation - Groundwater/Vadose Zone (PBS RL-0030)	\$7.7 - \$8.3
Nuclear Facility D&D - Remainder of Hanford (PBS RL-0040)	\$14.8 - \$18.8
Infrastructure and Services (PBS RL-0040)	\$2.6 - \$2.7
Nuclear Facility D&D - River Corridor Closure Project (PBS RL-0041)	\$1.4
Nuclear Facility D&D - Fast Flux Test Facility Project (PBS RL-0042)	\$1.0 - \$1.1
Richland Community and Regulatory Support (PBS RL-0100)	\$1.1
Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014)	\$55.5
Major Construction - Waste Treatment Plant (PBS ORP-0060)	\$4.1
<b>Hanford Site Total Remaining Estimated Cleanup Costs</b>	<b>\$102.1 - \$107.5</b>
Long-Term Stewardship (PBS RL-LTS) <sup>2</sup>	\$5.4
Final Reactor Disposition <sup>2</sup>	\$1.9
<b>DOE-Office of Environmental Management Total Remaining Estimated Cleanup Costs</b>	<b>\$109.4 - \$114.8</b>
<sup>1</sup> Cost ranges are shown in this table to reflect cost and schedule uncertainty where available, and the higher number is used throughout this report. Values are rounded, see Appendix D for details.	
<sup>2</sup> Shown separate to align with DOE-Headquarters fund source accounting.	
D&D= decontamination and decommissioning.	PBS = project baseline summary.
DOE= U.S. Department of Energy.	PFP = Plutonium Finishing Plant.
NM = nuclear materials.	SNF = spent nuclear fuel.
ORP= Office of River Protection.	

### Cost Estimate Alternative Analyses for Selected Cleanup Actions

The TPA agencies have agreed that the Lifecycle Report should include information about cleanup alternatives and cost estimates for selected future cleanup actions. For the 2013 Lifecycle Report, the TPA agencies identified 39 cleanup actions for which final cleanup decisions are still needed (see Table 1-4). Based on agency values and interests of affected stakeholders and Tribal Nations, the TPA agencies selected the cleanup actions to be analyzed for this report. A proposed schedule for analyzing remaining cleanup actions is provided in Appendix A, Table A-6.

For the 2013 Lifecycle Report, the TPA agencies determined that cleanup actions associated with four Central Plateau source operable units should be evaluated. Table 1-5 and Section 5.7 of this Lifecycle Report provide additional details about the four cleanup actions and the basis of estimate approach used.

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## TERMS

ABAR	aggregate barrier
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CH	contact-handled
CSB	Canister Storage Building
CSNA	confirmatory sampling to support no further cleanup action
CW	Cesium Waste
D&D	decontamination and decommissioning
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DOE-EM	U.S. Department of Energy, Office of Environmental Management
DOE-HQ	U.S. Department of Energy, Headquarters
DOE-ORP	U.S. Department of Energy, Office of River Protection
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objectives
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESH&Q	Environment, Safety, Health, and Quality
ET	evapotranspiration
ETF	Effluent Treatment Facility
FBSR	fluidized bed steam reformer
FETF	Fast Flux Test Facility
FY	fiscal year
HAB	Hanford Advisory Board
HAMMER	Hazardous Materials Management and Emergency Response; also known as the Volpentest HAMMER Training and Education Center
HFFACO	<i>Hanford Federal Facility Agreement and Consent Order</i>
HLW	high-level waste
HWMA	<i>Hazardous Waste Management Act (Washington State)</i>
IBAR	individual barrier
IDF	Integrated Disposal Facility
IHLW	immobilized high-level waste
ILAW	immobilized low-activity waste
ISS	interim safe storage
LAW	low-activity waste
LDR	Land Disposal Restrictions
LERF	Liquid Effluent Retention Facility
LM	Legacy Management
LTS	long-term stewardship

MESC/MNA/IC	maintain existing soil cover/monitored natural attenuation/institutional controls
MLLW	mixed low-level waste
MNA	monitored natural attenuation
NEPA	<i>National Environmental Policy Act</i>
NM	nuclear materials
NRDAR	Natural Resource Damage Assessment and Restoration
O&M	operations and maintenance
OMB	Office of Management and Budget
PBS	project baseline summary
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PMB	Performance Measurement Baseline
PUREX	Plutonium Uranium Extraction (Plant)
PW	Plutonium Waste
R&D	research and development
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
REDOX	Reduction-Oxidation Facility (S Plant)
RH	remote-handled
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RPP	River Protection Project
RTD	remove, treat, and dispose
S&M	surveillance and maintenance
SNF	spent nuclear fuel
SST	single-shell tank
TBD	to be determined
TEDF	Treated Effluent Disposal Facility
TPA	Tri-Party Agreement
TRU	transuranic
TRUM	transuranic mixed (waste)
TRUPACT	Transuranic Packaging Transporter
TSD	treatment, storage, and disposal
UPR	unplanned release
USDOE	U.S. Department of Energy
WBS	work breakdown structure
WESF	Waste Encapsulation and Storage Facility
WIDS	Waste Information Data System
WIPP	Waste Isolation Pilot Plant
WMA	waste management area
WRAP	Waste Receiving and Processing (Facility)
WTP	Waste Treatment and Immobilization Plant

## 1.0 INTRODUCTION

In October 2010, the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and Washington State Department of Ecology (Ecology) added a new milestone to the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as the Tri-Party Agreement (TPA). The TPA Milestone M-036-01 requires that DOE submit a *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report) to EPA and Ecology each year.

This document is the Lifecycle Report for 2013. Chapters 1.0 and 2.0 discuss the basis for the Lifecycle Report and how information provided in this document has been developed. Chapters 3.0 through 7.0 describe the work needed to complete Hanford Site cleanup and reflect all applicable environmental obligations. Chapter 8.0 discusses limitations of this report and the appendices provide important details and backup information.

Unless noted otherwise in the text, this report reflects scope, schedule and cost estimate information from fiscal year (FY) 2013 to FY 2090. The 2013 Lifecycle Report information reflects scope, schedule and cost that is current as of August 31, 2012, and the costs shown have been escalated for inflation. Changes that have occurred after this cutoff date are noted in Section 1.7 and will be incorporated into future reports.

### 1.1 PURPOSE OF THE LIFECYCLE REPORT

To plan for the future and make the best use of each year's funding, DOE, EPA, and Ecology (the TPA agencies) work together and share information about the scope, schedule and costs of cleaning up the Hanford Site. TPA Milestone M-036-01 cites that the Lifecycle Report should serve:

The Lifecycle Report includes the remaining scope, schedule and cost required for Hanford Site cleanup. The report will be used to inform affected parties and will help the TPA agencies make decisions about how best to complete Hanford cleanup.

**“...as an agreed upon foundation for preparing budget requests and for informational briefings of affected Tribal Governments and Hanford stakeholders.**

**“...as the basis for annual discussions among USDOE, EPA, and Ecology on how and when the USDOE will complete cleanup, how Congressional appropriations for the Hanford Site for that year may affect assumptions presented in the report, and how milestone changes and adjustments will affect lifecycle scope, schedule and cost.”**

### 1.2 PREPARING THE LIFECYCLE REPORT

In preparing the Lifecycle Report, DOE considered input from numerous affected parties, as discussed in the following sections.

### **1.2.1 Tribal Involvement**

Four Tribal Nations are involved in the Hanford Site cleanup:

- The Confederated Tribes of the Umatilla Indian Reservation is made up of the Cayuse, Umatilla, and Walla Walla people, and is federally recognized under the *Treaty with the Walla Walla, Cayuse and Umatilla, 1855*.
- The Confederated Tribes and Bands of the Yakama Nation are descendants of 14 tribes and bands that were federally recognized under the *Treaty with the Yakama, 1855*.
- The Nez Perce Tribe is federally recognized under the *Treaty with the Nez Percés, 1855*.
- The Wanapum Band is a non-federally recognized tribe that historically resided on Hanford lands, and participates in discussions regarding Hanford cleanup.

Representatives from the Tribal Nations work in a government-to-government relationship with DOE officials on decisions affecting cleanup of the Hanford Site and protection of the land. DOE consults with the Tribal Nations on a regular basis and will continue to update information about their values relevant to this Lifecycle Report.

### **1.2.2 Oregon Department of Energy**

DOE recognizes the State of Oregon's interests in Hanford Site cleanup and protection of the Columbia River and its uses. Consistent with legal and other agreements, DOE has committed to share information and sustain an active dialogue with Oregon representatives about decisions and activities affecting cleanup at the Hanford Site.

### **1.2.3 Hanford Advisory Board**

The Hanford Advisory Board (HAB) is a non-partisan and broadly representative body consisting of a balanced mix of the diverse interests that are affected by Hanford Site cleanup issues. The primary mission of the HAB is to provide informed recommendations and advice to DOE, EPA, and Ecology on selected major policy issues related to cleanup. The HAB is a DOE Office of Environmental Management (DOE-EM) Site-Specific Advisory Board, a stakeholder board that provides DOE's Assistant Secretary for DOE-EM and designees with independent advice, information, and recommendations on issues affecting the DOE-EM program at the Hanford Site.

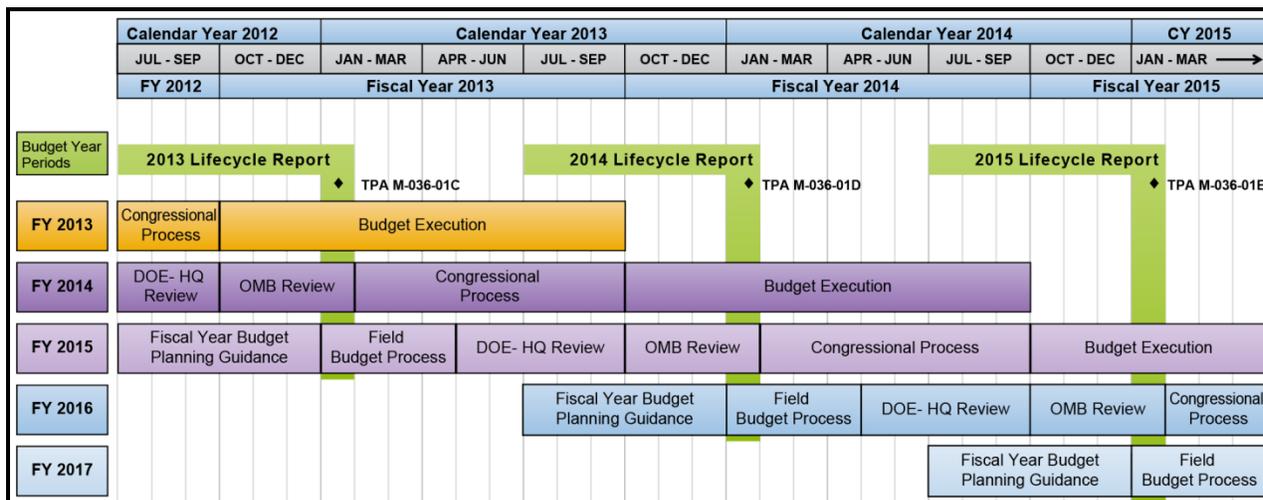
The HAB recommended that DOE prepare information similar to the Lifecycle Report. HAB Consensus Advice No. 223, "Lifecycle Cost and Schedule Report of the Proposed Consent Decree and the Tri-Party Agreement (TPA) Modifications," was issued in November 2009.

The HAB has prepared advice that relates to cleanup decisions throughout the Hanford Site. The HAB advice and the TPA agencies' responses to advice can be found on DOE's website at [www.hanford.gov/?page=453](http://www.hanford.gov/?page=453). That advice was considered in the development of this report.

## **1.3 LIFECYCLE REPORT AND HANFORD BUDGET SCHEDULE**

In developing the Lifecycle Report milestone, the TPA agencies sought to align submittal of the report with the annual Federal budget planning process. For most fiscal years, Federal planning begins about 2 years before the funded work is executed (Figure 1-1). The cycle begins when DOE field offices receive fiscal year budget planning guidance from the President of the United

States, DOE-Headquarters (DOE-HQ), and the Office of Management and Budget (OMB). During the next 12 to 15 months, the DOE field offices develop their budgets, submit to DOE-HQ and OMB for review, and then are provided as part of the President's budget that is submitted annually to Congress. Approximately 8 months later, under normal circumstances, before the start of the new Federal fiscal year (October 1), Congress approves a budget, funding is made available, and DOE begins executing work to the approved budget.



**Figure 1-1. Relationship Between U.S. Department of Energy Budget Planning and Lifecycle Report Schedule.**

As shown in Figure 1-1, the TPA agencies scheduled the Lifecycle Report to be completed in time to support the field offices budget planning process each year. Each Lifecycle Report will have the latest information available when planning begins for the next 2-year budget cycle. In addition, the period of time for developing the Lifecycle Report each year overlaps with the funding approval process for the current budget execution year and with the DOE-HQ and OMB review of funding requests for the next fiscal year. This overlap will enable the Lifecycle Report to include useful information about national priorities, events at other DOE sites, emerging technologies and best practices, and other circumstances that may affect the Hanford Site.

## 1.4 HANFORD SITE CLEANUP OVERVIEW

The 586-square-mile Hanford Site is located along the Columbia River in southeastern Washington State (Figure 1-2). Beginning in the 1940s with the Manhattan Project, the Hanford Site played a pivotal role in the Nation's defense, eventually producing approximately 74 tons of plutonium — nearly two-thirds of all the plutonium recovered for government purposes in the United States. Today, the Hanford Site includes numerous former nuclear material production areas, active and closed research facilities, waste storage and disposal sites, and large areas of natural habitat and buffer zones all underlain by groundwater.

Under the direction of DOE, the Hanford Site workforce is now engaged in the environmental cleanup of contaminated facilities, groundwater, and soil. The Hanford cleanup is further described in *Hanford Site Cleanup Completion Framework* (DOE/RL-2009-10).

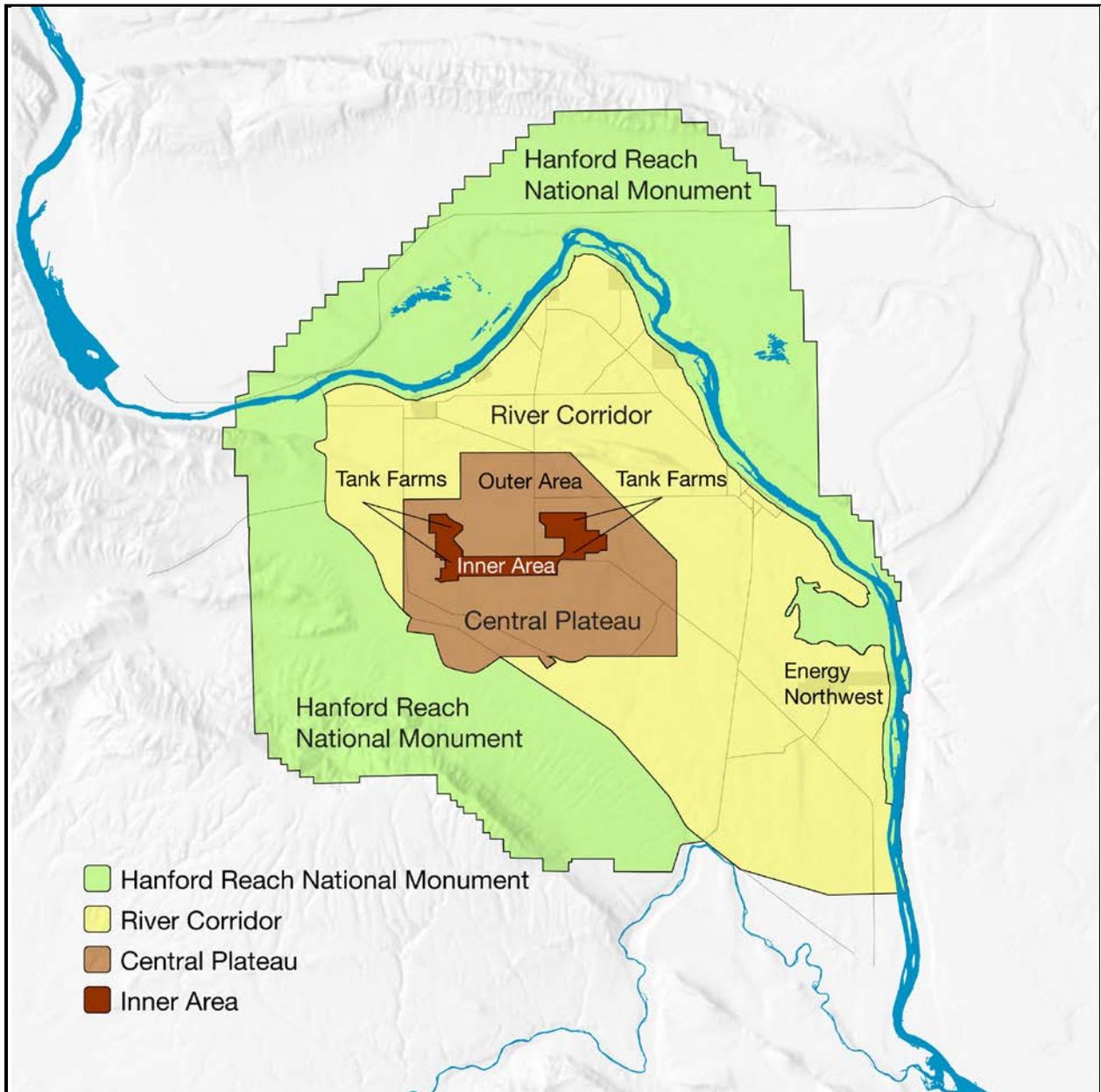


Figure 1-2. Hanford Site Map Showing Hanford’s Principal Areas Designated for Cleanup Purposes.

#### 1.4.1 U.S. Department of Energy Strategic and Cleanup Goals

The *Roadmap for EM’s Journey to Excellence* (DOE 2010) identifies seven strategic goals to accomplish cleanup across the DOE complex, including the Hanford Site, as described in Table 1-1.

**Table 1-1. U.S. Department of Energy Environmental Management Strategic Goals (All Sites). (3 pages)**

Journey to Excellence Strategic Goal	Key Strategies to Reach the Goal
<p><b>Goal 1.</b> Complete the three major tank waste treatment construction projects within the approved baselines.</p>	<ul style="list-style-type: none"> <li>• Work with the Federal staff, contractors, and union representatives to ensure that the projects have the necessary tools (e.g., technology resources, innovative tools to maintain motivation, a strong owner’s presence) to succeed in the most efficient manner.</li> <li>• Partner with national laboratories, industry, academia, and the Corps of Engineers to ensure the best scientific and engineering resources are used, so that the technologies selected for development and deployment and the design and construction approaches used will help reduce risk, lower cost, and accelerate project completion.</li> <li>• Establish an integrated design/engineering testing and commissioning framework across the DOE-EM complex to support project teams and enhance technical decision making.</li> <li>• Use the code of record concept to only make project changes that are essential to project success. (Code of record refers to the set of requirements in effect at the time a facility or item of equipment was designed and accepted by DOE.)</li> <li>• Use construction project reviews to identify and assist in resolution of key project issues related to scope, schedule, cost, project risk management, and technical approach.</li> <li>• Ensure the contract fee is aligned with completion of each capital asset.</li> </ul>
<p><b>Goal 2.</b> Reduce the lifecycle costs and accelerate the cleanup of the Cold War environmental legacy.</p>	<ul style="list-style-type: none"> <li>• Develop an R&amp;D roadmap for the development and application of advanced modeling and simulation tools to accelerate progress on DOE-EM challenges in 2011.</li> <li>• Engage the Department’s basic and applied research capabilities to develop novel methods for addressing high-level waste that can accelerate progress and reduce costs of this multi-decadal program.</li> <li>• Integrate and manage the technology development and deployment investment and insert technologies at appropriate maturity.</li> <li>• Continue to use the National Academy of Sciences, Environmental Management Advisory Board, DOE-EM Technical Experts Group, and the expertise of DOE-EM Federal staff to inform us on how best to achieve reductions in the lifecycle cost for the tank waste mission.</li> <li>• Use appropriate system planning models to demonstrate the benefit of deploying state-of-the-art technologies and/or more effective strategies in order to reduce the lifecycle cost of the tank waste cleanup mission.</li> </ul>
<p><b>Goal 3.</b> Complete disposition of 90 percent of the legacy TRU waste by the end of 2015.</p>	<ul style="list-style-type: none"> <li>• Utilize shielded canisters to accelerate transportation and disposal of remote-handled TRU wastes.</li> <li>• Process and dispose of Large Box TRU, utilizing the TRUPACT-III.</li> <li>• Align contract incentives at WIPP and TRU generator sites to support specific legacy TRU disposition targets each year.</li> </ul>
<p><b>Goal 4.</b> Reduce the DOE-EM legacy footprint by 40 percent by the end of 2011, leading to approximately 90 percent reduction by 2015.</p>	<ul style="list-style-type: none"> <li>• Utilize Hanford’s portion from the <i>American Recovery and Reinvestment Act</i>.</li> <li>• Work with regulators and stakeholders to ensure compliance and timely implementation of required cleanup actions.</li> <li>• Focus on safe completion of DOE-EM activities (TRU waste, low-level waste, soil and groundwater, and D&amp;D) resulting in reduced environmental risks to the community.</li> </ul>

**Table 1-1. U.S. Department of Energy Environmental Management Strategic Goals (All Sites). (3 pages)**

<b>Journey to Excellence Strategic Goal</b>	<b>Key Strategies to Reach the Goal</b>
<p><b>Goal 5.</b> Improve safety, security and quality assurance towards a goal of zero accidents, incidents, and defects.</p>	<ul style="list-style-type: none"> <li>• Ensure that DOE-EM sites and projects integrate safety, security and quality, and evaluate performance indicators that measure these functions throughout the applicable lifecycle, including procurement, design, engineering, construction, commissioning, operation, deactivation/decommissioning, and environmental restoration.</li> <li>• Use sound science and engineering along with developing a proactive relationship with the Defense Nuclear Facilities Safety Board to expeditiously resolve Board concerns and issues.</li> <li>• Ensure DOE-EM Headquarters and field elements continue to identify and deploy strategies and approaches that guarantee strong safety and security cultures are in place, such as Human Performance Improvement, performance and vulnerability assessments, and enhancement of the self-assessment process, focusing improvement efforts on areas of poorest performance.</li> <li>• Employ a risk-based decision-making process for operation and decommissioning of DOE-EM facilities.</li> </ul>
<p><b>Goal 6.</b> Improve contract and project management with the objective of delivering results on time and within cost.</p>	<ul style="list-style-type: none"> <li>• Use the DOE-EM Contract and Project Management Corrective Action Plan as a starting point and create an internal quality assurance process that will lead to successful and sustained execution of DOE-EM contract and project management improvements.</li> <li>• Improve and expand the use of independent contract and project reviews, construction project reviews, peer reviews, and external independent reviews to keep contracts and projects aligned and on track. Conduct verification and validation reviews to ensure that performance data is credible and reliable.</li> <li>• Strengthen the integration of acquisition and project management processes so that contract statements of work and deliverables are based on clear project requirements, robust front-end planning and risk analysis, ensuring that nuclear safety requirements are addressed early, and changes to contract and project baseline are managed through strict and timely change control processes.</li> <li>• Become a stronger owner by holding contractors accountable and pursue partnering relationships to create win-win scenarios, where both the Federal staff and contractor staff understand and respect the rules of engagement and build better business relationships. Also, build stronger relationships with oversight organizations to improve communications and demonstrate transparency and accountability in DOE-EM's contract and project management.</li> <li>• Develop DOE-EM-specific cost estimating policy, guidance, historical cost databases, and expertise to improve our ability to perform independent government cost estimates as well as independent cost reviews and validation of contractor-generated cost estimates.</li> <li>• Invest in personnel development by providing training and career development in contract and project management.</li> <li>• Make effective use of small and minority owned businesses.</li> </ul>

**Table 1-1. U.S. Department of Energy Environmental Management Strategic Goals (All Sites). (3 pages)**

Journey to Excellence Strategic Goal	Key Strategies to Reach the Goal																								
<b>Goal 7.</b> Achieve excellence in management and leadership, making DOE-EM one of the best places to work in the Federal Government.	<ul style="list-style-type: none"> <li>• Benchmark best-in-class agencies (the Nuclear Regulatory Commission ranked number one in this year's Partnership for Public Service survey) and develop improvement plans in the areas of leadership, planning, performance tracking, work/business processes, customer service/relations, and accountability.</li> <li>• Establish sustainability goal targets.</li> <li>• Support DOE corporate management improvement initiatives.</li> </ul>																								
<p>From <u>DOE 2010, Roadmap for EM's Journey to Excellence</u>, U.S. Department of Energy, Washington, D.C.</p> <table border="0"> <tr> <td>D&amp;D</td><td>=</td><td>decontamination and decommissioning.</td> <td>R&amp;D</td><td>=</td><td>research and development.</td> </tr> <tr> <td>DOE</td><td>=</td><td>U.S. Department of Energy.</td> <td>TRU</td><td>=</td><td>transuranic.</td> </tr> <tr> <td>DOE-EM</td><td>=</td><td>U.S. Department of Energy, Office of Environmental Management.</td> <td>TRUPACT</td><td>=</td><td>Transuranic Packaging Transporter.</td> </tr> <tr> <td></td><td></td><td></td> <td>WIPP</td><td>=</td><td>Waste Isolation Pilot Plant.</td> </tr> </table>		D&D	=	decontamination and decommissioning.	R&D	=	research and development.	DOE	=	U.S. Department of Energy.	TRU	=	transuranic.	DOE-EM	=	U.S. Department of Energy, Office of Environmental Management.	TRUPACT	=	Transuranic Packaging Transporter.				WIPP	=	Waste Isolation Pilot Plant.
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The overarching goals for Hanford Site cleanup are stated in Table 1-2. These goals embody more than 20 years of dialogue among the TPA agencies, Tribal Nations, State of Oregon, stakeholders, and the public. They carry forward key values captured in earlier forums such as the Hanford Future Site Uses Working Group, Tank Waste Task Force, Hanford Summits, and HAB Exposure Scenario Workshops, as well as more than 250 advice letters issued by the HAB (<http://www.hanford.gov/page.cfm/hab>). These goals help guide all aspects of Hanford Site cleanup. Cleanup activities at various areas of the site support the achievement of one or more of these goals. These goals help set priorities to apply resources and sequence cleanup efforts for the greatest benefit.

These goals reflect DOE's recognition that the Columbia River is a critical resource for the people and ecology of the Pacific Northwest. The 50-mile stretch of the river known as the Hanford Reach is the last free-flowing section of the Columbia River in the United States. As one of the largest rivers in North America, its waters support a multitude of uses that are vital to the economic and environmental well being of the region and it is particularly important in sustaining the culture of Native Americans.

**Table 1-2. Cleanup Goals Identified for the Hanford Site.<sup>1</sup> (2 pages)**

Goals for Cleanup	
<b>Goal 1:</b>	Protect the Columbia River.
<b>Goal 2:</b>	Restore groundwater to its beneficial use to protect human health, the environment, and the Columbia River.
<b>Goal 3:</b>	Clean up River Corridor waste sites and facilities to: <ul style="list-style-type: none"> <li>• Protect groundwater and the Columbia River.</li> <li>• Shrink the active cleanup footprint to the Central Plateau.</li> <li>• Support anticipated future land uses.</li> </ul>
<b>Goal 4:</b>	Clean up Central Plateau waste sites and facilities to: <ul style="list-style-type: none"> <li>• Protect groundwater and the Columbia River.</li> <li>• Minimize the footprint of areas requiring long-term waste management activities.</li> <li>• Support anticipated future land uses.</li> </ul>

**Table 1-2. Cleanup Goals Identified for the Hanford Site.<sup>1</sup> (2 pages)**

Goals for Cleanup	
<b>Goal 5:</b>	Safely mitigate and remove the threat of Hanford's tank waste: <ul style="list-style-type: none"> <li>• Safely store tank waste until it is retrieved for treatment</li> <li>• Safely and effectively immobilize tank waste</li> <li>• Close tank farms and mitigate the impacts from past releases of tank waste to the ground.</li> </ul>
<b>Goal 6:</b>	Safely manage and transfer legacy materials scheduled for offsite disposition, including special nuclear material (including plutonium), spent nuclear fuel, transuranic waste, and immobilized high-level waste.
<b>Goal 7:</b>	Consolidate waste treatment, storage, and disposal operations on the Central Plateau.
<b>Goal 8:</b>	Develop and implement institutional controls and long-term stewardship activities that protect human health, the environment, and Hanford's unique cultural, historical, and ecological resources after cleanup activities are completed.
<sup>1</sup> DOE/RL-2009-10, 2012, <i>Hanford Site Cleanup Completion Framework</i> , Draft Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.	

#### 1.4.2 Hanford Site Cleanup and Management Areas

The Hanford Site cleanup focuses on two broad geographic areas: the River Corridor and the Central Plateau. Tank Waste is a separate cleanup component located within the Central Plateau area.

The River Corridor includes approximately 220 square miles of the Hanford Site, encompassing the 100 Area and 300 Area along the south shore of the Columbia River, portions of the 400 and 600 Areas, and the contiguous lands that extend to the Central Plateau boundaries. This includes a considerable land area not directly affected by production operations (non-operational areas). The 100 Area contains nine retired plutonium production reactors, numerous support facilities, solid and liquid waste disposal sites that have contaminated groundwater and soil. The 300 Area, located north of the city of Richland, contains fuel fabrication facilities, nuclear research and development facilities, and associated solid and liquid waste disposal sites that have contaminated groundwater and soil. The non-operational areas include substantial land area that was never used for locating production operations. The non-operational areas are adjacent to the 100 and 300 Areas and extend to the Central Plateau.

For sites in the River Corridor, the goal of remedial action is to restore groundwater to drinking water standards wherever practicable, and to achieve ambient water quality standards in the groundwater prior to its discharging into the Columbia River. In those instances where remedial action objectives are not achievable in a reasonable time frame, or are determined to be technically impracticable, programs will be implemented to limit contaminant migration and prevent exposure to contaminated groundwater. River Corridor cleanup work also relocates sources of contamination, which are close to the Columbia River, to the Central Plateau for final disposal. The intent is to shrink the footprint of active cleanup to within the 75-square-mile area of the Central Plateau by removing excess facilities and remediating waste sites. Cleanup actions will support anticipated future land uses consistent with the Hanford Reach National Monument, where applicable, and the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE/EIS-0222-F).

The River Corridor has been divided into six geographic decision areas to achieve source and groundwater remedy decisions. These decisions will provide comprehensive coverage for all areas within the River Corridor and will incorporate ongoing interim action cleanup activities. Cleanup levels will be achieved that support the anticipated land uses of conservation and preservation for most of this area and industrial use for the 300 Area. At the conclusion of cleanup actions, the federal government will retain ownership of most land in the River Corridor and will implement long-term stewardship activities to ensure protection of human health and the environment.

The Central Plateau includes approximately 75 square miles in the central portion of the Hanford Site, which includes the Inner Area (~10 square miles) and the Outer Area (~65 square miles). The Inner Area contains the major nuclear fuel processing, waste management, and disposal facilities. The Inner Area will be dedicated to long-term waste management and containment of residual contamination. The Outer Area is that portion of the Central Plateau outside the boundary of the Inner Area. The Outer Area will be remediated to be protective of human health and the environment and the groundwater. Cleanup levels will support future reasonably anticipated land uses. Cleanup of the Outer Area is planned to be completed in the 2016 to 2020 time period as funding allows. Completing cleanup of the Outer Area will shrink the footprint of active cleanup by an additional 65 square miles leaving just the Inner Area remaining.

Cleanup of the Central Plateau is a highly complex activity because of the large number of waste sites, surplus facilities, active treatment and disposal facilities, and areas of deep soil contamination. Past discharges of more than 450 billion gallons of liquid waste and cooling water to the soil have resulted in about 74 square miles of contaminated groundwater. Today, some plumes extend far beyond the plateau. Containing and remediating these plumes remains a high priority. For areas of groundwater contamination in the Central Plateau, the goal is to restore the aquifer to achieve drinking water standards. In those instances where remediation goals are not achievable in a reasonable time frame, programs will be implemented to contain the plumes, prevent exposure to contaminated groundwater, and evaluate further risk reduction opportunities as new technologies become available. Near-term actions will be taken to control plume migration until remediation goals are achieved.

At the completion of cleanup efforts, some residual hazardous and radioactive contamination will remain, both in surface disposal facilities and in subsurface media within portions of the Inner Area. DOE's goal is to minimize the area used for long-term waste management activities that require institutional controls to ensure protection of human health and the environment.

The Tank Waste Cleanup component focuses on retrieving and treating Hanford's tank waste, and closing or remediating tank farms. The tank farms are comprised of 18 distinct waste storage units that include a total of 177 underground storage tanks (149 single-shell tanks [SSTs] and 28 double-shell tanks [DSTs]) located in the Inner Area of the Central Plateau. The storage tanks range in capacity from about 55,000 to 1,250,000 gallons and contain approximately 56 million gallons of chemically hazardous radioactive waste from past processing operations. Sixty-seven of the Hanford Site's SSTs are confirmed or presumed to have collectively leaked up to 1 million gallons of contamination into the ground. In some areas, releases from some SST farms have reached groundwater. DOE expects these impacts to groundwater could increase in the future unless near-term actions are taken. Today, actions are being taken to slow the movement of those contaminants that were previously released. DOE is also containing and

recovering those contaminants once they reach groundwater. A key step in reducing the risk that tank waste poses to human health and the environment is to retrieve as much waste from SSTs as possible and put it into DSTs. Then, the waste must be fed to the WTP for processing and converted by a process called vitrification into solid glass waste forms. A number of associated tank waste facilities, including additional underground tanks, waste transfer lines, the 242-A Evaporator, and the WTP (under construction) are associated with the Tank Waste Cleanup component. This component of cleanup is one of Hanford's most challenging legacies.

Significant portions of the Hanford Site have been designated and preserved as part of the Hanford Reach National Monument (Figure 1-2). Much cleanup work has been accomplished within the designated monument area, and remaining work is expected to be completed within the next few years either as part of the River Corridor or Central Plateau cleanup projects. DOE is coordinating with the U.S. Department of Interior, U.S. Fish and Wildlife Service, and other agencies to provide care and maintenance of the clean national monument lands.

DOE leases Hanford Site land to several non-DOE entities, such as the Laser Interferometer Gravitational Wave Observatory and the State of Washington, which in turn leases land to US Ecology, Inc., a private firm that operates burial grounds for commercial radioactive low-level waste. DOE leases land to Energy Northwest (a consortium of public utility companies), which operates Washington and Oregon's only operating commercial nuclear power reactor, the Columbia Generating Station. These operations are not part of cleanup at the Hanford Site and are not included in the Lifecycle Report.

Hanford Site cleanup is overseen at DOE-HQ by the DOE-EM, and is directed and implemented locally by two DOE field offices: the DOE Richland Operations Office (DOE-RL) and the DOE Office of River Protection (DOE-ORP).<sup>3</sup> DOE-RL manages cleanup of most of the Hanford Site, and provides human resource, administration, and security services, as well as physical infrastructure necessary to perform the cleanup. DOE-ORP was established in response to Section 3139 of the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999* to manage the River Protection Project (RPP). The RPP is responsible for the safe storage, retrieval, and transfer of tank waste currently stored in the 200 Area Tank Farms; construction of the WTP to process and immobilize the tank waste in a process known as vitrification; and associated tank farm operation, maintenance, engineering, and construction activities.

## 1.5 LIFECYCLE REPORT MILESTONE REQUIREMENTS

TPA Milestone M-036-01 includes a number of requirements for the Lifecycle Report. Table 1-3 provides the full text of the approved TPA Milestone M-036-01.

The following restates the most important requirements from the milestone (cited in **bold text** in the following paragraphs) and briefly explains how DOE, in consultation with EPA and Ecology, applied each requirement during development of this Lifecycle Report.

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<sup>3</sup> In addition to the ongoing cleanup mission, numerous research and environmental support activities are conducted at Hanford by the Pacific Northwest National Laboratory, which is overseen by DOE's Office of Science, Pacific Northwest Site Office.

**Table 1-3. Tri-Party Agreement Milestone M-036-01.****M-036-01A (Subsequent Annual Milestones to be Lettered B, C, D, etc.)**

Due date to submit the report to be January 31 and annually thereafter, except that the first report to be due no sooner than 9 months after incorporation of this milestone in TPA.

The USDOE shall prepare and submit to EPA and Ecology a report setting out the lifecycle scope, schedule and cost for completion of the Hanford Site cleanup mission. The report shall reflect all of those actions necessary for the USDOE to fully meet all applicable environmental obligations including those under the HFFACO, the consent decree in State of Washington V. Chu, Case No. 08-5085-FVS, and the Hanford RCRA/HWMA Permit. The report shall include scope, schedule and cost for completing work at each of the operable units and RCRA TSD groups/units that are listed in Appendixes B and C of the HFFACO, in the consent decree in State of Washington V. Chu, Case No. 08-5085-FVS and in the Hanford RCRA/HWMA Permit, including the Hanford Waste Treatment and Immobilization Plant. The report will include all other cleanup and monitoring activities (including post-closure activities) and all related actions necessary to complete the cleanup mission to provide a complete understanding of the resources necessary for the Hanford cleanup mission.

This report shall take into account circumstances existing as of the end of the fiscal year preceding the month of the report, including funds appropriated by Congress for the Hanford cleanup, but shall not assume any limitation on funding for future years. However, the report will take into consideration critical resource availability not based upon assumed future funding limitations and the practical limits of project acceleration when developing an executable plan. USDOE may also include costs other than those directly related to environmental obligations (such as security costs) but shall clearly distinguish expenditures for environmental obligations from other expenditures. Costs shall be displayed by program baseline summary. Additional levels of detail will appear in appendixes to the report. Cost information will provide sufficient detail to validate consistency with the scope and schedule for individual cleanup projects. Reporting in the appendixes will typically be one level below the PBS for the lifecycle, and at levels below that for the next two to five years beyond the execution year (usually at the activity level within the budget assigned to a specific project, e.g., RL-0011, WBS element 011.04.01, Nuclear Material Stabilization and Disposition – PFP, Disposition PFP, Transition 234 5Z). EPA and Ecology project managers may request additional levels of detail be provided by their DOE counterparts.

In circumstances where final cleanup decisions have not yet been made, the report shall be based upon the reasonable upper bound of the range of plausible alternatives or may set forth a range of alternative costs including such a reasonable upper bound. In making assumptions for the purpose of preparing the initial report, USDOE shall take into account the views of EPA and Ecology and shall also take into account the values expressed by the affected Tribal Governments and Hanford stakeholders regarding work scope, priorities and schedule. The report shall include the scope, schedule and cost for each such PBS level two element and shall set forth the bases and assumptions for each cleanup activity.

After USDOE submits the report, the USDOE will revise the report based upon EPA and Ecology comments to reflect a common vision of the scope, schedule and budget for the remainder of the cleanup mission. If the agencies are unable to reach resolution on specific aspects of the scope of cleanup actions, the revised document will present a range of potential actions with the associated schedule and budget, thereby completing the milestone. DOE, EPA and Ecology shall attempt to reach agreement on the report so it can serve as an agreed upon foundation for preparing budget requests and for informational briefings of affected Tribal Governments and Hanford stakeholders. The report shall also serve as the basis for annual discussions among USDOE, EPA and Ecology on how and when the USDOE will complete cleanup, how Congressional appropriations for the Hanford Site for that year may affect assumptions presented in the report, and how milestone changes and adjustments will affect lifecycle scope, schedule and cost.

Without limiting any DOE obligation under any other provisions of this agreement, and without limiting any DOE obligation to disclose information that is otherwise publicly available, nothing in this milestone shall be construed, either alone or in combination with any other provision of the HFFACO, to require disclosures related to internal federal budget deliberations.

The TPA agencies also found that they needed to clarify direction on issues encountered during Lifecycle Report development. The TPA agencies communicated extensively about these aspects of the milestone, and Appendix B documents how the Lifecycle Report has addressed them.

**“The report will include all other cleanup and monitoring activities (including post-closure activities) and all related actions necessary to complete the cleanup mission to provide a complete understanding of the resources necessary for the Hanford cleanup mission.”**

This requirement recognizes that cleanup often extends beyond the major demolition and construction activities needed to close and remediate contaminated facilities and sites. Hanford Site cleanup will be protective of future uses consistent with the land-use designations adopted and implemented by DOE. Radioactive and hazardous substances will remain in areas of the Hanford Site, even after cleanup. Over time, some of these substances will degrade or decay in place. DOE will perform post-cleanup activities to maintain protective features (e.g., barriers, run-on and run-off diversion, fencing) and to monitor Hanford Site conditions (e.g., air quality, groundwater quality). Some activities will go on for decades after the primary cleanup activities are completed. The milestone language cited above reinforces that the Hanford Site cleanup includes, and the Lifecycle Report will address, future work needed to protect human health and the environment.

**“This report shall take into account circumstances existing as of the end of the fiscal year preceding the month of the report, including funds appropriated by Congress for the Hanford cleanup, but shall not assume any limitation on funding for future years.”**

The Federal fiscal year covers the calendar period from October 1 to September 30. The Lifecycle Report is required to be submitted by January 31 each year, with the exception of the initial Lifecycle Report.

Each Lifecycle Report will take into account a combination of the actual expenditures for the preceding fiscal year (i.e., the “circumstances existing as of the end of the fiscal year preceding the month of the report”), and the budget approved for the current fiscal year (i.e., the “funds appropriated by Congress for the Hanford cleanup”), if available in time to be included in the report.

For example, the 2013 Lifecycle Report will be submitted on or before January 31, 2013 (about 4 months after FY 2013 begins), will take into account what cleanup actions were performed using the FY 2012 authorized budget (covering the period from October 1, 2011 to September 30, 2012), and the cleanup actions planned based on the approved planning case for the remaining lifecycle.

The milestone language acknowledges that DOE must work within the budgets authorized by Congress. The Lifecycle Report includes scope, schedule, or cost information for cleanup actions that are already constrained by Congressional appropriations for the fiscal year in which the report is submitted. However, the milestone does require that for future years (i.e., after the current fiscal year), the Lifecycle Report will be developed without assuming that future funding is limited. If Congressional appropriations do not match assumed future funding then work schedule shifts will be shown in future Lifecycle Reports.

**“...The report will take into consideration critical resource availability not based upon assumed future funding limitations and the practical limits of project acceleration when developing an executable plan.”**

Performance of Hanford Site cleanup activities can depend on specialized expertise, personnel, equipment, and materials that are in limited supply. For example, the availability of trained and qualified radiation control specialists at the Hanford Site is limited. If resources are unavailable, DOE’s ability to complete work can be constrained. In addition, the ability to perform work quickly can be constrained by a variety of practical limits, such as how many loads of contaminated soil can be physically placed and covered at a disposal site in a given amount of time. As a result, planning for the execution of work must account for the availability of critical resources and the practical limits that time, space, and other factors impose.

**“USDOE may also include costs other than those directly related to environmental obligations (such as security costs) but shall clearly distinguish expenditures for environmental obligations from other expenditures.”**

DOE has financial responsibilities for maintaining a safe and secure Hanford Site, and meeting the needs of the associated workforce. Examples include security forces that guard nuclear materials, employee insurance premiums and pension benefits. The milestone language gives DOE the option to include non-environmental costs in the Lifecycle Report, but requires that where this occurs, DOE will show which costs are required for meeting environmental obligations.

**“Costs shall be displayed by program baseline summary. Additional levels of detail will appear in appendixes to the report.... Reporting in the appendixes will typically be one level below the PBS for the lifecycle, and at levels below that for the next two to five years beyond the execution year....”**

This milestone language specifies the level of detail DOE is required to provide when presenting cost data in the Lifecycle Report. The project baseline summary (PBS) summarizes information about each major Hanford Site cleanup project. Projects that have common attributes (e.g., a common assumed geographic location or activity type) typically are grouped within a single PBS. There are 12 PBSs that cover Hanford Site cleanup.

The milestone requires DOE to provide cost information by PBS, requires that near-term costs (covering the next 2 to 5 years) be presented at two or more levels of additional detail below the top-level PBS, and requires that costs for the entire lifecycle be presented at one level of additional detail below the top-level PBS. This distinction reflects the maturity of planning that is possible in the DOE budget. Activities in the near term, and where regulatory decisions have been made, are better defined and generally have more detailed cost information, whereas

activities beyond the near term, or where regulatory decisions have not been made, are less well defined with less detailed cost estimates.

**“In circumstances where final cleanup decisions have not yet been made, the report shall be based upon the reasonable upper bound of the range of plausible alternatives or may set forth a range of alternative costs including such a reasonable upper bound.”**

This milestone language describes what DOE is required to do when providing information about cleanup activities for which final decisions have not yet been made. Section 1.6 provides additional discussion of this requirement and how it has been applied.

**“The report shall include the scope, schedule and costs for each such PBS level two element and shall set forth the bases and assumptions for each cleanup activity.”**

The TPA agencies have chosen to apply this provision broadly, and DOE has taken the approach in this Lifecycle Report to provide information about the bases and assumptions underlying all cleanup actions as presented down to PBS Level 2 and at further levels, if needed, depending on the particular cleanup action.

## **1.6 CLEANUP DECISIONS AND ALTERNATIVES INCLUDED IN LIFECYCLE REPORT**

Hanford Site cleanup is achieved through an ongoing process for making and then implementing cleanup decisions in accordance with approved work plans and procedures, which are the bases for performing cleanup actions. When making cleanup decisions, the TPA agencies ensure compliance with applicable laws and regulations, compare various cleanup alternatives, consider the interests of the public and other affected parties, consult with Tribal Nations, and document selected cleanup actions in legally binding records.

In portions of the cleanup, the TPA agencies have agreed to schedule final cleanup decisions to be made at a time when more information and experience can be gained, or after certain facilities are no longer needed. For example, decisions on cleaning up the T Plant Canyon Building in the Central Plateau will not be made until the TPA agencies have determined when the T Plant will not be needed to support Hanford Site cleanup.

The Lifecycle Report is required to include scope, schedule and cost information across the entire Hanford Site regardless of whether the cleanup decision has been made. Where cleanup decisions are not known or only partially defined (i.e., not final), the Lifecycle Report is based on the reasonable upper bound for the range of plausible alternatives, or a range of alternative costs, including a reasonable upper bound or a basis of existing estimates. These requirements introduce several concepts that are not fully defined in TPA Milestone M-036-01:

- **Cleanup decisions.** How are cleanup decisions made and when are they considered to be final decisions?
- **Alternatives.** How are alternatives considered when making cleanup decisions and defining what cleanup actions should be performed?
- **Reasonable upper bound.** How is a reasonable upper bound defined for a range of alternatives and how are an upper bound cost and schedule calculated?

Appendix C describes the multiple kinds of cleanup decisions to be made at the Hanford Site and identifies decisions that are considered to be final for the Hanford Site. Appendix A describes future actions required to complete Hanford cleanup and presents information on plausible alternatives for the future cleanup actions. Table 1-4 lists the Hanford Site cleanup actions for which final cleanup decisions have not yet been made.

**Table 1-4. List of Hanford Site Cleanup Actions for which Final Decisions Have Not Been Made.**

<b>River Corridor Cleanup Actions</b>	
<ul style="list-style-type: none"> <li>• Disposition N Reactor.</li> <li>• Disposition 100 Area K West Basin.</li> <li>• Remediate 100 Area Contaminated Soil Sites.</li> <li>• Restore 100-BC-5 Groundwater OU to Beneficial Use.</li> <li>• Restore 100-KR-4 Groundwater OU to Beneficial Use.</li> <li>• Restore 100-NR-2 Groundwater OU to Beneficial Use.</li> </ul>	<ul style="list-style-type: none"> <li>• Restore 100-HR-3 Groundwater OU to Beneficial Use.</li> <li>• Restore 100-FR-3 Groundwater OU to Beneficial Use.</li> <li>• Disposition 300 Area Facilities Retained by PNNL.</li> <li>• Remediate 300 Area Contaminated Soil Sites.</li> <li>• Restore 300 Area Groundwater to Beneficial Use.</li> <li>• Disposition 100 Area former Orchard Contaminated Soil Sites (100-OL-1 OU)</li> </ul>
<b>Central Plateau Cleanup Actions</b>	
<ul style="list-style-type: none"> <li>• Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU).</li> <li>• Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 OUs).</li> <li>• Disposition Below-Grade Portions of Plutonium Finishing Plant.</li> <li>• Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU).</li> <li>• Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU).</li> <li>• Disposition PUREX Storage Tunnels (200-CP-1 OU).</li> <li>• Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU).</li> <li>• Disposition T Plant Canyon Building/Associated Waste Sites.</li> <li>• Disposition Cesium/Strontium Capsules.</li> <li>• Remediate 200-SW-1 OU.</li> <li>• Disposition Remaining Liquid Waste Disposal Facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Disposition Remaining Waste Treatment, Storage, and Disposal Facilities.</li> <li>• Remediate 200-IS-1 OU.</li> <li>• Remediate 200-SW-2 OU.</li> <li>• Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU).</li> <li>• Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU).</li> <li>• Disposition FFTF Complex.</li> <li>• Disposition Remaining Buildings and Facilities within FFTF Complex.</li> <li>• Disposition Remaining Inner Area Buildings and Facilities.</li> <li>• Remediate Contaminated Deep Vadose Zone (200-DV-1 OU).</li> <li>• Restore 200 West Groundwater (200-UP-1 OU) to Beneficial Use.</li> <li>• Restore 200 East Groundwater (200-PO-1/200-BP-5 OUs) to Beneficial Use.</li> </ul>
<b>Tank Waste Cleanup Actions</b>	
<ul style="list-style-type: none"> <li>• Tank Retrieval and Single-Shell Tank Farm Closure.</li> <li>• Tank Waste Treatment.</li> <li>• Secondary Waste Treatment.</li> </ul>	<ul style="list-style-type: none"> <li>• Double-Shell Tank Closure.</li> <li>• Waste Treatment and Immobilization Plant Closure.</li> </ul>
FFTF = Fast Flux Test Facility. OU = operable unit. PNNL = Pacific Northwest National Laboratory.	PUREX = Plutonium Uranium Extraction (Plant). REDOX = Reduction-Oxidation Facility (S Plant).

The Lifecycle Report includes numerous assumptions about future cleanup actions and decisions. Assumptions take into consideration the ranges of plausible alternatives for specific cleanup actions, and what would be reasonable upper bounds for the ranges of alternatives.

The alternatives and upper bounds for future cleanup actions contemplate potential decisions, events, contingencies, and cost and/or schedule uncertainties, and take into account the views and values of regulators, Tribal Nations, and stakeholders.

The TPA agencies have agreed the Lifecycle Report should develop more in-depth information about selected cleanup actions (for which final decisions have not been made). The TPA agencies identified approximately 39 cleanup actions for which final cleanup decisions are still needed (Table 1-4), and Appendix A proposes a schedule for preparing in-depth cost estimate alternative analyses for these cleanup actions.

For the 2013 Lifecycle Report, cost estimate alternative analyses have been presented for waste sites in four Central Plateau operable units. Table 1-5 lists the cleanup actions for which cost estimate information has been provided in this Lifecycle Report.

**Table 1-5. Hanford Site Cleanup Actions and Reasons for Performing Cost Estimate Alternative Analysis in 2013 Lifecycle Report.**

Cleanup Action	Reasons for Analysis in This Year's Lifecycle Report
<ul style="list-style-type: none"> <li>• Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 Operable Units)</li> <li>• Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 Operable Unit)</li> </ul>	Because the U.S. Department of Energy planning case range of alternatives for these Central Plateau operable unit waste sites includes remove, treat and dispose as a significant component of the cleanup actions, the Tri-Party agencies agreed to document the basis of estimate and key assumptions. Cost estimate alternative analysis information is presented in Section 5.7 of this Lifecycle Report.

The scope, schedule and cost information and any cost estimate alternative analyses are for informational purposes only and cannot replace the full analysis of a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC 9601, et seq.)* feasibility study or *Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901, et seq.)* corrective measures study or closure plan. The information and analyses presented here will be used to inform the public and to support budget requests. All cleanup decisions will follow the applicable decision-making process (e.g., CERCLA, RCRA). The Lifecycle Report will be updated to reflect these decisions as they are made.

## 1.7 CHANGES FROM PREVIOUS REPORT

### 1.7.1 Incorporated Changes

Written feedback related to the 2011 Lifecycle Report, received from EPA, Ecology, Oregon, the HAB, and the public was considered when preparing this report. In addition, written feedback related to the 2012 Lifecycle Report received from Ecology, EPA and the public was considered when preparing this report.

The TPA agencies reviewed and considered all feedback received on both reports and reached agreement on changes that should be incorporated into the 2013 Lifecycle Report. The agencies

discussed ways to address “what-if” scenarios to explore alternate funding and scope priorities in addition to using information provided in the Lifecycle Report.

The comments received on the 2011 and 2012 Lifecycle Reports are available on the DOE website at [www.hanford.gov](http://www.hanford.gov).

Significant changes made in this Lifecycle Report include the following:

1. Updated cost and schedule planning basis for each PBS to incorporate updated scope, regulatory changes, and contract changes so this information reflects the DOE-RL and DOE-ORP configuration-controlled planning cases that are current as of August 31, 2012.
2. Updated cleanup costs in Table ES-1, which clarify Hanford Site and DOE-EM costs.
3. Incorporation of the Hanford Site cleanup completion approach presented in *Hanford Site Cleanup Completion Framework (DOE/RL-2009-10)* in Section 1.4.
4. Added explanation of cost and/or schedule uncertainty and evaluation of project risk to Chapter 2.0 and Appendix D.
5. Added information regarding final reactor disposition removal to Table ES-1, Table 3-3, and new Section 4.3.
6. Added assumptions to Section 4.4 that Natural Resource Damage Assessment and Restoration (NRDAR) studies and litigation will not significantly affect cost or schedule at this time. The report does not include scope or cost for activities to resolve any NRDAR liability at this time.
7. Clarified that pump-and-treat remedy durations in Table 5-4 are estimates based on previous experience and modeling.
8. Added new Section 5.7 to present the cost estimate alternative analysis and the basis of estimate approach used in the 2013 Lifecycle Report which captures DOE’s planning case remedies for the 200-CW-1, 200-CW-3, 200-OA-1 and 200-WA-1 OU waste sites in the Central Plateau.
9. Clarified that “secondary waste treatment” is part of the waste feed delivery/treatment planning/DST retrieval/closure work element in Chapter 6.0.
10. Provided enhanced discussion of assumptions regarding temporary onsite storage of high-level vitrified waste in Chapter 6.0.
11. Revised Section 7.3 to clarify the scope, schedule and cost of Site-wide Services.
12. Revised Section 7.4 Long-Term Stewardship (LTS) to clarify that LTS has started and how it will continue under PBS-LTS.
13. Revised Table A-3 to remove “thermal generation of electricity/steam” from the range of plausible alternatives for the cesium/strontium capsules. The TPA agencies agreed that this is not a cleanup alternative.
14. Revised Table D-12 to clarify that the Deep Vadose Zone Operable Unit costs and schedule (at this time) are limited to investigation and preparation of regulatory decision documents. As the scope of this work element matures, future reports will be updated to reflect any changes.

### 1.7.2 Future Report Changes

The scope, schedule and cost information presented in the 2013 Lifecycle Report is current as of August 31, 2012. This section summarizes regulatory decisions and other changes that have occurred after the August 31 cutoff date, as well as other pending changes that are not reflected in this Lifecycle Report, but will be incorporated in future reports.

1. The report presents the DOE-RL and DOE-ORP configuration-controlled planning cases. The DOE-ORP planning case is the same as that presented in the 2012 Lifecycle Report. Any future changes to the planning cases will be incorporated in future reports.
2. The TPA agencies have discussed revisions to various TPA milestone due dates. The revised milestone due dates and the adjusted schedule and costs are not included in this report. They will be shown in future reports after they have been officially accepted and formalized.
3. The TPA agencies established a new operable unit (100-OL-1) in May 2012 to address former orchard lands soil contamination in the 100 Areas. This cleanup action has been added to Table 1-4 and Table A-6, but the range of plausible alternatives has not been developed in Appendix A, Table A-2.
4. Regulatory decision documents are nearing completion for several River Corridor cleanup actions (e.g., 100-K Area, 300 Area) and a record of decision (ROD) for the Central Plateau groundwater cleanup action (e.g., 200-UP-1) was issued in September 2012. The scope, schedule and costs of these decisions will be included in future Lifecycle Reports.
5. The *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*, DOE/EIS-0391, was issued as a final document in December 2012, and DOE will issue a ROD. The scope, schedule and costs associated with any decisions provided in the ROD will be included in future Lifecycle Reports.

## 2.0 HANFORD SITE CLEANUP PLANNING AND INTEGRATION

This chapter provides background information on DOE's work planning, budget preparation, and integration of activities to implement Hanford Site cleanup. This section also discusses the level of cost detail provided in the Lifecycle Report, consistent with TPA milestone direction.

### 2.1 PLANNING AND INTEGRATION OVERVIEW

This section introduces the Federal budget formulation process and DOE's overall planning and budget development practices. A general understanding of common terms and methodology will be useful later in this Lifecycle Report, particularly where information about project costs is presented.

#### 2.1.1 Annual Budget Formulation Process

Each year, DOE formulates its budget requests for Congressional appropriations. This annual planning cycle begins between December and January, nearly 2 years before the start of a budgeted fiscal year. The process begins with the budget formulation stage where funding requirements are analyzed, prioritized, requested, and received. This process results in submission of budget requests by the field offices to DOE-HQ in early spring. The process continues with post-formulation monitoring and responding to questions to estimate impacts of actual or potential changes to budget requests. The process ends with receipt of Congressional appropriations. DOE's budget process occurs in four distinct phases:

1. **Field Budget Process.** The field budget process is the first phase of DOE's annual budget formulation process. The Hanford Site offices (DOE-RL and DOE-ORP) prepare and submit field budget data to DOE-HQ for use in the corporate review budget process.
2. **DOE-HQ Corporate Review Budget Process.** The DOE-HQ organizations use field budget data and spring planning decisions to develop initial organizational budget requests that are jointly evaluated and considered in DOE's internal budget review.
3. **OMB Budget Review Process.** The OMB budget review process is the principal mechanism for preparing DOE's annual budget submission to the OMB, which is responsible for assembling the President's annual budget request to Congress.
4. **Congressional Budget Review Process.** The Congressional budget review process determines DOE's final appropriations for the next Federal fiscal year, based on final Presidential funding and policy determinations in conjunction with Federal budget deliberations by Congress.

The annual budgets developed by DOE and appropriated for spending by Congress are allocated to the responsible DOE projects. Congressional budgets commonly provide different allocations, include additional requirements, or provide other directions that can affect project planning. If adjustments are required, DOE goes through a scheduling and resource-leveling process to adjust plans and accommodate the authorized budget. In some cases, this can result in cost and schedule changes to reconfigure activities resulting from budget or other constraints. DOE also must determine the appropriations that will be used to fund each task to comply with applicable budget direction.

Based on final Congressional appropriations, budget formulation, project planning, and re-planning are intertwined and involve iterative processes with similar steps. The main steps, and DOE's process for defining and managing projects and their baseline summaries, are described below.

### **2.1.2 U.S. Department of Energy Project Formulation Process**

DOE follows a structured approach that organizes all environmental management activities into discrete projects. The following information summarizes key components of DOE's cleanup project management approach.

**Project Baseline Summary (PBS).** DOE-EM projects that have common attributes, such as a common geographic location or activity type, typically are grouped as a PBS. Congressional funding authorizations typically are also allocated by PBS. Each PBS contains a logical grouping of work activities organized in discrete projects or activities by establishing technical scope, schedule and cost baselines; defining performance metrics; and providing financial history, budget request justification, and other information such as programmatic risk and compliance drivers. DOE may define a cleanup project as the entire PBS, or a project may be a portion of a single or multiple PBSs. A PBS or project may include operations and facility support activities such as surveillance and maintenance (S&M).

**Work Breakdown Structure (WBS).** The work scope associated with each PBS is further organized into discrete WBS elements. The WBS provides a product/activities-oriented system to arrange, define, and depict all work in a structured framework. This step is essential to developing comprehensive bases for planning and managing project-specific scope, schedule and cost. Whether the government or a contractor performs the elements, the structure must be compatible with cost estimating and scheduling requirements.

**Resource Allocation.** The next step is to define the resources necessary to execute each WBS element. Resources include labor, materials, and equipment. These resources are a part of work packages, which define the work for each WBS element. Planning packages are used when the work has not been completely defined. Budget is assigned to planning packages based on a mature estimate, until such time as a work package can be developed.

**Project Master Schedule.** With a solid WBS and well-developed work packages in place, DOE can develop a master schedule that contains a reliable estimate of the total time required to accomplish each task and the sequence of execution. The master schedule should reveal tasks that must be completed or partially completed before other tasks begin. These interrelationships help define the project's critical path (the sequence of activities that must be completed on schedule for the entire project to be completed on schedule). Task schedules evolve by balancing the work to be done against the required completion date to achieve project milestones.

**Resource Leveling.** All resources are finite and not all work can be accomplished simultaneously, so work must be organized to ensure existing resources are not overtaxed or underutilized. For example, an engineering or craft labor individual cannot be scheduled to accomplish more than one work package simultaneously, and the same piece of equipment cannot be operated in more than one location at a time. The sequencing of tasks, therefore, addresses not only the order of things to be accomplished, but the availability and optimal use of

resources. Resource leveling may result in the need to revise or update a project's master schedule.

**Uncertainty and Project Risk.** Risk management is an essential function of project management. Cost and schedule uncertainty are included in the development of the Total Project Cost and the approved DOE planning case and are reserved to accommodate additional work scope related to risk events that may stem from conditions and events that were not known during project planning, and other unanticipated changes or uncertainties. Information provided in this Lifecycle Report includes estimates for both cost and schedule uncertainty based on risk analysis methods that comply with DOE guidelines and orders. These estimates are identified as "cost and/or schedule uncertainty" in the Appendix D tables.

Uncertainty addresses both cost-based and schedule-based impacts on a project. Cost uncertainty is the portion of the project budget that is available for risk uncertainty related to the project, but is held outside the contract budget and is part of the government's planning case estimate. Schedule uncertainty is the risk-based, quantitatively derived portion of the overall project schedule duration that is estimated to allow for the time-related risk impacts and other time-related project uncertainties.

Cost and schedule uncertainty is established to manage or cover the cost of unexpected events (e.g., changed conditions discovered by environmental sampling and characterization as cleanup proceeds). Money and time that has been reserved to address risks may be used to account for their effects or the handling actions necessary to mitigate or avoid risk events, but may not be used for work that is outside of the scope of the planning case.

Uncertainty is calculated based upon DOE risks, which are contained in a centralized risk register for each project. The risks are derived from various sources including project team members, project documentation, review teams and other sources. These risks are documented and are utilized in the calculation of cost uncertainty.

To identify the required amount of uncertainty, a quantitative risk analysis (using a Monte Carlo methodology) is performed using the project schedule, complete with the costs of each work activity and applying risks and uncertainty to the schedule. The analysis utilizes stochastic modeling to develop a probability distribution and calculate the cost and/or schedule uncertainty requirements for the project.

**Cost Values.** In a budget request, cost is represented in escalated dollars. Escalation is the provision in a cost estimate for increases in the cost of equipment, material, labor, etc., due to continuing price changes over time. Escalation is used to estimate the future cost of a project or to bring historical costs to the present. Most cost estimating is done in "current" dollars and then escalated to the time when the project will be accomplished. In general, an escalation rate between 2.0 and 4.0 percent per year is used.

## **2.2 SCOPE, SCHEDULE AND COST DEFINITION FOR HANFORD SITE CLEANUP**

Consistent with the cleanup project management approach outlined in Section 2.1.2, DOE-RL and DOE-ORP have organized their work into PBSs. These PBSs include detailed work breakdowns to describe in greater context the scope of DOE's projects and operations at the

Hanford Site. Hanford Site cleanup currently encompasses 12 PBSs, 10 of which are managed by DOE-RL and 2 of which are managed by DOE-ORP, as shown in Table 2-1.

**Table 2-1. Hanford Site Cleanup Project Baseline Summary.**

PBS	Title
RL-0011	NM Stabilization and Disposition–PFP
RL-0012	SNF Stabilization and Disposition
RL-0013C	Solid Waste Stabilization and Disposition–200 Area
RL-0020	Safeguards and Security
RL-0030	Soil and Water Remediation–Groundwater/Vadose Zone
RL-0040	Nuclear Facility D&D–Remainder of Hanford and Infrastructure and Services
RL-0041	Nuclear Facility D&D–River Corridor Closure Project
RL-0042	Nuclear Facility D&D–Fast Flux Test Facility Project
RL-0100	Richland Community and Regulatory Support
RL-LTS	Long-Term Stewardship
PBS	Final Reactor Disposition
ORP-0014	Radioactive Liquid Tank Waste Stabilization and Disposition
ORP-0060	Major Construction–Waste Treatment Plant
D&D = decontamination and decommissioning.	PBS = project baseline summary.
LTS = Long-Term Stewardship.	PFP = Plutonium Finishing Plant.
NM = nuclear materials.	RL = U.S. Department of Energy, Richland Operations Office.
ORP = U.S. Department of Energy, Office of River Protection.	SNF = spent nuclear fuel.

These are discussed in more detail in other chapters of this Lifecycle Report. Table 2-2 shows an example of Level 2 and Level 3 work breakdown associated with a single PBS. This example presents a typical environmental management cleanup project, down to a third tier of planning detail. Most of the work at the Hanford Site has been similarly broken down to at least Level 3.

Depending on complexity of work scope, project maturity, contract period of performance, and other needs, DOE's contractors typically plan their near-term work down to Level 6 and further to manage and schedule the designs, approvals, and resources needed for their projects. This scope, schedule and cost information rolls up and is incorporated into the upper tier planning information. Table 2-3 depicts an example of work planning down to Level 6 and how it rolls up through Levels 1 through 5.

**Table 2-2. Example Cleanup Project Baseline Summary and Work Breakdown to Level 3.**

<b>PBS (Level 1)</b>	<b>RL-0012 SNF Stabilization and Disposition</b>
Level 2	RL-12.12 K Basins Closure Project
Level 3	RL-12.12.01 100-K Safe and Compliant
	RL-12.12.02 K Basins Operations and Maintenance
	RL-12.12.03 Facility Operations
	RL-12.12.11 100-K Facilities Deactivation
	RL-12.12.15 105-K West Basin Deactivation and Demolition
	RL-12.12.16 Sludge Treatment Project
PBS =	project baseline summary.
RL =	U.S. Department of Energy, Richland Operations Office.
SNF =	spent nuclear fuel.

**Table 2-3. Example of a Level 6 Work Breakdown Structure.**

Level 1	RL-0041 Nuclear Facility D&D–River Corridor
Level 2	041.03 Field Remediation Closure
Level 3	041.03.02 Field Remediation – 100 D Area
Level 4	041.03.02.02 Field Remediation – 100-DR-1
Level 5	041.03.02.02.06 Field Remediation – Burial Grounds – 100-DR-1
Level 6	041.03.02.02.06.01 Remediate Burial Ground – 100-D-32
	041.03.02.02.06.02 Remediate Burial Ground – 100-D-33
	041.03.02.02.06.04 Remediate Burial Ground – 100-D-41
	041.03.02.02.06.05 Remediate Burial Ground – 100-D-45
	041.03.02.02.06.06 Remediate Burial Ground – 126-D-2
D&D =	decontamination and decommissioning.
RL =	U.S. Department of Energy, Richland Operations Office.

For years beyond the contractor’s near-term work, DOE maintains out-year planning estimates for the remaining Hanford Site cleanup. Out-year planning estimates are not as fully developed as near-term planning (typically no further than Level 3 or Level 4). Out-year planning information that DOE maintains beyond the contract terms, along with rolled up near-term information, is further elaborated in Chapters 4.0 through 7.0, and in Appendix D of this Lifecycle Report. Cost information will be updated each year to reflect work completion, recent decision making, and other changes affecting the lifecycle scope (e.g., upgrades or infrastructure modernization to support major projects).

Chapters 4.0 through 7.0 summarizes information at PBS Level 2, and includes the work breakdown for each PBS, descriptions of the lifecycle work scope and associated work elements, and schedules for completing each of the work elements. Each chapter provides estimated cleanup cost information for corresponding work elements, and includes costs that are not work elements directly performed under the respective PBS. For example, Site-wide Services is not a work element directly performed in each PBS, but rather an estimated support cost for the entire lifecycle (see Section 7.3). Appendix D of this Lifecycle Report provides additional details at Level 3 for near-term work, and at Level 2 for the entire Hanford Site cleanup.

### 3.0 HANFORD SITE INTEGRATED LIFECYCLE SUMMARY

This chapter presents the overall Hanford Site cleanup scope, schedule and cost. Chapters 4.0 through 7.0 and Appendix D present additional details on the PBSs that cover the lifecycle cleanup work scope in the three major cleanup components and Mission Support.

#### 3.1 HANFORD SITE LIFECYCLE SCOPE

Hanford Site cleanup consists of three major scope components: River Corridor, Central Plateau, and Tank Waste (the Tank Waste component is contained geographically within the Central Plateau). The cleanup includes Mission Support activities that provide key infrastructure and services for the Hanford Site. Hanford Site cleanup is a complex task that involves multiple contractors performing discrete yet interdependent scopes of work. The scope of Hanford Site cleanup work is broken down into a series of PBSs, shown in Table 3-1. Table 3-1 also describes the general scope of each PBS and where in the Lifecycle Report each PBS is addressed.

**Table 3-1. Hanford Site Project Baseline Summaries – Richland Operations Office and Office of River Protection. (2 pages)**

Lifecycle Report Section	PBS	Official Title	Alternate Titles	General Scope
<b>CHAPTER 4.0 – RIVER CORRIDOR CLEANUP</b>				
River Corridor (Section 4.1)	RL-0041	Nuclear Facility D&D–River Corridor Closure Project	None	Cleanup of the River Corridor waste sites and facilities, including placing the reactors in interim safe storage (this scope excludes groundwater remediation, which is addressed through PBS RL-0030). Includes 105-KW SNF Basin deactivation and removal work scope which was shifted from RL-0012 in FY 2012.
River Corridor (Section 4.2)	RL-0012	SNF Stabilization and Disposition	K Basins Closure Project	Removal of the K Basin sludges, found spent nuclear fuel and fuel scrap.
River Corridor (Section 4.3)	None	None	Final Reactor Disposition	Disposition of the 100 Area production reactors (excluding the B Reactor).
<b>CHAPTER 5.0 – CENTRAL PLATEAU CLEANUP</b>				
Central Plateau (Section 5.1)	RL-0011	NM Stabilization and Disposition–PFP	PFP Closure Project	Demolition of aboveground facilities and structures at PFP.
Central Plateau (Section 5.2)	RL-0030	Soil and Water Remediation–Groundwater/Vadose Zone	Groundwater Project	Decision-making process for groundwater and waste sites and Hanford Site-wide groundwater remediation.

**Table 3-1. Hanford Site Project Baseline Summaries – Richland Operations Office and Office of River Protection. (2 pages)**

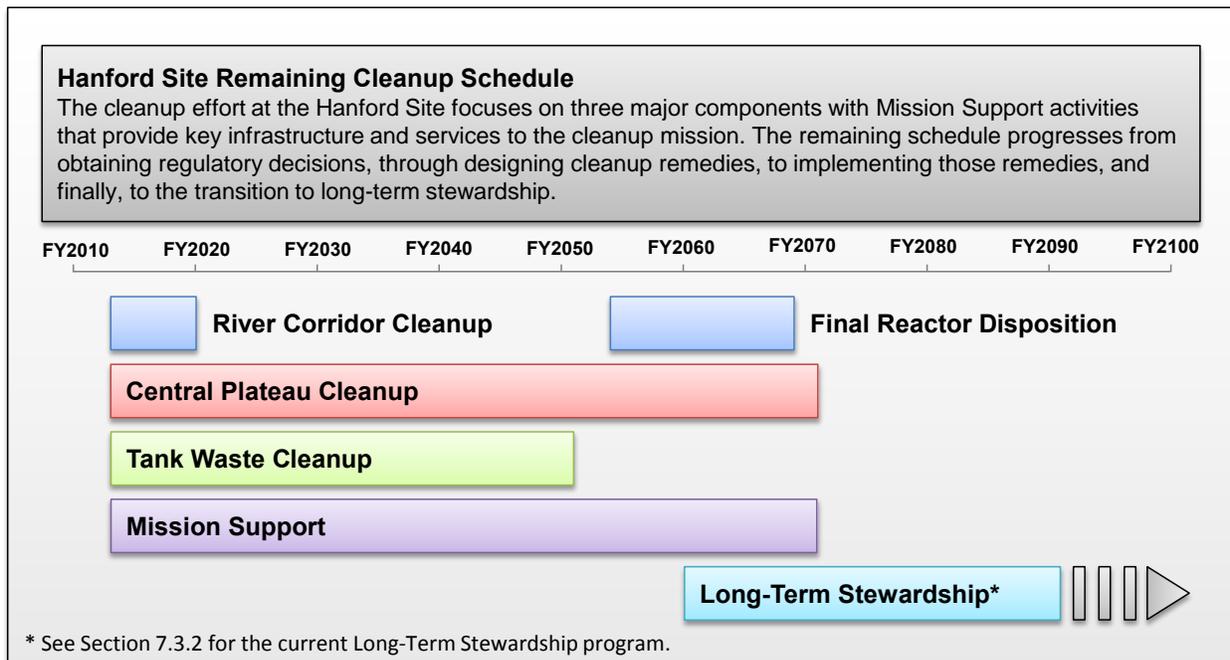
<b>Lifecycle Report Section</b>	<b>PBS</b>	<b>Official Title</b>	<b>Alternate Titles</b>	<b>General Scope</b>
Central Plateau (Section 5.3) and Mission Support (Section 7.3)	RL-0040	Nuclear Facility D&D–Remainder of Hanford	This PBS has two parts: 1. RL-0040 Central Plateau Remediation 2. RL-0040 Infrastructure and Services or Mission Support Site-wide Services	Cleanup of the Central Plateau waste sites and facilities, including canyon facilities. Management, repair, and capital upgrades to infrastructure and other site-wide services.
Central Plateau (Section 5.4)	RL-0042	Nuclear Facility D&D–Fast Flux Test Facility Project	None	Demolition of the Fast Flux Test Facility and associated waste sites and structures.
Central Plateau (Section 5.5)	RL-0013C	Solid Waste Stabilization and Disposition–200 Area	Solid and Liquid Waste Disposition Project	Waste management operations, including storage, treatment, and disposal of Hanford Site waste streams and offsite wastes <sup>1</sup> .
<b>CHAPTER 6.0 – TANK WASTE CLEANUP</b>				
Tank Waste Cleanup (Section 6.1)	ORP-0014	Radioactive Liquid Tank Waste Stabilization and Disposition	None	Operations, retrieval, treatment, and closure of the single-shell and double-shell tanks.
Tank Waste Cleanup (Section 6.2)	ORP-0060	Major Construction–Waste Treatment Plant	None	Construction of the Waste Treatment and Immobilization Plant.
<b>CHAPTER 7.0 – MISSION SUPPORT</b>				
Mission Support (Section 7.1)	RL-0020	Safeguards and Security	None	Protection of the Hanford Site, special materials, resources, and workers.
Mission Support (Section 7.2)	RL-0100	Richland Community and Regulatory Support	None	Support for community and regulatory interaction, including the Hanford Advisory Board, the Natural Resource Trustee Council, the Oregon Department of Energy, and the Washington State Department of Ecology.
Mission Support (Section 7.4)	RL-LTS	Long-Term Stewardship (LTS)	Post-cleanup LTS <sup>2</sup>	Infrastructure support, surveillance and maintenance, community support, and management activities following completion of cleanup activities.
<sup>1</sup> Waste from other sites will not be received until the Waste Treatment and Immobilization Plant is operational. <sup>2</sup> See Section 7.3.2 for the current ongoing LTS program. D&D = decontamination and decommissioning.      ORP = U.S. Department of Energy, Office of River Protection. LTS = long-term stewardship.                              PFP = Plutonium Finishing Plant. NM = nuclear materials.                                      RL = U.S. Department of Energy, Richland Operations Office. PBS = project baseline summary.                        SNF = spent nuclear fuel.				

### 3.2 HANFORD SITE CLEANUP SCHEDULE

The Hanford Site's remaining cleanup schedule covers activities for waste cleanup and waste management, leading to transition of portions of the Hanford Site to LTS. Figure 3-1 depicts the remaining schedule for the primary cleanup components. Chapters 4.0 through 7.0 and Appendix D of this Lifecycle Report present additional schedule details for the River Corridor, Central Plateau, Tank Waste, and Mission Support activities. Figure 3-1 shows River Corridor Cleanup complete by FY 2019, Final Reactor Disposition complete by FY 2068, Tank Waste Cleanup complete by FY 2050, and Central Plateau Cleanup complete by FY 2070.

To support the cleanup, DOE-RL also has responsibility for Mission Support activities related to safeguards and security, community and regulatory support, Hanford Site infrastructure and site-wide services, and LTS. These Mission Support activities align with the cleanup through FY 2070. DOE-RL has planned for an LTS period that runs from FY 2060 through FY 2090 as part of Mission Support.

DOE's cleanup priorities for each of the three primary Hanford Site cleanup components are summarized for several time periods in Table 3-2. Because all cleanup work cannot be done at the same time, a high priority is placed on activities that provide the greatest benefit to the environment and public health (e.g., cleanup of waste sites and groundwater close to the Columbia River) and activities that, once they are completed, will free funds for additional cleanup (e.g., removal of the Plutonium Finishing Plant [PFP] Complex).



Scale dates represent start of fiscal year

**Figure 3-1. Hanford Site Remaining Cleanup Schedule.**

**Table 3-2. DOE’s Time-Phased Cleanup Priorities for Hanford Site Cleanup Completion.**<sup>1</sup>

	Now - 2015	2016 - 2020	2021 - Completion
River Corridor	<ul style="list-style-type: none"> <li>Complete waste site remediation per interim records of decision for 100 Areas and 300 Area</li> <li>Obtain final records of decision</li> <li>Commence site remediation per records of decision</li> <li>Complete surplus facility removal in 100 Areas and 300 Area</li> <li>Complete installation of final groundwater remedies in all areas; stop chromium in excess of standards from entering the Columbia River, implement remedies for strontium-90 and 300 Area uranium</li> <li>Complete transition of seven of nine surplus production reactors to interim safe storage configuration (not K West or B Reactor)</li> <li>Remove sludge from K West Basin</li> <li>Complete transition of Fast Flux Test Facility to surveillance and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Transition areas for which cleanup has been completed to long-term stewardship</li> <li>Complete interim safe storage for KW reactor</li> <li>Continue surveillance and maintenance of Fast Flux Test Facility (FFTF)</li> <li>Demolish K West Basin and complete K Area cleanup</li> <li>Continue to operate groundwater remediation systems</li> </ul>	<ul style="list-style-type: none"> <li>Complete final actions for surplus production reactors (e.g., remove or entomb)</li> <li>Complete final action for Fast Flux Test Facility (e.g., remove or entomb)</li> <li>Return to DOE-RL the four 300 Area facilities retained for near-term use by DOE Office of Science; remove facilities and remediate waste sites</li> <li>Transition remaining areas to long-term stewardship</li> </ul>
Central Plateau	<ul style="list-style-type: none"> <li>Complete removal of Plutonium Finishing Plant complex</li> <li>Complete construction and begin operation of 200 West Area groundwater treatment system</li> <li>Implement groundwater remedies for 200 West Area</li> <li>Initiate cleanup of Outer Area</li> <li>Continue retrieval, packaging and offsite shipment of retrievable-stored transuranic materials</li> <li>Continue decision documentation supporting final decisions for the Inner Area, Outer Area, and any remaining groundwater operable units</li> </ul>	<ul style="list-style-type: none"> <li>Obtain final decisions for Inner Area and Outer Area operable units</li> <li>Complete remediation of Outer Area waste sites</li> <li>Complete remediation of the U Plant Canyon</li> <li>Complete remediation of the first Inner Area zone and start cleanup of additional Inner Area zones</li> <li>Begin sludge treatment</li> <li>Obtain final decision and implement final remedies for 200 East Area groundwater operable units</li> <li>Continue to operate groundwater remediation systems</li> <li>Initiate implementation of remedies for deep vadose zone contamination</li> <li>Retrieve and ship transuranic waste to the Waste Isolation Pilot Plan</li> <li>Construct and operate solid waste treatment capability for large box and remote-handled waste</li> <li>Move cesium/strontium capsules to dry storage</li> </ul>	<ul style="list-style-type: none"> <li>Complete cleanup of Inner Area geographic zones – waste site remediation, facility cleanup, and treatment, storage, and disposal facility closure</li> <li>Provide waste disposal capability for WTP operations</li> <li>Complete packaging and offsite shipment of transuranic materials</li> <li>Complete canyon cleanup and implement remedy configuration</li> <li>Complete active groundwater treatment operations</li> <li>Complete transition of Outer Area to long-term stewardship and Inner Area to long-term waste management</li> <li>Continue safe storage of spent fuel and transport to a national repository or consolidation center.</li> </ul>
Tank Waste	<ul style="list-style-type: none"> <li>Continue construction of Waste Treatment Plant (WTP)</li> <li>Complete waste retrieval from C Farm tanks</li> <li>Maintain and upgrade tank farm infrastructure</li> <li>Develop waste feed delivery infrastructure</li> <li>Mitigate impacts from past tank leaks</li> </ul>	<ul style="list-style-type: none"> <li>Complete WTP construction</li> <li>Start up and commission WTP</li> <li>Close C Tank Farm; demonstrate closure methods and approaches for future single shell tank farms</li> <li>Implement waste feed delivery systems and tank infrastructure to support WTP operation</li> <li>Begin operation of the Integrated Disposal Facility and provide storage for immobilized high-level waste</li> <li>Upgrade liquid effluent treatment capability to accommodate WTP operations</li> </ul>	<ul style="list-style-type: none"> <li>Achieve initial plan operations for WTP (2022)</li> <li>Continue tank waste retrieval – 9 tanks beyond C tank farm by 2022 and complete all SSTs by 2040</li> <li>Implement supplemental treatment capacity, as necessary</li> <li>Close all single shell tanks (2043)</li> <li>Complete treatment of tank waste (2047)</li> <li>Close all double shell tanks (2052)</li> </ul>

<sup>1</sup>From DOE/RL-2009-10. Most of these activities support achievement of a TPA milestone. More detailed scope and schedules are provided in Chapters 4.0 through 7.0. The FFTF is discussed in Section 5.4.

### 3.3 HANFORD SITE ESTIMATED CLEANUP COST

The DOE remaining cleanup costs are estimated to be about \$114.8 billion to complete the scope for the River Corridor, Final Reactor Disposition, Central Plateau, Tank Waste, Mission Support activities, and LTS. DOE-RL scope accounts for about \$55.2 billion, or about 48 percent of the total costs. DOE-ORP scope accounts for about \$59.6 billion, or about 52 percent. These estimates include cost uncertainty because many of the final cleanup decisions have not been made. Once these decisions are made, estimates will be revised.

Figure 3-2 summarizes the Hanford Site estimated remaining cleanup cost distribution between DOE-RL and DOE-ORP. Figure 3-3 shows the Hanford Site remaining cleanup costs by year for DOE-RL and DOE-ORP. Figure 3-4 summarizes the estimated Hanford Site cleanup costs by DOE-RL and DOE-ORP PBSs. Table 3-3 provides a summary of total estimated cleanup costs for each PBS.

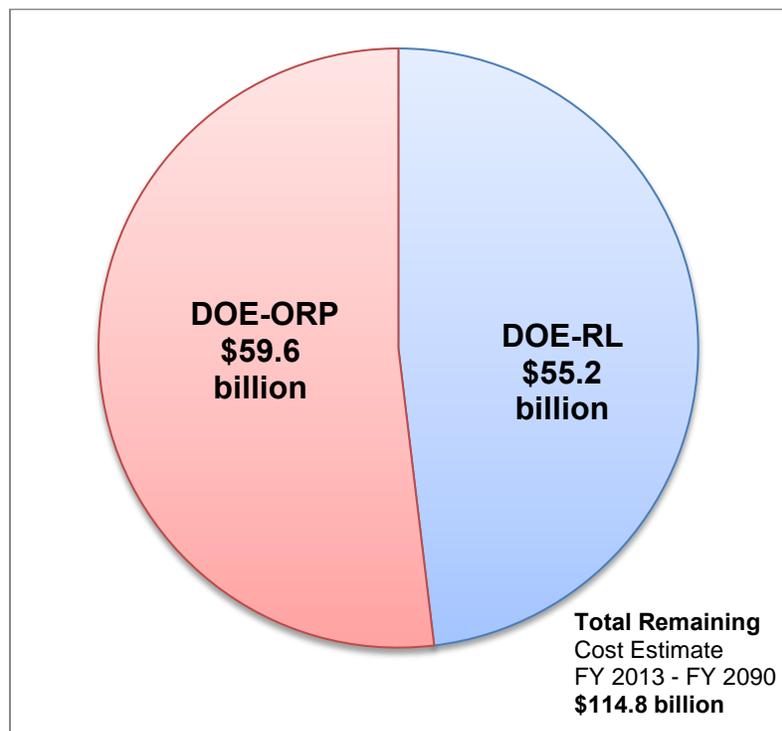


Figure 3-2. Hanford Site Estimated Cleanup Cost Distribution by U.S. Department of Energy Field Office.

### 3.4 SCOPE AND COSTS NOT DIRECTLY RELATED TO CLEANUP

As stated in TPA Milestone M-036-01:

**“USDOE may also include costs other than those directly related to environmental obligations (such as security costs) but shall clearly distinguish expenditures for environmental obligations from other expenditures.”**

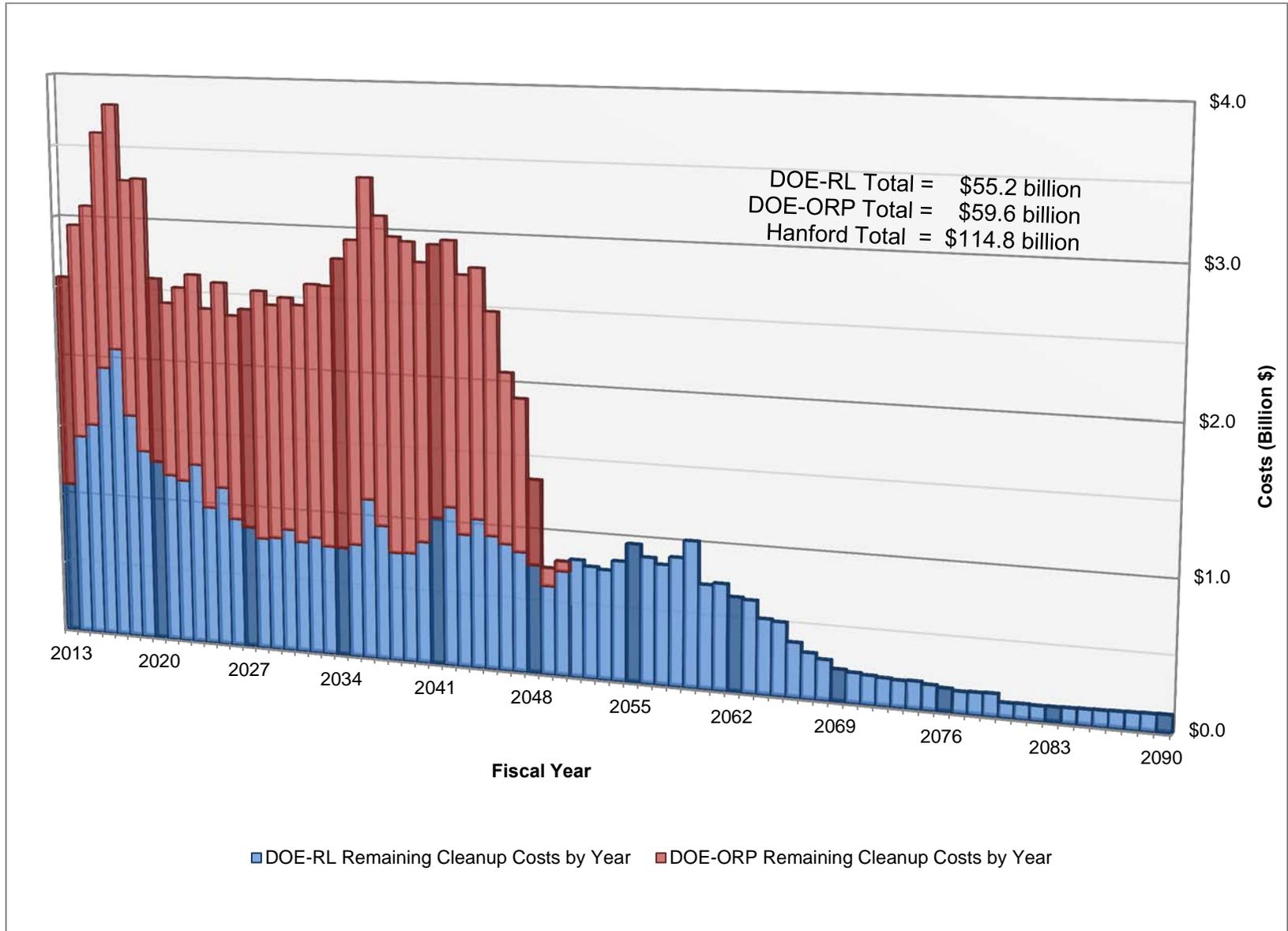


Figure 3-3. Hanford Site Remaining Cleanup Costs by Fiscal Year.

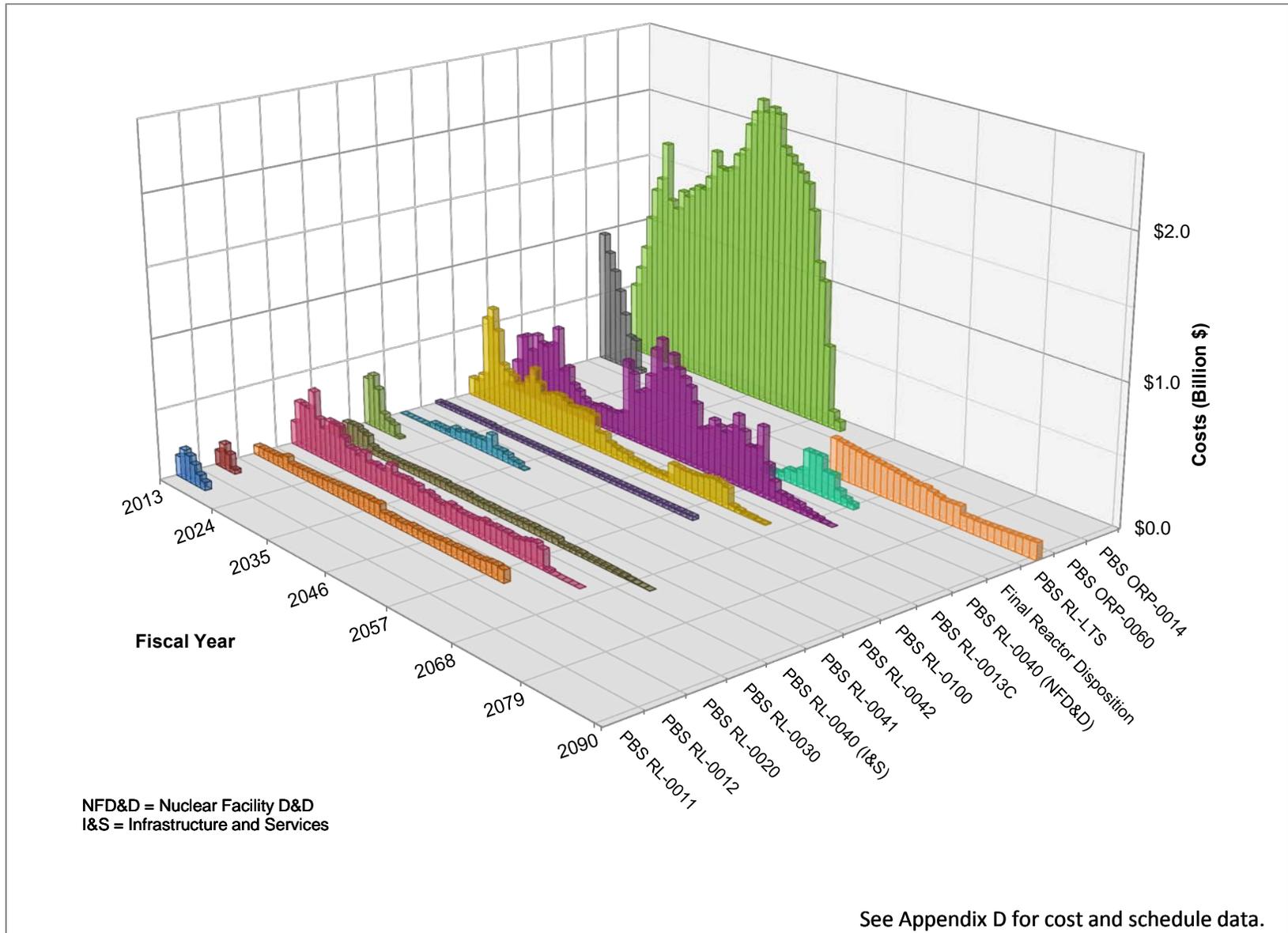


Figure 3-4. Hanford Site Remaining Cleanup Costs by Project Baseline Summary.

**Table 3-3. Hanford Site Remaining Cleanup Cost Estimates by PBS.**

<b>Project Work Scope</b>	<b>Estimated Cleanup Costs<sup>1</sup> (Billion \$)</b>
<b>DOE-RL Total Remaining Estimated Costs</b>	<b>\$49.8 - \$55.2</b>
NM Stabilization and Disposition – PFP (PBS RL-0011)	\$0.5 - \$0.8
SNF Stabilization and Disposition (PBS RL-0012)	\$0.4
Solid Waste Stabilization and Disposition - 200 Area (PBS RL-0013C)	\$9.5 - \$9.8
Safeguards and Security (PBS RL-0020)	\$3.6
Soil and Water Remediation - Groundwater/Vadose Zone (PBS RL-0030)	\$7.7 - \$8.3
Nuclear Facility D&D - Remainder of Hanford (PBS RL-0040)	\$14.8 - \$18.8
Infrastructure and Services (PBS RL-0040)	\$2.6 - \$2.7
Nuclear Facility D&D - River Corridor Closure Project (PBS RL-0041)	\$1.4
Nuclear Facility D&D - Fast Flux Test Facility Project (PBS RL-0042)	\$1.0 - \$1.1
Richland Community and Regulatory Support (PBS RL-0100)	\$1.1
Long-Term Stewardship (PBS RL-LTS)	\$5.4
Final Reactor Disposition	\$1.9
<b>DOE-ORP Total Remaining Estimated Costs</b>	<b>\$59.6</b>
Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014)	\$55.5
Major Construction – Waste Treatment Plant (PBS ORP-0060)	\$4.1
<b>Total Remaining Estimated Costs</b>	<b>\$109.4 - \$114.8</b>
<sup>1</sup> Cost ranges have been shown in this table to reflect cost and schedule uncertainty; the higher number is used throughout this report. Values are rounded, see Appendix D for details. D&D = decontamination and decommissioning. LTS = long-term stewardship. DOE-ORP = U.S. Department of Energy, Office of River Protection. NM = nuclear materials. DOE-RL = U.S. Department of Energy, Richland Operations Office. PFP = Plutonium Finishing Plant. SNF = spent nuclear fuel.	
<b>NOTE:</b> The remaining estimated cleanup cost does not include the upper bound cost estimates prepared for selected future cleanup actions. These are summarized in Appendix A, Table A-5.	

For purposes of this 2013 Lifecycle Report, DOE has treated all Hanford Site scope and costs as being directly related to environmental obligations. This approach has been taken because virtually all Hanford Site work is necessary for successful completion of the cleanup and can rarely be distinguished from non-cleanup work. This is particularly the case when work fulfills multiple purposes, such as maintaining Hanford Site infrastructure (e.g., roads, utilities). Even the costs for security include, in addition to guarding nuclear materials, other actions that directly support cleanup, such as controlling and restricting access to contaminated areas of the Hanford Site, protecting property and equipment used for environmental remediation, and ensuring that only authorized workers are allowed onsite to perform cleanup work.

## 4.0 RIVER CORRIDOR CLEANUP

The River Corridor, the area of the Hanford Site along the Columbia River, is comprised of four production and operations areas:

- **100 Areas** – the location of nine former production reactors, associated support facilities, and related waste sites.
- **300 Area** – the location of research, development, and fuel fabrication facilities, and related waste sites.
- **400 Area** – the buildings and waste sites other than operating facilities, Fuels and Materials Examination Facility, and the Fast Flux Test Facility (FFTF).
- **600 Area** – the location of two major burial grounds (618-10 and -11) with some soil and debris sites.

The majority of the River Corridor Cleanup is on track for completion by FY 2015. Final remedial activities (excluding final reactor disposition) may extend until FY 2024. Work related to the 100-K Area is scheduled for completion by FY 2024 per TPA Milestone M-016-00 (Table 4-1) in conjunction with SNF Stabilization and Disposition (PBS RL-0012) and Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) work scope.

DOE manages the River Corridor Cleanup through two projects, which are planned and funded under separate PBSs:

1. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) addresses the cleanup of waste sites, burial grounds, and facilities in the 100, 300, 400, and 600 Areas and the interim safe storage (ISS) of the C, D, DR, F, H, KE, KW, and N Reactors. This project is currently responsible for operating and maintaining the ERDF, located on the Central Plateau, which is the disposal location for the remediation waste from the River Corridor and other Hanford Site cleanup operations. Section 4.1 discusses the scope of this project.
2. SNF Stabilization and Disposition (PBS RL-0012) addresses the removal of fuel and sludge from the K Basins. The 105-KW Basin deactivation and removal work scope has been transferred to PBS RL-0041. Section 4.2 discusses the scope of this project.

Although it is currently not considered to be a project, Final Reactor Disposition will address cleanup of the 100 Area surplus production reactors. Section 4.3 discusses the scope of this activity.

Groundwater cleanup is underway in the River Corridor. DOE-RL manages the groundwater cleanup through Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), which covers groundwater remediation for the entire Hanford Site. Therefore, the groundwater associated with the River Corridor is discussed in the Central Plateau Cleanup in Section 5.2.

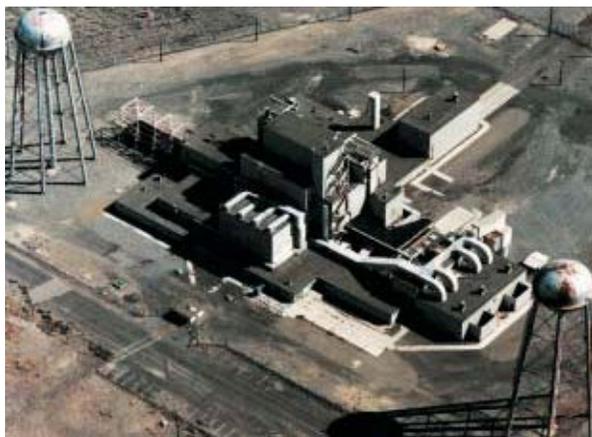
Cleanup is conducted in accordance with interim and final RODs and action memoranda as listed in Appendix C and with key TPA milestones as listed in Table 4-1. These TPA milestones provide the structure that the TPA agencies have agreed to for Hanford Site priorities and scope sequencing.



interim RODs and future final RODs (see Appendix C). Anticipated land uses for the River Corridor are described in DOE/EIS-0222-F, Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement, and in the pursuant ROD.

The River Corridor Closure Project has established the following cleanup objectives:

- Remediate waste sites.
- Deactivate, decontaminate, decommission, and demolish (D4) facilities.
- Place eight plutonium production reactors into ISS. Figure 4-1 and Figure 4-2 depict C Reactor before and after the ISS process. Table 4-2 provides the status of the reactors. Note B Reactor's status as a National Historic Landmark.
- Operate ERDF to support disposal of waste generated during D4, field remediation, ISS, and support to other Hanford Site waste generators.
- Complete substantive remediation to allow the 100 and 300 Areas to be deleted from the National Priorities List.
- The River Corridor Closure Project includes remediation of the 600 Area burial sites 618-10 and 618-11 by September 30, 2015. This is an accelerated schedule which complies with TPA Milestone M-16-00B (Table 4-1).



**Figure 4-1. C Reactor Before Interim Safe Storage.**



**Figure 4-2. C Reactor in Interim Safe Storage.**

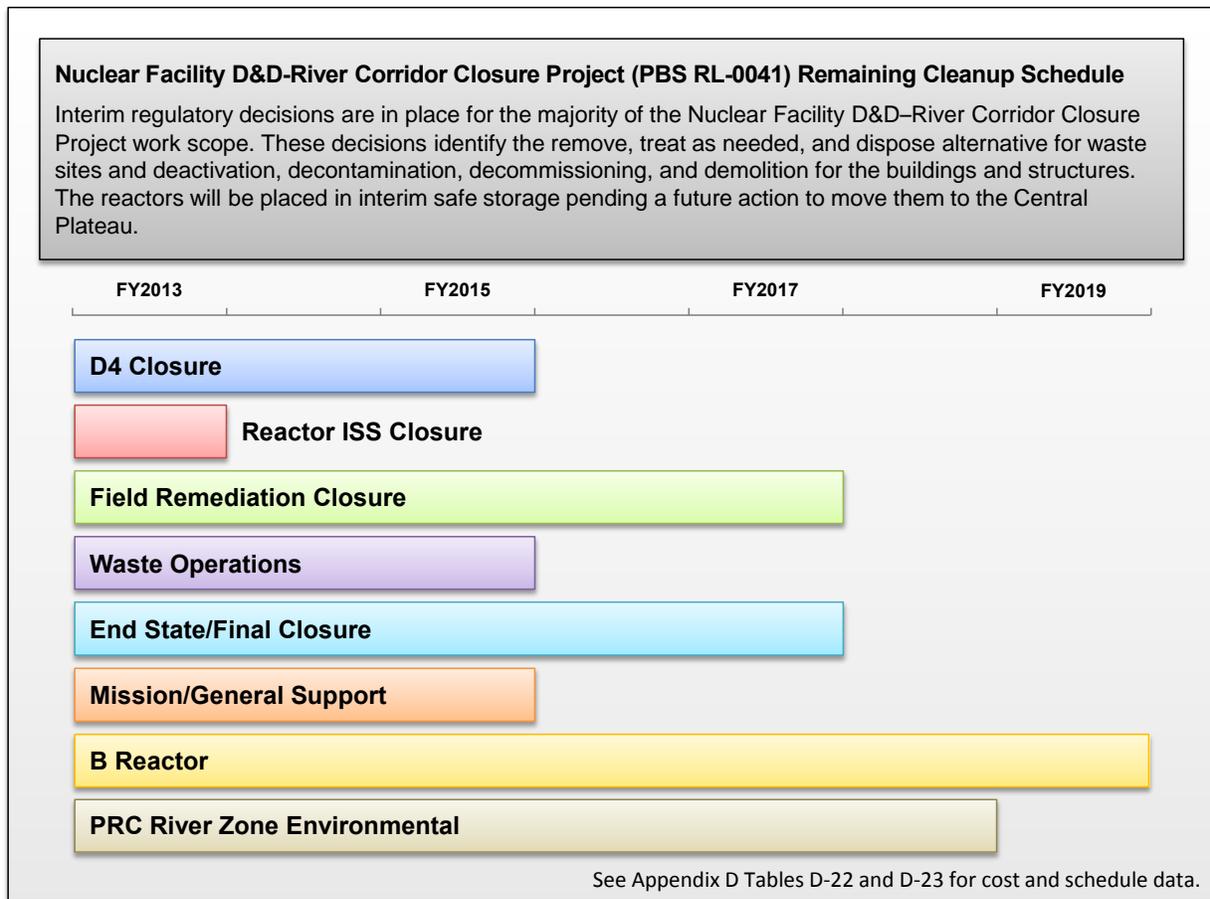
**Table 4-2. Reactor Status (2 pages).**

Reactor	Status (as of August 2012)	Remaining Activity
B	Named National Historic Landmark by U.S. Department of Interior in 2008. Reactor open for escorted public tours.	In July 2011, the National Park Service recommended to Congress inclusion of B Reactor into a Manhattan Project National Historic Park.
C	Reactor placed in ISS.	Final disposition of reactor block.
D	Reactor placed in ISS.	Final disposition of reactor block.
DR	Reactor placed in ISS.	Final disposition of reactor block.
F	Reactor placed in ISS.	Final disposition of reactor block.
H	Reactor placed in ISS.	Final disposition of reactor block.

**Table 4-2. Reactor Status (2 pages).**

Reactor	Status (as of August 2012)	Remaining Activity
KE	Fuel storage basin demolished; continued deactivation, decommissioning, and demolition activities in preparation for emplacement of safe storage enclosure.	Reactor ISS was started in 2011 and scheduled for completion by July 14, 2014; final disposition of reactor block.
KW	Awaiting sludge removal to proceed with demolition of adjacent buildings and installation of safe storage enclosure to complete ISS activities.	ISS; final disposition of reactor block.
N	Reactor placed in ISS.	Final end state of the reactor has not been determined..
ISS = interim safe storage.		

Figure 4-3 depicts the primary Level 2 work elements within the Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) remaining cleanup schedule. Table 4-3 summarizes the scope for the Level 2 work elements.



**Figure 4-3. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) Remaining Cleanup Schedule.**

**Table 4-3. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041) Level 2 Scope Summary. (2 pages)**

Work Element	Scope Description
Plateau Remediation Contract River Zone Environmental	This work element includes work remaining to complete the 100-K Area remediation including the demolition of the K East Basin, disposition of the K East Reactor, and the D4 of support structures. In the K West Basin, near-term deactivation includes the removal of containerized sludge and any found scrap/scrap fuel, and finally the removal of the fuel basin (conducted under PBS RL-0012).
D4 Closure	<p>This work element includes D4 of approximately 500 facilities, provision of utility and surveillance and maintenance services during D4, and closure of utilities located in the River Corridor. The D4 closure buildings are located throughout the River Corridor in the 100, 300, 400, and 600 Areas of the Hanford Site. Typical hazards associated with the buildings include radiological contamination (e.g., uranium, mixed fission products, activation products, plutonium), hazardous materials (e.g., asbestos, chemicals), and industrial hazards (e.g., elevated working locations, degraded roofs, biological hazards, electrical hazards, excavations).</p> <p>The D4 process includes obtaining regulatory approvals; characterizing the hazards and waste; deactivating the facility by removing loose hazardous materials and equipment; decontaminating the facility to allow open-air demolition; and decommissioning the facility by disconnecting utilities and services. The structure is then demolished using techniques such as heavy equipment (e.g., track hoe, processor, loader, cranes), explosives, cutting equipment, or other methods and the demolition debris is disposed, generally to ERDF. Following demolition, samples are collected to verify that cleanup criteria are met, and the sites are backfilled and revegetated.</p>
Reactor Interim Safe Storage (ISS) Closure	This work element includes removal of reactor area buildings and components, leaving the reactor blocks intact in ISS. The reactors will then undergo surveillance, monitoring, and maintenance for a period of time up to 75 years, to allow radionuclides to decay. Following this period (in most cases), the reactor blocks will be removed from their current locations and transported to the 200 Area for disposal (see Section 4.3). Figure 4-1 and Figure 4-2 show the change in reactor site footprint before and after being placed in ISS.
Field Remediation Closure	<p>This work element includes performing CERCLA field remediation and closure of contaminated waste sites and (liquid waste disposal facilities, burial grounds, burn pits, disposal pits, unplanned release sites, and contaminated pipelines) within the River Corridor. This includes confirmatory sampling, remediation design, RTD activities, verification sampling, and closure documentation. The RODs for the Field Remediation Closure work scope generally identify RTD as the preferred alternative. (RODs are identified in Appendix C.) In addition to RTD, sites were identified that require confirmatory sampling to determine the need for RTD. Following sampling, these sites either become RTD sites or are closed as no-action sites.</p> <p>Contamination in the waste sites and burial grounds of the River Corridor include chemical and radioactive constituents, such as metals, hexavalent chromium, petroleum related compounds, strontium, uranium, and cesium. The cleanup process involves sampling and analyzing the site to determine the extent and type of contamination, excavating contaminated waste materials, and restoring the landscape through site backfill, grading, and revegetation.</p>
Waste Operations	This work element includes the transportation, disposal, and treatment (if required) of waste from the River Corridor Cleanup activities, as well as from other Hanford Site cleanup operators. Waste operations will expand and operate the ERDF, and transition the ERDF to a successor operator at the end of the Nuclear Facility D&D–River Corridor Closure Project.

**Table 4-3. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041) Level 2 Scope Summary. (2 pages)**

Work Element	Scope Description																									
End State/Final Closure	This work includes preparing an integrated River Corridor work plan for a CERCLA baseline risk assessment; preparing a baseline risk assessment for the 100 and 300 Areas; conducting a risk evaluation for River Corridor areas outside of the 100 and 300 Areas; conducting orphan site evaluations; conducting surface soil surveys; preparing remedial action reports documenting completion of interim remedial actions for each geographic area; conducting closure reviews; preparing a remedial investigation/feasibility study and proposed plan for six River Corridor source and groundwater areas; and preparing transition turnover packages for the six geographic areas for transition to the Hanford Long-Term Stewardship Program.																									
Mission/General Support	This work element consists of functional support and business operations necessary to achieve River Corridor Closure and field project objectives. This includes providing trained and qualified staff, performance standards, facilities services, and office supplies. General support functions include safety, health and quality, regulatory and environmental management, project integration, project services, engineering services, and Office of the Project General Manager.																									
Site Infrastructure & Utility/Logistics & Transportation (B Reactor)	This work element includes management and oversight for B Reactor facility activities, including planning, directing, and providing technical support to maintain, upgrade, and preserve the B Reactor facility in a safe condition.																									
Site-wide Services (RL-0041)	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.																									
<p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.</i></p> <table> <tr> <td>CERCLA=</td> <td><i>Comprehensive Environmental Response, Compensation, and Liability Act.</i></td> <td>ERDF</td> <td>=</td> <td>Environmental Restoration Disposal Facility.</td> </tr> <tr> <td>D4</td> <td>= deactivation, decontamination, decommissioning, and demolition.</td> <td>ISS</td> <td>=</td> <td>interim safe storage.</td> </tr> <tr> <td>D&amp;D</td> <td>= decontamination and decommissioning.</td> <td>PBS</td> <td>=</td> <td>project baseline summary.</td> </tr> <tr> <td></td> <td></td> <td>ROD</td> <td>=</td> <td>record of decision.</td> </tr> <tr> <td></td> <td></td> <td>RTD</td> <td>=</td> <td>remove, treat, and dispose.</td> </tr> </table>		CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	ERDF	=	Environmental Restoration Disposal Facility.	D4	= deactivation, decontamination, decommissioning, and demolition.	ISS	=	interim safe storage.	D&D	= decontamination and decommissioning.	PBS	=	project baseline summary.			ROD	=	record of decision.			RTD	=	remove, treat, and dispose.
CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	ERDF	=	Environmental Restoration Disposal Facility.																						
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D&D	= decontamination and decommissioning.	PBS	=	project baseline summary.																						
		ROD	=	record of decision.																						
		RTD	=	remove, treat, and dispose.																						

Figure 4-4 presents the remaining cleanup costs for PBS RL-0041 by fiscal year, and Figure 4-5 presents the remaining estimated costs by work element.

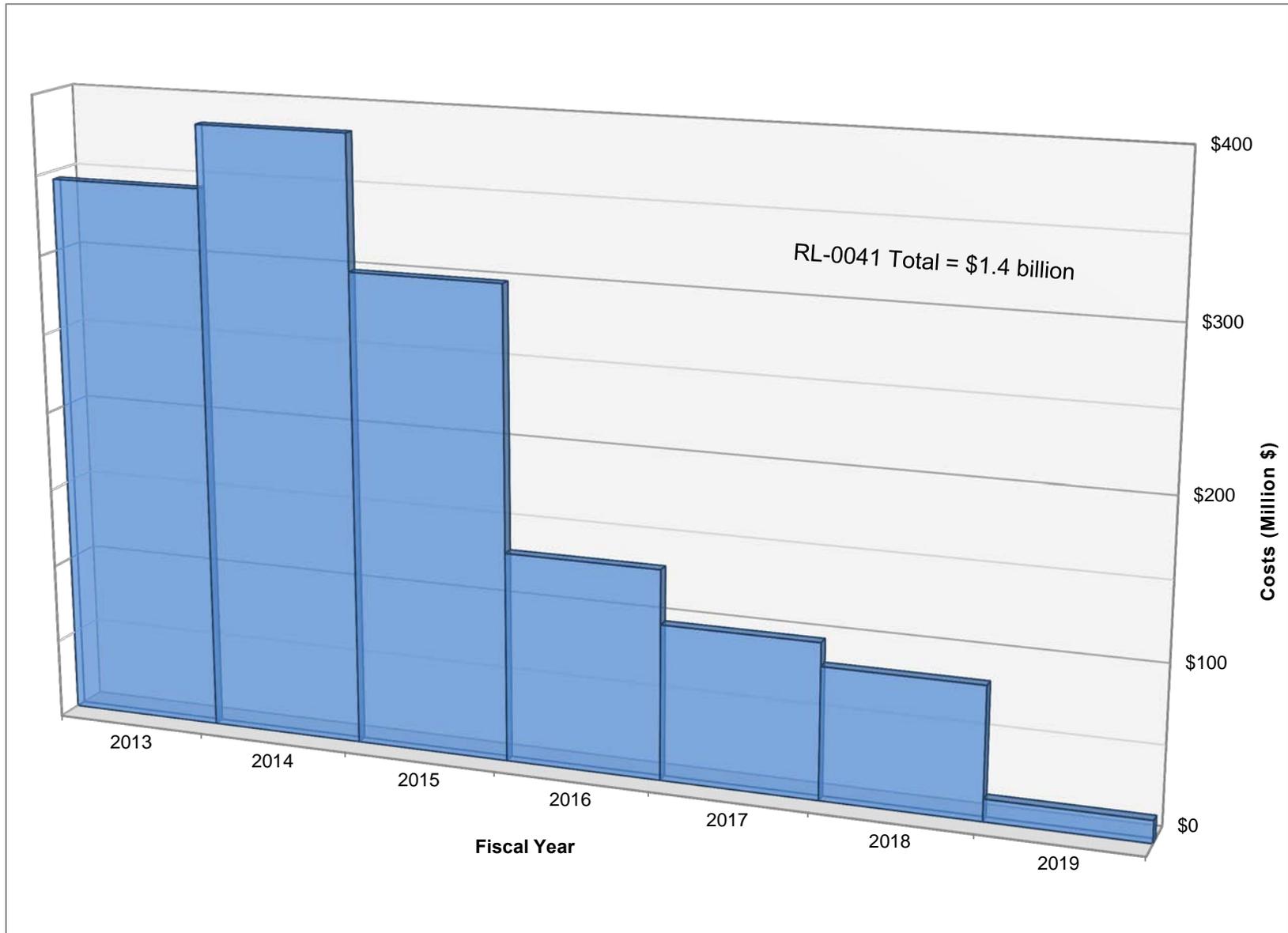


Figure 4-4. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) Remaining Estimated Cleanup Costs by Fiscal Year.

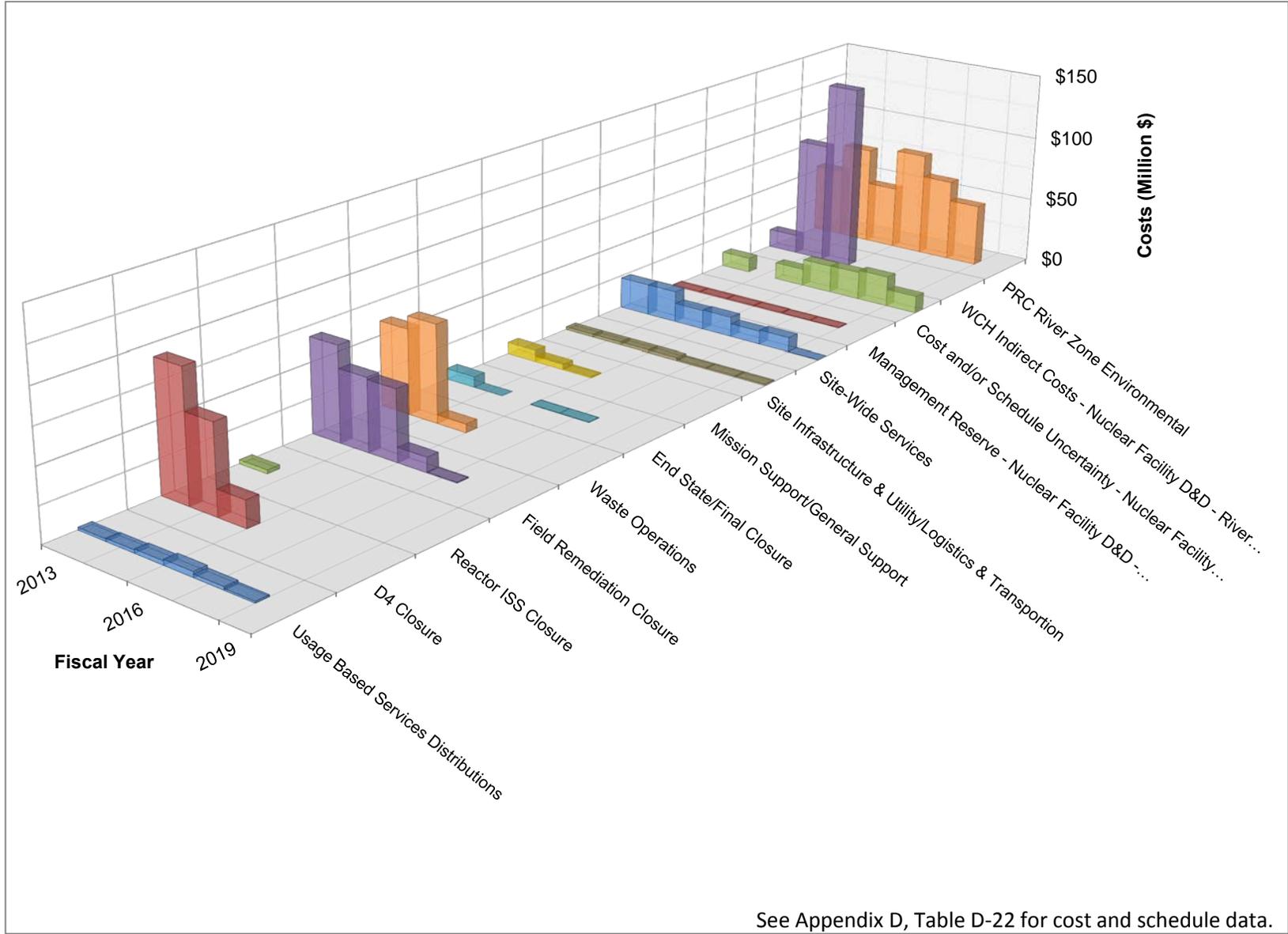


Figure 4-5. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) Remaining Estimated Cleanup Costs by Work Element.

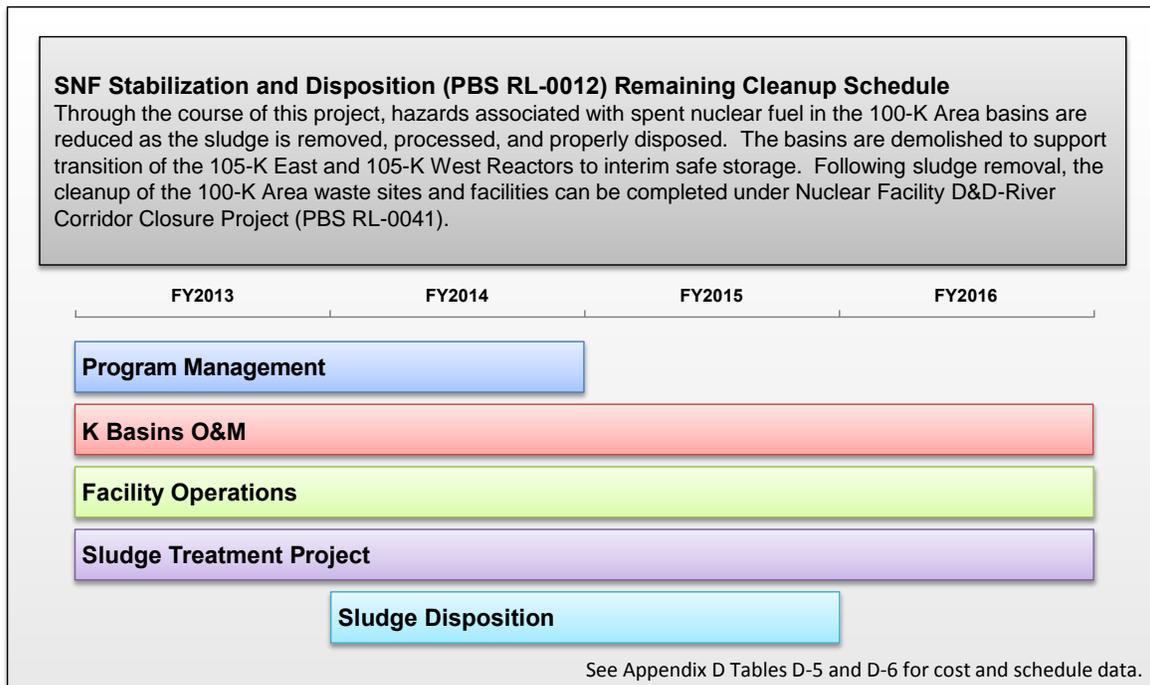
#### 4.2 SNF STABILIZATION AND DISPOSITION (PBS RL-0012)

The Spent Nuclear Fuel (SNF) Stabilization and Disposition Project (PBS RL-0012) provides for safe stabilization, packaging, and interim storage of SNF sludge. After removal of the sludges, the 105-KW Basin deactivation and removal work scope will be performed under PBS RL-0041. At the completion of this project, significant hazards to workers, the public, and the environment will have been eliminated.

The major cleanup objectives for the SNF Stabilization and Disposition Project (PBS RL-0012) are:

- All SNF will be removed from the K Basins and repackaged, dried, and transported to interim storage at the Canister Storage Building (CSB).
- Sludge material from K Basin knock-out pots will be pretreated, packaged, dried, and transported to interim storage at the CSB pending disposal at a future repository. Once stabilized and placed into storage, this waste stream and the remaining sludge will be handed off to another project (PBS RL-0013C, Solid Waste Stabilization and Disposition–200 Area) for final disposition to the Waste Isolation Pilot Plant (WIPP) or other disposal facilities.
- The remaining sludge will be retrieved and shipped to an interim onsite storage facility, then treated and packaged for shipment to an offsite disposal facility.
- Debris within the 105-KW Basin will be packaged and transported for disposal.

The work scope for SNF Stabilization and Disposition Project (PBS RL-0012) is organized into the work elements shown in Figure 4-6, which also presents the remaining cleanup schedule. Additional scope information on these work elements is provided in Table 4-4.



**Figure 4-6. SNF Stabilization and Disposition Project (PBS RL-0012) Remaining Cleanup Schedule.**

**Table 4-4. SNF Stabilization and Disposition (PBS RL-0012) Level 2 Scope Summary.**

<b>Work Element</b>	<b>Scope Description</b>
Program Management	This work element provides for project management for the 100-K Area work activities.
K Basins Operations and Maintenance	This work element includes dose data gathering and analysis; sampling and characterization of both radioactive and hazardous waste to maintain compliance within the 105-KW Basin (note that 105-KE Basin already has been demolished); and basic plant maintenance and general duties and operations to keep the 105-KW Basin and CVDF in a safe and compliant condition.
Facility Operations	This work element includes auxiliary operations support, conduct of operations support, waste management support, and sample management support. Specific tasks include, but are not limited to, operational and environmental sampling, operation of potable and service water supplies, and conduct of operations.
Sludge Treatment Project	This work element includes the design, procurement, fabrication, installation, testing, startup, operation, deactivation, and decontamination of the equipment necessary to perform the functions to remove consolidated containerized sludge, then stabilize and package the sludge for interim storage at the Hanford Site. Once stabilized and placed into storage, the waste stream will be handed off to another project area (PBS RL-0013C, Solid Waste Stabilization and Disposition–200 Area) for final disposition to WIPP or other disposal facilities.
Sludge Disposition	This work element includes design, procurement, fabrication, installation, testing, startup, operation, deactivation, and decontamination of the equipment necessary to treat and package the sludge for ultimate disposition at WIPP. This material is K East and K West Basins floor sludge and settler tube sludge currently stored in engineered containers. The stabilization and packaging of sludge for offsite disposal is part of the K Basins CERCLA Interim Remedial Action. Treatment processes and system requirements will be developed through the project definition and conceptual design phase.
Site-wide Services – RL-0012	Includes proportional share of costs for site-wide services and infrastructure. See Section 7.3.2 for details.
CVDF = Cold Vacuum Drying Facility.	FY = fiscal year.
ERDF = Environmental Restoration Disposal Facility.	PBS = project baseline summary.
	WIPP = Waste Isolation Pilot Plant.

Figure 4-7 presents remaining estimated cleanup costs for SNF Stabilization and Disposition (PBS RL-0012) by fiscal year, and Figure 4-8 presents remaining estimated cleanup costs by work element.

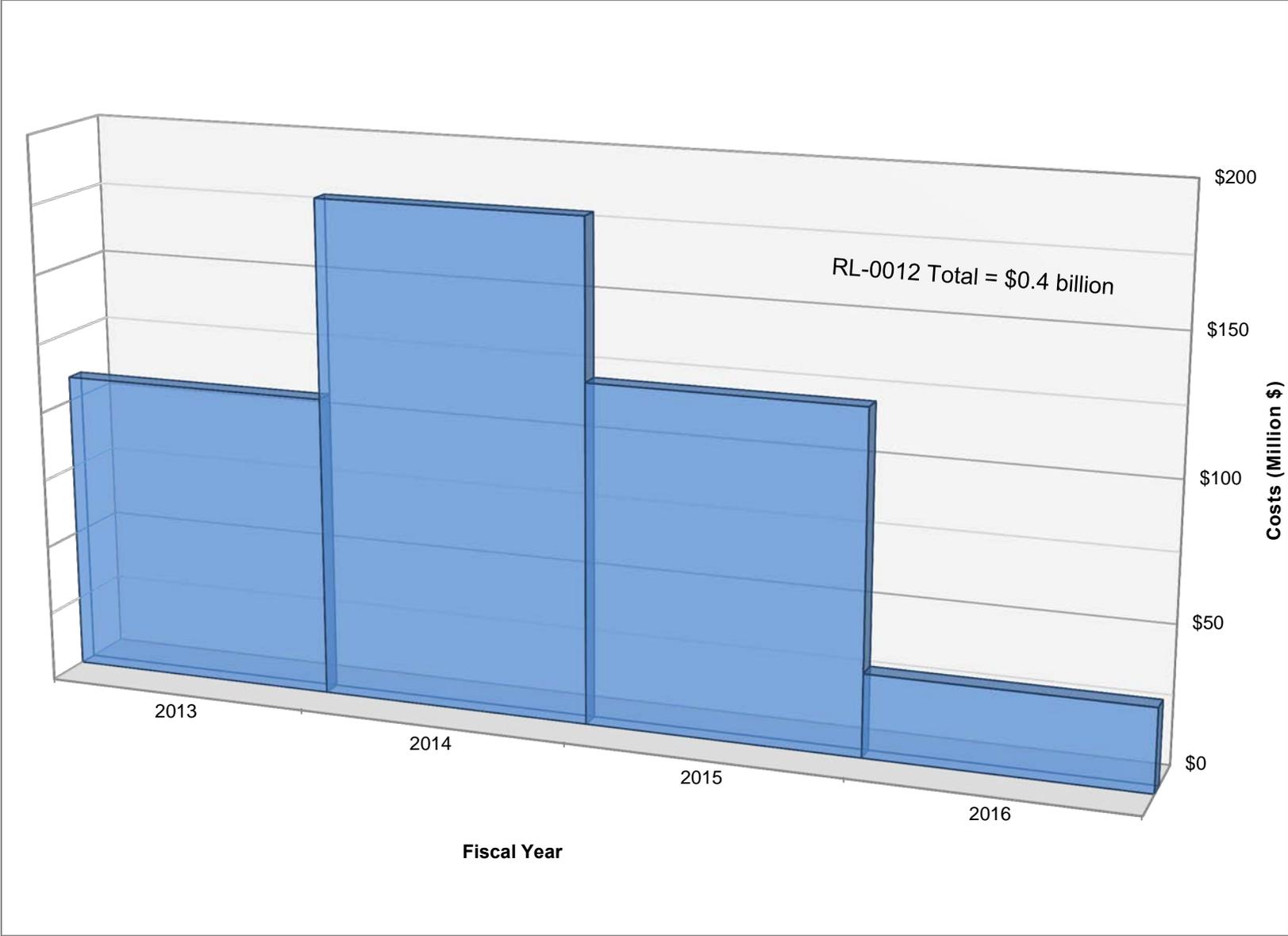


Figure 4-7. SNF Stabilization and Disposition (PBS RL-0012) Remaining Estimated Cleanup Costs by Fiscal Year.

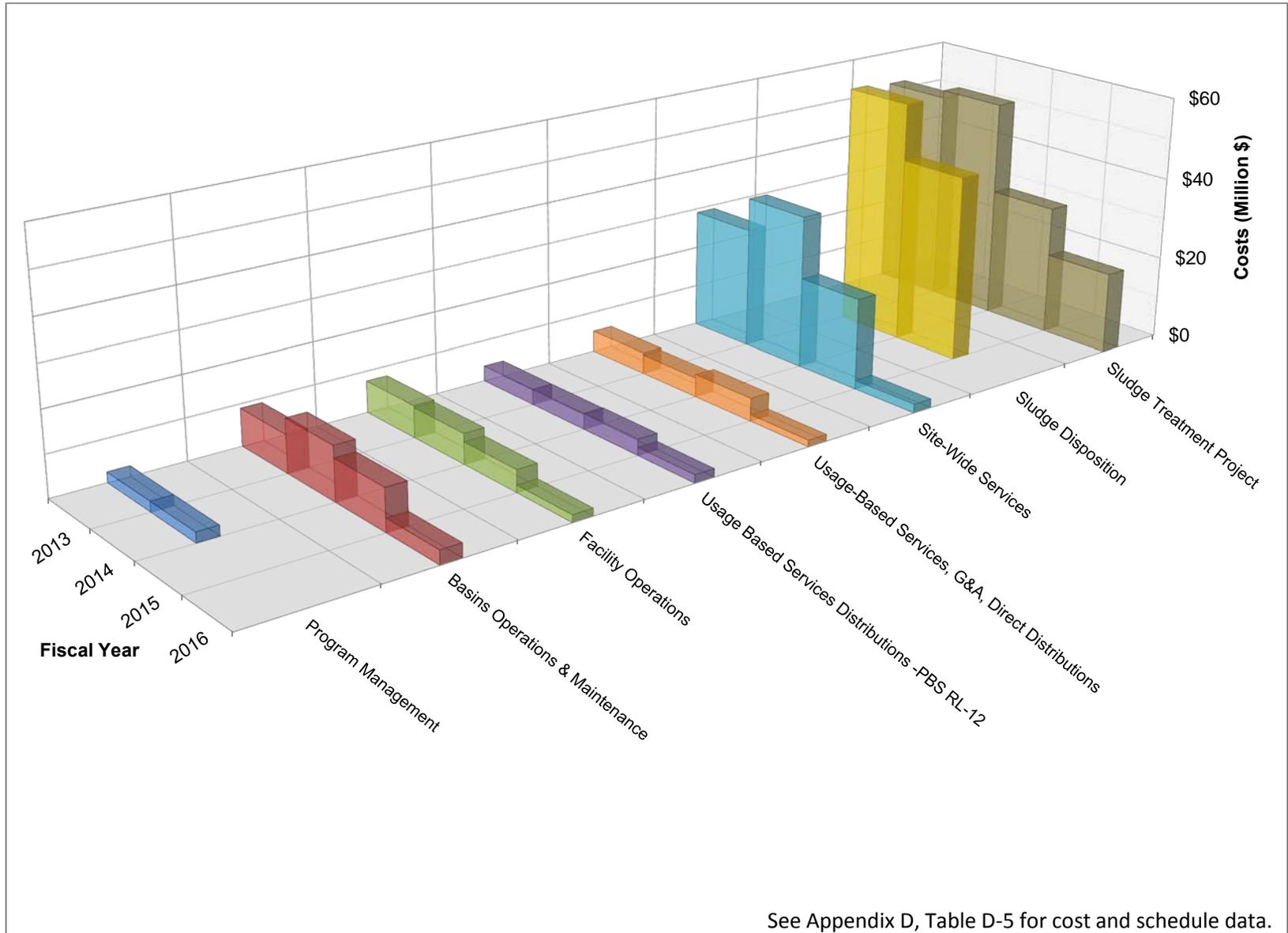


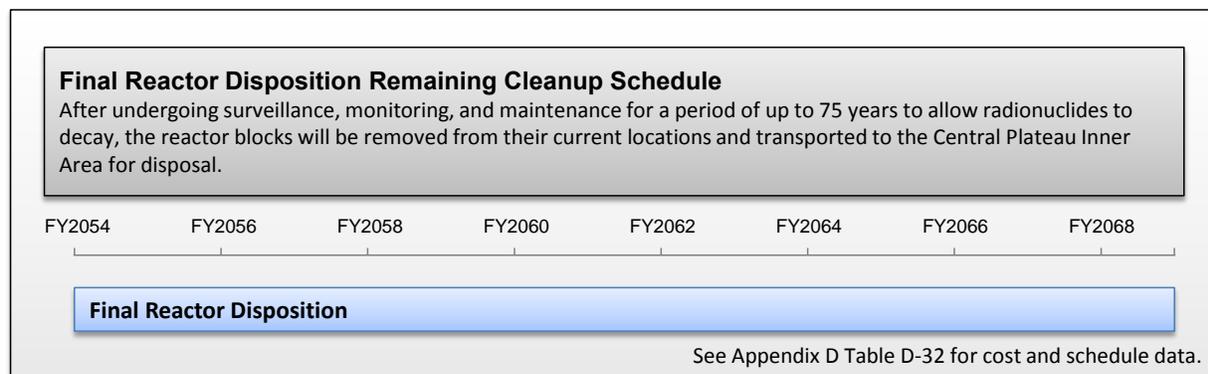
Figure 4-8. SNF Stabilization and Disposition (PBS RL-0012) Remaining Estimated Cleanup Costs by Work Element.

### 4.3 FINAL REACTOR DISPOSITION

Final Reactor Disposition will address cleanup of the 100 Area surplus production reactors in accordance with TPA Milestone M-093-00 (Table 4-1). Disposition of the 100 Area reactors (except for B Reactor which has been recommended to Congress for inclusion in a Manhattan Project National Historic Park) was one of the cost estimate alternative analyses evaluated in the 2011 Lifecycle Report ([DOE/RL-2010-25](#)).

Currently six of the reactors (C, D, DR, F, H, and N) have been placed in ISS configuration (Table 4-2). The KE Reactor is undergoing ISS and the KW Reactor is scheduled to complete ISS by FY 2019. After being placed in ISS, the reactors will undergo surveillance, monitoring, and maintenance for a period of up to 75 years, to allow radionuclides to decay. Following this period, the reactor blocks will be removed from their current locations and transported to the Central Plateau Inner Area for disposal. The 2011 Lifecycle Report identified the most plausible alternative for the reactors as safe storage followed by deferred one-piece removal. This alternative was developed and evaluated in a final environmental impact statement (EIS) ([DOE/EIS-0119F](#)) and in a subsequent engineering evaluation ([DOE/RL-2005-45, Surplus Reactor Final Disposition Engineering Evaluation](#)). In September 1993, DOE issued [58 FR 48509, Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington](#), which implements the recommendation for safe storage followed by deferred one-piece removal of the surplus reactors. N Reactor was not included in the EIS because it was not available for decommissioning at the time of the [National Environmental Policy Act of 1969](#) (NEPA) EIS and ISS was approved through the CERCLA process. Final disposition of N Reactor will be determined by a subsequent NEPA or CERCLA decision process. In the planning case presented in this report, N Reactor is assumed to undergo safe storage followed by deferred one-piece removal.

Figure 4-9 presents the remaining cleanup schedule and Figure 4-10 provides the remaining estimated costs by fiscal year. The schedule is based on a 14-year implementation period for the one-piece removal work and completion of reactor removal by FY 2068 based on the ROD issue date of 1993 and a maximum 75-year storage period; therefore, reactor removal must start by FY 2054. The estimated \$1.9 billion to complete Final Reactor Disposition by FY 2068 is the escalated \$676 million removal cost (in 2010 constant dollars) presented in Table 4-5 of the 2011 Lifecycle Report.



Scale dates represent start of fiscal year

**Figure 4-9. Final Reactor Disposition Remaining Cleanup Schedule.**

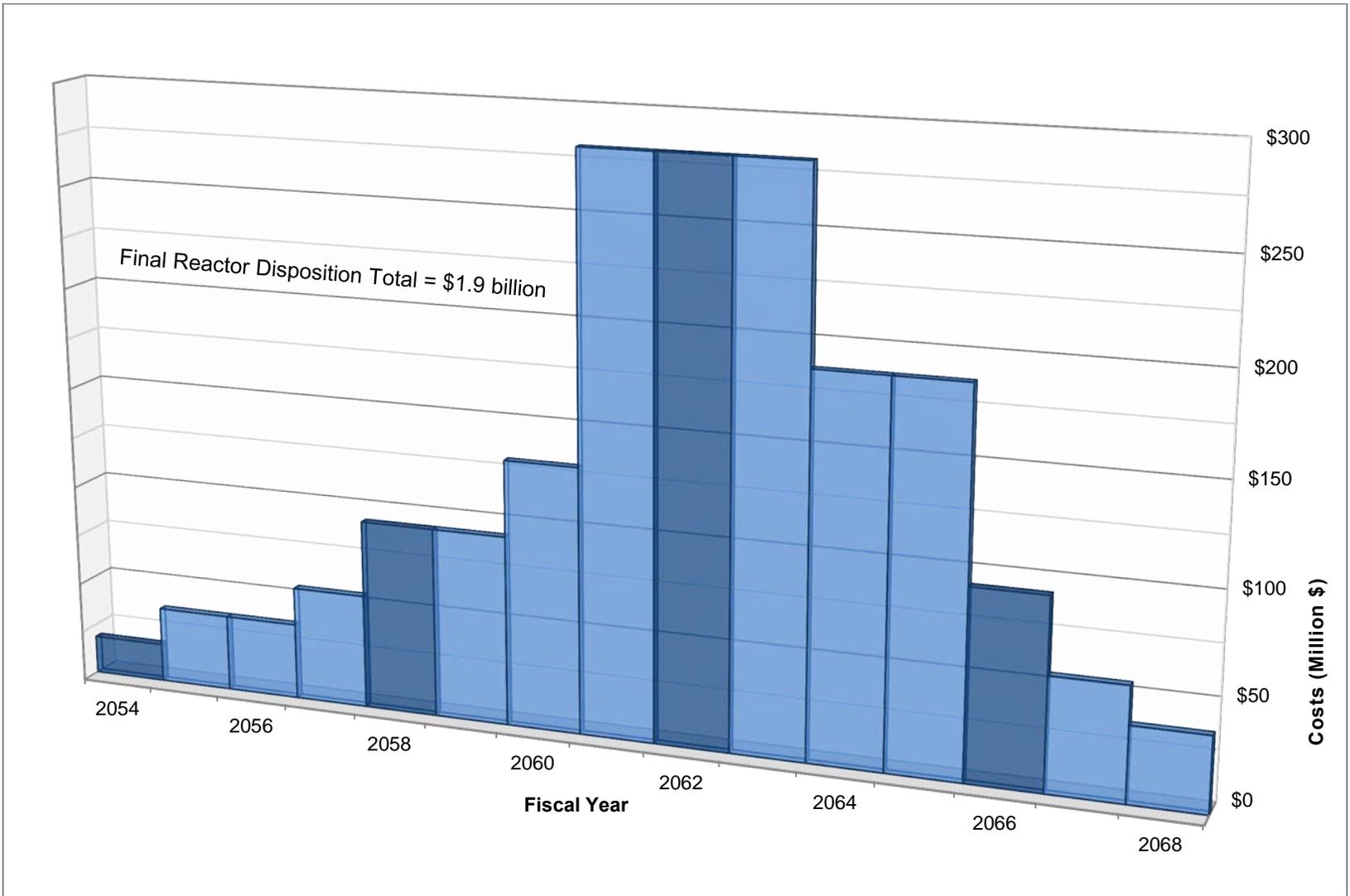


Figure 4-10. Final Reactor Disposition Remaining Estimated Cleanup Costs by Fiscal Year.

#### 4.4 RIVER CORRIDOR CLEANUP ASSUMPTIONS AND UNCERTAINTIES

In planning for the Hanford Site lifecycle, there are uncertainties that are analyzed to estimate potential scope, schedule and cost changes. The following assumptions are identified for Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) work scope:

- Final RODs will confirm that cleanup levels established in the interim RODs are protective of human health and the environment. Additional work scope to address ecological receptors will not significantly impact cost or schedule.
- Regulatory changes will not require additional activities (e.g., document revisions, additional sampling) that would significantly impact costs or schedules.
- Pacific Northwest National Laboratory (PNNL) operating facilities will need to be available to support Office of Science missions.
- The NRDAR and risk assessment litigation brought by the Yakama Nation will not significantly affect cost or schedule.
- The Hanford Natural Resource Trustee Council activities, including studies and NRDAR and restoration process will not significantly affect cost or schedule.

For SNF Stabilization and Disposition (PBS RL-0012), the following assumptions are currently identified:

- Compliance with regulatory standards and requirements will provide an adequate level of protection for the worker, public health, safety, and the environment during operations activities and after D4 is complete.
- ERDF waste acceptance criteria will not change substantially.
- T Plant is acceptable for interim sludge storage and no pretreatment for the sludge is needed before transfer. Subsequent treatment and packaging of the sludge will be done by work scope in PBS RL-0013C.
- Post-CERCLA ROD treatability studies and focused feasibility studies will not affect the sludge treatment process.

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## 5.0 CENTRAL PLATEAU CLEANUP

The Central Plateau is a 75-square-mile area near the center of the Hanford Site that contains approximately 900 excess facilities, including five massive chemical processing facilities called canyons, and roughly 800 non-tank farm waste sites. The Central Plateau is also home to ongoing waste management operations, such as the Mixed Waste Low-Level Burial Grounds, liquid waste facilities, and the Waste Receiving and Processing (WRAP) Facility. Infrastructure services (e.g., power, water, telecommunication lines), either existing or to be constructed, in the Central Plateau are needed to support cleanup. This collection of facilities, waste sites, canyons, and ongoing waste management operations and infrastructure is spread across the Central Plateau. The tank waste and WTP facilities on the Central Plateau are discussed in Chapter 6.0 as part of DOE-ORP's scope.

During site operations, 450 billion gallons of liquid waste were discharged to the ground; most within the Central Plateau (TRAC-0151-VA, *Historical Perspective of Radioactively Contaminated Liquid and Solid Wastes Discharged or Buried in the Ground at Hanford*). These past releases have created extensive plumes of groundwater contamination with a combined area of approximately 74 square miles that exceeds drinking water standards (DOE/RL-2011-118, *Hanford Site Groundwater Monitoring Report for 2011*). A significant portion of the contamination remains in the soil column above the water table and poses a potential threat to groundwater. Interim and final groundwater treatment is in place for contaminant plumes in the 200 West Area and in several locations in the 100 Areas. The ROD for the large carbon tetrachloride plume in the 200 West Area (200-ZP-1 OU) was signed in 2008 (EPA 2008, *Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington*) and operation of the expanded 200 West Pump-and-Treat Facility began in FY 2012. The ROD for plutonium- and cesium-contaminated soil sites (200-PW-1/3/6 and 200-CW-5 OUs) was signed in FY 2011 (EPA 2011, *Record of Decision Hanford 200 Area Superfund Site 200-CW-5 and 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*).

The Central Plateau cleanup is organized into the following three principal components (DOE/RL-2009-10):

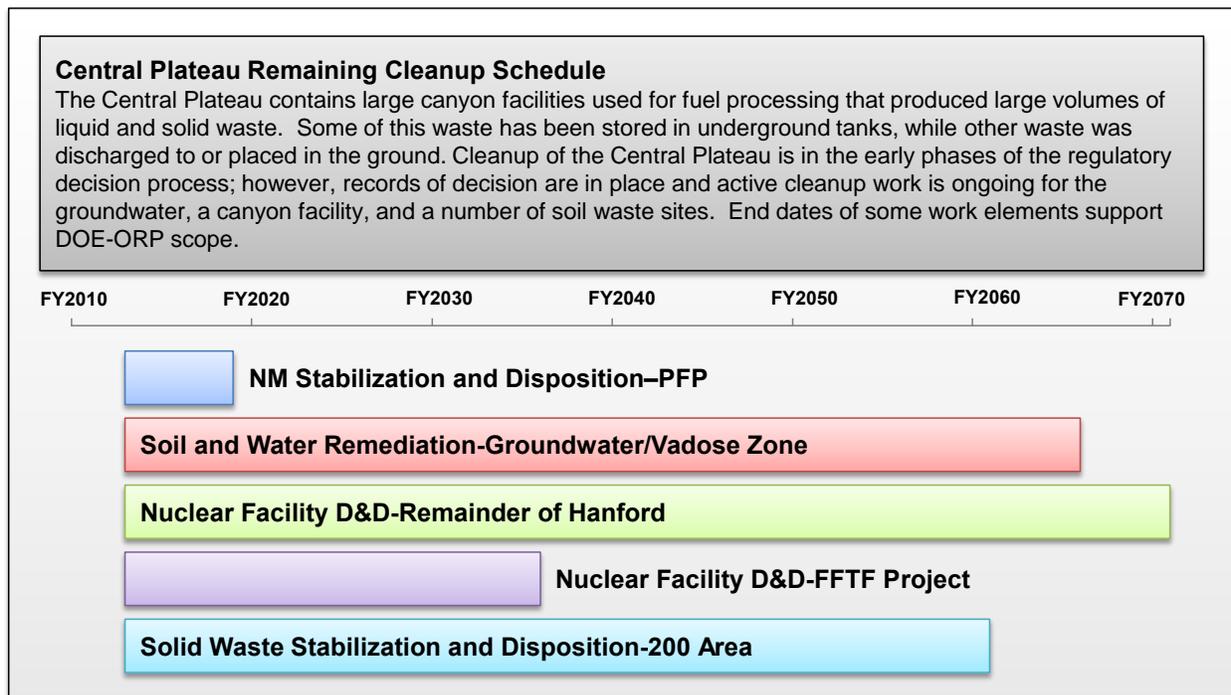
- Inner Area – that footprint of the Central Plateau that will be dedicated to long-term waste management and containment of residual contamination and will remain under federal ownership and control for as long as a potential hazard exists. The Inner Area contains the majority of Hanford's active waste treatment, storage and disposal facilities. The Inner Area also includes hundreds of waste sites, surplus facilities, many miles of buried pipelines, tank farms, and large canyon facilities. Cleanup of the Inner Area will make this footprint as small as practical.
- Outer Area – defined as all areas of the Central Plateau beyond the boundary of the Inner Area. It is DOE's intent to clean up the Outer Area to a level comparable to the River Corridor (i.e., suitable for unrestricted surface use under continued Federal ownership and control and consistent with DOE's anticipated future land use of conservation/mining). Contaminated soil and debris removed as part of Outer Area cleanup will be placed within the Inner Area for final disposal. Completion of cleanup for the approximately 65-square-mile Outer Area will shrink the active footprint of cleanup for the Central Plateau to the Inner Area.

- Groundwater and Deep Vadose Zone Remediation – DOE’s goal is to restore Central Plateau groundwater to its beneficial uses (Table 1-2, Goal 2), unless restoration is determined to be technically impracticable. An important element of groundwater protection and remediation is to develop and implement ways to protect groundwater from continuing influx of contaminants from the deep vadose zone.

Cleanup work scope in the Central Plateau is managed through five projects:

- NM Stabilization and Disposition–PFP, PBS RL-0011 (Inner Area).
- Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030 (entire Hanford Site, including both Inner and Outer Areas and the River Corridor).
- Nuclear Facility D&D–Remainder of Hanford, PBS RL-0040 (includes the geographical cleanup of waste sites and facilities, including the remaining canyon facilities [Inner and Outer Areas]).
- Nuclear Facility D&D–Fast Flux Test Facility Project, PBS RL-0042 (includes the FFTF [located in River Corridor]).
- Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C (Inner Area).

Figure 5-1 presents the remaining cleanup schedule for the Central Plateau. Cleanup is being done in accordance with RODs and action memoranda as listed in Appendix C and with key TPA milestones as listed in Table 5-1.



**Figure 5-1. Central Plateau Remaining Cleanup Schedule.**

**Table 5-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)**

Milestone	Description	Compliance Date
<b>NM Stabilization and Disposition–PFP, PBS RL-0011</b>		
M-083-44	Complete transition of the 234-5Z (Plutonium Conversion Facility) and ZA (Plutonium Conversion Support Facility), 243-Z Low-Level Waste Treatment Facility, 291-Z Exhaust Building, and 291-Z-1 Exhaust Stack to support PFP decommissioning.	09/30/2015 <sup>1</sup>
M-083-00A	Complete PFP facility transition and selected disposition activities.	09/30/2016
<b>Nuclear Facility D&amp;D–Remainder of Hanford, PBS RL-0040</b>		
M-016-00	Complete remedial actions for all non-tank farm and non-canyon OUs.	09/30/2024
M-016-200A	Complete U Plant Canyon (221-U Facility) demolition in accordance with the remedial design/remedial action work plan.	09/30/2017
M-016-200B	Complete U Plant Canyon (221-U Facility) barrier construction in accordance with the remedial design/remedial action work plan.	09/30/2021
M-037-10	Complete unit-specific closure requirements according to the closure plan(s) for seven (7) TSD units: 207-A South Retention Basin, 216-A-29 Ditch, 216-A-36B Crib, 216-A-37-1 Crib, 216-B-63 Trench, Hexone Storage and Treatment Facility (276-S-141/142), and 241-CX Tank System (241-CX-70/71/72).	09/30/2020
M-037-11	Complete unit-specific closure requirements for two (2) TSD units: 216-B-3 Main Pond system and 216-S-10 Pond and Ditch.	09/30/2016
M-085-00	Complete response actions for the canyon facilities/associated past practice waste sites, other Tier 1 Central Plateau facilities not covered by existing milestones, and Tier 2 Central Plateau facilities. This includes B Plant, PUREX, and REDOX canyons and associated past practice waste sites in 200-CB-1, 200-CP-1, and 200-CR-1 OUs.	TBD
M-085-01	Submit a change package to establish a date for major milestone M-085-00.	03/31/2013
M-085-50	Submit revised removal action work plan for the 224B Concentration Facility in accordance with <u>DOE/RL-2004-36</u> , <i>Action Memorandum for the Non-Time Critical Removal Action for the 224-B Plutonium Concentration Facility</i> .	12/31/2015
M-085-51	Submit removal action work plan for the 224T Transuranic Storage and Assay Facility in accordance with <u>DOE/RL-2004-68</u> , <i>Action Memorandum for the Non-Time-Critical Removal Action for the 224-T Plutonium Concentration Facility</i> .	12/31/2025
M-085-60	Complete Engineering Evaluation/Cost Analysis report(s) for all Tier 2 facilities listed in Appendix J of the Tri-Party Agreement.	03/31/2018
<b>Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C</b>		
M-091-00	Complete the treatment to LDR treatment standards for all Hanford Site RCRA MLLW and RCRA TRUM waste. DOE may choose to complete certification and shipment of TRUM waste for disposal at the WIPP in lieu of LDR treatment if, as of the time of shipment, such waste is exempt from LDR treatment standards when disposed at WIPP.	Date to be established pursuant to Milestone M-091-44T
M-091-01	Complete the acquisition of new facilities, modification of existing facilities, and modification of planned facilities necessary for retrieval, storage, and treatment/processing, of all Hanford Site RCRA TRUM waste.	Date to be established pursuant to Milestones M-091-01A and M-091-01B

**Table 5-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)**

<b>Milestone</b>	<b>Description</b>	<b>Compliance Date</b>
M-091-01A	Complete the conceptual design for acquisition of capabilities and/or acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for retrieval, designation, storage, and treatment/processing prior to disposal of all Hanford Site RH TRUM waste and TRUM waste in large containers (in aboveground storage as of June 30, 2009 and in retrievable storage). In addition, submit a milestone change package (based on the conceptual design) for annual construction milestones for the planned facilities necessary for retrieval, storage, and treatment / processing of all Hanford Site RH TRUM waste and large container CH TRUM waste.	09/30/2016
M-091-01B	Complete the definitive design for acquisition of capabilities and/or acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for retrieval, designation, storage, and treatment/processing prior to disposal of all Hanford Site RH TRUM waste and TRUM waste in large containers (in aboveground storage as of June 30, 2009 and in retrievable storage). In addition, submit a milestone change package documenting any substantial variations, based on the definitive design, from annual construction milestones finalized pursuant to M-091-01A.	09/30/2018
M-091-40	Complete the retrieval and designation of CH retrievably stored waste in burial grounds 218-W-4B, 218-W-3A, and 218-E-12B.	09/30/2016
M-091-41	Complete retrieval and designation of RH retrievably stored waste (regardless of package size, including the 200 Area caissons).	12/31/2018
M-091-41A	Complete retrieval of non-caisson RH, retrievably stored waste.	09/30/2016 <sup>1</sup>
M-091-42	Complete the treatment of small container CH MLLW (in aboveground storage as of June 30, 2009 and in retrievable storage) to meet applicable LDR treatment standards in compliance with <u>WAC 173-303-140</u> .	09/30/2017 <sup>1</sup>
M-091-43	Complete the treatment of large container CH MLLW and RH MLLW (in aboveground storage as of June 30, 2009 and in retrievable storage) to applicable LDR treatment standards in compliance with WAC 173-303-140.	09/30/2017 <sup>1</sup>
M-091-44	Complete the treatment of large container CH TRUM waste and RH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage).	12/31/2030
M-091-44T	Submit a change package for annual milestones to treat or certify and ship large container CH TRUM waste and RH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage) to complete the disposition of this waste.	09/30/2018
M-091-46	Complete the certification of small container CH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage).	09/30/2017
M-091-46H	Complete offsite shipment of all small container CH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage).	09/30/2018
M-092-05	Determine disposition path and establish interim agreement milestones for Hanford Site cesium/strontium capsules.	06/30/2017

**Table 5-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)**

Milestone	Description	Compliance Date																																								
<b>Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030</b>																																										
M-015-00	Complete the RI/FS (or RCRA facility investigation/corrective measures study and RI/FS) process for all non-tank farm OUs except for canyon/associated past practice waste site OUs covered in M-085-00.	12/31/2016																																								
M-015-21A	Submit a 200-BP-5 and 200-PO-1 OU feasibility study report and proposed plan(s) to Ecology.	06/30/2015																																								
M-015-38B	Submit a revised feasibility study report and revised proposed plan(s) for the 200-CW-1, 200-CW-3, and 200-OA-1 OUs for waste sites in the Outer Area of the Central Plateau to EPA.	10/30/2014																																								
M-015-91B	Submit feasibility study report(s) and proposed plan(s) for the 200-BC-1/200-WA-1 OUs (200 West Inner Area) to EPA.	12/31/2015																																								
M-015-92B	Submit corrective measures study and feasibility study report(s) and proposed corrective action decision(s)/proposed plan(s) for the 200-EA-1 and 200-IS-1 OUs (Central Plateau 200 East Inner Area) to Ecology.	12/31/2016																																								
M-015-93B	Submit RCRA facility investigation/corrective measures study and RI/FS report and proposed corrective action decision/proposed plan for the 200-SW-2 OU to Ecology.	12/31/2016																																								
M-015-95	Submit RI/FS work plan for the 100-OL-1 OU to EPA and Ecology	04/30/2013																																								
M-015-110B	Submit corrective measures study and feasibility study report and proposed plan/proposed corrective action decision for the 200-DV-1 OU to Ecology.	09/30/2015																																								
M-024-00O	Complete required well installations in accordance with the RCRA and CERCLA groundwater requirements.	TBD																																								
M-037-02	Submit revised closure plans to support TSD closure for five TSD units: 207-A South Retention Basin, 216-A-29 Ditch, 216-A-36B Crib, 216-A-37-1 Crib, and 216-B-63 Trench.	06/30/2014																																								
M-037-03	Submit revised closure plans to support TSD closure for two TSD units: 216-B-3 Main Pond System, and 216-S-10 Pond and Ditch.	04/30/2013																																								
<p><sup>1</sup> At Risk.  <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.</i>  <u>DOE/RL-2004-36</u>, 2004, <i>Action Memorandum for the Non-Time Critical Removal Action for the 224-B Plutonium Concentration Facility</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.  <u>DOE/RL-2004-68</u>, 2005, <i>Action Memorandum for the Non-Time-Critical Removal Action for the 224-T Plutonium Concentration Facility</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.  <i>Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.</i>  <u>WAC 173-303-140</u>, “Land Disposal Restrictions,” <i>Washington Administrative Code</i>, Olympia, Washington.</p> <table> <tbody> <tr> <td>CERCLA=</td> <td><i>Comprehensive Environmental Response, Compensation, and Liability Act.</i></td> <td>PFP =</td> <td>Plutonium Finishing Plant.</td> </tr> <tr> <td>CH =</td> <td>contact-handled.</td> <td>PUREX =</td> <td>Plutonium Uranium Extraction (Plant).</td> </tr> <tr> <td>D&amp;D =</td> <td>decontamination and decommissioning.</td> <td>RCRA =</td> <td><i>Resource Conservation and Recovery Act.</i></td> </tr> <tr> <td>Ecology =</td> <td>Washington State Department of Ecology.</td> <td>REDOX =</td> <td>Reduction-Oxidation Facility (S Plant).</td> </tr> <tr> <td>EPA =</td> <td>U.S. Environmental Protection Agency.</td> <td>RH =</td> <td>remote-handled.</td> </tr> <tr> <td>LDR =</td> <td>Land Disposal Restrictions.</td> <td>RI/FS =</td> <td>remedial investigation/feasibility study.</td> </tr> <tr> <td>MLLW =</td> <td>mixed low-level waste.</td> <td>TBD =</td> <td>to be determined.</td> </tr> <tr> <td>NM =</td> <td>nuclear material.</td> <td>TRUM =</td> <td>transuranic mixed (waste).</td> </tr> <tr> <td>OU =</td> <td>operable unit.</td> <td>TSD =</td> <td>treatment, storage, and disposal.</td> </tr> <tr> <td>PBS =</td> <td>project baseline summary.</td> <td>WIPP =</td> <td>Waste Isolation Pilot Plant.</td> </tr> </tbody> </table>			CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	PFP =	Plutonium Finishing Plant.	CH =	contact-handled.	PUREX =	Plutonium Uranium Extraction (Plant).	D&D =	decontamination and decommissioning.	RCRA =	<i>Resource Conservation and Recovery Act.</i>	Ecology =	Washington State Department of Ecology.	REDOX =	Reduction-Oxidation Facility (S Plant).	EPA =	U.S. Environmental Protection Agency.	RH =	remote-handled.	LDR =	Land Disposal Restrictions.	RI/FS =	remedial investigation/feasibility study.	MLLW =	mixed low-level waste.	TBD =	to be determined.	NM =	nuclear material.	TRUM =	transuranic mixed (waste).	OU =	operable unit.	TSD =	treatment, storage, and disposal.	PBS =	project baseline summary.	WIPP =	Waste Isolation Pilot Plant.
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## 5.1 NM STABILIZATION AND DISPOSITION–PFP (PBS RL-0011)

The PFP complex was constructed at the Hanford Site 200 West Area in the late 1940s. Its mission was to convert plutonium nitrate product to the more stable oxide, metal, and oxalate forms for safer shipment to nuclear weapons fabrication facilities. In 1989, plutonium production operations ended at PFP and removing the plutonium inventory and plant D4 were assigned high national priority ([HNF-EP-0924](#), *History and Stabilization of the Plutonium Finishing Plant (PFP) Complex Hanford Site*).

Cleanup and demolition to slab-on-grade of the PFP complex is being conducted as a closure project under NM Stabilization and Disposition–PFP (PBS RL-0011), also known as the PFP Closure Project ([DOE/RL-2005-13](#), *Action Memorandum for the Plutonium Finishing Plant Above-Grade Structures Non-Time Critical Removal Action*). To begin the PFP closure process, about 20 tons of plutonium-bearing material stored at PFP required an integrated DOE-wide disposition strategy. In 2004, PFP completed the project to recover, stabilize, and package the inventory to meet updated safety standards in addition to shipping designated plutonium-bearing material to WIPP. Shipment of the remaining PFP plutonium inventory to DOE storage facilities was completed in 2009.

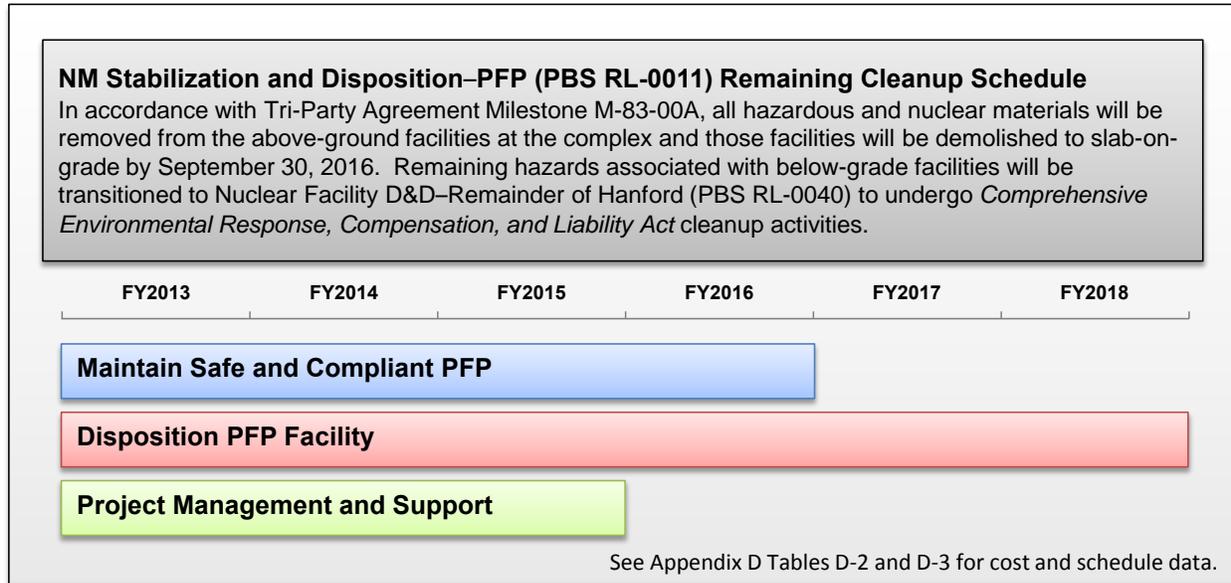
The PFP Closure Project scope requires D4 of PFP systems and structures to accomplish the defined project endpoint completion criteria in compliance with all applicable agreements, regulations, and CERCLA, RCRA, and other applicable processes. This effort eliminates significant hazards to workers, the public, and the environment, and additionally minimizes long-term risks and costs.

Major cleanup objectives for PFP closure are to:

- Remove plutonium-bearing material and waste, including un-irradiated fuel, slightly irradiated fuel, and other nuclear materials from PFP facilities (removing the plutonium inventory was completed in 2009; residual plutonium is removed in the cleanup process).
- Eliminate the Protected Area at PFP (this scope was completed in 2009).
- Clean out and demolish facilities in the PFP complex (currently underway with two major and numerous minor facilities complete).
- Transfer the remainder of the PFP complex to RL-0040 for final remediation. Waste sites and subsurface facilities will be managed through the remediation of the 200-PW-1/3/6 and 200-CW-5 OUs and the new 200-WA-1 OU.

Figure 5-2 presents the NM Stabilization and Disposition–PFP (PBS RL-0011) work elements along with the remaining cleanup schedule. PFP facility transition is planned to be complete in FY 2016 per TPA Milestone M-083-00A (Table 5-1). Cost and/or schedule uncertainty extends the schedule beyond FY 2016.

Table 5-2 provides a summary of the scope of each of these work elements.



**Figure 5-2. NM Stabilization and Disposition–PFP (PBS RL-0011) Remaining Cleanup Schedule.**

**Table 5-2. NM Stabilization and Disposition–PFP (PBS RL-0011) Level 2 Scope Summary.**

Work Element	Scope Description
Maintain Safe and Compliant PFP	This work element maintains building integrity and safety systems during D4 efforts. Tasks include maintaining worker/public health and environmental safety; maintaining an environmentally compliant facility; maintaining facility systems and components; maintaining the maintenance program; and maintaining special projects.
Disposition PFP Facility	This work element includes planning, preparation, engineering, sampling, procurement, and other tasks necessary to execute the removal of plutonium holdup material (e.g., material in ducting), deactivation, and disposition of aboveground PFP facilities before transitioning the below-grade components (e.g., below-grade structures and waste sites) to Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) for surveillance and maintenance and final remediation. D4 activities will be completed for the buildings and facilities in the PFP area, reducing them to slab-on-grade as part of this activity. Slab-on-grade is defined as a concrete slab, typically the first floor of a building resting on grade (earth) that is free of dispersible radiological contamination.
Project Management and Support	This work element includes project management and support to the PFP D4 activities including procurement and project controls. This work element includes technical support, such as engineering, quality assurance, and procedure and document maintenance.
Site-wide Services – RL-0011	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.
D4 = deactivation, decontamination, decommissioning, and demolition.	NM = nuclear material.
D&D = decontamination and decommissioning.	PBS = project baseline summary.
	PFP = Plutonium Finishing Plant.

Figure 5-3 presents the remaining estimated cleanup costs for NM Stabilization and Disposition-PFP (PBS RL-0011) work scope by fiscal year; Figure 5-4 presents the remaining estimated cleanup costs by work element.

## **5.2 SOIL AND WATER REMEDIATION–GROUNDWATER/VADOSE ZONE (PBS RL-0030)**

The Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), also known as the Groundwater Project, includes the following:

- The regulatory decision-making process for all the groundwater OUs on the Hanford Site.
- Remediation of all the groundwater on the Hanford Site in accordance with the groundwater OU decisions.
- The regulatory decision-making process for the Central Plateau waste sites (remediation of waste sites is part of the Nuclear Facility D&D–Remainder of Hanford [PBS RL-0040] project scope).
- The regulatory decision-making process and remediation for the soil contamination in the Central Plateau deep vadose zone.

The project includes soil and groundwater characterization, groundwater monitoring, groundwater treatment, well drilling, treatability testing, evaluation of remediation options, and preparing the regulatory documentation necessary to obtain final RODs on remedial actions for soil waste sites and groundwater, including both the River Corridor and Central Plateau.

Much of the contamination remains in the vadose zone soil column above the water table; however, at waste sites where large volumes of liquid were released, the more mobile contaminants have reached groundwater. The tritium groundwater contaminant plume from the Central Plateau has reached the Columbia River. Additional groundwater contaminant plumes such as chromium, strontium-90, and uranium originating in the 100 or 300 Areas have also reached the Columbia River. An important target date is to contain or remediate the hexavalent chromium groundwater plumes in the 100 Areas by the end of 2012 so that water quality standards are achieved, and to have groundwater remedies in place for strontium-90 and uranium by 2015.

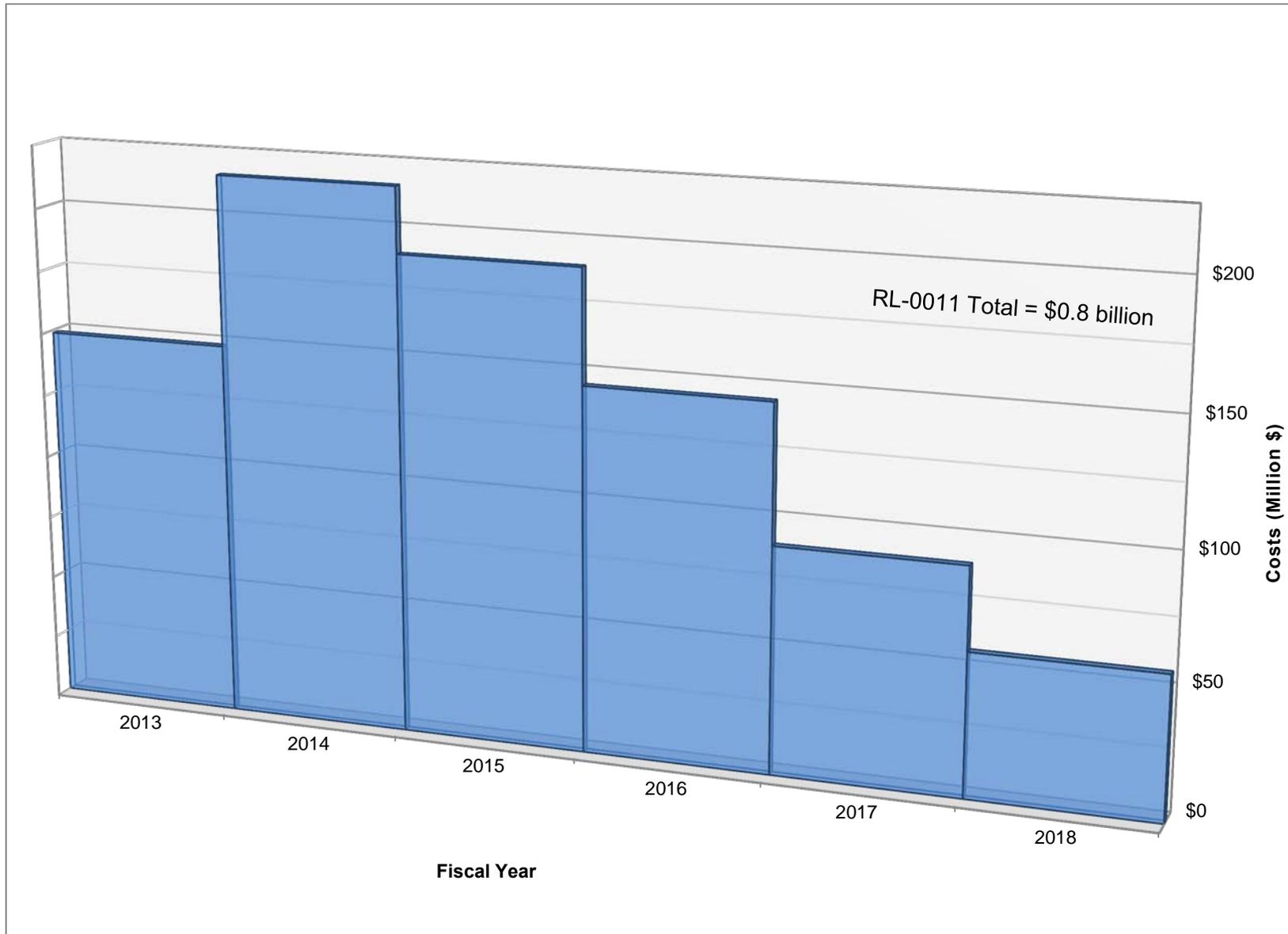


Figure 5-3. NM Stabilization and Disposition–PFP (PBS RL-0011) Remaining Estimated Cleanup Costs by Fiscal Year.

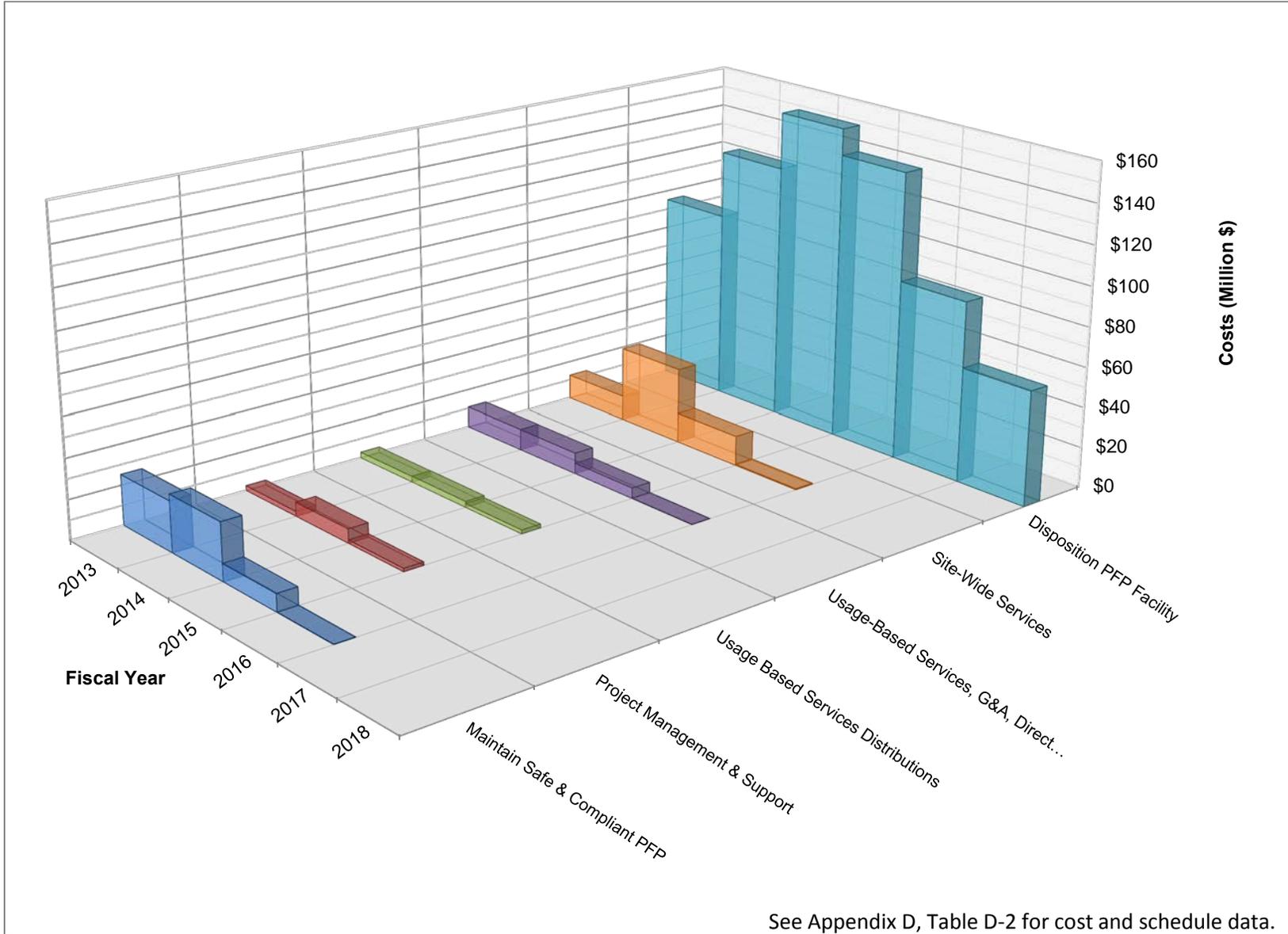


Figure 5-4. NM Stabilization and Disposition–PFP (PBS RL-0011) Remaining Estimated Cleanup Costs by Work Element.

The major chemical contaminants present in Hanford Site groundwater include carbon tetrachloride, hexavalent chromium, cyanide, nitrate, and trichloroethene. Major radioactive contaminants include iodine-129, strontium-90, technetium-99, tritium, and uranium. Other groundwater contaminants that exceed drinking water standards in several Hanford Site areas but are of limited extent include fluoride, metals (arsenic, nickel), volatile organic compounds (benzo(a)pyrene, cis-1,2-dichloroethene, methylene chloride), and radioactive contaminants (carbon-14, cesium-137, gross alpha, gross beta) ([DOE/RL-2011-118](#)).

The Groundwater Project has three major objectives ([DOE/RL-2002-59](#), *Hanford Site Groundwater Strategy Protection, Monitoring, and Remediation*):

- Take actions necessary to prevent degradation of the groundwater.
- Remediate groundwater to restore it to beneficial use where practicable and to protect the Columbia River.
- Monitor groundwater to identify emerging problems and guide the remediation process.

To be successful, the Groundwater Project needs to obtain sufficient characterization data, evaluate performance of early actions, and develop remedial action objectives. The Hanford Site is divided into 10 groundwater OUs. Groundwater monitoring activities are also required by the *Atomic Energy Act*, CERCLA, and the *Draft Hanford Site Dangerous Waste Permit (Site-Wide Permit), Revision 9 (WA7890008967)*.

Groundwater cleanup in the River Corridor is divided into six groundwater OUs:

- 100-BC-5, which addresses the groundwater contamination associated with activities conducted at the B and C Reactors and support facilities. No active remediation is in place, but the OU is being monitored and assessed for potential actions.
- 100-FR-3, which addresses the groundwater contamination associated with the F Reactor and support facilities. No active remediation is in place, but the OU is being monitored.
- 100-HR-3, which addresses the groundwater contamination associated with the D, DR, and H Reactors and support facilities. Active pump-and-treat systems are in place in both 100-D and 100-H Areas and a permeable reactive barrier is in place in the 100-D Area under an interim ROD.
- 100-KR-4, which addresses the groundwater contamination associated with the KE and KW Reactors. Pump-and-treat systems are in place in the 100-K Area under an interim ROD.
- 100-NR-2, which addresses the groundwater contamination associated with the N Reactor. The existing apatite permeable reactive barrier is being expanded to approximately 2,500 feet under an interim ROD.
- 300-FF-5, which addresses the groundwater contamination associated with activities in the 300 Area. The 300 Area groundwater is being monitored and evaluated under an interim ROD.

The groundwater underlying the Central Plateau is divided into four groundwater OUs:

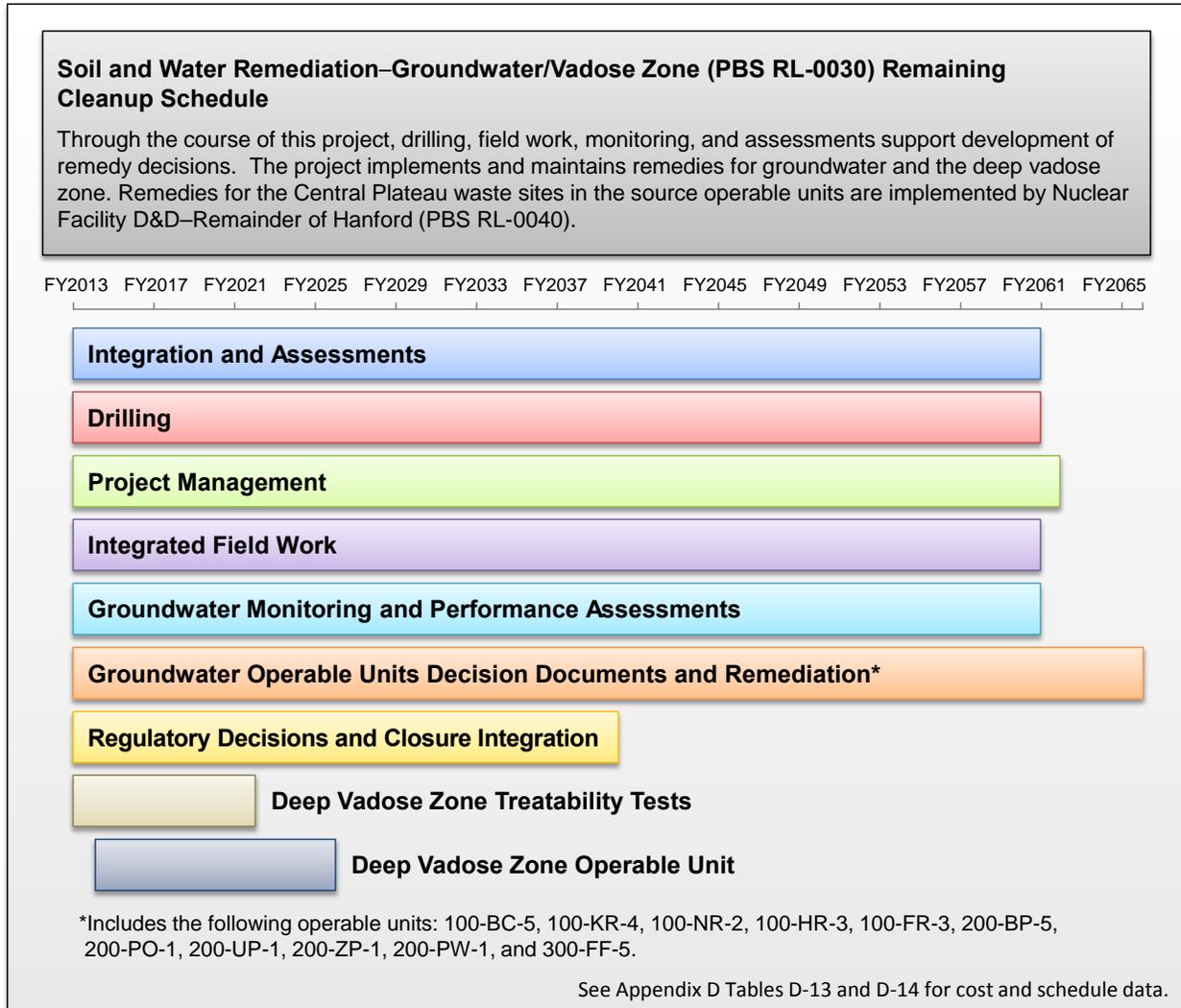
- 200-BP-5, which addresses the groundwater contamination associated with the B Plant processing facility and associated waste sites in the northeast quadrant of the Central

Plateau. No active remediation is in place, but the OU is being monitored and assessed for potential actions.

- 200-PO-1, which addresses the groundwater contamination associated with the Plutonium-Uranium Extraction (PUREX) Plant processing facility and associated waste sites in the southeast quadrant of the Central Plateau, including the BC cribs and trenches. No active remediation is in place, but the OU is being monitored and assessed for potential actions.
- 200-UP-1, which addresses the groundwater contamination associated with the U Plant and Reduction-Oxidation (REDOX) processing facilities and the associated waste sites in the southwest quadrant of the Central Plateau. An active pump-and-treat system is in place for the 200-UP-1 OU under an interim ROD.
- 200-ZP-1, which addresses contamination associated with the T Plant and PFP processing facilities and associated waste sites in the northwest quadrant of the Central Plateau. An active pump-and-treat system put in place in the 200-ZP-1 OU under an interim ROD was replaced by a new larger pump-and-treat system in FY 2012 to fulfill the requirements of the 2008 ROD for this OU. This OU is also supported by 200-PW-1, which is a source OU that is remediating carbon tetrachloride contamination above the water table at several PFP waste sites using active and passive vapor extraction systems in place under an action memorandum and ROD.

The work scope for the Groundwater Project is organized into 10 Level 2 work elements as shown in Figure 5-5, which also presents the remaining cleanup schedule for PBS RL-0030. Table 5-3 provides additional details on the scope of work for each of these work elements.

The end dates of several work elements in Figure 5-5 reflect planning estimates of the duration of groundwater remediation and long-term groundwater monitoring, well support, well maintenance, reporting, and project management. Since most of the groundwater OUs do not have final decisions yet, the planning estimates will be updated in future reports as remedial decisions are completed (e.g., the cleanup timeframe in the ROD for the 200-ZP-1 OU is estimated at 125 years; through FY 2065 this work is part of PBS RL-0030 and after that it transfers to PBS-LTS).



**Figure 5-5. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Cleanup Schedule.**

**Table 5-3. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030)  
Level 2 Scope Summary. (3 pages)**

Work Element	Scope Description
Integration and Assessments	This work element is comprised of six parts: Strategic Integration, Technical Integration and Assessments, Remediation Decision Support, Remediation Science and Technology, Sample and Data Management, and Environmental Databases. This integration function coordinates and focuses Hanford Site characterization and assessment efforts to ensure consistency, eliminate information gaps and overlaps, apply science and technology new to the Hanford Site, foster technical peer review, and integrate remediation decisions.
Drilling	This work element includes planning, coordinating, and implementing well drilling and well decommissioning for Hanford Site wells according to project-specific requirements. This includes drilling wells to Washington State standards and preparing all required submittals and notifications required by State law and providing well-related information for Hanford Site databases. Aspects of drilling include technical coordination, procurement, labor, subcontracts, materials, and equipment for project planning; documentation; field support during drilling; and project closeout to support drilling wells for groundwater monitoring and optimization of groundwater treatment systems.
Project Management	This work element includes program management oversight; business management and integration; project control and integration; engineering and maintenance; environmental, safety, health and quality; and technical support.
Integrated Field Work	This work element includes services, infrastructure, material, equipment, labor, and contracts that are used to plan, support, and perform field work. It includes non-OU related well maintenance, monitoring, and reporting. Major elements include operations and maintenance, training, field equipment purchases, unanticipated field work, and maintenance, monitoring, and reporting for wells that are not aligned with a specific OU.
Groundwater Monitoring and Performance Assessments	<p>This work element includes:</p> <ul style="list-style-type: none"> <li>• Operation, maintenance, sampling, and dismantlement of the Modutanks that are used for disposal of groundwater from onsite well sampling and maintenance, characterization, and remediation activities.</li> <li>• Management, oversight, and performance of borehole and geophysical logging to support characterization and remedial decisions.</li> <li>• Groundwater sampling, analysis, monitoring, evaluation, assessment, and reporting for RCRA TSDs, CERCLA OUs, and other permitted facilities and sites.</li> <li>• Coordination and management of groundwater sampling and water level determinations.</li> <li>• Operation, maintenance, and relocation of the Hanford Site Geotechnical Sample Library, the repository for historical sediment, core, and other soil and sediment samples used for scientific studies including laboratory studies, bench tests, conceptual model development, and fate and transport evaluations for contaminant migration.</li> <li>• Project management for these activities.</li> </ul>

**Table 5-3. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030)  
Level 2 Scope Summary. (3 pages)**

Work Element	Scope Description
Groundwater OUs Decision Documents and Remediation	<p>This work element includes the management and implementation of groundwater remediation for the Hanford Site, including:</p> <ul style="list-style-type: none"> <li>• Implementing the RI/FS process for groundwater OUs by performing remedial investigations and feasibility studies leading to final RODs.</li> <li>• Preparing DQO reports, sampling and analysis plans, waste management plans, and other regulatory documentation, as needed, for all groundwater OUs.</li> <li>• Conducting as needed field studies to support decision making and design.</li> <li>• Designing treatment systems in accordance with the RODs and remedial action work plans.</li> <li>• Implementing the treatment systems in accordance with the design and the ROD requirements.</li> <li>• Conducting ongoing monitoring and reporting.</li> <li>• Maintaining system and monitoring wells.</li> </ul> <p>The work scope is managed by OU and is consistent between the OUs. Figure 5-6 provides an overview of the active groundwater remediation efforts. Details of the actual assumptions for this work element are provided in Table 5-4.</p>
Regulatory Decisions and Closure Integration	<p>This work element includes planning, management, characterization, documentation, and other associated activities necessary to complete the remedial decision process for each closure zone, including closure plans for RCRA TSD sites. Specific activities include RI/FSs, proposed plans, closure plans, engineering evaluation/cost analyses, DQOs, sampling and analysis plans, RODs, and other documents and activities leading to remedial decisions and remediation planning. Following completion of assessment activities through decision documentation (e.g., ROD or closure plan), completion of the remedial design/remedial action work plan and waste site/facility remediation and/or closure will be addressed under Nuclear Facility D&amp;D–Remainder of Hanford (PBS RL-0040). The reorganization of Central Plateau OUs resulting from the October 2010 TPA changes to Central Plateau Cleanup is summarized in Table 5-5.</p>
Deep Vadose Zone Treatability Tests	<p>This work element involves conducting the deep vadose zone treatability test(s) in accordance with the <i>Deep Vadose Zone Treatability Test Plan for the Hanford Central Plateau</i> (DOE/RL-2007-56), conducting cross-cutting engineering and technical studies necessary to support decision-making for Central Plateau remediation of the Deep Vadose Zone OU, and evaluating tradeoffs associated with remedial action decisions.</p> <p>The initial work phase focuses on conducting laboratory work and numerical modeling to address uncertainties associated with the technology and employing the technology in the deep vadose zone. The second phase involves the design and implementation of treatability testing in the field at carefully selected locations using one or more technologies depending on the success of the initial testing. Technologies to be tested include desiccation, in situ gaseous reduction, multi-step geochemical manipulation, grout injection, soil flushing and surface barriers as described in Table 5-6.</p>

**Table 5-3. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030)  
Level 2 Scope Summary. (3 pages)**

Work Element	Scope Description										
Deep Vadose Zone OU	<p>This work element addresses mitigation of the contamination present at the Hanford Site in the deep vadose zone. The initial actions planned for this OU are field studies and deployment activities and the development of the decision documents. Other tasks for this OU, such as remedial action planning and implementation; well support activities; monitoring and reporting support; OU modifications and expansions; and final deactivation and decommissioning of the OU remediation activities at the conclusion of the project, will be included following the decision process.</p> <p>Changes to the TPA have been undertaken to add milestones for testing remedial technologies and to establish a new deep vadose zone OU (200-DV-1). In addition, DOE is establishing a project team to focus on the development and evaluation of deep vadose zone remedies. DOE is also establishing the Deep Vadose Zone Applied Field Research Center at the Hanford Site, which would be the focal point for investigation and resolution of critical deep vadose zone issues at the Hanford Site and within the DOE complex.</p>										
Site-wide Services – RL-0030	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.										
<p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.</i>  <i>DOE/RL-2007-56, 2008, Deep Vadose Zone Treatability Test Plan for the Hanford Central Plateau, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</i>  <i>Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.</i></p> <table border="0"> <tr> <td>CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i></td> <td>RCRA = <i>Resource Conservation and Recovery Act.</i></td> </tr> <tr> <td>DOE = U.S. Department of Energy.</td> <td>RI/FS = remedial investigation/feasibility study.</td> </tr> <tr> <td>DQO = data quality objectives.</td> <td>ROD = record of decision.</td> </tr> <tr> <td>OU = operable unit.</td> <td>TPA = Tri-Party Agreement.</td> </tr> <tr> <td>PBS = project baseline summary.</td> <td>TSD = treatment, storage, and disposal.</td> </tr> </table>		CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	RCRA = <i>Resource Conservation and Recovery Act.</i>	DOE = U.S. Department of Energy.	RI/FS = remedial investigation/feasibility study.	DQO = data quality objectives.	ROD = record of decision.	OU = operable unit.	TPA = Tri-Party Agreement.	PBS = project baseline summary.	TSD = treatment, storage, and disposal.
CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	RCRA = <i>Resource Conservation and Recovery Act.</i>										
DOE = U.S. Department of Energy.	RI/FS = remedial investigation/feasibility study.										
DQO = data quality objectives.	ROD = record of decision.										
OU = operable unit.	TPA = Tri-Party Agreement.										
PBS = project baseline summary.	TSD = treatment, storage, and disposal.										

**Table 5-4. Groundwater Operable Unit Remediation. (2 pages)**

Groundwater Operable Unit	Current Remedial Action	Planning Assumption Remedial Action	Estimated Period of Remediation <sup>1</sup>
100-BC-5	None	Pump-and-treat	10 years
100-FR-3	None	Pump-and-treat	10 years
100-HR-3	Pump-and-treat systems in D and H Areas; permeable reactive barrier	Expanded pump-and-treat augmented with electrocoagulation treatment; bioremediation; inject zero valent iron into existing semi-permeable barrier	Through FY 2020
100-KR-4	Pump-and-treat systems in KE and KW areas	Continued pump-and-treat	Through FY 2018

**Table 5-4. Groundwater Operable Unit Remediation. (2 pages)**

Groundwater Operable Unit	Current Remedial Action	Planning Assumption Remedial Action	Estimated Period of Remediation <sup>1</sup>
100-NR-2	Pump-and-treat formerly operated; expanding apatite permeable reactive barrier	Expansion of apatite reactive barrier, total petroleum hydrocarbon plume remediation, phytoremediation	Through FY 2020
200-BP-5	None	Pump-and-treat	Through FY 2022
200-PO-1	None	Monitored natural attenuation	Not yet identified
200-UP-1	Pump-and-treat system	Expanded pump-and-treat system	Through FY 2039
200-ZP-1	Pump-and-treat system	Expanded pump-and-treat system	Through FY 2036
200-PW-1 <sup>2</sup>	Soil vapor extraction	Soil vapor extraction	Through FY 2043
300-FF-5	Monitoring and institutional controls	Install polyphosphate barrier	Through FY 2024

<sup>1</sup>Estimates based on previous experience with interim record of decision remedial actions and groundwater modeling, and exclude subsequent long-term monitoring under PBS RL-0030 or PBS RL-LTS.

<sup>2</sup>200-PW-1 is a source operable unit above the 200-ZP-1 groundwater operable unit.

**Table 5-5. Central Plateau Soil Operable Unit Remediation. (2 pages)**

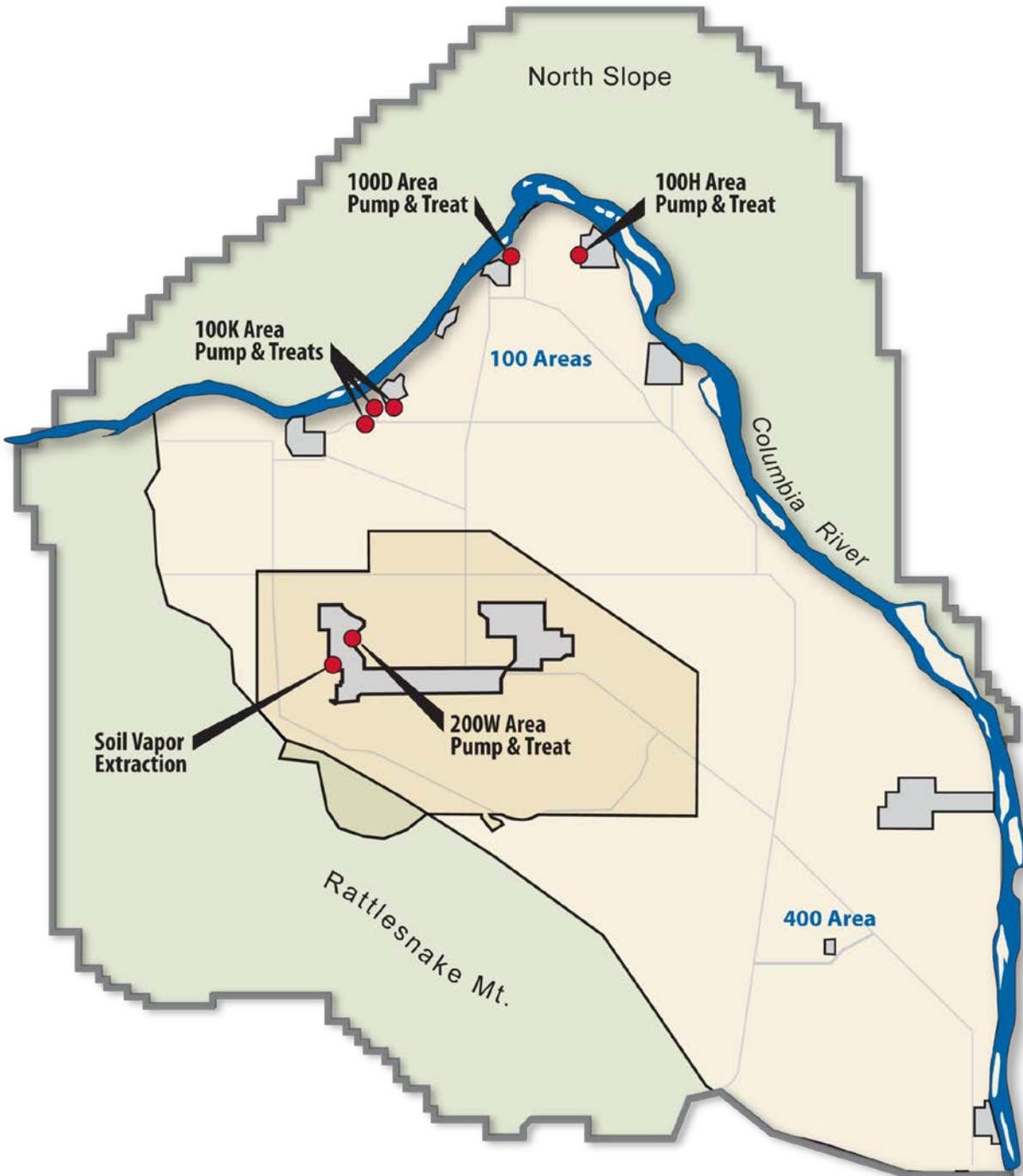
New Operable Units (October 2010)	Changes to Previous Operable Units
200-PW-1/3/6, 200-BC-1, and 200-CW-5	No additions or deletions of waste sites.
B Plant Canyon/associated waste sites (200-CB-1)	Waste sites, including pipelines, in close proximity to the canyon building are reassigned to the new 200-CB-1 OU.
PUREX Canyon/associated waste sites (200-CP-1)	Waste sites, including pipelines, in close proximity to the canyon building are reassigned to the new 200-CP-1 OU.
REDOX Canyon/associated waste sites (200-CR-1)	Waste sites, including pipelines, in close proximity to the canyon building are reassigned to the new 200-CR-1 OU.
Solid Waste Burial Grounds (200-SW-2)	Waste sites in the footprint of the burial grounds are reassigned to the 200-SW-2 OU.
200 West Inner Area (200-WA-1)	Other sites in the 200 West Area not included in 200-CR-1, 200-IS-1, 200-PW-1/6, 200-BC-1, 200-CW-5, or 200-SW-2 are reassigned to the new 200-WA-1 OU.
200 East Inner Area (200-EA-1 and 200-IS-1)	200-IS-1 sites not included in one of the canyon OUs remain in the 200-IS-1 OU. Other waste sites not included in 200-CB-1, 200-CP-1, 200-PW-3, or 200-SW-2 are reassigned to the new 200-EA-1 OU.
Deep Vadose Zone (200-DV-1)	Waste sites from the 200-TW-1/2 and 200-PW-5 OUs that have contaminants in the deep vadose zone are reassigned to the new 200-DV-1 OU.
Outer Area (200-OA-1, 200-CW-1, and 200-CW-3)	One site from 200-CW-1 OU is reassigned to the 200-SW-2 OU. Other 200-CW-1 sites and the 200-CW-3 sites will remain in their existing OU. Sites from other OUs that are

**Table 5-5. Central Plateau Soil Operable Unit Remediation. (2 pages)**

New Operable Units (October 2010)	Changes to Previous Operable Units
	located in the geographically-based Outer Area are reassigned to the new 200-OA-1 OU.
OU = operable unit. PUREX = Plutonium Uranium Extraction (Plant). REDOX = Reduction-Oxidation Facility (S Plant).	

**Table 5-6. Summary of Deep Vadose Zone Treatment Technologies Being Tested.**

Technology	What is it?	Reason for Treatability Testing
Desiccation	Desiccation involves drying a targeted portion of the vadose zone by injecting dry air and extracting soil moisture. This reduces soil moisture that could transport contamination deeper.	Removing water from the vadose zone using desiccation has the potential to reduce the mobility of contaminants through the vadose zone.
In situ gaseous reduction	A reducing gas (e.g., hydrogen sulfide) is used to directly or indirectly reduce some contaminants so they are less soluble.	Has the potential to immobilize technetium-99 and uranium and has been demonstrated at the field scale for similar applications.
Multi-step geochemical manipulation	This developmental stage technique involves introducing gases into the vadose zone that create conditions for precipitation of minerals and contaminants.	Although still conceptual, it builds on the in situ gaseous reduction technology and provides potential for more effective immobilization of contaminants.
Grout injection	Injection of grout or a binding agent into the subsurface to physically or chemically bind or encapsulate contaminants.	Grouting technologies have the potential for use as part of a remedy for the deep vadose zone.
Soil flushing	Adding water and an appropriate mobilizing agent, if necessary to mobilize contaminants and flush them from the vadose zone into groundwater where they can be removed by a pump-and-treat system.	Under consideration as a potential mechanism to remove subsurface contaminants; however, testing is needed to address technical uncertainties about mobilizing targeted contamination without mobilizing non-targeted mineral components.
Surface barriers	Surface barriers reduce subsurface water infiltration and the driving force for contaminant migration toward the groundwater.	Surface barriers are a baseline technology for near-surface contamination and a promising technology for controlling migration of contaminants in the deep vadose zone.



**Figure 5-6. Overview of Hanford Site Groundwater Remedial Actions.**

Figure 5-7 presents the remaining estimated cleanup costs for Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) by fiscal year; Figure 5-8 presents the remaining estimated cleanup costs by work element.

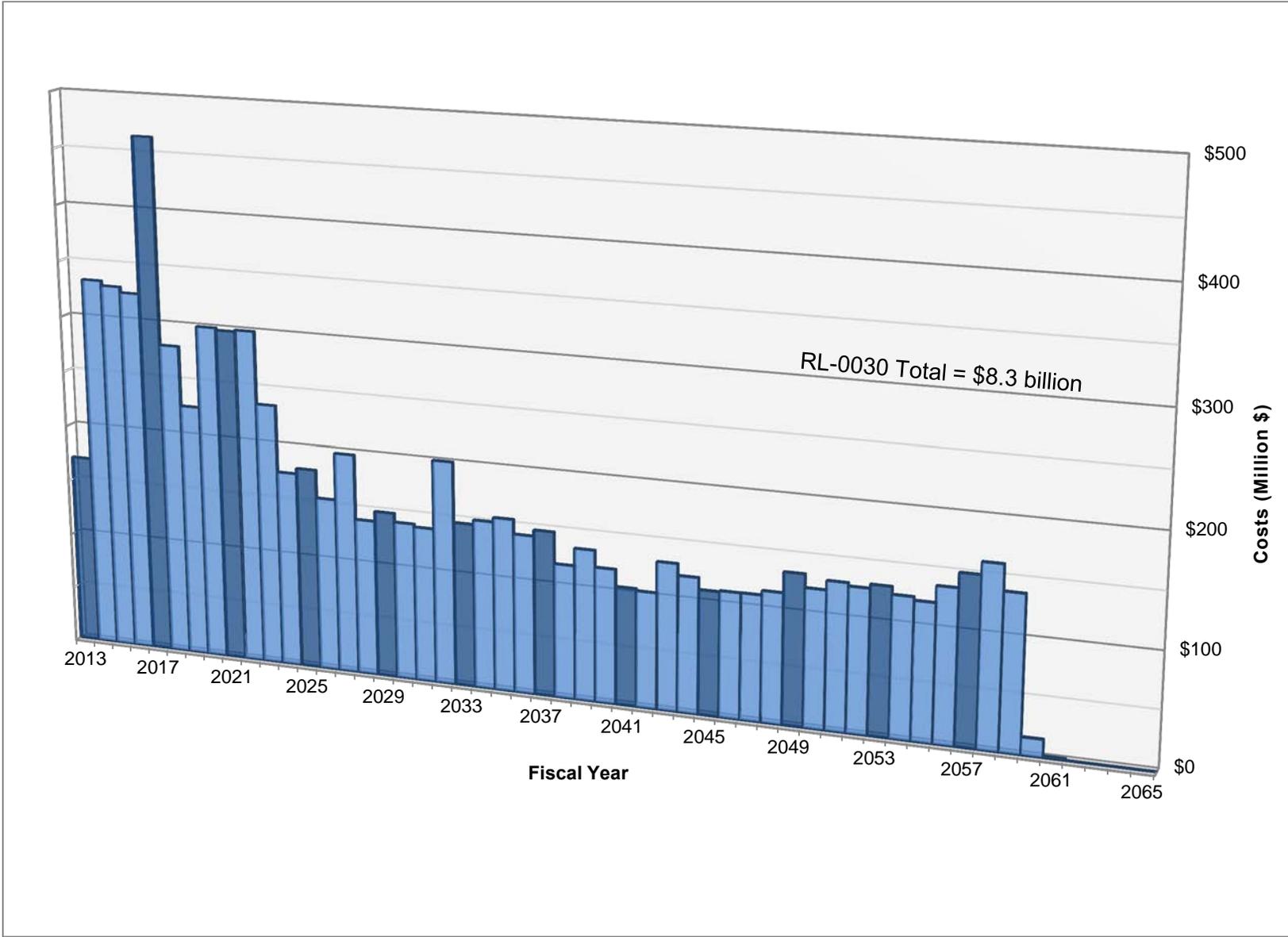
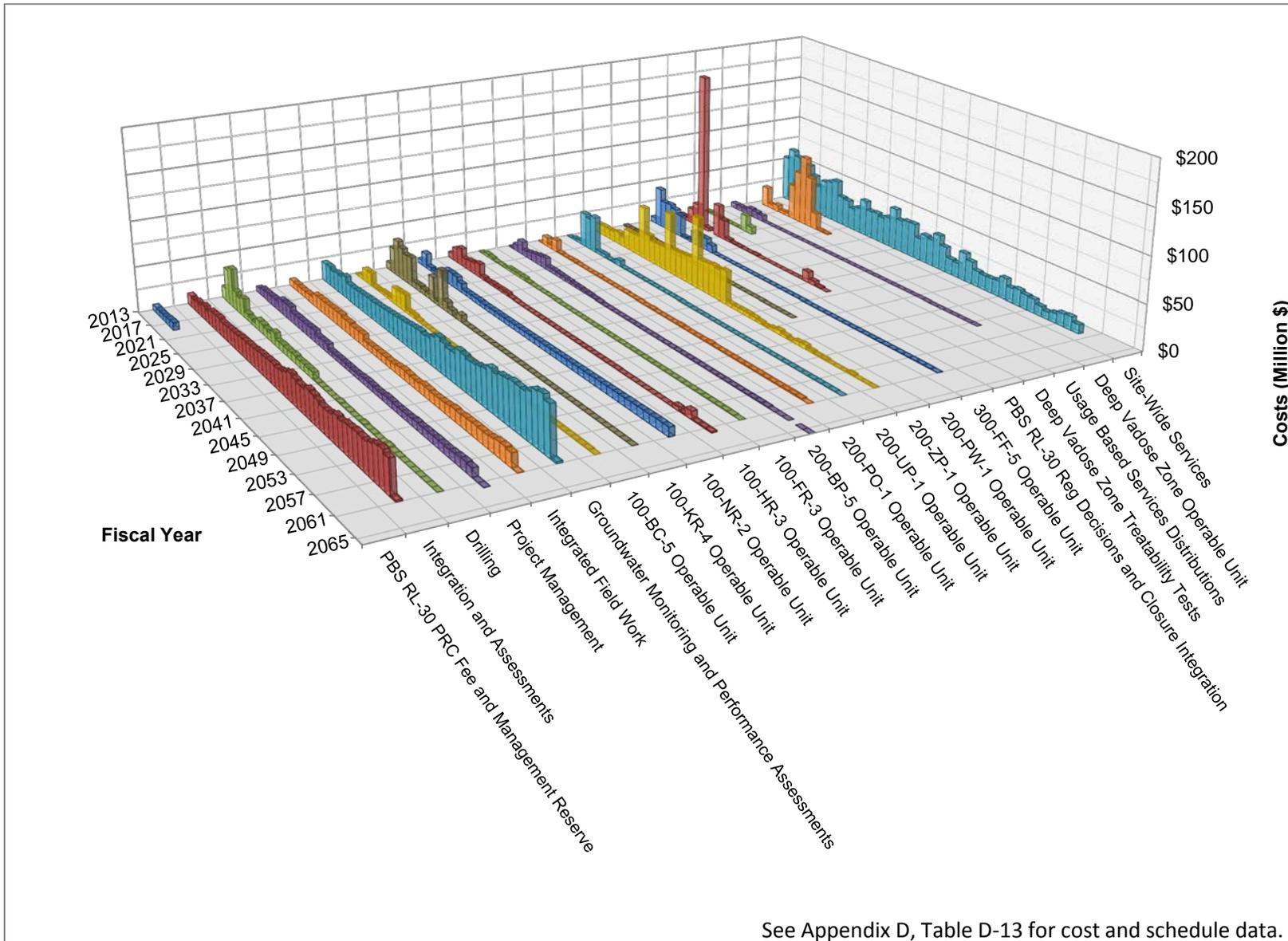


Figure 5-7. Soil and Water Remediation-Groundwater/Vadose Zone (PBS RL-0030) Remaining Estimated Cleanup Costs by Fiscal Year.



See Appendix D, Table D-13 for cost and schedule data.

Figure 5-8. Soil and Water Remediation-Groundwater/Vadose Zone (PBS RL-0030) Remaining Estimated Cleanup Costs by Work Element.

### 5.3 NUCLEAR FACILITY D&D–REMAINDER OF HANFORD (PBS RL-0040)

Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) is the geographically based cleanup and closure of the Central Plateau and remaining scope in the other Hanford Site areas. In addition to the Central Plateau Cleanup scope, PBS RL-0040 includes the infrastructure and services scope under Mission Support, which is discussed in Chapter 7.0. This section focuses on the cleanup-related elements of the PBS, also known (and referred to in the rest of this section) as the Central Plateau Remediation Project. The Central Plateau Remediation Project (PBS RL-0040) scope includes Hanford Site demolition and remediation scope that is organized into 26 geographical areas referred to as closure zones.

Following completion of assessment activities through decision documentation (e.g., ROD or closure plan) under Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), completion of the remedial design/remedial action work plan and waste site/facility remediation and/or closure will be addressed under the Central Plateau Remediation Project (PBS RL-0040). The Central Plateau Remediation Project (PBS RL-0040) scope includes implementing the decisions through the physical cleanup of canyon facilities, buildings and structures, waste sites, pipelines, and miscellaneous sites (e.g., debris piles), and utilities to ensure appropriate protectiveness has been provided for the cleanup.

To accomplish the Central Plateau Remediation Project (PBS RL-0040), the following major objectives have been established:

- Perform safe S&M of facilities and waste sites pending remediation.
- Integrate planning and execution activities with other Central Plateau projects.
- Remediate waste sites.
- Decontamination and decommissioning (D&D) canyons.
- D&D excess facilities.

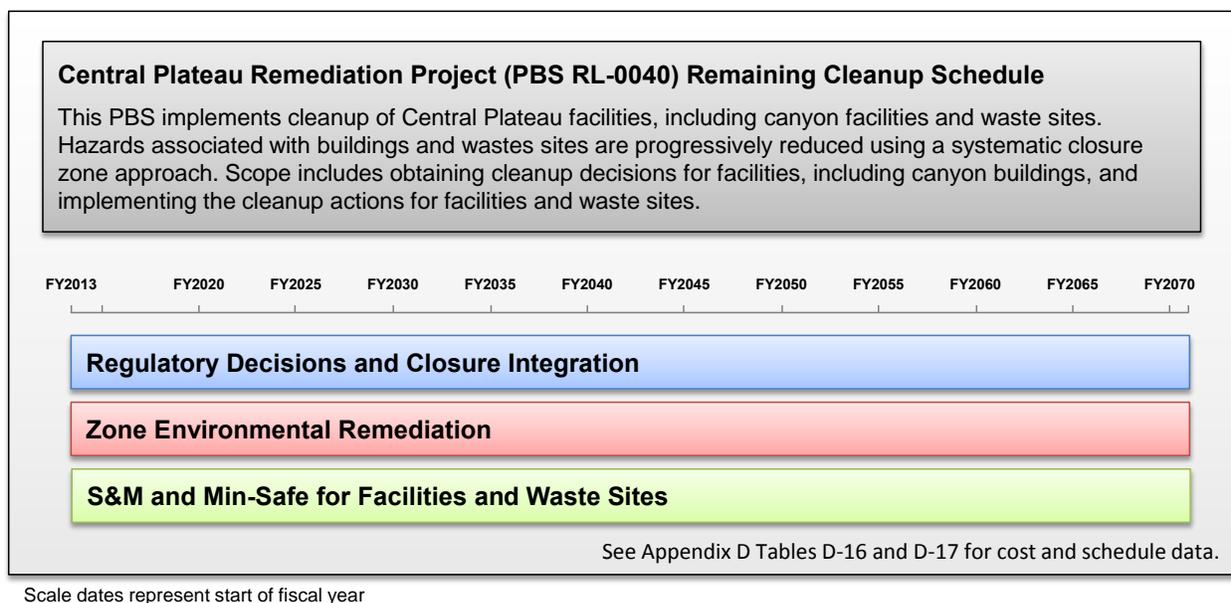
The project will be complete when the following endpoint criteria have been reached:

- Canyons and surplus facilities removed or dispositioned and ready for transition to LTS.
- Central Plateau waste sites remediated in accordance with approved decisions.
- Legacy wastes and facilities at PNNL dispositioned.
- Institutional controls implemented.
- Post-remediation operations and maintenance requirements implemented.

The work scope for the Central Plateau Remediation Project (PBS RL-0040) is organized into three primary Level 2 work elements as shown in Figure 5-9, which also presents the remaining cleanup schedule for this PBS. Table 5-7 provides additional details on the scope of work for each of these work elements.

The duration of the work elements in Figure 5-9 includes planning estimates for completing remedial actions for the 26 Central Plateau and remainder of Hanford closure zones.

The duration, in part, is dependent on transition of the tank farms to the project for final disposition after closure activities are completed by DOE-ORP (see Chapter 6.0). It is also dependent on transition of waste management facilities that are no longer needed to support Hanford Site cleanup from Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) to the project for final disposition (see Section 5.5).



**Figure 5-9. Central Plateau Remediation Project (PBS RL-0040) Remaining Cleanup Schedule.**

**Table 5-7. Central Plateau Remediation Project (PBS RL-0040) Level 2 Scope Summary.**

Work Element	Scope Description
Regulatory Decisions and Closure Integration	This work element includes general management direction and technical/ESH&Q support, cross-cutting engineering and technical studies necessary to support decision-making for Central Plateau remediation and to evaluate tradeoffs associated with remedial action and facility disposition decisions, regulatory decisions for canyons and related nuclear process facilities, and regulatory decisions for below-slab remediation for non-canyon facilities.
Zone Environmental Remediation	This work element is the geographic remediation of closure zones in the Central Plateau. Each zone has a variety of cleanup features that can include waste sites, facilities, canyons, pipelines, and remedial barriers.  The actions to be taken for cleaning up each waste site, including pipelines, will be determined through the regulatory decision processes (under Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030) and as part of remedial definition activities. Potential remedial actions for waste sites range from monitored natural attenuation to capping or removal, depending on waste site conditions. Contamination levels, risks, proximity to facilities, and other considerations are factored into the selection. Existing structures (other than the canyon facilities) are expected to be demolished and the debris disposed of at ERDF.
S&M and Min-Safe for Facilities and Waste Sites	This work element includes surveillance and system, structural, equipment, and other maintenance on Central Plateau facilities/buildings and waste sites.
Site-wide Services – RL-0040	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.
ERDF =	Environmental Restoration Disposal Facility.      PBS = project baseline summary.
ESH&Q =	Environment, Safety, Health, and Quality.      S&M = surveillance and maintenance.

Figure 5-10 presents the remaining estimated cleanup costs for the Central Plateau Remediation Project (PBS RL-0040) by fiscal year; Figure 5-11 presents the remaining estimated cleanup costs by work element.

#### **5.4 NUCLEAR FACILITY D&D–FAST FLUX TEST FACILITY PROJECT (PBS RL-0042)**

The FFTF is a deactivated, 400-megawatt (thermal) liquid-metal (sodium)-cooled, research and test reactor located in the 400 Area. The facility was used to develop and test advanced fuels and materials for the Liquid Metal Fast Breeder Reactor Program and to serve as a prototype facility for future Liquid Metal Fast Breeder Reactor Program facilities. In December 1993, DOE issued a shutdown order for FFTF because the Liquid Breeder Reactor Program had been cancelled.

The scope of Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) is to provide for safe D&D, secure storage and stabilization of the hazardous/radioactive materials, interim maintenance of the facilities, demolition, and disposal of the waste. The mission requires removal and disposition of sodium coolant, the Reactor Containment Building, reactor support buildings, and auxiliary facilities and support systems. The project technical objective will achieve the following:

- Remove and disposition sodium coolant and clean residual sodium.
- Fill spaces with grout below the 550-foot elevation level (grade level) of the Reactor Containment Building.
- Decommission and demolish all facilities.

The regulatory decision for the FFTF containment building final closure, including the de-fueled reactor vessel, will be determined following the appropriate environmental analysis process. For planning purposes, the reactor containment dome is assumed to be removed, the below-grade Reactor Containment Building grouted and entombed, and the support facilities and structures demolished to 3 feet below grade and backfilled. The FFTF alternatives are being evaluated in DOE/EIS-0391, *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington, Volume 1* and *Volume 2*.

Waste sites within the 400 Area are included as part of the 300-FF-2 OU, which is being remediated under the Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041). These waste sites will be remediated in accordance with the ROD for the 300-FF-2 OU ([EPA/ROD/R10-01/119](#), *Declaration of the Record of Decision for the 300-FF-2 Operable Unit, Hanford Site, Benton County, Washington*); the scope is included under PBS RL-0041 and discussed in Section 4.1.

Figure 5-12 shows the Level 2 scope elements and the remaining cleanup schedule for the Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042). Table 5-8 summarizes the work scope.

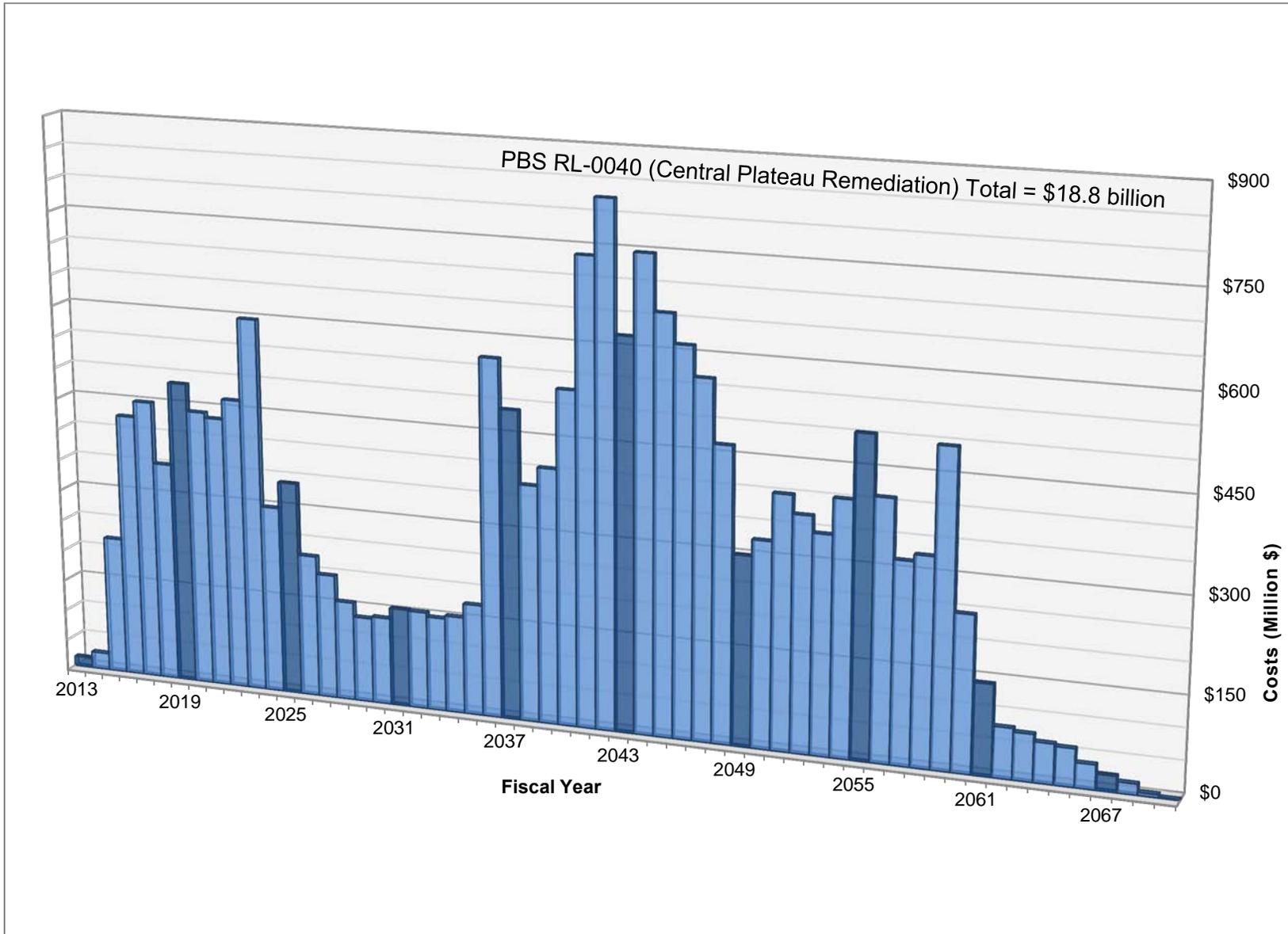


Figure 5-10. Central Plateau Remediation Project (PBS RL-0040) Remaining Estimated Cleanup Costs by Fiscal Year.

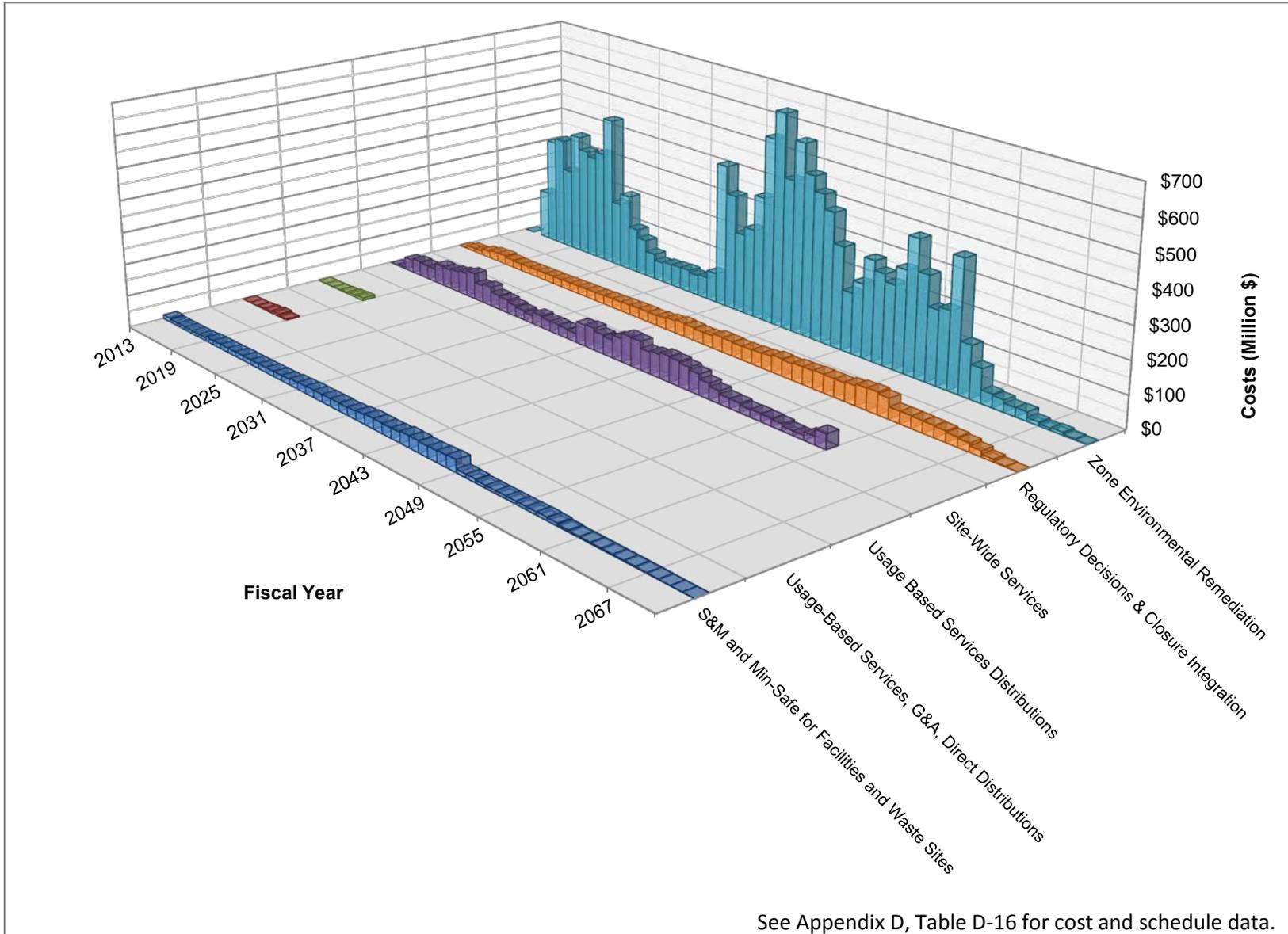
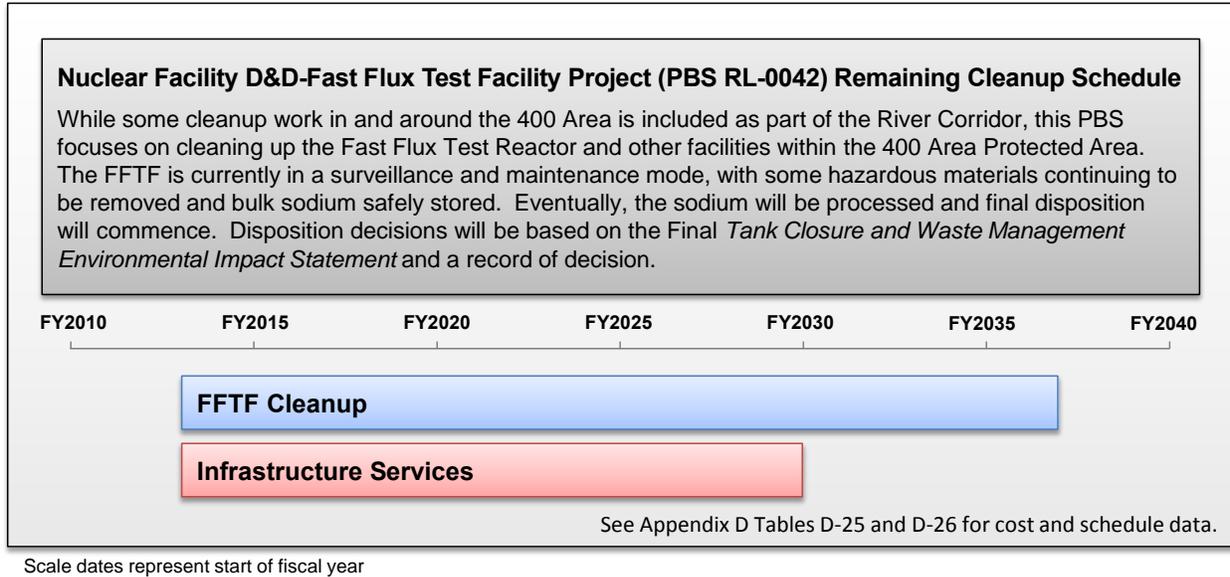


Figure 5-11. Central Plateau Remediation Project (PBS RL-0040) Remaining Estimated Cleanup Costs by Work Element.



**Figure 5-12. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Remaining Cleanup Schedule.**

**Table 5-8. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Level 2 Scope Summary.**

Work Element	Scope Description
FFTF Cleanup	This work element includes monitoring, surveillance, and maintenance of the FFTF and surrounding area in a safe and compliant manner until D&D; deactivation of the FFTF; disposition of the FFTF sodium; construction of a sodium reaction facility; decommissioning of the FFTF in accordance with a future record of decision; and project management for these activities.
Infrastructure and Services	This work element includes activity related to a DOE-RL direct contract.
Site-wide Services – RL-0040	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.
DOE-RL = D&D =	U.S. Department of Energy, Richland Operations Office. decontamination and decommissioning.
	FFTF = Fast Flux Test Facility. PBS = project baseline summary.

Figure 5-13 presents the remaining estimated cleanup costs for the Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) by fiscal year; Figure 5-14 shows the remaining estimated cleanup costs by work element.

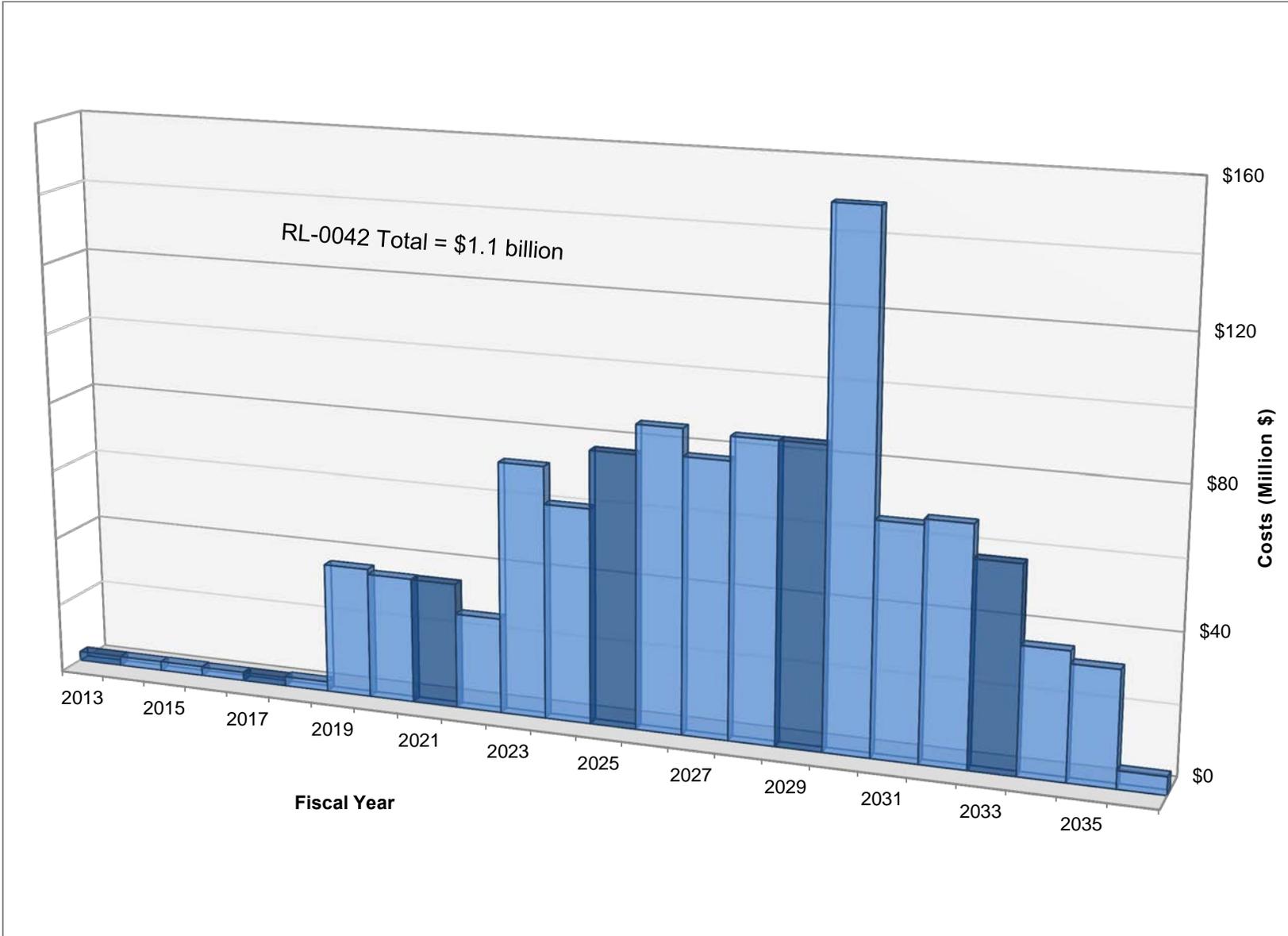


Figure 5-13. Nuclear Facility D&D-Fast Flux Test Facility Project (PBS RL-0042) Remaining Estimated Costs by Fiscal Year.

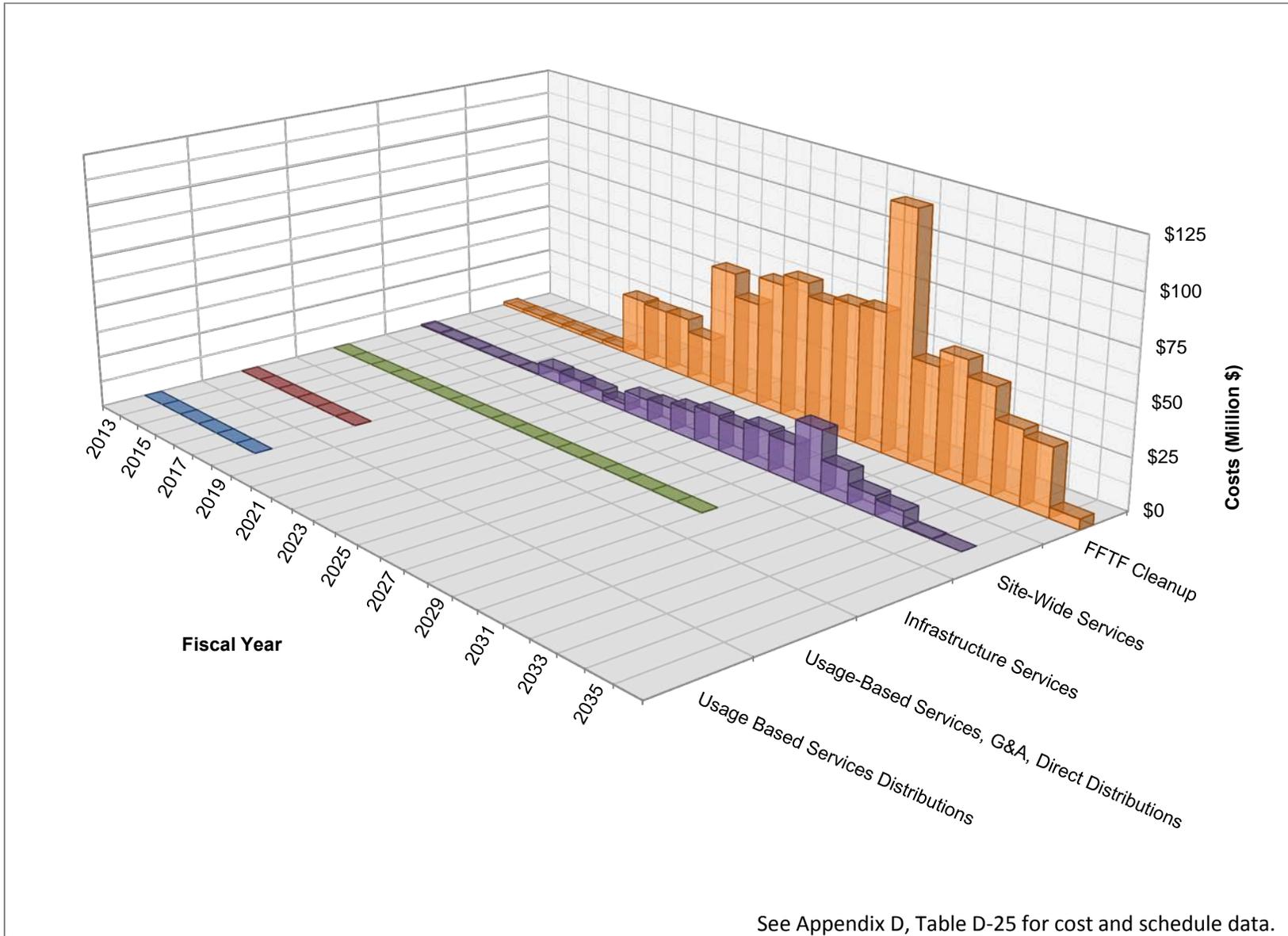


Figure 5-14. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Remaining Estimated Costs by Work Element.

## **5.5 SOLID WASTE STABILIZATION AND DISPOSITION–200 AREA (PBS RL-0013C)**

The scope of the Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) project is to provide waste treatment and disposal services for Hanford Site facilities and operations.

The major mission objectives are to:

- Operate Hanford Site waste treatment facilities, including T Plant, WRAP Facility, and 200 Area Liquid Effluent Treatment Facilities (ETF).
- Provide Base Waste Management Operations at the CSB and 200 Area Interim Storage Area, the Integrated Disposal Facility (IDF), the Waste Encapsulation and Storage Facility (WESF) for cesium/strontium capsule storage, and Low-Level Burial Grounds and mixed waste disposal trenches.

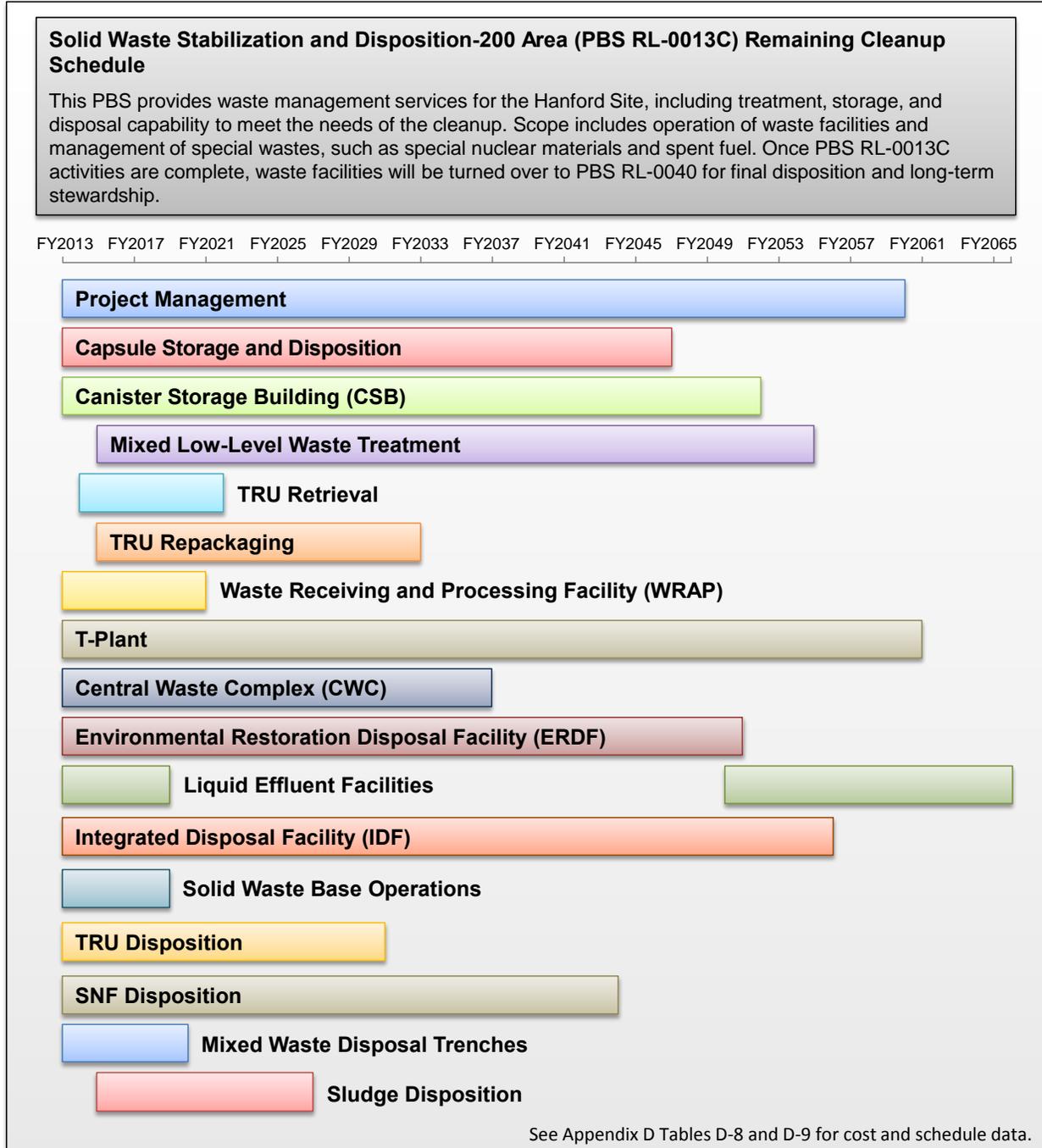
Additional objectives are:

- Retrieve and ship transuranic (TRU) waste for disposal to the WIPP.
- Develop alternative methods for treatment and disposal of orphan waste. This could include seeking land disposal restrictions variance approvals, expanding commercial treatment facilities permit limits and construction and operation of additional onsite treatment capabilities.
- Obtain processing capabilities to include repackaging of large and remote-handled contaminated waste containers.

The Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) includes completing the following activities:

- Cesium and strontium capsules will be transferred to dry storage and/or permanent disposal.
- Irradiated nuclear fuels will be removed offsite to a national repository for final disposition.
- Stored underground TRU waste will be retrieved and disposed.
- Mixed low-level and low-level waste will be treated as necessary and disposed.
- Waste management facilities will be deactivated at the end of their useful lives and will be turned over to Nuclear Facility D&D-Remainder of Hanford (PBS RL-0040) for final disposition.
- Low-Level Burial Grounds (including the mixed waste trenches) will be closed and transferred to Nuclear Facility D&D-Remainder of Hanford (PBS RL-0040) for final disposition and remedial action.
- ERDF will be operated to provide solid waste treatment and disposal services in support of Hanford Site cleanup after completion of the Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041).
- IDF will be closed according to the closure plan requirements in the Dangerous Waste Permit ([WA7890008967](#)). Closure will follow completion of tank waste vitrification.
- Operate liquid waste retention/transfer facilities to support the Office of Science mission in the 300 Area.

Figure 5-15 presents the scope elements and the remaining cleanup schedule for Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C). Table 5-9 summarizes each scope element. As waste management facilities are no longer needed to support Hanford Site cleanup, they will be transitioned to Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) for final disposition.



Scale dates represent start of fiscal year

**Figure 5-15. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Remaining Cleanup Schedule.**

**Table 5-9. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 2 Scope Summary.  
(2 pages)**

<b>Work Element</b>	<b>Scope Description</b>
Project Management	This work element provides for the overall project management, coordination, direction, and customer interface to ensure the proper conduct of operation for this project.
Capsule Storage and Disposition	This work element addresses operation of the WESF pool cells, and includes life extension upgrades to ensure safe and compliant operations, retrieval and disposition of cesium/strontium capsules, and transition of WESF for final D&D.
Canister Storage Building (CSB)	This work element includes safe storage of SNF and immobilized high-level waste from the WTP while awaiting final disposition at the geologic repository, repackaging of SNF for shipment, and coordination with the offsite repository for evaluations and information.
Mixed Low-Level Waste (MLLW) Treatment	This work element addresses treatment of MLLW to meet regulatory requirements including alternative methods for treatment and disposal of orphan waste. Treatment technologies include macro-encapsulation, stabilization, or thermal techniques, such as vacuum desorption. Once categorized, the waste will be prepared for shipment to the appropriate processing or treatment facility.
TRU Retrieval	This work element consists of the retrieval, designation, and transfer to a TSD facility of both contact-handled and remote-handled solid stored underground TRU waste.
TRU Repackaging	This work element provides funding for WIPP production, TRU repacking operations at T Plant and WRAP (or a commercial facility), TRU program support for repackaging, and RH/large packaging capabilities.
Waste Receiving and Processing (WRAP) Facility	This work element provides base and minimum safe operations at the WRAP to support processing of TRU wastes to WIPP and includes transition to final D&D.
T Plant	This work element addresses the operation and maintenance of the T Plant Complex for waste processing operations, including necessary upgrades and transition to final D&D of the canyon.
Central Waste Complex (CWC)	This work element includes operation and maintenance of the CWC, including upgrades to maintain needed capability and transition to final D&D. The scope includes provision of an alternate capability (other than WRAP) to load contact-handled TRU waste into shipping containers for shipment to WIPP.
Environmental Restoration Disposal Facility (ERDF)	This work element addresses the operation of the ERDF after turnover from the River Corridor Closure Project through the end of Hanford Site cleanup, including cell expansion and ERDF interim cover construction.
Liquid Effluent Facilities	This work element includes operation and maintenance of LERF, ETF, and 200 Area TEDF to receive, store, treat, and dispose of liquid effluents from Hanford Site cleanup activities. From FY 2019 to FY 2049 DOE-ORP will operate these facilities as part of Waste Feed Delivery/Treatment Planning/Double-Shell Tank Retrieval/Closure under PBS ORP-0014.
Integrated Disposal Facility (IDF)	This work element provides for the preparation, startup, and operation of the IDF to receive and store low-level waste and MLLW in accordance with applicable waste acceptance criteria. The scope includes provisions for IDF expansion.
Solid Waste Base Operations	This work element provides for the minimum staffing to maintain a viable waste management program and to capture those waste support activities that are essentially fixed cost in nature.

**Table 5-9. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 2 Scope Summary.  
(2 pages)**

Work Element	Scope Description
TRU Disposition	This work element provides funding and resources for the TRU Program’s coordination with the Central Characterization Project (CCP) to certify TRU waste according to the WIPP Waste Acceptance Criteria. This work element also provides funding to perform Hanford WIPP closeout activities, TRU waste characterization activities at the direction or guidance of the CCP and to establish shipping capabilities for RH TRU waste and additional CH TRU waste shipping capabilities.
SNF Disposition	This work element includes design and construction of a Fuel Preparation Facility, turnover of the facility to operations, and level of effort support to the DOE Office of Civilian Radioactive Waste Management and National Spent Nuclear Fuel Program activities.
Mixed Waste Disposal Trenches	This work element includes operation of the mixed waste disposal trenches and the design, construction, and other activities necessary to add operational layers in the trenches to maintain their ready-to-serve status and to place temporary caps on the trenches.
Sludge Disposition	The scope includes activities to stabilize and package the sludge from the 105-KW Basin for final disposition to WIPP or other disposal facilities, including Phase 2 treatment and packaging shutdown and deactivation of needed equipment, and management and support.
Site-wide Services – RL-0013C	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.
CCP = Central Characterization Project. CH = contact handled. CSB = Canister Storage Building. CWC = Central Waste Complex. D&D = decontamination and decommissioning. ERDF = Environmental Restoration Disposal Facility. ETF = Effluent Treatment Facility. IDF = Integrated Disposal Facility. LERF = Liquid Effluent Retention Facility. LLW = low-level waste. MLLW = mixed low-level waste.	PBS = project baseline summary. RH = remote handled. SNF = spent nuclear fuel. TEDF = Treated Effluent Disposal Facility. TRU = transuranic. TSD = treatment, storage, and disposal. WESF = Waste Encapsulation and Storage Facility. WIPP = Waste Isolation Pilot Plant. WRAP = Waste Receiving and Processing (Facility). WTP = Waste Treatment Plant.

Figure 5-16 shows the remaining estimated cleanup costs for the Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) by fiscal year; Figure 5-17 shows the remaining estimated cleanup costs by work element.

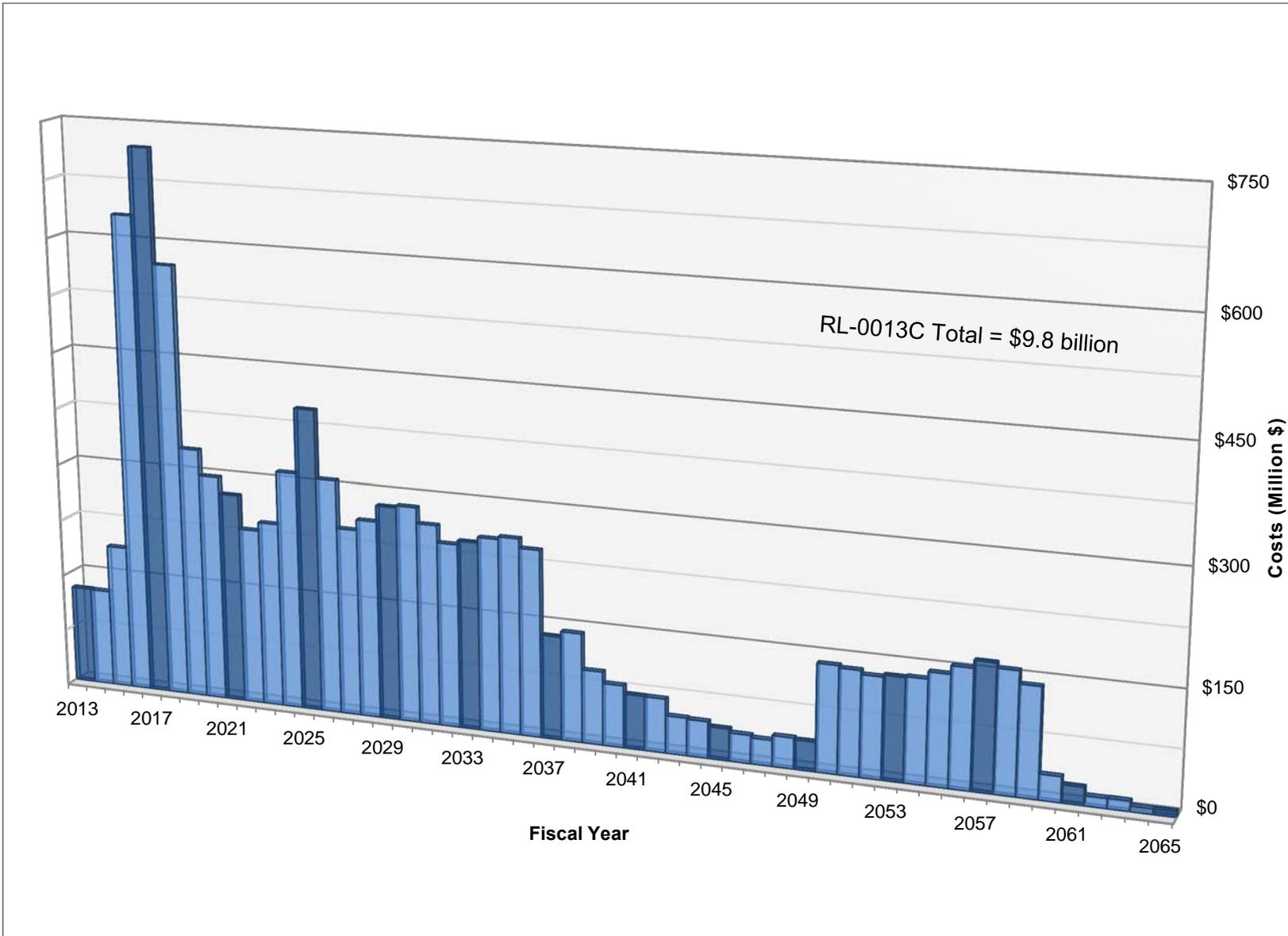


Figure 5-16. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Remaining Estimated Cleanup Costs by Fiscal Year.

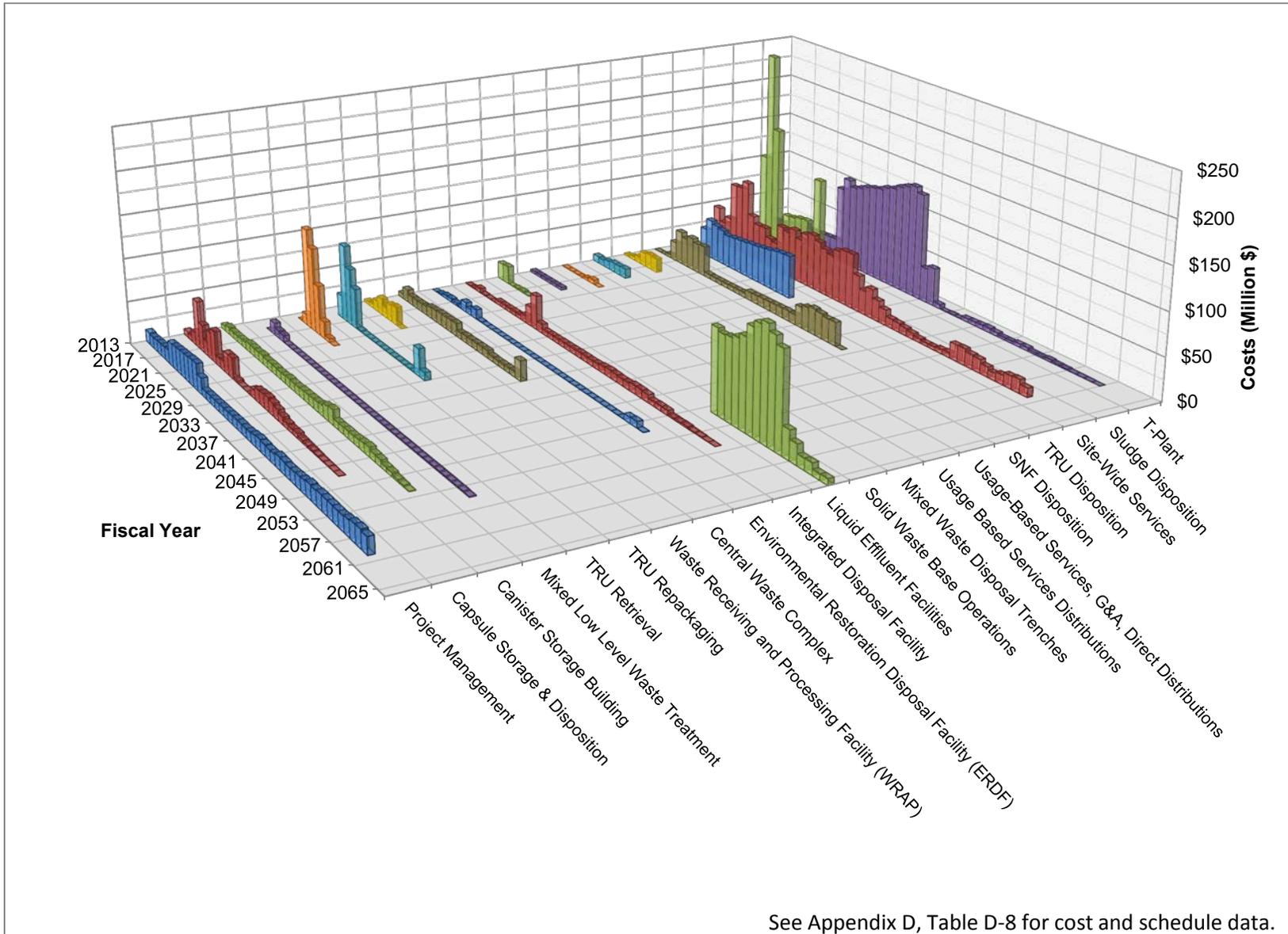


Figure 5-17. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Remaining Estimated Cleanup Costs by Work Element.

## 5.6 CENTRAL PLATEAU ASSUMPTIONS AND UNCERTAINTIES

In planning for the Hanford Site lifecycle, there are uncertainties considered regarding estimated scope, schedule, and cost. While a number of assumptions are made to support lifecycle development, the assumptions presented here are major assumptions that drive costs.

The following assumption is identified for NM Stabilization and Disposition–PFP (PBS RL-0011) work scope:

- The annual funding for implementation of PBS RL-0011 will match the project request.

For Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), the following assumptions are currently identified:

- The annual funding for implementation of PBS RL-0030 will match the project request.
- Planned characterization of the vadose zone below the high-level waste (HLW) tanks will be sufficient to evaluate remedies for protection of groundwater.
- No substantial new requirements will be added to meet the state’s implementation of RCRA.

For Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040), the following assumptions are currently identified:

- An industrial worker scenario will be used to define the exposure scenarios and the threshold cleanup levels for waste sites located within the 200 Areas.
- The Central Plateau area of the Hanford Site will remain under Federal control for the foreseeable future.
- All low-level legacy waste will be managed and treated on the Hanford Site via remove, treat, and dispose to approved onsite disposal facilities.
- Planning assumes that geographic aggregate barriers (ABAR) will be utilized. The ABARs are assumed to cover canyons or other large facilities and adjacent waste sites or to cover multiple adjacent waste sites.
- Removal excavations are assumed to be 15 feet below grade for planning and estimating purposes. Decision documents will identify the actual removal excavation criteria (soil cleanup level or excavation depth) for waste sites.

For Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042), the following assumptions are currently identified:

- The annual funding profile for implementation of PBS RL-0042 will match the project request.
- FFTF funding to accomplish the scope can be carried over from year to year. Beginning in FY 2015, budget levels are to reflect an optimal ramp up to complete sodium residuals cleaning, bulk sodium processing, and D4 work scope.

For Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C), the following assumptions are currently identified:

- The annual funding profile for implementation of PBS RL-0013C will match the project request.
- New treatment facilities are not required to support longer WTP operations.
- T Plant will be available for modification to be the facility necessary for retrieval, storage, and treatment/processing of all Hanford Site RCRA TRUM waste as required by TPA Milestone M-091-01.
- WIPP will remain operational through the end of Hanford Site cleanup operations that have the potential to generate TRU waste. Current planning has shipping of TRU waste until FY 2030.

### **5.7 CENTRAL PLATEAU CLEANUP ACTION - REMEDIATE 200-CW-1, 200-CW-3, 200-OA-1 AND 200-WA-1 OPERABLE UNITS COST ESTIMATE ALTERNATIVE ANALYSIS**

This section provides more in-depth information about selected Central Plateau cleanup actions for which final decisions have not yet been made. Section 1.6 discusses the overall process for identifying cleanup actions, defining the range of plausible alternatives, and preparing reasonable upper bound cost estimates. Appendix A describes remaining cleanup actions for the Hanford Site, including others associated with the Central Plateau. The TPA agencies determined that the 2013 Lifecycle Report should analyze the Central Plateau cleanup actions identified in Appendix A, Table A-3 as: Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 Operable Units) and Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 Operable Unit) ([DOE/RL-2010-49](#)).

The 200-CW-1 Operable Unit waste sites consist primarily of large-area cooling-water ponds and ditches that are primarily located in the geographic Outer Area around the perimeter of the 200 Areas. The cooling-water ponds tend to be shallow waste sites that received large volumes of steam condensate, cooling water, and chemical sewer waste.

The 200-CW-3 Operable Unit includes 16 remaining waste sites located in the 200 North Area of the Outer Area that were included in the interim action ROD for the 100 and 200 Area remaining sites ([EPA/ROD/R10-99/039](#), *Hanford 200-Area (USDOE) and Hanford 100-Area (USDOE) EPA ID: WA1890090078 and WA3890090076, OU(s) 15 & 27, Benton County, WA, 07/15/1999*). Four of the waste sites were cleaned up in calendar year 2007 while the remaining 12 were addressed between 2009 and 2011. The *200-CW-3 Operable Unit Interim Remedial Action Report* ([DOE/RL-2011-58](#)) documents completion of the remedial action, including costs and achievement of interim action remedial action objectives, so the 200-CW-3 Operable Unit waste sites were excluded from this alternative analysis.

The 200-OA-1 Operable Unit was created in 2010 as part of the geographic closure goals on the Central Plateau in accordance with TPA Change Number C-09-07. The 200-OA-1 Operable Unit contains waste sites located in the geographic Outer Area that were not assigned to the 200-CW-1 or 200-CW-3 Operable Units. This operable unit includes sites that received liquid wastes from the PUREX Plant, T, S, and B Plants as well as waste sites that were not associated

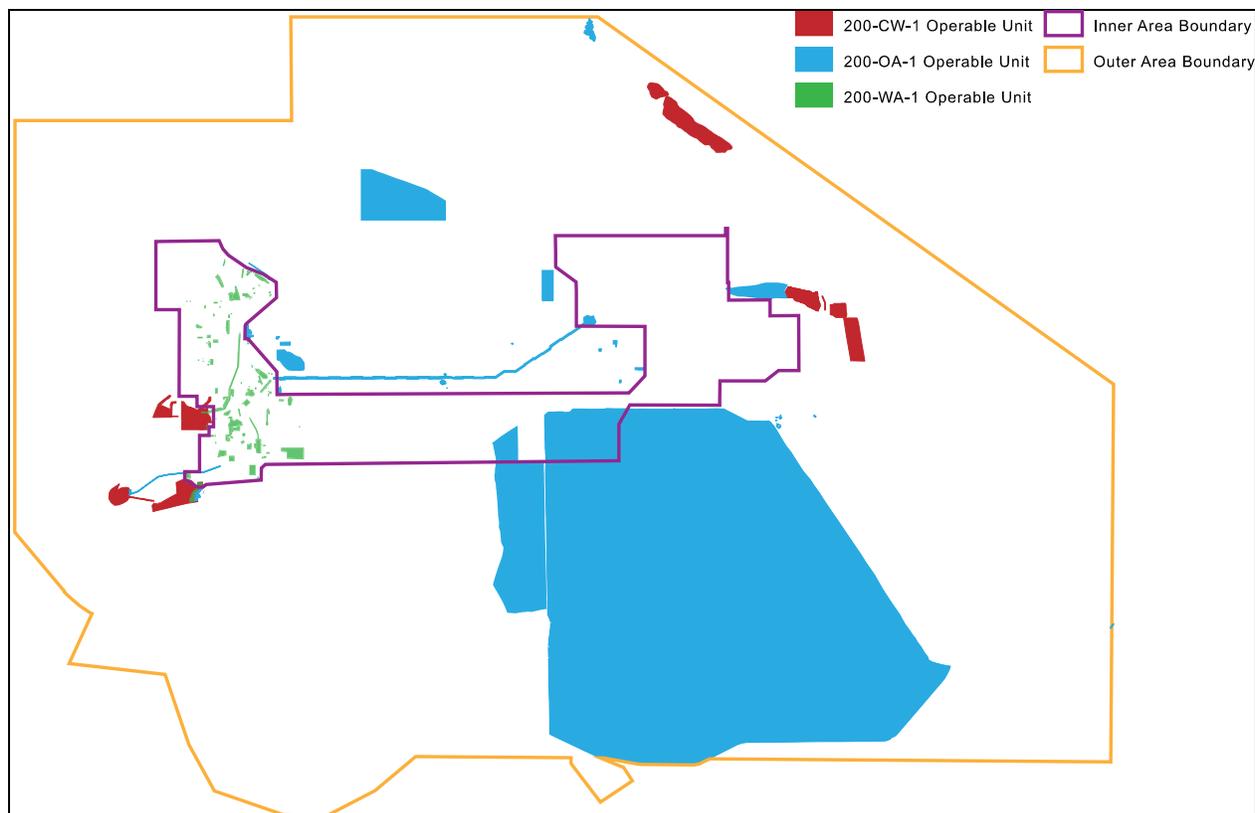
directly with the nuclear weapons production byproducts or waste streams but supported past military, industrial, infrastructure, and support functions.

The 200-WA-1 Operable Unit also was created in 2010 as part of the geographic closure goals on the Central Plateau in accordance with TPA Change Number C-09-07. The 200-WA-1 Operable Unit contains waste sites located within the 200 West Inner Area of the Central Plateau. This operable unit contains many different types of waste sites including cribs, dumping areas, French Drains, injection/reverse wells, septic tanks, trenches, and unplanned releases.

Waste sites assigned to the 200-CW-1, 200-OA-1 and 200-WA-1 Operable Units in the Waste Information Data System (WIDS) database as of May 23, 2012, were included in the analysis. Interim actions have previously been approved for selected waste sites in the 200-OA-1 and 200-WA-1 Operable Units that were previously assigned to the 200-MG-1 and 200-MG-2 Operable Units (e.g., [DOE/RL-2009-37](#), [DOE/RL-2009-53](#), TPA-CN-390). Waste sites with a completed interim action were excluded from the analysis. In addition, waste sites with the following classification or reclassification status in WIDS were also excluded from the analysis:

- Interim closed out – Due to actions taken, a waste management unit meets cleanup standards specified in an interim action ROD or action memorandum, but for which a final ROD has not been issued.
- Closed out – Due to actions taken, a waste management unit meets applicable cleanup standards or closure requirements.
- Not accepted (proposed) – A temporary classification indicating a WIDS site has been recommended to be classified as 'Not Accepted', but the review process has not been completed. Sites that are 'Not Accepted' indicate an assessment has been made that a WIDS site is not a waste management unit and is not within the scope of Tri Party Agreement Action Plan, Section 3.1 - this classification requires lead regulatory agency review.
- No action – A site does not require any further remedial action under RCRA Corrective Action, CERCLA, or other cleanup standards based on an assessment of quantitative data collected for the site.
- Rejected – A site does not require remediation under RCRA Corrective Action, CERCLA, or other cleanup standards based on qualitative information such as a review of historical records, photographs, drawings, walkdowns, ground penetrating radar scans, and shallow test pits.

Of the remaining 190 waste sites in this analysis, cleanup has been partially completed at one waste site in the 200-OA-1 Operable Unit. During August 2009 through July 2011, approximately 483,000 tons of contaminated soil was removed from a 140-acre area of waste site UPR-200-E-83, also known as the BC Controlled Area, at a cost of approximately \$34.5 million ([DOE/RL-2011-101](#)). Only the remaining estimated cleanup cost for this waste site is included in this analysis. Figure 5-18 shows the location of the waste sites included in the alternative analysis.



**Figure 5-18. Location of the Central Plateau Waste Sites Included in the Alternative Analysis.**

The CERCLA remedial investigation/feasibility study process is not complete for these operable units. To support development of a range of plausible alternatives and describe a reasonable upper bound cleanup alternative, the TPA agencies participated in working sessions in 2010 and 2011. The range of cleanup alternatives identified at that time for these operable units includes remove, treat and dispose (RTD), monitored natural attenuation (MNA), and capping with long-term monitoring and institutional controls (see Appendix A, Table A-3). In subsequent meetings, the TPA agencies considered that a range of cleanup alternatives with a significant RTD component would describe the reasonable upper bound alternative for these operable unit waste sites. Because the DOE planning case includes a significant RTD component, the TPA agencies agreed that this alternative analysis would document the DOE planning case range of alternatives, costs and schedule for cleanup of the waste sites in these operable units.

The DOE planning case cleanup remedies were developed to be protective of human health and the environment based on information for each waste site such as physical dimensions, historic use, and a conceptual model of the nature and extent of contamination. For many of these waste sites the conceptual contaminant model is shallow or readily addressed contamination, making them candidates for an RTD cleanup remedy in keeping with the preference for RTD presented in HAB Consensus Advice #173, “Central Plateau Values.” In addition to RTD, the DOE planning case cleanup remedies include maintain existing soil cover/monitored natural attenuation/institutional controls (MESC/MNA/IC), confirmatory sampling to support no further cleanup action is needed (CSNA), and individual barriers (IBAR) (or caps) over waste sites or aggregate barriers (ABAR) over processing facilities and nearby waste sites or groups of waste

sites. The DOE planning case cleanup remedies for these operable unit waste sites are summarized in Table 5-10.

**Table 5-10. DOE Planning Case Cleanup Remedies for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis. (6 pages)**

Waste Site Code	Waste Site Type	Operable Unit	Location / Implementation Area	DOE Planning Case Cleanup Remedy
216-A-25	Pond	200-CW-1	Outer Area	MESC/MNA/IC & RTD
216-B-3	Pond	200-CW-1	Outer Area	MESC/MNA/IC
216-B-3A RAD	Pond	200-CW-1	Outer Area	CSNA
216-B-3B RAD	Pond	200-CW-1	Outer Area	CSNA
216-B-3C RAD	Pond	200-CW-1	Outer Area	CSNA
216-S-16P	Pond	200-CW-1	Outer Area	IBAR
216-S-17	Pond	200-CW-1	Outer Area	ABAR
216-U-10	Pond	200-CW-1	Outer Area	ABAR
216-U-11	Ditch	200-CW-1	Outer Area	IBAR
216-U-9	Ditch	200-CW-1	Outer Area	MESC/MNA/IC
UPR-200-W-124	Unplanned Release	200-CW-1	Outer Area	ABAR
200 CP	Depression/Pit (nonspecific)	200-OA-1	Outer Area	CSNA
200-E-1	Dumping Area	200-OA-1	Outer Area	RTD
200-E-126-PL-A	Radioactive Process Sewer	200-OA-1	Outer Area	MESC/MNA/IC
200-E-127-PL-A	Radioactive Process Sewer	200-OA-1	Outer Area	MESC/MNA/IC
200-E-2	Unplanned Release	200-OA-1	Outer Area	CSNA
200-E-46	Dumping Area	200-OA-1	Outer Area	CSNA
200-E-7	Septic Tank	200-OA-1	Outer Area	CSNA
200-W ADB	Coal Ash Pit	200-OA-1	Outer Area	CSNA
200-W BP	Burn Pit	200-OA-1	Outer Area	CSNA
200-W-102-PL	Radioactive Process Sewer	200-OA-1	Outer Area	RTD
200-W-3	Dumping Area	200-OA-1	Outer Area	RTD
200-W-64	Foundation	200-OA-1	Outer Area	RTD
216-B-3-1	Ditch	200-OA-1	Outer Area	RTD
216-B-3-2	Ditch	200-OA-1	Outer Area	RTD
216-B-3-3	Ditch	200-OA-1	Outer Area	RTD
216-N-8	Pond	200-OA-1	Outer Area	RTD
216-S-10D	Ditch	200-OA-1	BOIA 200W	MESC/MNA/IC
216-S-10P	Pond	200-OA-1	Outer Area	ABAR
216-S-11	Pond	200-OA-1	Outer Area	ABAR
216-S-16D	Ditch	200-OA-1	Outer Area	MESC/MNA/IC
216-T-1	Ditch	200-OA-1	Outer Area	CSNA
216-W-LWC	Crib	200-OA-1	Outer Area	IBAR
2607-W1	Septic Tank	200-OA-1	Outer Area	CSNA

**Table 5-10. DOE Planning Case Cleanup Remedies for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis. (6 pages)**

Waste Site Code	Waste Site Type	Operable Unit	Location / Implementation Area	DOE Planning Case Cleanup Remedy
2607-WL	Septic Tank	200-OA-1	Outer Area	CSNA
600 OCL	Sanitary Landfill	200-OA-1	Outer Area	RTD
600-227	Foundation	200-OA-1	Outer Area	RTD
600-66	Dumping Area	200-OA-1	Outer Area	RTD
600-71	Burn Pit	200-OA-1	Outer Area	CSNA
CTFN 2703-E	Drain/Tile Field	200-OA-1	Outer Area	CSNA
OCSA	Foundation	200-OA-1	Outer Area	CSNA
UPR-200-E-11	Unplanned Release	200-OA-1	Outer Area	RTD
UPR-200-E-83	Contamination Migration	200-OA-1	Outer Area	RTD
UPR-200-W-58	Unplanned Release	200-OA-1	Outer Area	RTD
UPR-200-W-70	Unplanned Release	200-OA-1	Outer Area	RTD
UPR-200-W-8	Unplanned Release	200-OA-1	Outer Area	CSNA
UPR-600-12	Unplanned Release	200-OA-1	Outer Area	MESC/MNA/IC
UPR-600-20	Contamination Migration	200-OA-1	Outer Area	RTD
200-W-1	Mud Pit	200-WA-1	Redox	RTD
200-W-101	Dumping Area	200-WA-1	Redox	CSNA
200-W-106	Unplanned Release	200-WA-1	BOIA 200W	RTD
200-W-11	Dumping Area	200-WA-1	BOIA 200W	CSNA
200-W-118	Injection/Reverse Well	200-WA-1	U Plant	CSNA
200-W-12	Dumping Area	200-WA-1	BOIA 200W	RTD
200-W-14	Unplanned Release	200-WA-1	BOIA 200W	CSNA
200-W-2	Spoils Pile/Berm	200-WA-1	Redox	CSNA
200-W-21	Pump Station	200-WA-1	T Plant	RTD
200-W-22	Unplanned Release	200-WA-1	Redox	RTD
200-W-42	Radioactive Process Sewer	200-WA-1	U Plant	RTD
200-W-51	Septic Tank	200-WA-1	BOIA 200W	CSNA
200-W-53	Unplanned Release	200-WA-1	BOIA 200W	MESC/MNA/IC
200-W-54	Contamination Migration	200-WA-1	BOIA 200W	ABAR
200-W-55	Dumping Area	200-WA-1	BOIA 200W	CSNA
200-W-6	Dumping Area	200-WA-1	BOIA 200W	RTD
200-W-63	Unplanned Release	200-WA-1	BOIA 200W	RTD
200-W-67	Unplanned Release	200-WA-1	BOIA 200W	RTD
200-W-71	Trench	200-WA-1	U Plant	CSNA
200-W-75	Experiment/Test Site	200-WA-1	Redox	RTD
200-W-77	Unplanned Release	200-WA-1	U Plant	RTD
200-W-80	Spoils Pile/Berm	200-WA-1	T Plant	RTD
200-W-81	Unplanned Release	200-WA-1	200 West Landfill 1	RTD

**Table 5-10. DOE Planning Case Cleanup Remedies for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis. (6 pages)**

Waste Site Code	Waste Site Type	Operable Unit	Location / Implementation Area	DOE Planning Case Cleanup Remedy
200-W-82	Product Piping	200-WA-1	BOIA 200W	RTD
200-W-83	Unplanned Release	200-WA-1	BOIA 200W	RTD
200-W-85	Unplanned Release	200-WA-1	U Plant	RTD
200-W-86	Unplanned Release	200-WA-1	U Plant	MESC/MNA/IC
200-W-87	Unplanned Release	200-WA-1	U Plant	RTD
200-W-89	Foundation	200-WA-1	U Plant	RTD
200-W-9	Unplanned Release	200-WA-1	T Plant	ABAR
200-W-90	Unplanned Release	200-WA-1	200 West Landfill 1	ABAR
200-W-92	Dumping Area	200-WA-1	BOIA 200W	RTD
207-S	Retention Basin	200-WA-1	Redox	IBAR
207-SL	Retention Basin	200-WA-1	Redox	RTD
207-T	Retention Basin	200-WA-1	BOIA 200W	RTD
207-U	Retention Basin	200-WA-1	BOIA 200W	RTD
207-Z	Retention Basin	200-WA-1	PFP	CSNA
216-S-1&2	Crib	200-WA-1	Redox	IBAR
216-S-12	Trench	200-WA-1	Redox	RTD
216-S-14	Trench	200-WA-1	BOIA 200W	RTD
216-S-18	Trench	200-WA-1	BOIA 200W	CSNA
216-S-20	Crib	200-WA-1	Redox	RTD
216-S-22	Crib	200-WA-1	Redox	CSNA
216-S-23	Crib	200-WA-1	BOIA 200W	IBAR
216-S-25	Crib	200-WA-1	BOIA 200W	IBAR
216-S-4	French Drain	200-WA-1	Outer Area	CSNA
216-S-5	Crib	200-WA-1	Outer Area	ABAR
216-S-6	Crib	200-WA-1	BOIA 200W	ABAR
216-S-7	Crib	200-WA-1	Redox	IBAR
216-S-8	Trench	200-WA-1	Redox	CSNA
216-SX-2	Crib	200-WA-1	BOIA 200W	RTD
216-T-10	Trench	200-WA-1	T Plant	CSNA
216-T-11	Trench	200-WA-1	T Plant	CSNA
216-T-12	Trench	200-WA-1	BOIA 200W	RTD
216-T-13	Trench	200-WA-1	BOIA 200W	CSNA
216-T-2	Injection/Reverse Well	200-WA-1	T Plant	MESC/MNA/IC
216-T-20	Trench	200-WA-1	BOIA 200W	RTD
216-T-27	Crib	200-WA-1	BOIA 200W	ABAR
216-T-28	Crib	200-WA-1	BOIA 200W	ABAR
216-T-29	French Drain	200-WA-1	T Plant	ABAR

**Table 5-10. DOE Planning Case Cleanup Remedies for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis. (6 pages)**

Waste Site Code	Waste Site Type	Operable Unit	Location / Implementation Area	DOE Planning Case Cleanup Remedy
216-T-31	French Drain	200-WA-1	BOIA 200W	CSNA
216-T-33	Crib	200-WA-1	T Plant	RTD
216-T-34	Crib	200-WA-1	T Plant	IBAR
216-T-35	Crib	200-WA-1	T Plant	IBAR
216-T-36	Crib	200-WA-1	BOIA 200W	RTD
216-T-4-1D	Ditch	200-WA-1	BOIA 200W	RTD
216-T-8	Crib	200-WA-1	T Plant	IBAR
216-T-9	Trench	200-WA-1	T Plant	CSNA
216-U-1&2	Crib	200-WA-1	U Plant	IBAR
216-U-12	Crib	200-WA-1	U Plant	IBAR
216-U-13	Trench	200-WA-1	BOIA 200W	ABAR
216-U-14	Ditch	200-WA-1	BOIA 200W	MESC/MNA/IC
216-U-15	Trench	200-WA-1	U Plant	RTD
216-U-16	Crib	200-WA-1	U Plant	MESC/MNA/IC
216-U-17	Crib	200-WA-1	U Plant	MESC/MNA/IC
216-U-3	French Drain	200-WA-1	BOIA 200W	RTD
216-U-4	Injection/Reverse Well	200-WA-1	U Plant	RTD
216-U-4A	French Drain	200-WA-1	U Plant	RTD
216-U-4B	French Drain	200-WA-1	U Plant	RTD
216-U-5	Trench	200-WA-1	U Plant	RTD
216-U-6	Trench	200-WA-1	U Plant	RTD
216-U-7	French Drain	200-WA-1	U Plant	ABAR
216-U-8	Crib	200-WA-1	U Plant	IBAR
216-Z-13	French Drain	200-WA-1	PFP	CSNA
216-Z-14	French Drain	200-WA-1	PFP	CSNA
216-Z-15	French Drain	200-WA-1	PFP	ABAR
216-Z-16	Crib	200-WA-1	PFP	IBAR
216-Z-17	Trench	200-WA-1	PFP	ABAR
216-Z-4	Trench	200-WA-1	PFP	RTD
216-Z-6	Crib	200-WA-1	PFP	RTD
216-Z-7	Crib	200-WA-1	PFP	ABAR
218-W-8	Burial Vault	200-WA-1	T Plant	RTD
218-W-9	Burial Ground	200-WA-1	Redox	IBAR
231-W-151	Receiving Vault	200-WA-1	PFP	RTD
241-T-361	Settling Tank	200-WA-1	T Plant	IBAR
241-U-361	Settling Tank	200-WA-1	U Plant	RTD
2607-W3	Septic Tank	200-WA-1	T Plant	RTD

**Table 5-10. DOE Planning Case Cleanup Remedies for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis. (6 pages)**

Waste Site Code	Waste Site Type	Operable Unit	Location / Implementation Area	DOE Planning Case Cleanup Remedy
2607-W4	Septic Tank	200-WA-1	T Plant	RTD
2607-W5	Septic Tank	200-WA-1	U Plant	MESC/MNA/IC
2607-W6	Septic Tank	200-WA-1	BOIA 200W	CSNA
2607-W7	Septic Tank	200-WA-1	U Plant	CSNA
2607-W8	Septic Tank	200-WA-1	PFP	CSNA
2607-W9	Septic Tank	200-WA-1	BOIA 200W	CSNA
2607-WC	Septic Tank	200-WA-1	BOIA 200W	CSNA
2607-WZ	Septic Tank	200-WA-1	BOIA 200W	CSNA
2607-Z	Septic Tank	200-WA-1	PFP	CSNA
2607-Z1	Septic Tank	200-WA-1	PFP	CSNA
270-W	Neutralization Tank	200-WA-1	U Plant	RTD
600-70	Dumping Area	200-WA-1	ERDF	CSNA
UPR-200-W-101	Unplanned Release	200-WA-1	U Plant	CSNA
UPR-200-W-103	Unplanned Release	200-WA-1	PFP	ABAR
UPR-200-W-111	Unplanned Release	200-WA-1	BOIA 200W	RTD
UPR-200-W-112	Unplanned Release	200-WA-1	BOIA 200W	RTD
UPR-200-W-116	Unplanned Release	200-WA-1	Redox	RTD
UPR-200-W-117	Unplanned Release	200-WA-1	U Plant	RTD
UPR-200-W-118	Unplanned Release	200-WA-1	U Plant	ABAR
UPR-200-W-138	Unplanned Release	200-WA-1	U Plant	RTD
UPR-200-W-14	Unplanned Release	200-WA-1	BOIA 200W	RTD
UPR-200-W-162	Unplanned Release	200-WA-1	U Plant	ABAR
UPR-200-W-165	Unplanned Release	200-WA-1	BOIA 200W	CSNA
UPR-200-W-166	Unplanned Release	200-WA-1	BOIA 200W	RTD
UPR-200-W-19	Unplanned Release	200-WA-1	U Plant	MESC/MNA/IC
UPR-200-W-23	Unplanned Release	200-WA-1	PFP	RTD
UPR-200-W-3	Unplanned Release	200-WA-1	T Plant	RTD
UPR-200-W-33	Unplanned Release	200-WA-1	U Plant	RTD & ABAR
UPR-200-W-36	Unplanned Release	200-WA-1	Redox	CSNA
UPR-200-W-39	Unplanned Release	200-WA-1	U Plant	RTD
UPR-200-W-4	Unplanned Release	200-WA-1	T Plant	RTD
UPR-200-W-41	Unplanned Release	200-WA-1	Redox	RTD
UPR-200-W-44	Unplanned Release	200-WA-1	BOIA 200W	RTD
UPR-200-W-46	Unplanned Release	200-WA-1	Redox	RTD
UPR-200-W-48	Unplanned Release	200-WA-1	U Plant	RTD
UPR-200-W-51	Unplanned Release	200-WA-1	S-SX Farm	CSNA
UPR-200-W-55	Unplanned Release	200-WA-1	U Plant	ABAR

**Table 5-10. DOE Planning Case Cleanup Remedies for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis. (6 pages)**

Waste Site Code	Waste Site Type	Operable Unit	Location / Implementation Area	DOE Planning Case Cleanup Remedy
UPR-200-W-60	Unplanned Release	200-WA-1	U Plant	RTD
UPR-200-W-63	Unplanned Release	200-WA-1	BOIA 200W	CSNA
UPR-200-W-65	Unplanned Release	200-WA-1	T Plant	RTD
UPR-200-W-67	Unplanned Release	200-WA-1	T Plant	CSNA
UPR-200-W-71	Unplanned Release	200-WA-1	200 West Landfill 1	ABAR
UPR-200-W-73	Unplanned Release	200-WA-1	T Plant	RTD
UPR-200-W-78	Unplanned Release	200-WA-1	U Plant	ABAR
UPR-200-W-99	Unplanned Release	200-WA-1	BOIA 200W	RTD
ABAR = aggregate barrier. BOIA 200W = Balance of Inner Area 200 West. CSNA = confirmatory sampling no action. IBAR = individual barrier. MESC/MNA/IC = maintain existing soil cover/monitored natural attenuation/institutional controls. OCSA = Old Central Shop Area. RTD = remove, treat, dispose. ERDF = Environmental Restoration Disposal Facility. PFP = Plutonium Finishing Plant. Redox = Reduction-Oxidation Facility. UPR = Unplanned release.				

The specific cleanup actions to be taken for closing each waste site will be determined through the regulatory decision process and as part of remedial design activities. The DOE planning case cleanup remedies for each waste site were also developed based on the following assumptions.

- Closure of waste sites located adjacent to a processing facility or underground tank will occur as part of implementation of closure actions performed on those closure elements.
- The waste sites will be closed through implementation of one, or a combination of, the following actions:
  - RTD— Remove, treat, and dispose is assumed for waste sites where the contamination is expected to be shallow or readily addressed, or where remedial investigations are expected to indicate that sufficient radioactive material and/or hazardous chemical contamination is present and removal will be needed to protect the groundwater or the environment.
  - MESC/MNA/IC— Maintain existing soil cover/monitored natural attenuation/institutional controls is assumed for waste sites that may contain concentrations of radioactive material contamination and/or hazardous chemical contamination that are below regulatory action, concern, or limits, and/or already have a stabilized surface that is protective.

- CSNA—Confirmatory sampling with no further cleanup action is assumed for waste sites where risk to the groundwater or risk to workers, the public, and the environment resulting from human or biological intrusion is considered to be very limited.
- IBAR or ABAR—Individual barriers or aggregate barriers are assumed for waste sites where contamination may exist in the vadose zone in sufficient quantity to be a groundwater and/or environmental concern. Some waste sites may need limited removal of high concentrations of contaminants (“hot spot” removal), concrete, pipelines or tanks prior to barrier construction. Voids are assumed to be filled as needed before barrier placement to minimize the potential for subsidence. Contiguous or adjacent waste sites are assumed to be placed under an aggregate barrier. For example, aggregate barriers over canyons or other large facilities may also be placed over nearby waste sites.

For waste sites with an assumed RTD cleanup remedy, the planning case basis of estimate includes the following work items:

- Prepare Waste Site D&D Plan
- Prepare Waste Forecast
- Prepare Safety Documentation
- Conduct Remedial Design Review
- Hazardous Material & Radiological Survey
- Characterization Plan
- Characterization Work
- Characterization Report
- Mobilization of Personnel & Equipment
- Mobilize & Set Up Temporary Trailers
- Waste Sites – RTD – Decontamination Pad
- Overburden Soil Samples
- Contaminated Soil Samples
- Air Sampling
- Overburden Soil Removal
- Contaminated Soil Removal
- Contaminated Soil Blending (if needed for minimizing radiological dose to workers)
- Hauling Contaminated Soil to ERDF plus cost of disposal
- Certification Samples
- Backfill with Borrow Source Material
- Backfill with Overburden Material
- Revegetation – application of seed
- Site Supervision Personnel
- Construction Oversight Personnel
- Medical Surveys
- Dosimetry
- Project Management.

For waste sites with an assumed MESC/MNA/IC cleanup remedy, the planning case basis of estimate includes the following work items:

- Prepare Waste Site D&D Plan
- Prepare Waste Forecast
- Prepare Safety Documentation
- Conduct Remedial Design Review
- Hazardous Material & Radiological Survey
- Characterization Plan
- Characterization Work
- Characterization Report
- Mobilization of Personnel & Equipment
- Mobilize & Set Up Temporary Trailers
- Medical Surveys
- Dosimetry
- Project Management
- S&M.

Depending on the conceptual contaminant model and physical details of each waste site, the MESC/MNA/IC basis of estimate also may include the following items: cultural resources review, remediation design, concrete structure demolition, excavation of clean and contaminated soil, tank demolition, steel pipe and/or concrete removal, in process sampling, overburden/stockpile sampling, confirmation sampling, waste load out, waste transportation, treatment and disposal, backfill, revegetation and usage-based services.

For waste sites with an assumed CSNA cleanup remedy, the planning case basis of estimate includes the following work items:

- Project Management - Field remediation project management and associated office complex expenses.
- Prepare Sampling Work Plan - Prepare instructions, prepare site-specific Waste Management Plan, prepare and issue Excavation Permit/Cultural Survey, confirm interim hazard classification criteria screen, document no asbestos work permit required, prepare Environmental Radiological Survey Task Instruction, prepare sample authorization form/field sampling report, prepare S/C change notice (C/N), review S/C documentation, prepare sample readiness checklist, and conduct sampling readiness.
- Confirmatory Sample Design - Prepare sample design, technical editing, internal review, incorporate internal review comments, resolve comments, and DOE and regulator signoff.
- Field collection of samples, laboratory analysis and materials. Sample analysis and collection costs are based on an assumed six samples per waste site.
- Data validation and closeout.
- Medical Surveys.
- Dosimetry.

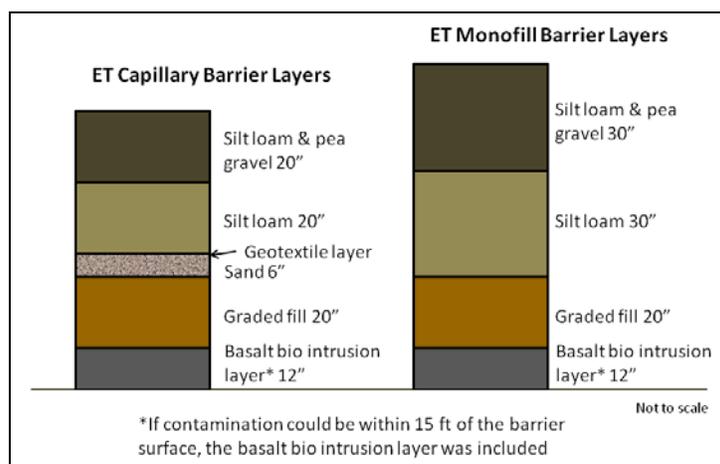
For waste sites with an assumed IBAR or ABAR cleanup remedy, the planning case basis of estimate includes the following work items:

- |   |  |
|---|--|
| • Prepare Waste Site D&D Plan                 | • Waste Sites - Barriers-<br>Decontamination Pad                                   |
| • Prepare Waste Forecast                      | • Mobilization of Personnel &<br>Equipment   |
| • Prepare Safety Documentation                | • Construction of barrier  |
| • Conduct Remedial Design Review              | • Replanting of native vegetation at the<br>completion of barrier remediation work |
| • Hazardous Material & Radiological<br>Survey | • Medical Surveys  |
| • Characterization Plan                       | • Dosimetry  |
| • Characterization Work                       | • Project Management   |
| • Characterization Report                     | • S&M.   |
| • Mobilize & Set Up Temporary Trailers        |  |

Some waste sites with an assumed IBAR or ABAR cleanup remedy may need limited removal of high concentrations of contaminants (“hot spot” removal), concrete, pipelines or tanks prior to

barrier construction. Likewise, some waste sites may need backfilling of voids with grout prior to barrier construction. These activities are included in the cost estimates for individual waste sites, as necessary, based on the conceptual site model and physical details of each waste site.

For cost estimating purposes the IBAR or ABAR barriers are assumed to be either evapotranspiration (ET) capillary or ET monofill barriers with the layers shown in Figure 5-19. It was assumed that 30% of the barriers would need the 12-inch thick broken basalt biological intrusion layer, so a 4-inch thick layer was included in the cost of all barriers. All barriers are assumed to have slopes of 2 horizontal:1 vertical (2H:1V) on all sides and the slopes are covered with 12 inches of fractured basalt with silt. Revegetation of the barrier, including all disturbed areas, stockpile, staging areas, and access roads, includes planting with native dry-land grass and sagebrush seedlings.



**Figure 5-19. ET Capillary and ET Monofill Barrier Layers.**

The S&M activities are applied to waste sites with MESC/MNA/IC, IBAR or ABAR as the assumed cleanup remedy. This work includes the following:

- CERCLA 5-Year Review evaluation of completed remediation.
- Annual Area Visual Survey - The visual survey will check for burrowing animals, damage to barrier, invasive vegetation, vegetation maturation, density, etc., global positioning satellite coordinates of any damage observed, and global positioning satellite coordinates of alignment walked (so that alignment can be verified each year to avoid wearing a “path” of damage on the barrier).
- Annual Area Surface Maintenance - The surface maintenance work includes, replacing lost soil due to erosion by wind and rain, addition of rip-rap to stabilize slopes, vegetation replacement/enhancement, cap thickening to change observed performance (e.g., inaccuracies in modeling may have underestimated required thickness), and shaping surface to route runoff to more desirable pathways.

Key assumptions for the DOE planning case basis also include:

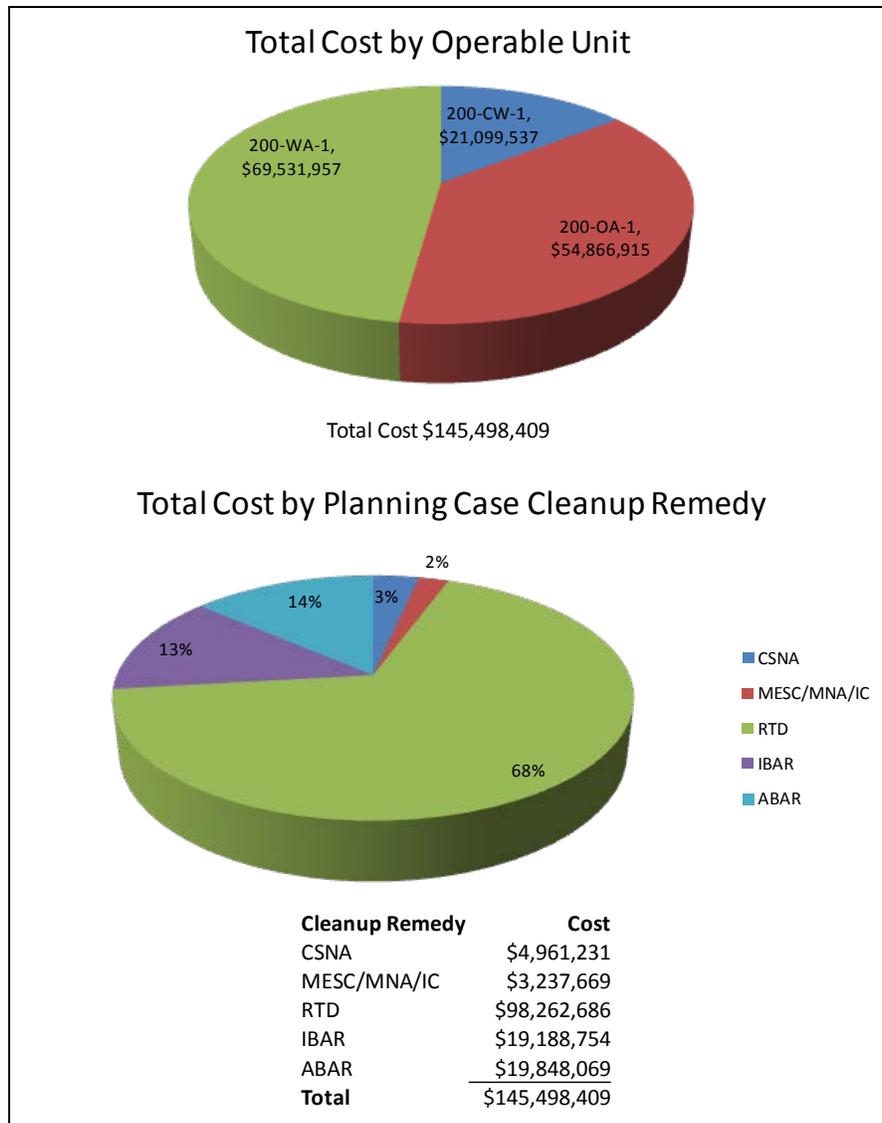
1. Central Plateau remediation will be completed by geographic zones to promote optimization and integration of project activities. The remedial actions will be performed in accordance with action memoranda and RODs.

2. Contaminated soil waste and demolition debris can be disposed in onsite facilities (i.e. ERDF).
3. Current and future land use is industrial-exclusive for the 200 Areas as defined by the *Hanford Site Comprehensive Land-Use Plan Environmental Impact Statement Record of Decision* (64 FR 61615).
4. Beneficial use of groundwater is precluded for the foreseeable future.
5. Active institutional control of the Hanford Site will be maintained at least through 2150.
6. Nominally, RTD excavations will not exceed 15 feet below grade. For RTD sites, 5% of the quantity of contaminated soil removed is assumed to require blending for worker radiological protection using 8 parts clean soil to 1 part contaminated soil.
7. Deep vadose zone contamination can be addressed via an engineered surface barrier or natural attenuation.
8. The scope of work for MESC/MNA/IC waste site remediation includes the placement of a 2-foot thick layer of clean soil over the existing surface.
9. Fill material is assumed to come from an onsite borrow source and the silt loam is assumed to come from Area C (located about 2 miles south of the 200 West Area). Basalt, sand and pea gravel are assumed to come from an offsite commercial source. Extraction of materials from on site borrow sources will comply with the *Final Hanford Comprehensive Land Use Plan Environmental Impact Statement (DOE/EIS-0222-F)* and implementing plans for industrial minerals (*Draft Industrial Mineral Resources Management, DOE/RL-2000-61*); biological resources (*Hanford Site Biological Resources Management Plan, DOE/RL-96-32*; *Hanford Site Biological Resources Mitigation Strategy, DOE/RL-96-88*); and cultural resources (*Hanford Cultural Resources Management Plan, DOE/RL-98-10*).

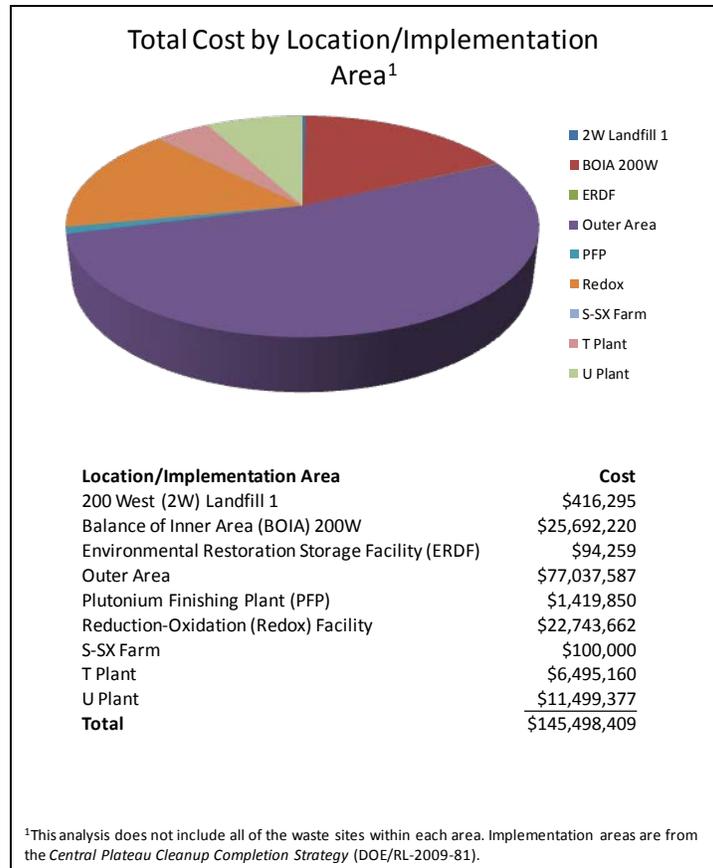
The DOE planning case cost estimates for each waste site were prepared using waste site remediation models in Microsoft Excel. The input quantities are based on a conceptual site model developed for each waste site using available information and the judgment of DOE technical subject matter experts. The estimates also are based on observed crews and production rates for similar waste site remediation work in the River Corridor with some modifications based on Central Plateau remediation work. The cost estimates are in FY 2012 constant dollars and have not been escalated.

Because ABARs cover other facilities or waste sites that are not included in this alternative analysis, the cost estimate for waste sites with an assumed ABAR remedy was based on the ratio of the waste site area to the entire ABAR area. The cost estimate includes S&M costs for some waste sites with MESC/MNA/IC, IBAR or ABAR as the assumed cleanup remedy through FY 2018. After FY 2018, the S&M costs in the DOE planning case were developed for each Central Plateau geographic closure zone rather than for each individual waste site. Because these S&M costs cannot be readily apportioned to individual waste sites they were not included in the cost estimates presented in this analysis. Similarly the site-wide S&M costs for the period FY 2060 to FY 2090 are included in PBS RL-LTS (see Appendix D, Table D-30) but they also cannot be readily apportioned to the waste sites in this analysis so they were not included in the cost estimates presented herein.

Figure 5-20 summarizes the estimated costs for the waste sites included in this alternative analysis by operable unit and by planning case cleanup remedy. Figure 5-21 summarizes the estimated costs for the waste sites included in this alternative analysis by location/implementation area. This analysis does not include all of the waste sites within each location/implementation area so the estimated costs do not represent the total cleanup cost for each location/implementation area. The implementation areas are the geographic closure zones from the *Central Plateau Cleanup Completion Strategy* (DOE/RL-2009-81).



**Figure 5-20. Estimated Costs for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in the Alternative Analysis by Operable Unit and by Planning Case Cleanup Remedy.**



**Figure 5-21. Estimated Costs for 200-CW-1, 200-OA-1 and 200-WA-1 Operable Unit Waste Sites Included in Alternative Analysis by Location/Implementation Area.**

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## 6.0 TANK WASTE CLEANUP

Tank waste cleanup is performed by the RPP. The RPP is managed by DOE-ORP as required by the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999*, and augmented by the *Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001*.

The RPP mission is to retrieve and treat Hanford Site tank waste and close the tank farms to protect the Columbia River. As a result, DOE-ORP is responsible for the retrieval, treatment, and disposal of approximately 56 million gallons<sup>4</sup> of mixed waste contained in Hanford Site waste tanks, and closure of all the tanks and associated facilities. The RPP work scope consists of two major elements:

- Safely manage the radioactive mixed waste stored in the Hanford Site's underground storage tanks. This work element is conducted under Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014).
- Design, construct, and commission the WTP, which will treat and immobilize tank wastes into a vitrified glass form. This work element is conducted under Major Construction – Waste Treatment Plant (PBS ORP-0060).

Figure 6-1 illustrates the relationships between the various activities and integration of the elements for retrieval of the waste from the tanks, treatment to reduce hazards, and disposal.

The RPP is comprised of the tank farms and WTP systems - nearly 200 interrelated waste storage, transfer, treatment, transportation, and disposal facilities. The RPP and these facilities are an important element of the DOE mission to protect the Columbia River. This chapter describes the RPP mission and scope as presented in the *River Protection Project System Plan* (ORP-11242, Rev. 4). Cost and schedule information also are based on Revision 4 of ORP-11242 in order to remain consistent with ORP's last certified baseline and approved baseline change requests.<sup>5</sup> ORP will be evaluating the need for potential changes to the RPP baseline, and future baseline changes will be reflected in the Lifecycle Report.

The underground waste storage tanks were built in groups of 2 to 18 tanks; each group is known as a tank farm (A, AN, AP, AW, AX, AY, AZ, B, BX, BY, C, S, SX, SY, T, TX, TY, and U Tank Farms). Seven tank farms (comprised of 86 tanks) are located in the 200 West Area, and 11 tank farms (comprised of 91 tanks) are located in the 200 East Area. The tanks were constructed in below-grade excavations to take advantage of the natural radiation shielding provided by the earth. The 177 underground storage tanks represent two basic design types: SSTs and DSTs. The smallest SSTs have about 55,000 gallons of capacity, while the largest DSTs hold up to about 1,250,000 gallons.

When the Hanford Site was in production, irradiated fuel from the reactors was transported to six separations facilities for isolating the desirable radionuclides from other reactor products. From 1944 to 1989, the separations processes yielded millions of gallons of highly radioactive and

<sup>4</sup> This is the volume of tank waste as of April 2012, reported in *Waste Tank Summary Report for Month Ending April 30, 2012* (HNF-EP-0182). The volume of tank waste fluctuates over time because water and chemicals may be added to the tanks as part of certain waste retrieval processes to facilitate waste retrieval; water is also removed by the waste evaporator.

<sup>5</sup> Revision 6 of ORP-11242, *River Protection Project System Plan*, was released in October 2011. This Lifecycle Report reflects information primarily from ORP-11242 Revision 4, and incorporates some important changes anticipated in Revision 6.

chemically hazardous waste, which was pumped through underground transfer lines and subsequently stored in the underground storage tanks. Although the reactors and separations facilities have long since ceased their operations, the underground waste tanks and their contents remain. The radioactive liquid waste was transferred from the separations facilities as slurry, a liquid with suspended solids. Over time, the radioactive solids settled to the bottom of the tanks, creating a layer known as sludge. The clarified radioactive liquid above the sludge is known as supernatant or supernate.

To reduce the total quantity of waste to be stored, the supernate is periodically decanted and transferred out of waste tanks to a waste evaporation process. The evaporation process results in a separation of the heated waste slurry to a steam condensate fraction, which is relatively clean for further treatment and safe disposal, and a waste slurry fraction, which becomes more concentrated and is returned to the underground waste storage tanks. Historically, the concentrated waste slurry fraction cooled and began to form salt cake, a crystalline solid waste form. At one time, most tanks contained supernate, slurry, and saltcake waste forms simultaneously.

In addition, the cesium and strontium capsules in the WESF resulted from efforts to reduce fission products in the tanks. Finally, long-term storage at high temperatures as a result of heat from fission product decay contributed to the formation of a solid mass or group of large solids not easily removed called hard heels in the bottoms of some tanks. The current typical content of the tanks is depicted in Figure 6-2. More information regarding the tanks and the RPP can be found in [ORP-11242](#).

The current strategy for tank waste cleanup involves a number of interrelated activities essential to the mission to retrieve and treat the Hanford Site's tank waste and close the tank farms to protect the Columbia River. DOE-ORP will reduce risk to the environment posed from tank waste by:

- Retrieving the waste from 149 SSTs, transferring it to 28 DSTs, and delivering the waste to the WTP.
- Constructing and operating the WTP, which will safely treat the entire HLW fraction contained in the tank farms. Approximately one-third of the low-activity waste (LAW) fraction will be immobilized in the WTP LAW Vitrification Facility.
- Developing and deploying supplemental treatment capability to treat the remaining two-thirds of the LAW.
- Developing and deploying waste feed preparation capability to mitigate sodium management issues. The goal is to minimize the quantity of glass by reducing contaminants that would require the addition of glass-forming additives.
- Developing and deploying treatment and packaging capability for potential contact-handled (CH) TRU tank waste with onsite storage prior to final disposition.
- Deploying interim storage capacity for the immobilized HLW pending determination of the final disposal pathway (national repository).
- Closing the SST and DST farms, ancillary facilities, and associated waste management and treatment facilities.

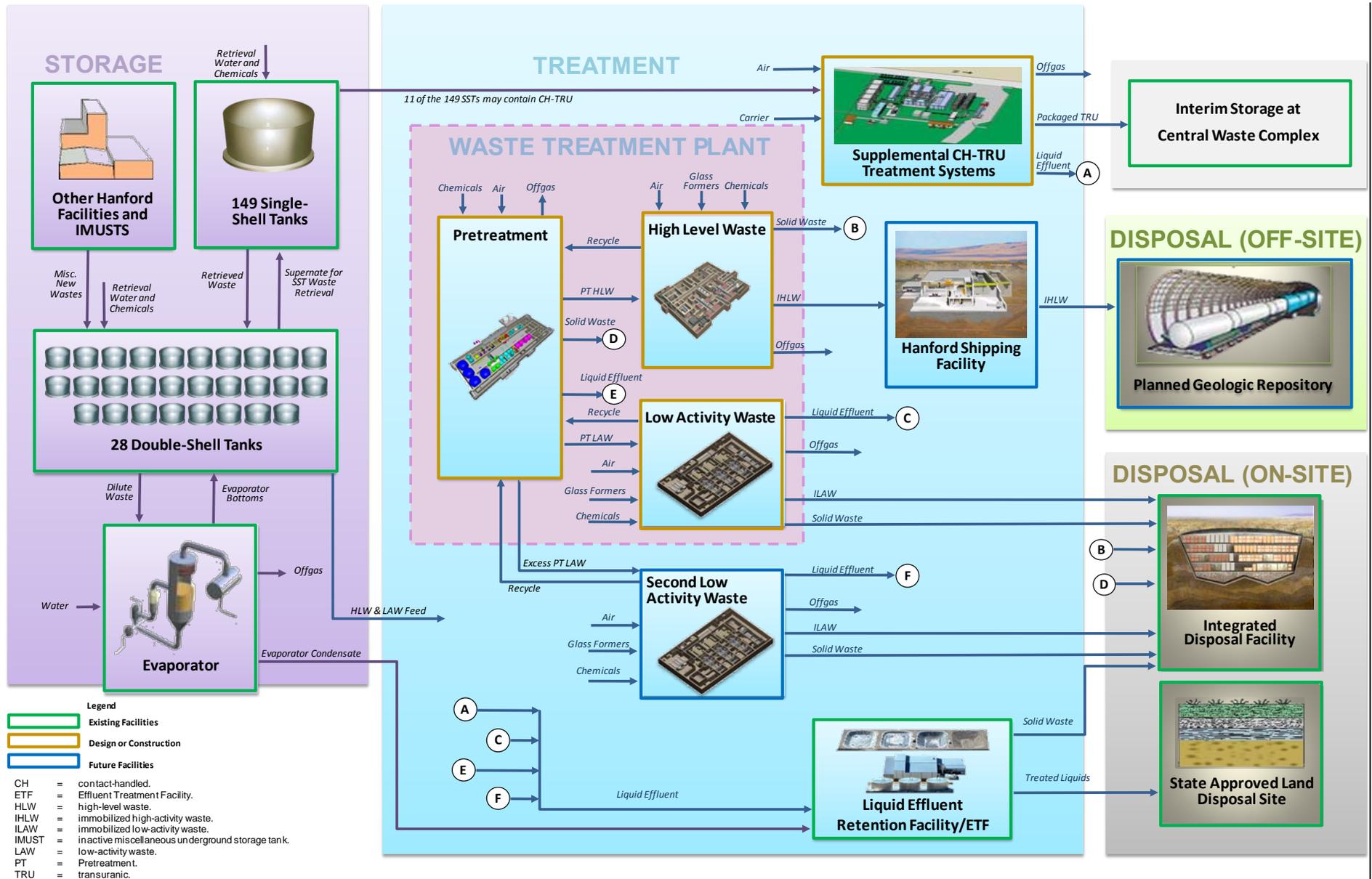
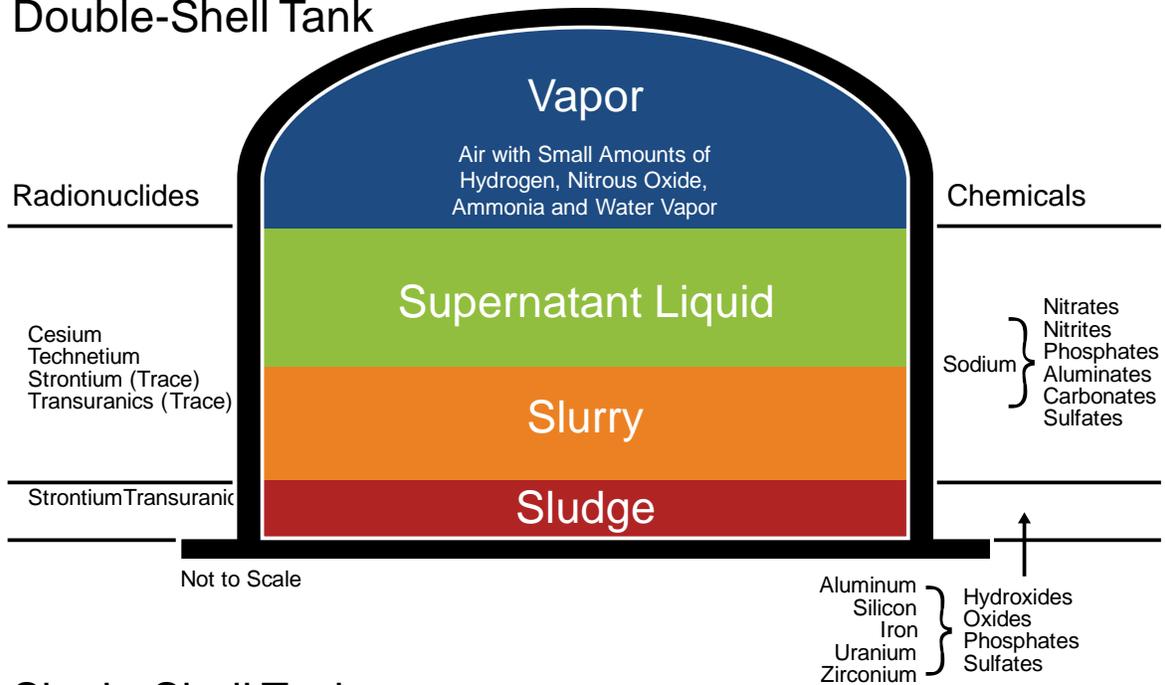
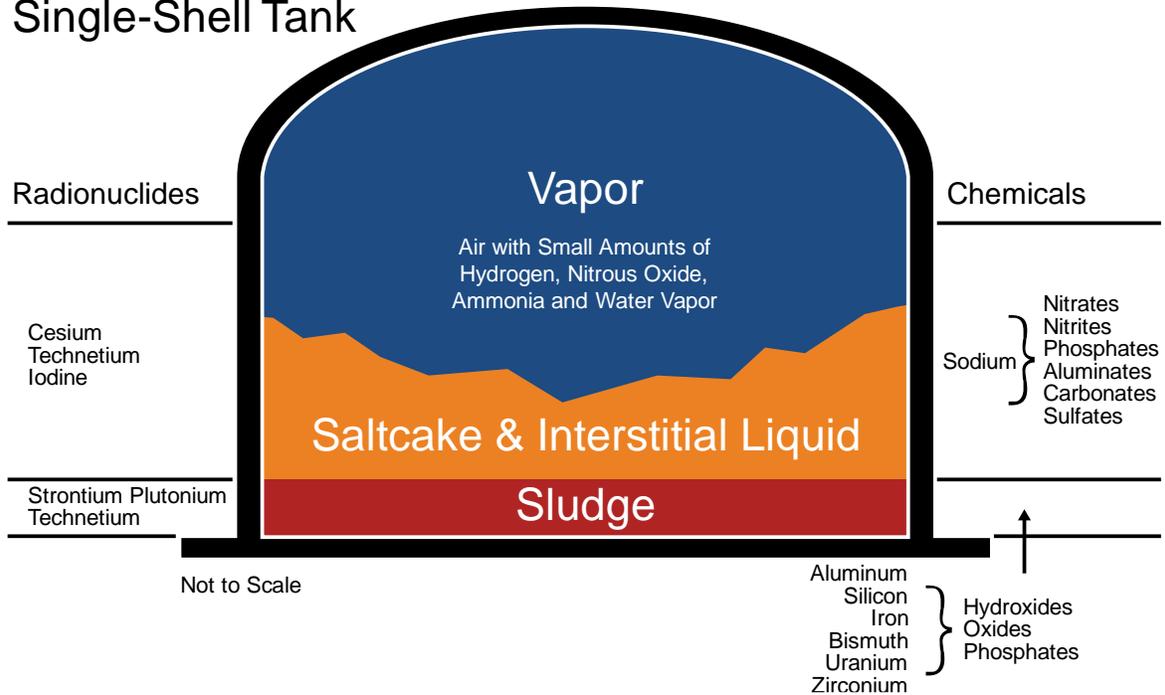


Figure 6-1. Simplified Process Diagram for Tank Waste Retrieval and Treatment.

### Double-Shell Tank

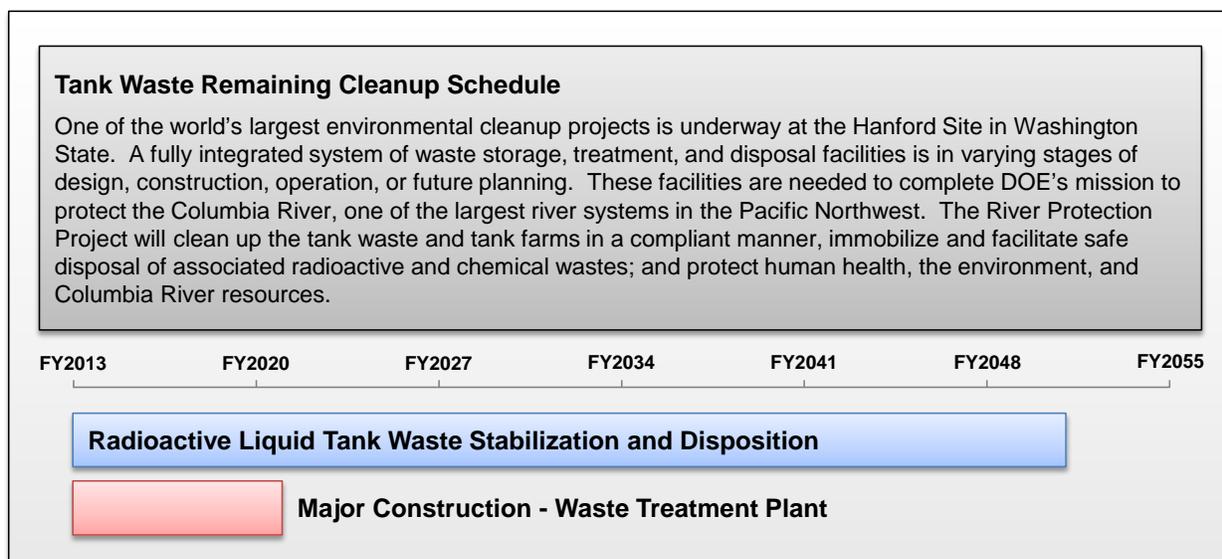


### Single-Shell Tank



**Figure 6-2. Depictions of Typical Tank Contents.**

The work scope for tank waste cleanup is organized into two PBSs, as shown in Figure 6-3, which also presents the remaining cleanup schedule. The overall schedule objective is to complete retrieval, treatment, and closure activities by the end of FY 2050. Once closure activities are completed, the tank farms will be transitioned to Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) for final disposition or LTS.



Scale dates represent start of fiscal year

**Figure 6-3. Tank Waste Remaining Cleanup Schedule.**

The DOE-ORP is developing and implementing operating strategies to meet applicable regulatory milestones, including those from the Consent Decree and Tri-Party Agreement Settlement Package (DOE and Ecology, 2010) that became effective on October 25, 2010. The milestones shown in Table 6-1 were selected from the TPA and from the Consent Decree and TPA Settlement Package as key measures for significant progress.

**Table 6-1. Tank Waste Cleanup Key Tri-Party Agreement and Consent Decree Milestones. (2 pages)**

Milestone	Description	Compliance Date
M-062-40	Submit a system plan to Ecology describing the disposition of all tank waste managed by the Office of River Protection.	10/31/2011; every 3 years thereafter
	DOE will submit the Hanford Tank Waste Supplemental Treatment Technologies Report.	10/31/2014
D-00B-01 <sup>1</sup>	Complete retrieval of tank wastes from the following remaining SSTs in WMA C: C-101, C-102, C-104, C-105, C-107, C-108, C-109, C-110, C-111, and C-112.	09/30/2014
M-062-45	Negotiate a one-time supplemental treatment selection and milestones.  Every 6 years, within 6 months of the issuance of the last revision of the system plan, the parties will negotiate tank waste retrieval sequencing and milestones, and milestones for installation of infrastructure to feed tank waste from the DST system to the tank waste treatment system for the next 8 years.	04/30/2015; every 6 years thereafter
M-045-82	Submit complete permit modification requests for Tiers 1, 2, and 3 (see Appendix I of Tri-Party Agreement) of the SST system, to support final closure requirements for WMA C.	09/30/2015

**Table 6-1. Tank Waste Cleanup Key Tri-Party Agreement and Consent Decree Milestones. (2 pages)**

Milestone	Description	Compliance Date
M-062-31-T01	Complete final design and submit a complete RCRA Part B permit modification request for Enhanced WTP and/or Supplemental Vitrification Treatment Facility based on the M-062-45 decision.	04/30/2016
D-00A-14	Pretreatment facility construction substantially complete.	12/31/2017
D-00A-17 <sup>1</sup>	Hot start of WTP.	12/31/2019
M-045-85	Complete negotiations of HFFACO interim milestones for closure of the remaining WMAs (including a schedule for 200 West Area closures, the submittal of closure plans and risk assessments, and final closure dates for each WMA).	01/31/2022
D-00B-04 <sup>1</sup>	Complete retrieval of tank wastes from the nine SSTs selected to satisfy D-00B-02 <sup>1</sup> .	09/30/2022
M-062-34-T01	Complete hot commissioning of Supplemental Treatment Vitrification Facility and/or WTP Enhancements.	12/30/2022
D-00A-01 <sup>1</sup>	Achieve initial plant operations for the WTP.	12/31/2022
M-047-00	Complete work necessary to provide facilities for management of secondary waste from the WTP.	12/31/2022
M-045-70	Complete waste retrieval from all remaining SSTs. Retrieval standards and completion definitions are provided in Milestone M-045-00.	12/31/2040
M-045-00	Complete the closure of all SST farms.	01/31/2043
M-062-00	Complete pretreatment processing and vitrification of Hanford high-level waste and low-activity waste tank wastes.	12/31/2047
M-42-00A	Complete the closure of all DST farms.	09/30/2052
<sup>1</sup> Milestones from Consent Decree and Tri-Party Agreement Settlement Package (DOE and Ecology, 2010). DOE = U.S. Department of Energy. RCRA = <i>Resource Conservation and Recovery Act</i> . DST = double-shell tank. SST = single-shell tank. Ecology = Washington State Department of Ecology. WMA = waste management area. HFFACO = <u>Hanford Federal Facility Agreement and Consent Order</u> . WTP = Waste Treatment and Immobilization Plant.		

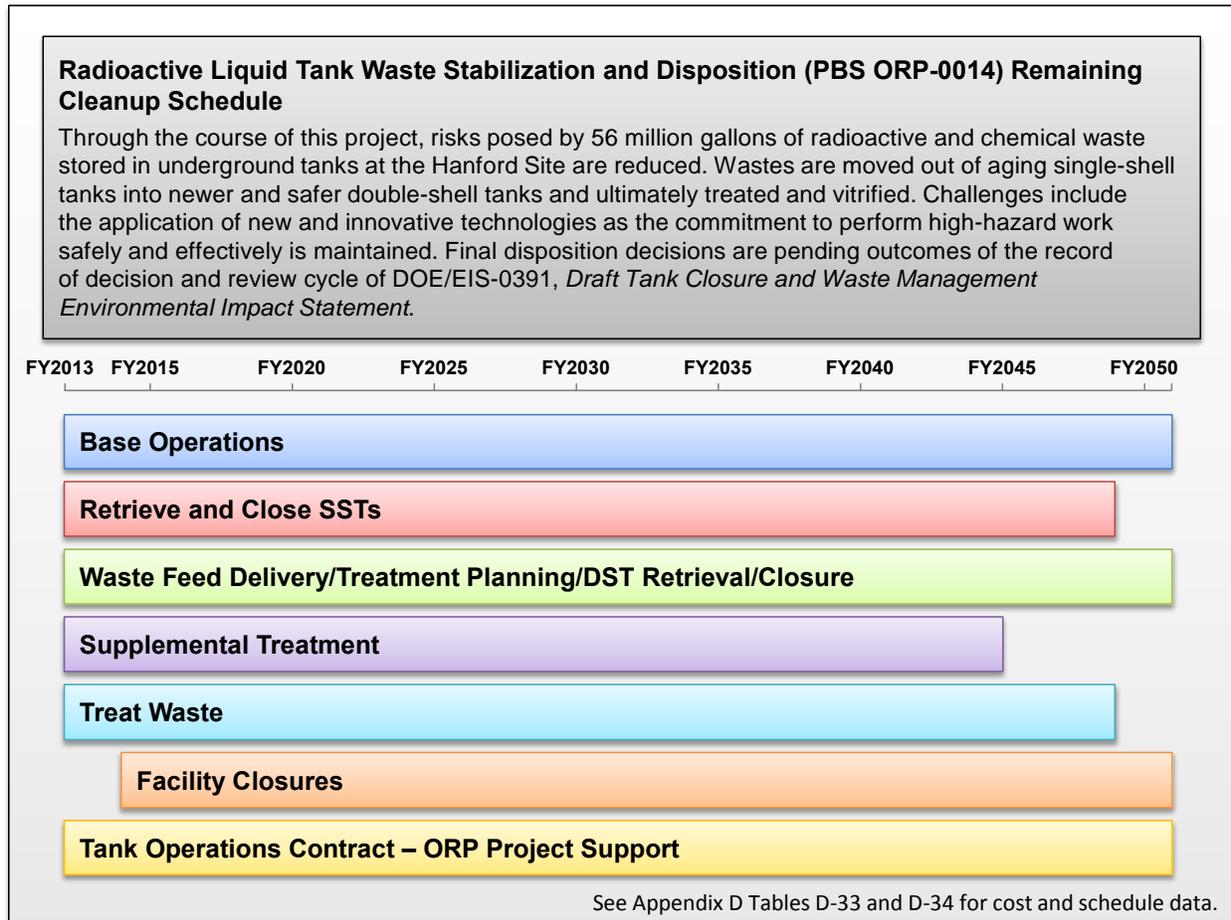
## 6.1 RADIOACTIVE LIQUID TANK WASTE STABILIZATION AND DISPOSITION (PBS ORP-0014)

The 177 underground waste storage tanks and ancillary equipment, along with various support facilities and buildings, are primarily located in the Central Plateau 200 East and 200 West Areas. The waste composition varies widely, necessitating a variety of unique waste retrieval and treatment methods.

The DOE-ORP's cleanup strategy focuses on achieving significant environmental risk reduction by the retrieval and treatment of Hanford's tank waste and the closure of the tank farms to protect the Columbia River. The primary accomplishments for FY 2013 involve continuing preparation of the Tank Farms to provide waste streams to the WTP upon hot commissioning. Work also continues on construction of the WTP. Completion and commissioning is driven by the Consent Decree milestones.

After closure, the remainder of the facilities will be transferred to Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) for final disposition or LTS.

The tank farms scope in this report includes planning for the lifecycle of the tank farms as detailed in ORP-11242, Revision 4. The scope of PBS ORP-0014 is organized into seven work elements as shown in Figure 6-4, which also presents the remaining cleanup schedule. Additional scope information on these work elements is provided in Table 6-2.



Scale dates represent start of fiscal year

**Figure 6-4. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Cleanup Schedule.**

**Table 6-2. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Level 2 Scope Summary. (2 pages)**

Work Element	Scope Description
Base Operations	This work element provides for safe storage of waste, reduces the volume of waste through evaporation, provides laboratory support, and includes necessary support activities such as project management.
Retrieve and Close SSTs	This work element includes retrieval of waste from the SSTs and transfer to interim storage in DSTs. SSTs will then undergo closure in accordance with regulatory requirements, as will other associated sites in the tank farms.

**Table 6-2. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014)  
Level 2 Scope Summary. (2 pages)**

Work Element	Scope Description
Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure	This work element covers modeling of waste characteristics and volumes; transfer, treatment and preparation of the wastes to meet the requirements for safe retrieval of the DST wastes; successful operation of the WTP; and closure of the DSTs to protect the environment and the community. This work element also includes treatment of secondary wastes generated during handling and processing of tank wastes.
Supplemental Treatment	This work element includes planning and analysis for supplemental low-activity waste treatment and contact-handled TRU handling, up to and including design and construction.
Treat Waste	This work element includes preparation for hot commissioning, closure planning, and final closure activities.
Facility Closures	This work element includes closure and monitoring of buildings and structures in the tank farms areas, but not covered elsewhere. Closure within this scope occurs mostly in the out-years and includes mobile facilities, office buildings, and support facilities (e.g., 200 East and West Evaporators).
Tank Operations Contract – ORP Project Support	Includes proportional share of costs for site services and infrastructure. See Section 7.3.2 for details.
DST = double-shell tank. ORP = Office of River Protection. PBS = project baseline summary.	SST = single-shell tank. TRU = transuranic. WTP = Waste Treatment and Immobilization Plant.

Figure 6-5 presents the remaining estimated cleanup costs for Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) by fiscal year; Figure 6-6 presents the remaining estimated cleanup costs by work element.

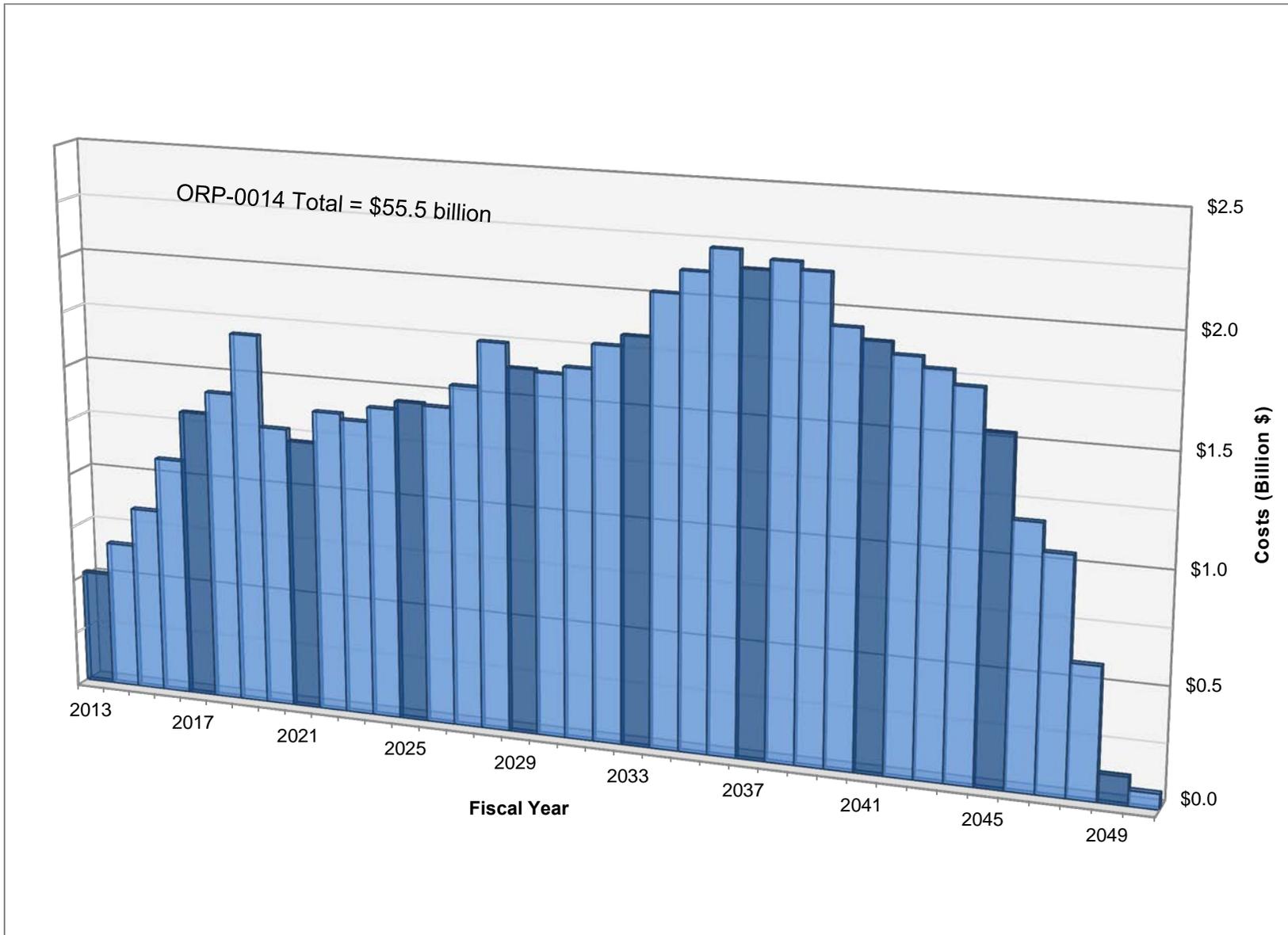
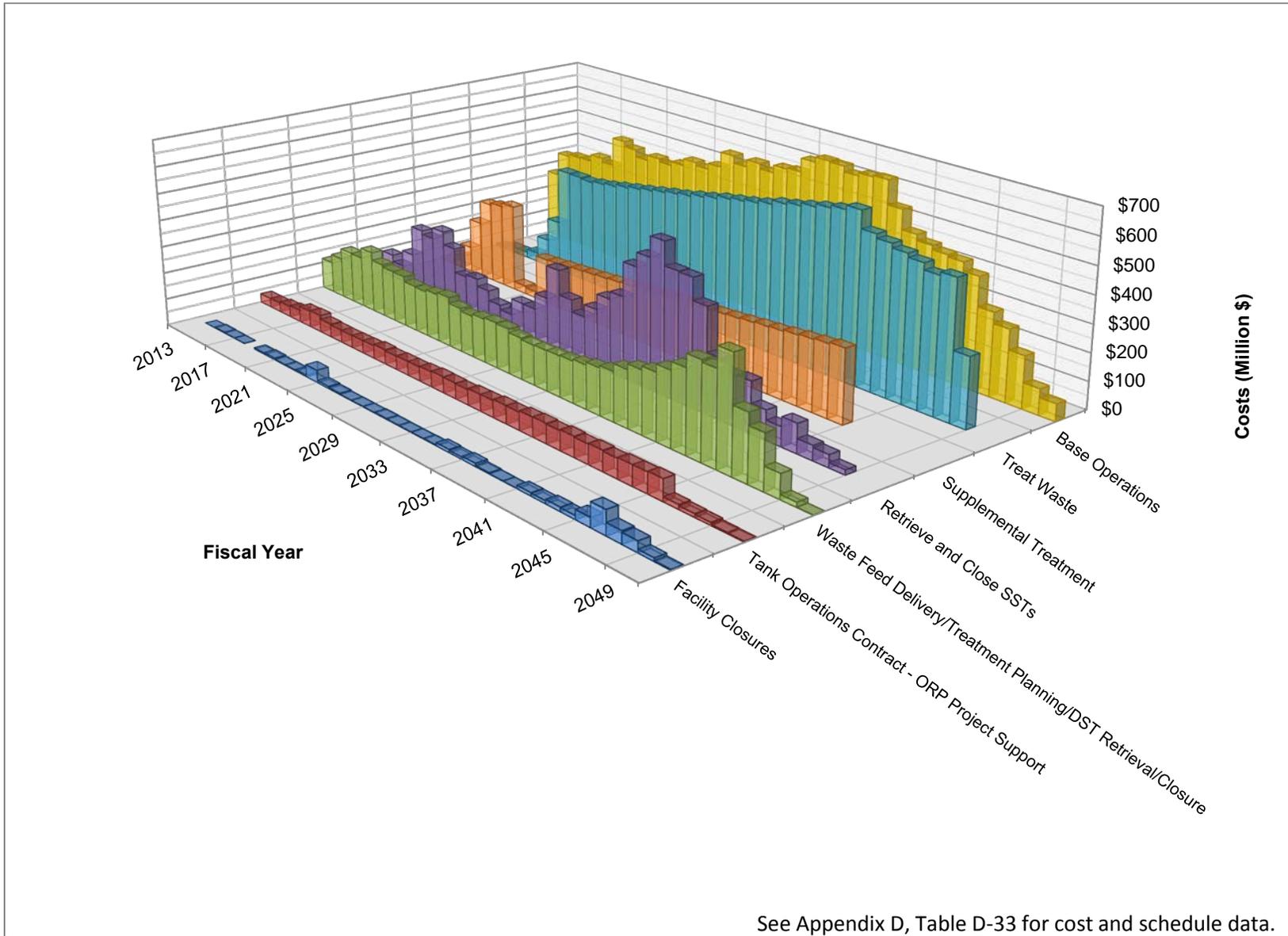


Figure 6-5. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Estimated Cleanup Costs by Fiscal Year.



See Appendix D, Table D-33 for cost and schedule data.

Figure 6-6. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Estimated Cleanup Costs by Work Element.

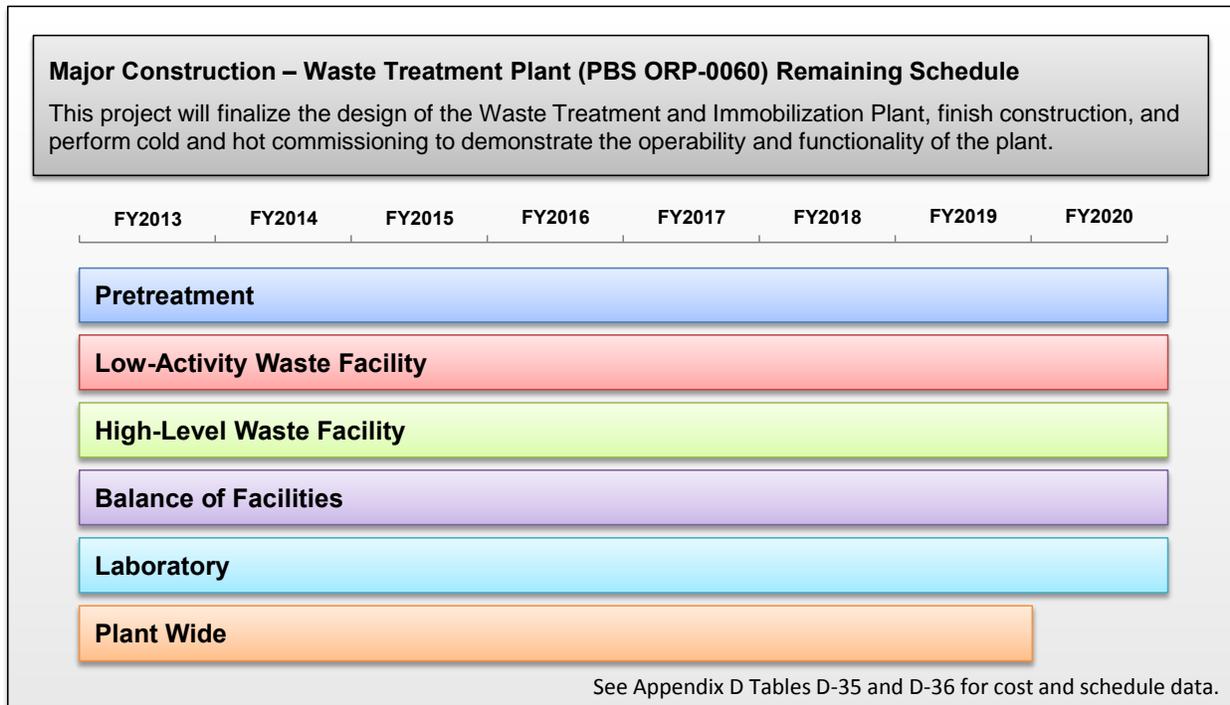
## 6.2 MAJOR CONSTRUCTION – WASTE TREATMENT PLANT (PBS ORP-0060)

The mission of Major Construction – Waste Treatment Plant (PBS ORP-0060) is to design, construct, and commission the WTP to pre-treat and immobilize the mixed wastes currently stored in the Hanford Site’s underground storage tanks. Work is complete when the WTP construction is complete and the facilities are turned over to DOE-ORP’s operations contractor.

Five main facilities are being constructed within the WTP:

- Pretreatment
- Low-Activity Waste Vitrification
- High-Level Waste Vitrification
- Balance of Facilities
- Dedicated Analytical Laboratory.

The scope for PBS ORP-0060 is organized into six main work elements, as shown in Figure 6-7, which also presents the remaining cleanup schedule. Additional scope information on these work elements is provided in Table 6-3.



**Figure 6-7. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Schedule.**

**Table 6-3. Major Construction – Waste Treatment Plant (PBS ORP-0060) Level 2 Scope Summary.**

<b>Work Element</b>	<b>Scope Description</b>
Pretreatment	This work element includes design, construction, and commissioning of the Pretreatment Facility. When finished, pretreatment will physically and chemically condition the waste feed stream, separating the low-activity radioactive waste from the high-level radioactive waste.
Low-Activity Waste (LAW)	This work element includes design, construction, and commissioning of the LAW Vitrification Facility. When finished, the LAW will go into a melter preparation vessel where silica and other glass-forming material are added and the mixture will be fed into one of two melters. The mixture will be heated to 2,100° F using Joule heating. The molten mixture will be poured into large stainless steel canisters that are then welded shut.
High-Level Waste (HLW)	This work element includes design, construction, and commissioning of the HLW Vitrification Facility. Similar to the LAW, when finished the HLW will be mixed with glass-forming materials, heated to molten, and poured into stainless steel canisters.
Balance of Facilities	This work element includes design, construction and commissioning of the Balance of Facilities. When finished, the dedicated facilities and utilities will support the WTP.
Laboratory	This work element includes design, construction, and commissioning of the Analytical Laboratory. When finished, samples will be analyzed to ensure the glass product meets requirements.
Plant Wide	This work element includes cross-cutting services and equipment provided to the construction site (e.g., project controls, engineering design and management, environmental, nuclear safety, construction services) as well as a proportional share of costs for site services and infrastructure (see Section 7.3.2).
HLW = high-level waste. LAW = low-activity waste.	PBS = project baseline summary. WTP = Waste Treatment and Immobilization Plant.

Figure 6-8 presents the remaining estimated costs for Major Construction – Waste Treatment Plant (PBS ORP-0060) by fiscal year; Figure 6-9 presents the remaining estimated costs by work element. Annual costs exhibit a downward trend as WTP design is complete, facility completions increase, and the project moves toward commissioning and turnover.

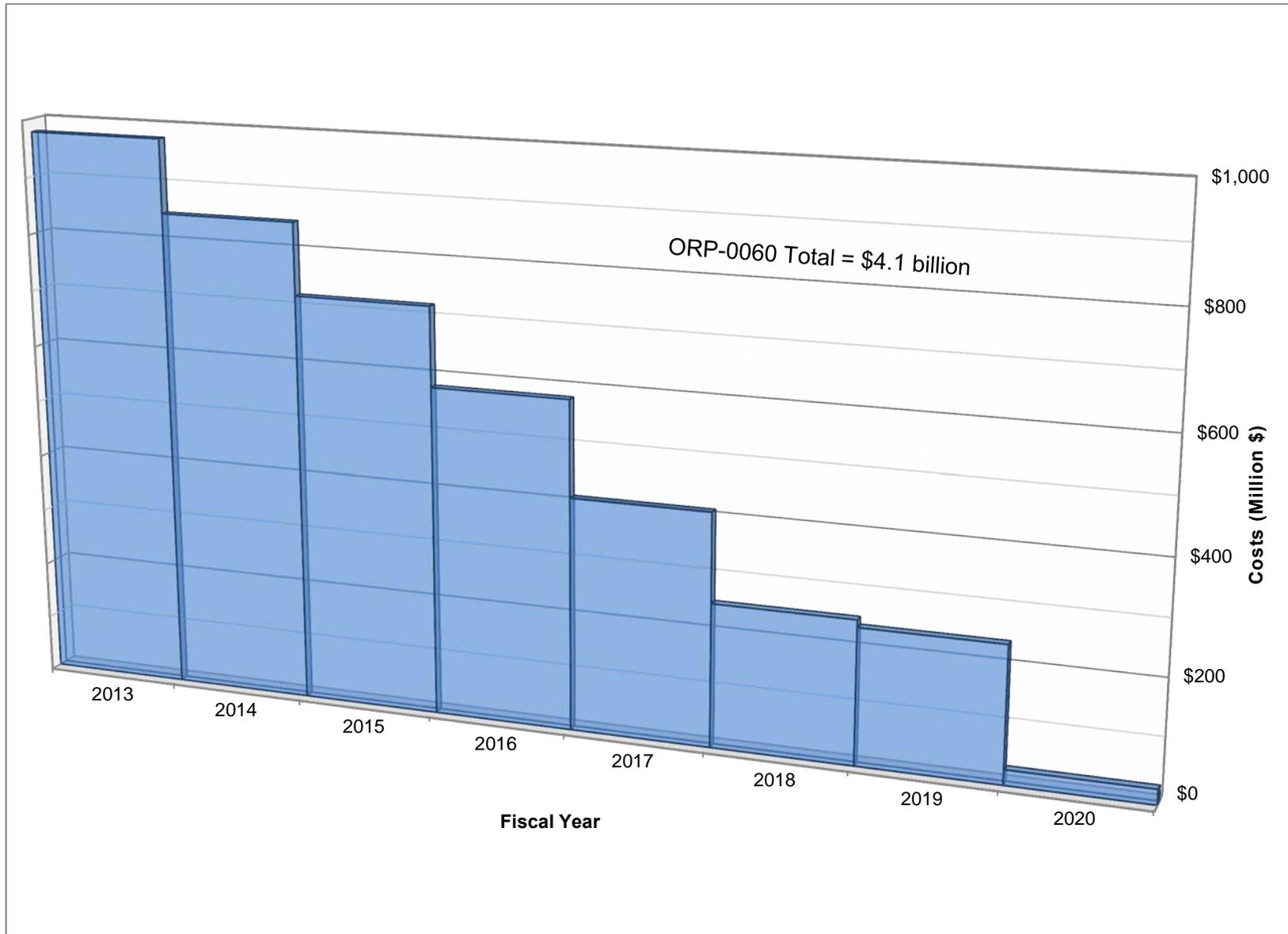


Figure 6-8. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Estimated Costs by Fiscal Year.

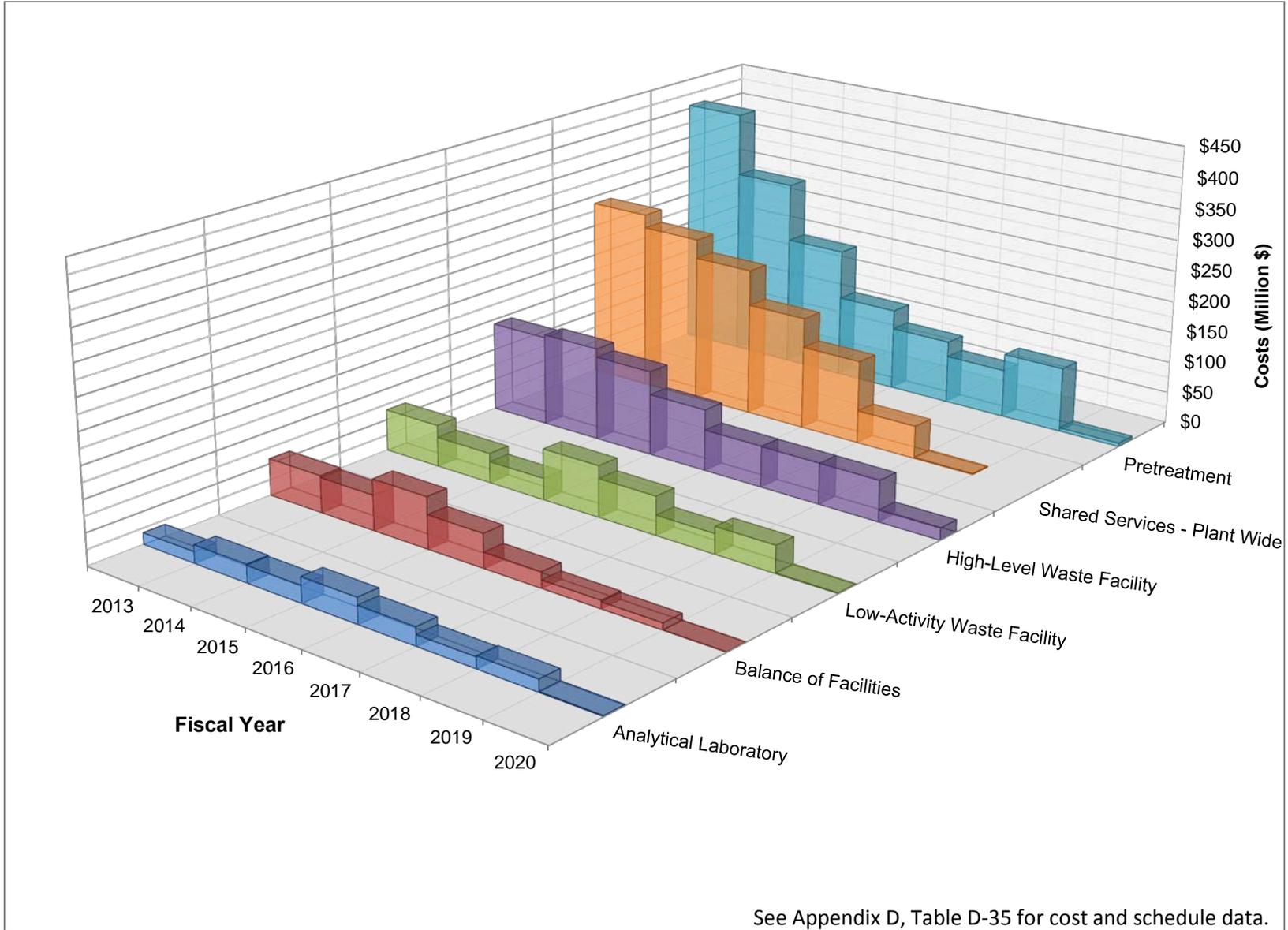


Figure 6-9. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Estimated Costs by Work Element.

### 6.3 TANK WASTE CLEANUP ASSUMPTIONS AND UNCERTAINTIES

The activities described for the RPP are assumed to be consistent with, and encompassed by, the outcome of the NEPA process. The operating scenarios continue to be reviewed against the assumptions in DOE/EIS-0391 (Volume 1 and Volume 2) as the planning process continues, and updated as appropriate. Unanticipated changes resulting from the NEPA process could impact assumptions. Detailed designs and processing of permits are subject to completion of the NEPA process and issuance of an ROD.

ORP-11242, Revision 4, details assumptions and uncertainties for the RPP. The following is a summary of key assumptions.

- Cesium and strontium capsules will not be processed in the WTP.
- A planned offsite geologic repository will be ready to accept immobilized high-level waste (IHLW) canisters from the Hanford Site starting in April 2023 at a rate that does not require construction of additional interim storage beyond that planned for the Hanford Shipping Facility. Onsite IHLW interim storage will be operational on or before May 17, 2019, and provide interim storage for at least 2,000 canisters.<sup>6</sup>
- The current strategy to comply with the IHLW acceptance criteria is described in 24590-HLW-PL-RT-07-0001, *IHLW Waste Form Compliance Plan for the Hanford Tank Waste Treatment and Immobilization Plant*. It is assumed that the strategy will be acceptable to the Office of Civilian Radioactive Waste Management. It is further assumed that the WTP prepared hazardous waste delisting petition for the IHLW is accepted by Ecology and the receiving state before shipping the waste to the planned offsite geologic repository.
- Supplemental LAW treatment capacity will be provided by a second LAW vitrification facility located adjacent to the WTP. The second LAW facility will have the same technical assumptions as the WTP LAW Vitrification Facility, will complete hot commissioning on September 30, 2021, and will begin full operations on October 1, 2021.
- Packaged CH-TRU waste will be interim stored onsite at the Central Waste Complex, and will be acceptable for disposal at the WIPP (a number of conditions, including approval of a Resource Conservation and Recovery Act Part B Permit Class III permit modification, would need to be satisfied prior to disposal at WIPP).
- CH-TRU waste treatment and packaging process capability will be available in FY 2015 to support TRU tank waste retrieval.

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<sup>6</sup> ORP recognizes delays in the availability of a national geologic repository by April 2023 as a key uncertainty, and continues to assess potential actions to mitigate this uncertainty. For example, one option being considered is development of a capability to receive and temporarily store IHLW canisters in Interim Hanford Storage, with the IHLW canisters subsequently retrieved and transported to the Hanford Shipping Facility in preparation for shipment to a national repository when it becomes available. Interim Hanford Storage could be expandable in modules up to a maximum capacity of 16,000 canisters, which would accommodate the number of IHLW canisters currently projected for the WTP. This and other potential mitigating actions are being evaluated, but they are not yet reflected in the RPP baseline schedule and cost.

- Waste previously assumed to be remote-handled TRU waste will be retrieved and treated at the WTP together with the HLW.
- The DSTs will remain fully operational for the nominal 40-year waste treatment mission duration.
- The 242-A Evaporator will continue to operate, as needed, through the life of the mission to support SST retrieval and to maintain the sodium concentration in the delivered feed within WTP feed specifications. The 242-A Evaporator will not be available during scheduled maintenance outages.
- Selected technologies will be able to meet retrieval (tank residual) requirements.
- Laboratory services required to support waste characterization for tank farm projects and operations are available and provided in a timely manner.
- WTP secondary solid waste will be disposed in the IDF and WTP secondary liquid waste will be treated at the ETF.
- The IDF is currently in standby mode and will be ready to serve upon completion of an operational readiness review, performance assessment, permit modification, etc. The activation will be completed when the IDF is needed by the WTP. The IDF will provide permanent disposal for the immobilized low-activity waste (ILAW), other low-level waste, and mixed low-level waste, including:
  - LAW glass packages from the WTP
  - Solid waste from the WTP, including spent LAW and HLW melters
  - Solid waste from the ETF from treating liquid effluent.

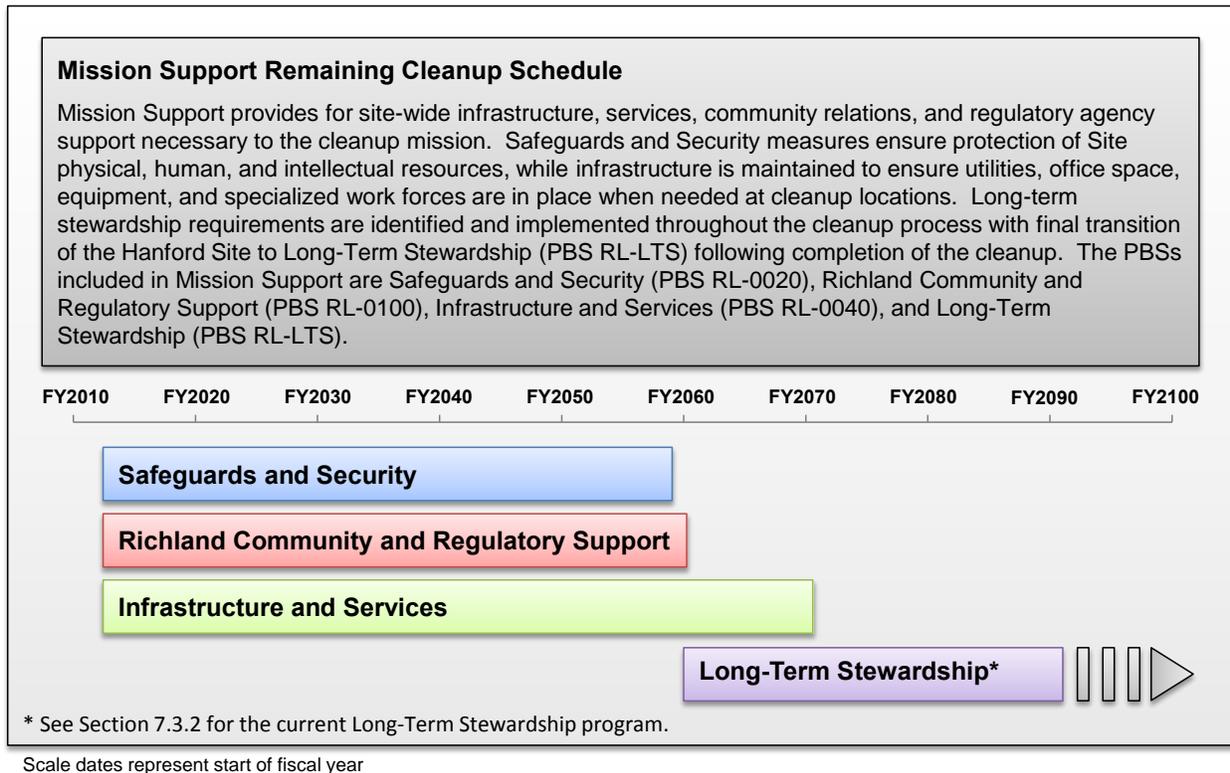
The IDF can be expanded as needed to support the mission.

- The baseline case implicitly assumes that the outcome of official Waste Incidental to Reprocessing Waste Determinations will be consistent with the assumed disposition of the primary and secondary waste forms prior to disposal.
- The cross-site transfer system will be modified as needed to allow for the transfer of slurry into multiple DSTs to provide operational flexibility in management of waste and staging of feed to the WTP.
- Fiscal year funding will be available to support the baseline case, including that funding required for risk mitigating actions.

## 7.0 MISSION SUPPORT

The Mission Support function is service-oriented and provides key infrastructure, utility, resource, and other Hanford Site-wide cleanup support. DOE has responsibilities to protect personnel, nuclear material, and physical property on the Hanford Site. These activities are performed under Safeguards and Security (PBS RL-0020). DOE works closely with the regulatory agencies and community to provide support to the Hanford Site cleanup through Richland Community and Regulatory Support (PBS RL-0100).

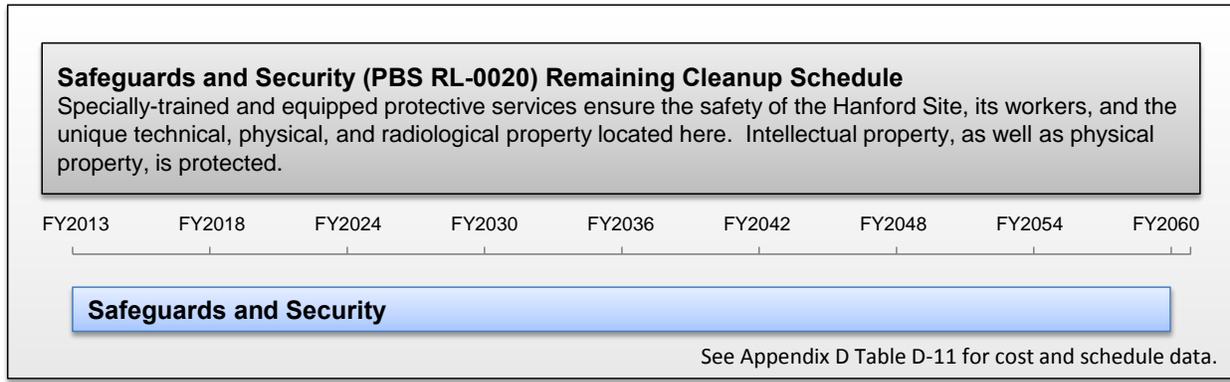
There are a number of infrastructure-related Mission Support activities in place to support the cleanup. These Mission Support activities are managed under Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040), specifically under PBS elements RL-0040.04, RL-0040.05, and RL-0040.06. Following cleanup efforts at the Hanford Site, DOE will have ongoing activities to maintain the protectiveness of the cleanup actions and support transition to future land uses. This period is referred to as LTS and is covered by PBS RL-LTS. Figure 7-1 presents the remaining cleanup schedule for Mission Support.



**Figure 7-1. Mission Support Remaining Cleanup Schedule.**

## 7.1 SAFEGUARDS AND SECURITY (PBS RL-0020)

The scope of this PBS includes one primary work element: Safeguards and Security. Figure 7-2 presents the remaining cleanup schedule. Table 7-1 describes the work scope. Safeguards and Security will be required until cleanup is complete. The level of effort required to ensure protectiveness may diminish as nuclear material is shipped offsite and as the cleanup progresses.



Scale dates represent start of fiscal year

**Figure 7-2. Safeguards and Security (PBS RL-0020) Remaining Cleanup Schedule.**

**Table 7-1. Safeguards and Security (PBS RL-0020) Level 2 Scope Summary.**

Work Element	Scope Description
Safeguards and Security	This work element includes management, training, and equipment for staff; physical protective systems, such as intrusion protection, Hanford Site access, and badging; information and cyber security; personnel security; material control and accountability; and security program management.
PBS = project baseline summary.	

Figure 7-3 provides the remaining estimated costs for Safeguards and Security (PBS RL-0020) by fiscal year.

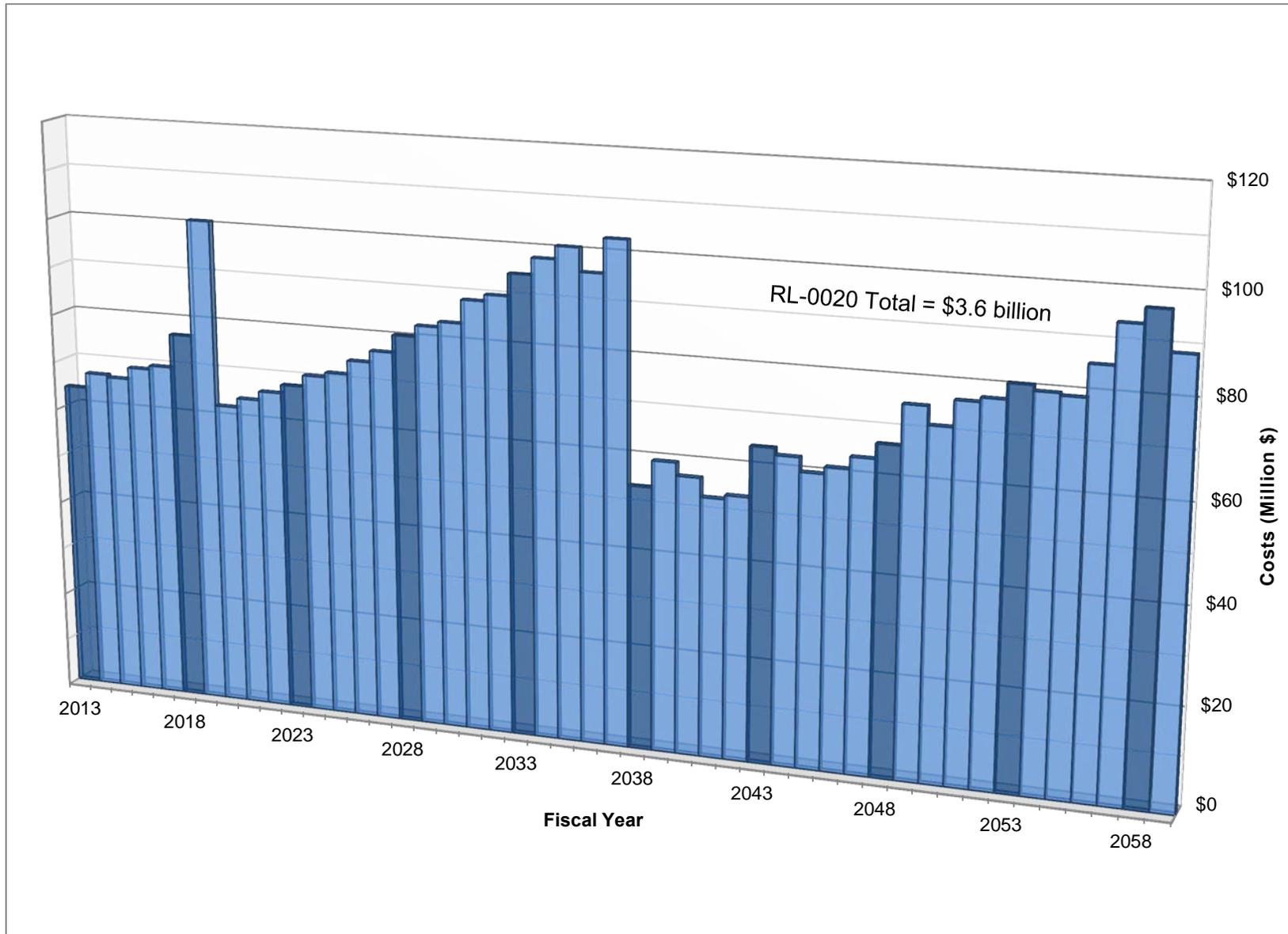
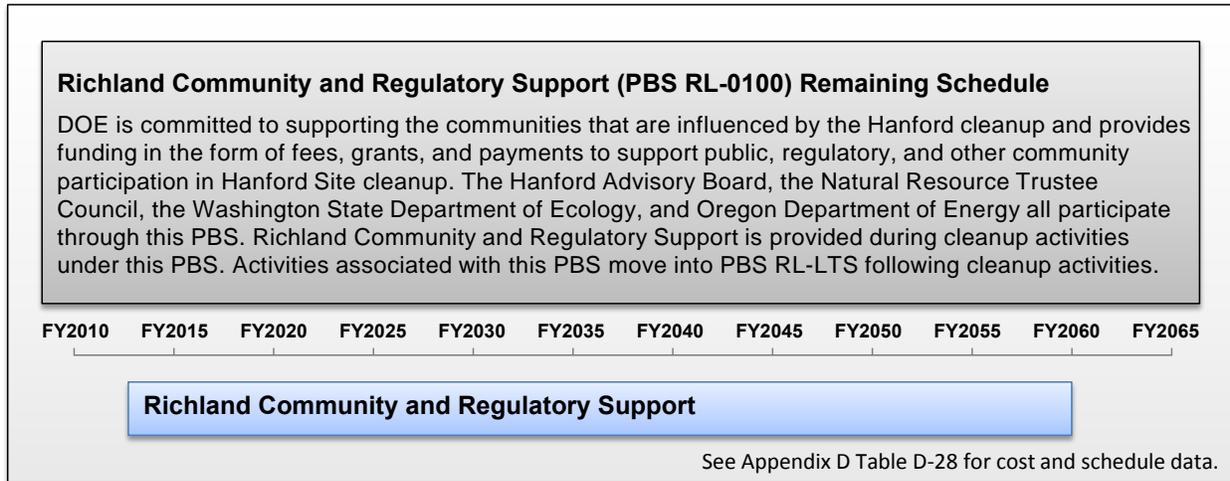


Figure 7-3. Safeguards and Security (PBS RL-0020) Remaining Estimated Costs by Fiscal Year.

## 7.2 RICHLAND COMMUNITY AND REGULATORY SUPPORT (PBS RL-0100)

This PBS includes support to the communities that are influenced by the Hanford cleanup. Figure 7-4 provides the remaining cleanup schedule for Richland Community and Regulatory Support (PBS RL-0100); Table 7-2 summarizes its scope of work.



Scale dates represent start of fiscal year

**Figure 7-4. Richland Community and Regulatory Support (PBS RL-0100) Remaining Schedule.**

**Table 7-2. Richland Community and Regulatory Support (PBS RL-0100) Level 2 Scope Summary.**

Work Element	Scope Description
Richland Community and Regulatory Support	This work element includes DOE-RL support to community activities and regulatory agencies, such as the Hanford Advisory Board, the Oregon Department of Energy, the Natural Resource Trustee Council, the Washington State Department of Ecology, and other entities through fees, grants, and payment in lieu of taxes.
DOE-RL = PBS =	U.S. Department of Energy, Richland Operations Office. project baseline summary.

Figure 7-5 provides the remaining estimated costs for Richland Community and Regulatory Support (PBS RL-0100) by fiscal year.

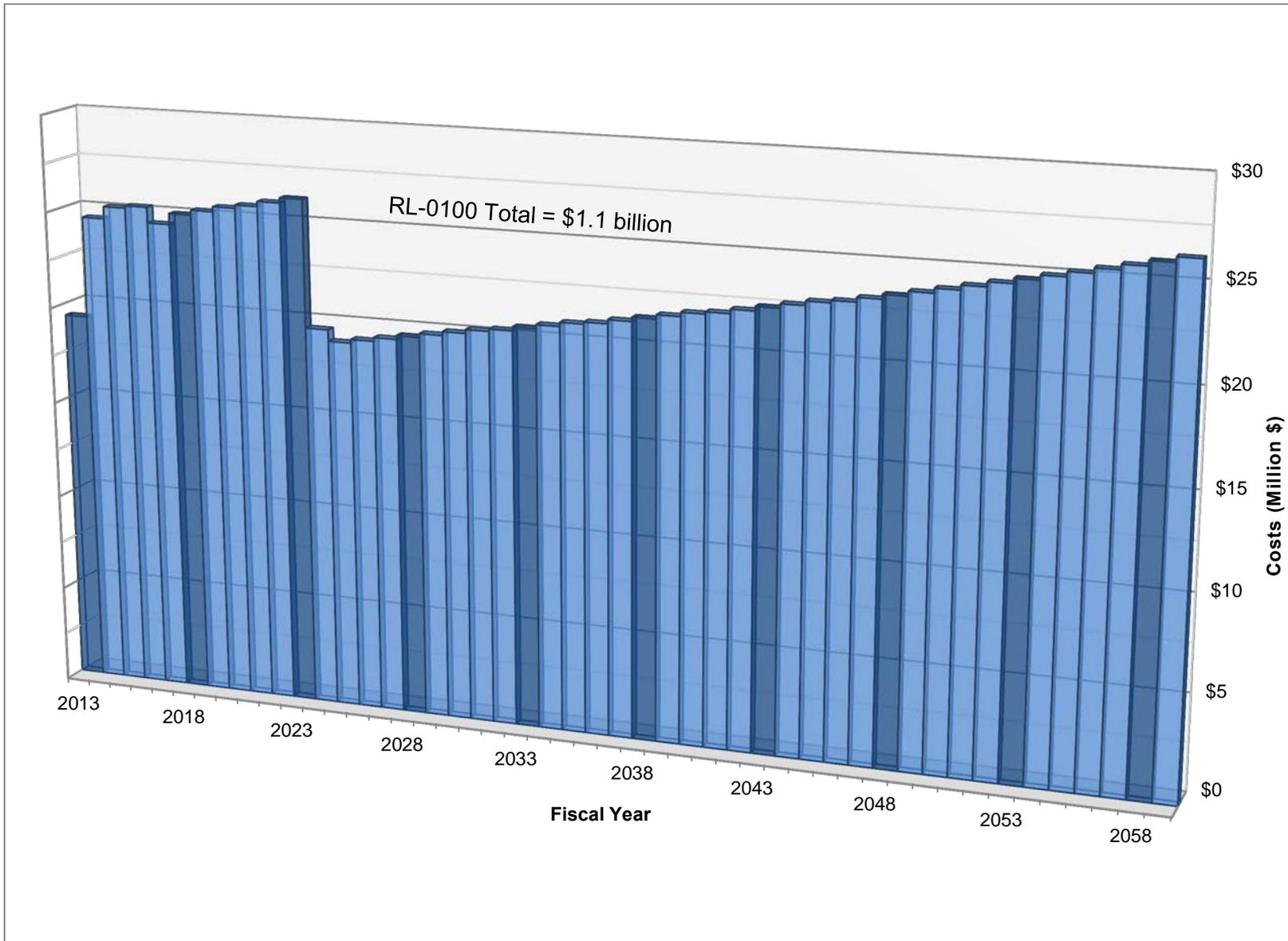


Figure 7-5. Richland Community and Regulatory Support (PBS RL-0100) Remaining Estimated Costs by Fiscal Year.

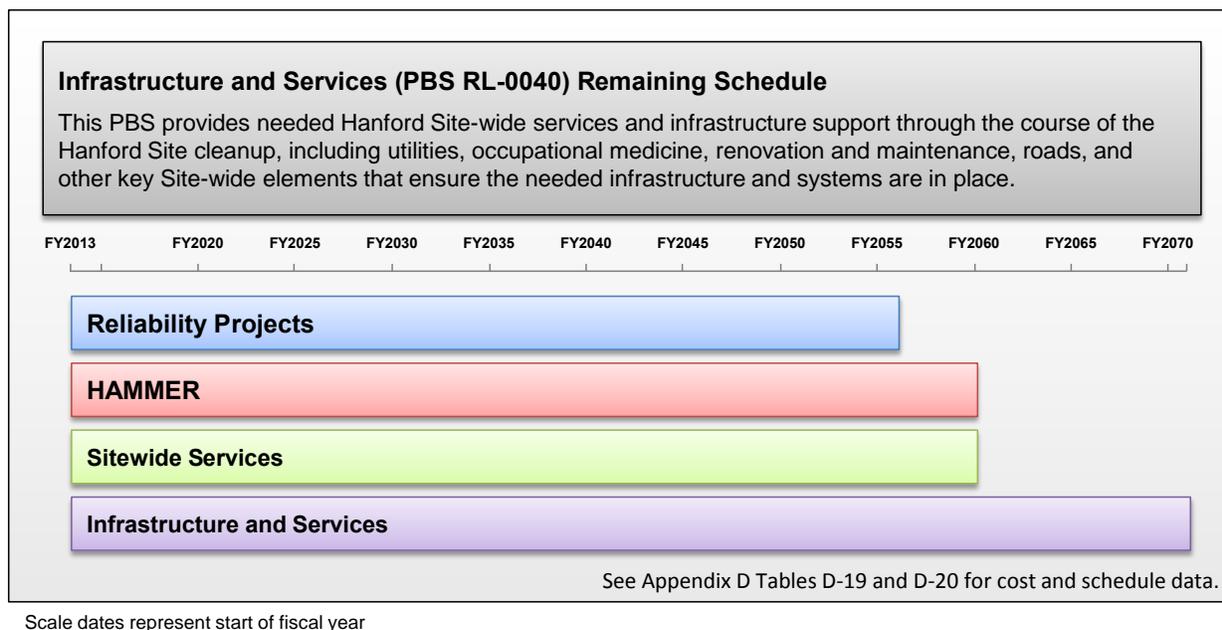
### 7.3 INFRASTRUCTURE AND SERVICES (PBS RL-0040)

Infrastructure and Services play a key role in completing the cleanup mission, and as noted in Chapters 3.0 and 5.0, the work scope is included within PBS RL-0040.

#### 7.3.1 Infrastructure and Services, HAMMER, and Infrastructure Reliability Projects

Infrastructure and Services (PBS RL-0040) provides cost-effective infrastructure and site services that are essential to accomplishing the Hanford Site environmental cleanup mission. These essential services cover a broad spectrum and range from the basic to highly-specialized services that reflect the complexity and scale of the Hanford Site environmental cleanup mission.

The work scope for Infrastructure and Services (PBS RL-0040) is organized into the work elements shown in Figure 7-6, which also presents the remaining cleanup schedule. The scope description for these work elements is provided in Table 7-3.



**Figure 7-6. Infrastructure and Services (PBS RL-0040) Remaining Schedule.**

**Table 7-3. Infrastructure and Services (PBS RL-0040) Level 2 Scope Summary. (2 pages)**

Work Element	Scope Description
Reliability Projects	This work element includes repair and replacement of infrastructure systems and provides capital upgrades to the infrastructure, including larger scale expense projects. Also included are capital equipment expenditures associated with replacements for crane and rigging, electrical utilities, facilities, biological control, network and telecommunications, transportation, materials management, Hanford Fire Department, and water and sewer utilities.
HAMMER	This work element includes operations and maintenance activities at the HAMMER facility in support of Hanford Site and other training.

**Table 7-3. Infrastructure and Services (PBS RL-0040) Level 2 Scope Summary. (2 pages)**

Site-wide Services – RL-0040	Includes proportional share of costs for site services and infrastructure. This work element includes emergency services (safeguards and security, fire and emergency response, emergency management), environmental integration services (site-wide safety standards, environmental integration, public safety and resource protection, radiological site services, and Waste Sampling and Characterization Facility analytical services), information management (information management planning and controls, information systems, content and records management, infrastructure/cyber security, information resources/content management, and information support services), site infrastructure and utilities/logistics and transportation (roads and grounds, biological services, electrical services, water/sewer services, facility services, transportation, mail, property systems/acquisitions, railroad services, technical services, energy management, work management, land and facilities management), support functions (business operations, human resources, safety, health and quality), and portfolio management (portfolio planning, analysis and performance, project acquisition and support, and independent assessment and analysis).
Infrastructure and Services	This work element includes occupational medicine; steam systems; contract closeout and acquisition team; legal support; land transfers; cleanup baseline, integration, and development; acquisition of natural gas utility service and other small contracts.
HAMMER = Volpentest HAMMER Training and Education Center.      PBS = project baseline summary.	

Figure 7-7 presents the remaining estimated costs for Infrastructure and Services (PBS RL-0040) by fiscal year and Figure 7-8 presents the remaining estimated costs by work element.

### 7.3.2 Site-wide Services

The Site-wide Services program provides direct operations support to DOE-RL, DOE-ORP and their contractors with cost-effective infrastructure and site services integral and necessary to accomplish the environmental cleanup mission. The scope includes five primary functions:

- Safety, Security and Environment
- Site Infrastructure and Utilities
- Site Business Management
- Information Resources and Content Management
- Portfolio Management.

Under the Safety, Security and Environment function, both Safeguards and Security (PBS RL-0020) and HAMMER (PBS RL-0040, Section 7.3.1) are funded through their respective projects and not through site-wide services. Other work elements under the Safety, Security and Environment function include:

- Fire and Emergency Response Services
- Emergency Operations
- Site Safety Standards
- Radiological Assistance Program
- Environmental Regulatory Management
- Public Safety & Resource Protection
- Radiological Site Services.

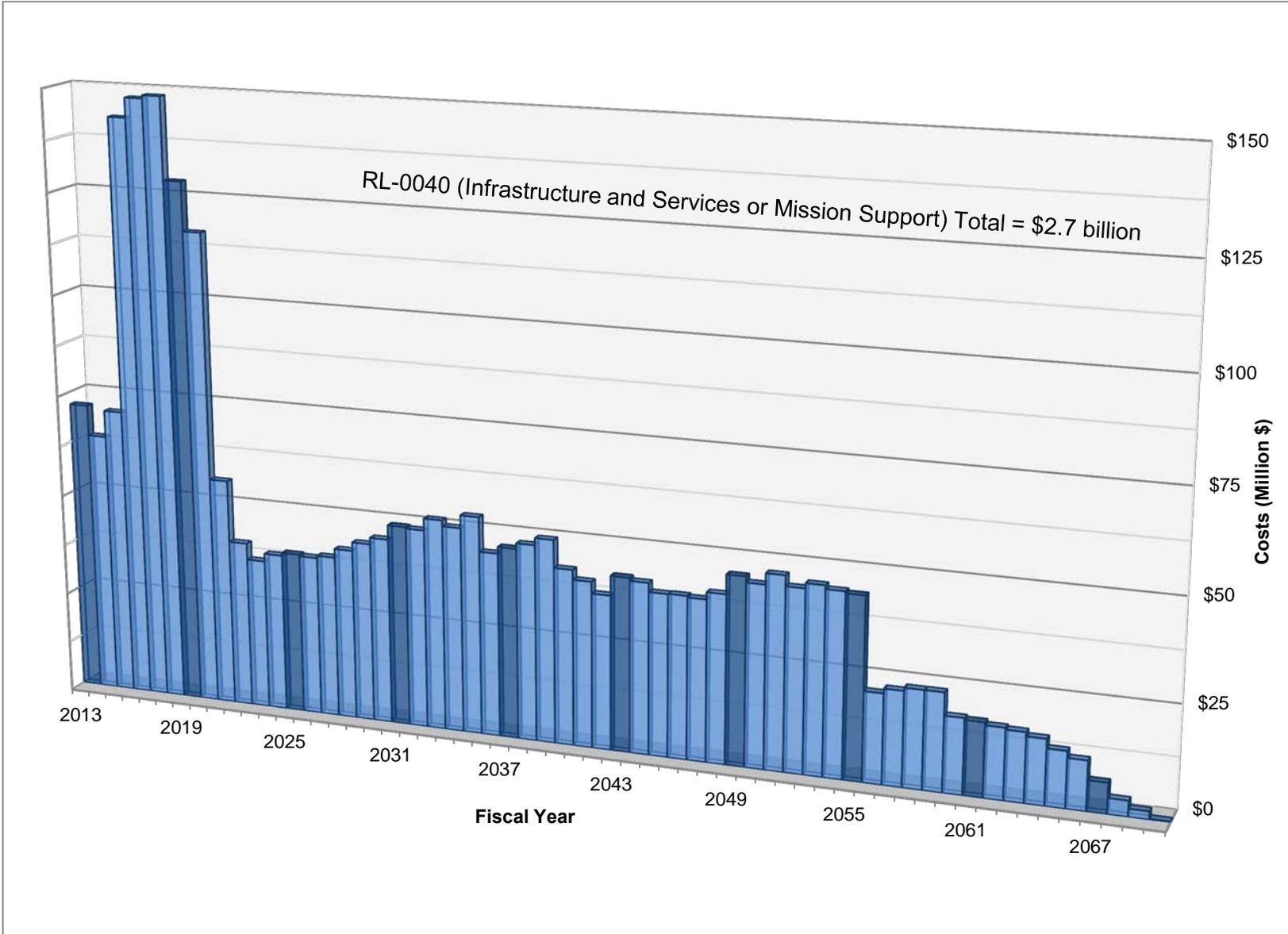
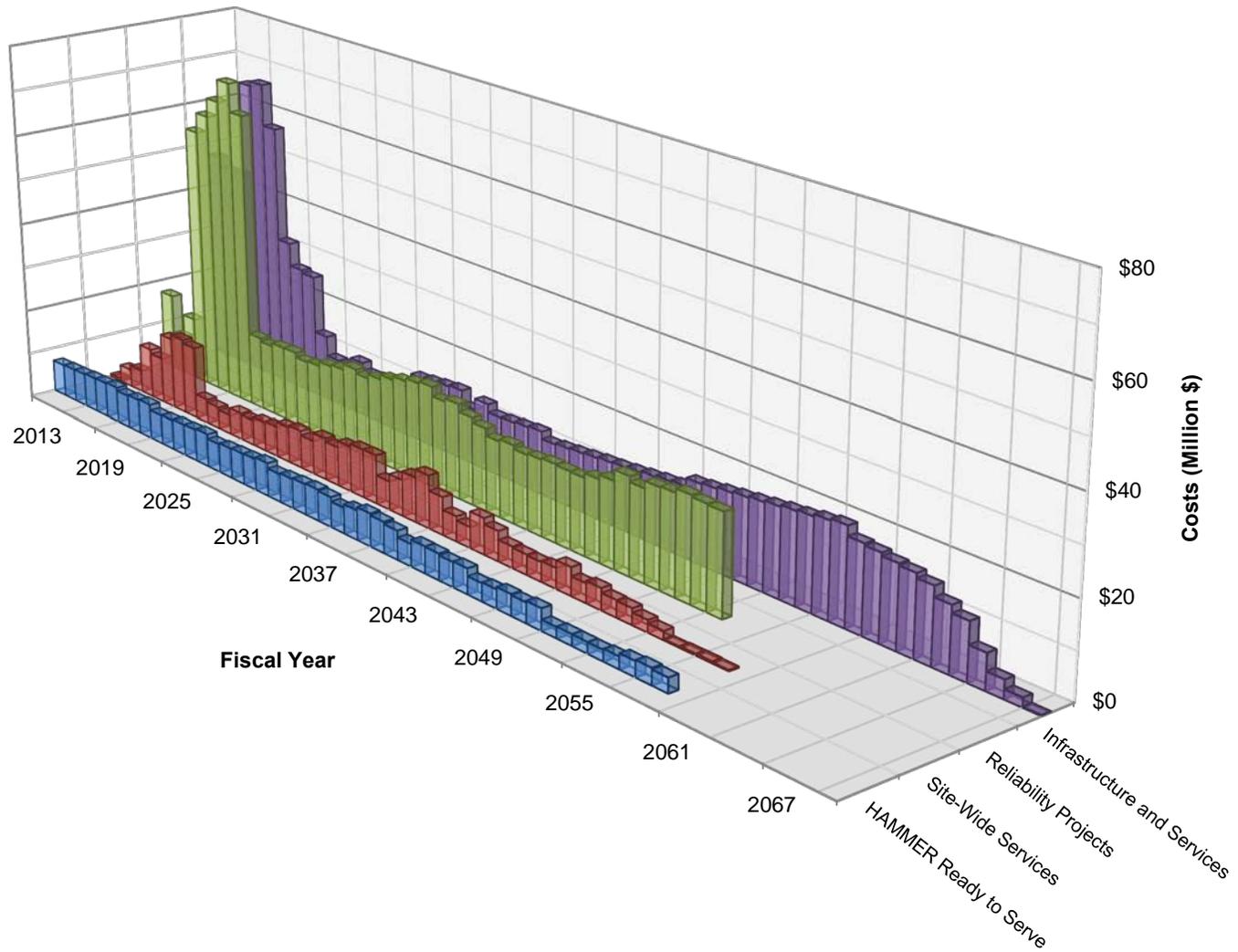


Figure 7-7. Infrastructure and Services (PBS RL-0040) Remaining Estimated Costs by Fiscal Year.



See Appendix D, Table D-19 for cost and schedule data.

Figure 7-8. Infrastructure and Services (PBS RL-0040) Remaining Estimated Costs by Work Element.

The work elements under the Site Infrastructure and Utilities function include:

- Analytical Services (e.g., the Waste Sampling and Characterization Facility [WSCF])
- Biological Control
- Facility Services
- Transportation
- Railroad Services
- Roads and Grounds
- Utilities (water, electricity)
- Sewer Systems
- Sanitary Waste Management and Disposal.

The work elements under the Site Business Management function include:

- Real Property Asset Management
- Property Systems/Acquisition & Materials Management
- Sponsorship, Management & Administration of Employee Pension and Other Benefit Plans
- Energy Employees Occupational Illness Compensation Program Act/Workers Compensation
- External Affairs and Other Interactions
- Mail Services
- Reproduction, Correspondence Control & Multi-Media.

As part of Real Property Asset Management, DOE-RL has established the LTS program to provide planning and interim execution of LTS for portions of the Hanford Site as they are cleaned up and before they are transferred to the DOE Office of Legacy Management (LM). The current LTS program is part of PBS RL-0040 Infrastructure and Services until it is transferred to LM – this future LTS program under LM is referred to as PBS RL-LTS in this report. The scope of the current and future LTS program is described in Section 7.4.

The work elements under the Information Resources and Content Management function include:

- Strategic Planning and Program Management
- Telecommunications
- Information Systems
- Content (Records) Management.

The work elements under the Portfolio Management function include:

- Hanford Portfolio Planning, Analysis and Performance Assessment
- Project Acquisition and Support, and
- Independent Analysis and Assessments.

The costs for Site-wide Services are allocated across the DOE-RL and DOE-ORP project PBSs so no separate cost graphs are shown for this service program.

## 7.4 LONG-TERM STEWARDSHIP (PBS RL-LTS)

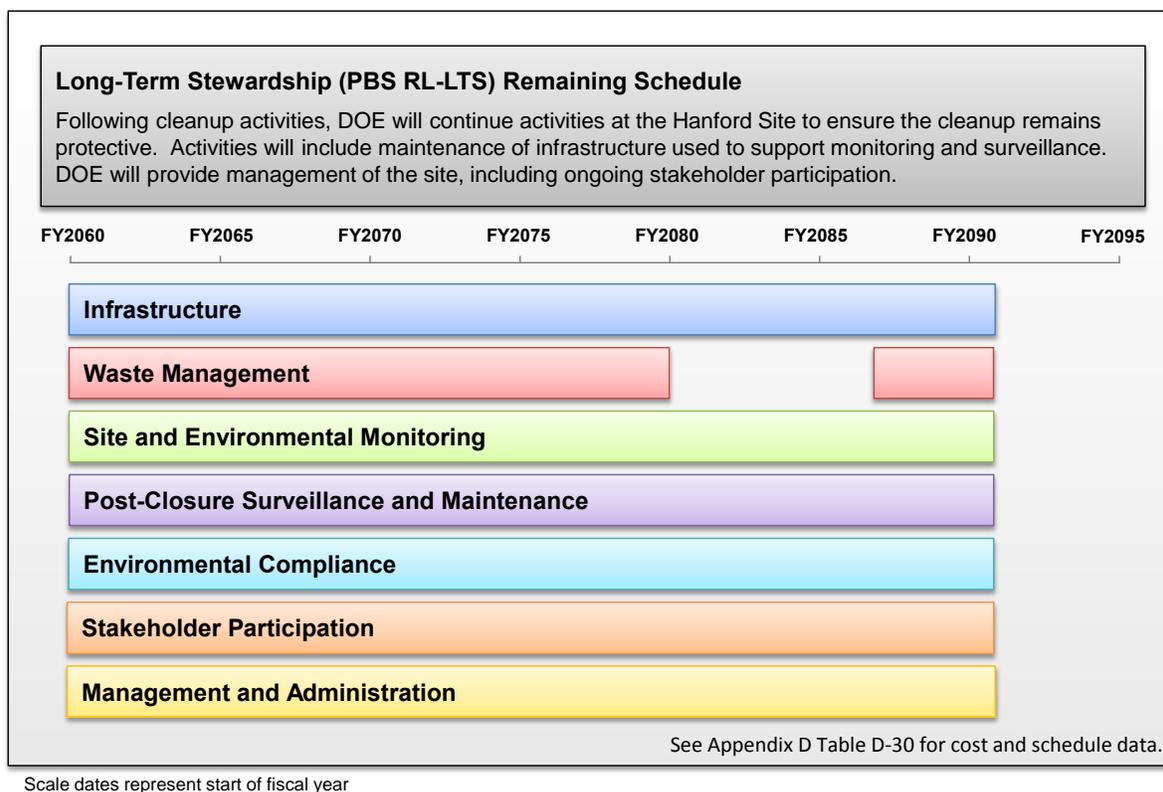
Following the completion of Hanford Site cleanup actions, the disposal facilities and other areas will require long-term management. Administration of the institutional controls activities will be required for portions of the Hanford Site to ensure protection of human health and the environment. As portions of the site are cleaned up, they are managed in accordance with the Hanford Site Long-Term Stewardship Program, as described in [DOE/RL-2010-35, Hanford Long-Term Stewardship Program Plan](#), under PBS RL-0040 Infrastructure and Services (see Section 7.3.2). When all of the cleanup actions defined by decision documents are completed, the Hanford Site will be turned over to DOE-LM. This PBS element pertains to the LM management activities at the Hanford Site.

LTS refers to all activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization at a site or a portion of a site. LTS includes engineered and institutional controls designed to contain or to prevent exposures to residual contamination and waste, such as surveillance activities, record-keeping activities, inspections, groundwater monitoring, ongoing pump-and-treat activities, cap repair, maintenance of entombed buildings or facilities, maintenance of other barriers and containment structures, access control, and posting signs. LTS begins when cleanup is completed and the selected remedy cleanup objectives and goals are met, as defined by the applicable CERCLA or RCRA decision documents, or when long-term remediation systems are constructed and operating as intended (e.g., groundwater pump-and-treat systems).

The current Hanford Site LTS Program (Section 7.3.2) manages the geographic areas for which cleanup has been completed in accordance with the post-cleanup requirements specified in the associated decision documents. These decisions include, but are not limited to, the CERCLA RODs and RCRA post-closure plans. In addition to managing the post-cleanup completion obligations, the Hanford Site LTS Program manages Hanford Site natural and cultural resources through the framework of [DOE/EIS-0222-F](#) and [64 FR 61615](#), “Record of Decision: Hanford Comprehensive Land Use Plan Environmental Impact Statement (HCP EIS),” and in accordance with Federal laws, executive orders, Tribal Nation treaties, DOE directives, and Hanford Site procedures. The planning basis for the Hanford Site LTS Program scope integrates stewardship and institutional controls elements into the program from present day to 2060.

The scope, schedule, and costs of LTS and institutional controls, to the extent predictable, have been included in this Lifecycle Report for the period from 2060 to 2090. DOE will have a presence at Hanford well beyond 2090 – especially in the Inner Area of the Central Plateau – to ensure that the cleanup remedies remain protective of people and the environment. As cleanup decisions are made and LTS requirements and institutional controls are refined, more specific information will be included in this Lifecycle Report. Figure 7-9 presents the remaining schedule and Table 7-4 provides a summary of the scope.

Figure 7-10 shows remaining estimated costs for PBS RL-LTS by fiscal year; Figure 7-11 shows the remaining estimated costs by work element. This PBS is assumed to extend from FY 2060 through FY 2090.



**Figure 7-9. Long-Term Stewardship (PBS RL-LTS) Remaining Schedule.**

**Table 7-4. Long-Term Stewardship (PBS RL-LTS) Level 2 Scope Summary.**

Work Element	Scope Description
Infrastructure	This work element includes operation and maintenance of Hanford Site infrastructure following cleanup activities. Specific scope will include supplying electrical and water utilities, operating and maintaining emergency services (Hanford Fire Department), and maintaining roads as needed to support Hanford Site LTS activities.
Waste Management	This work element includes operation and maintenance of 200 Area liquid effluent facilities in support of groundwater treatment and monitoring activities.
Site and Environmental Monitoring	This work element includes ongoing Hanford Site and environmental monitoring of groundwater, soil, vadose zone, and monitoring for public safety and resource protection.
Post-Closure Surveillance and Maintenance	This work element includes real estate and Hanford Site planning, land management, and surveillance and maintenance activities for the 100 and 200 Areas.
Environmental Compliance	This work element includes activities to ensure environmental compliance and protection.
Stakeholder Participation	This work element includes continued support of stakeholder participation through fees and payment in lieu of taxes.
Management and Administration	This work element provides for management and administration of these LTS activities.
LTS = long-term stewardship.	
PBS = project baseline summary.	

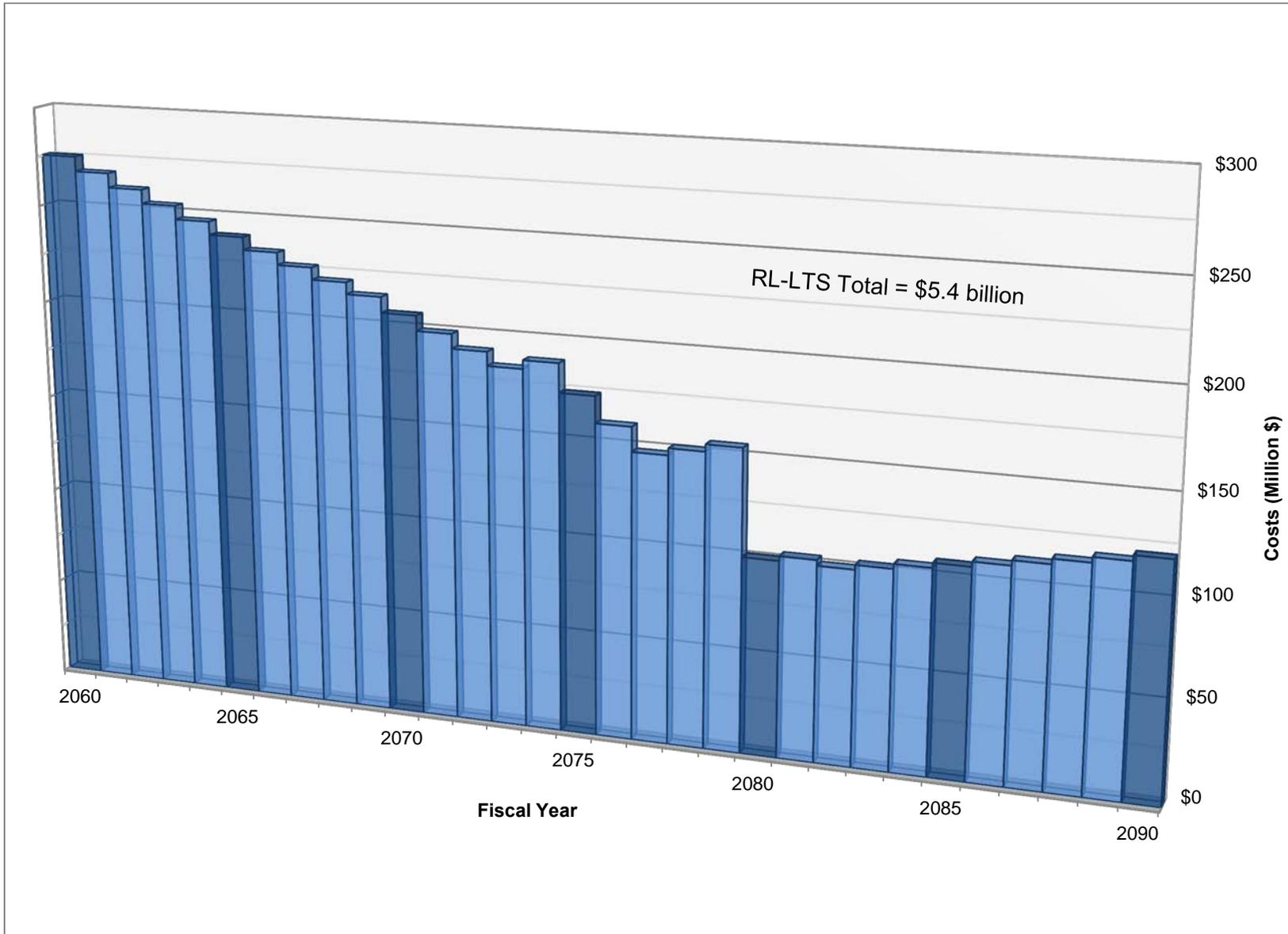
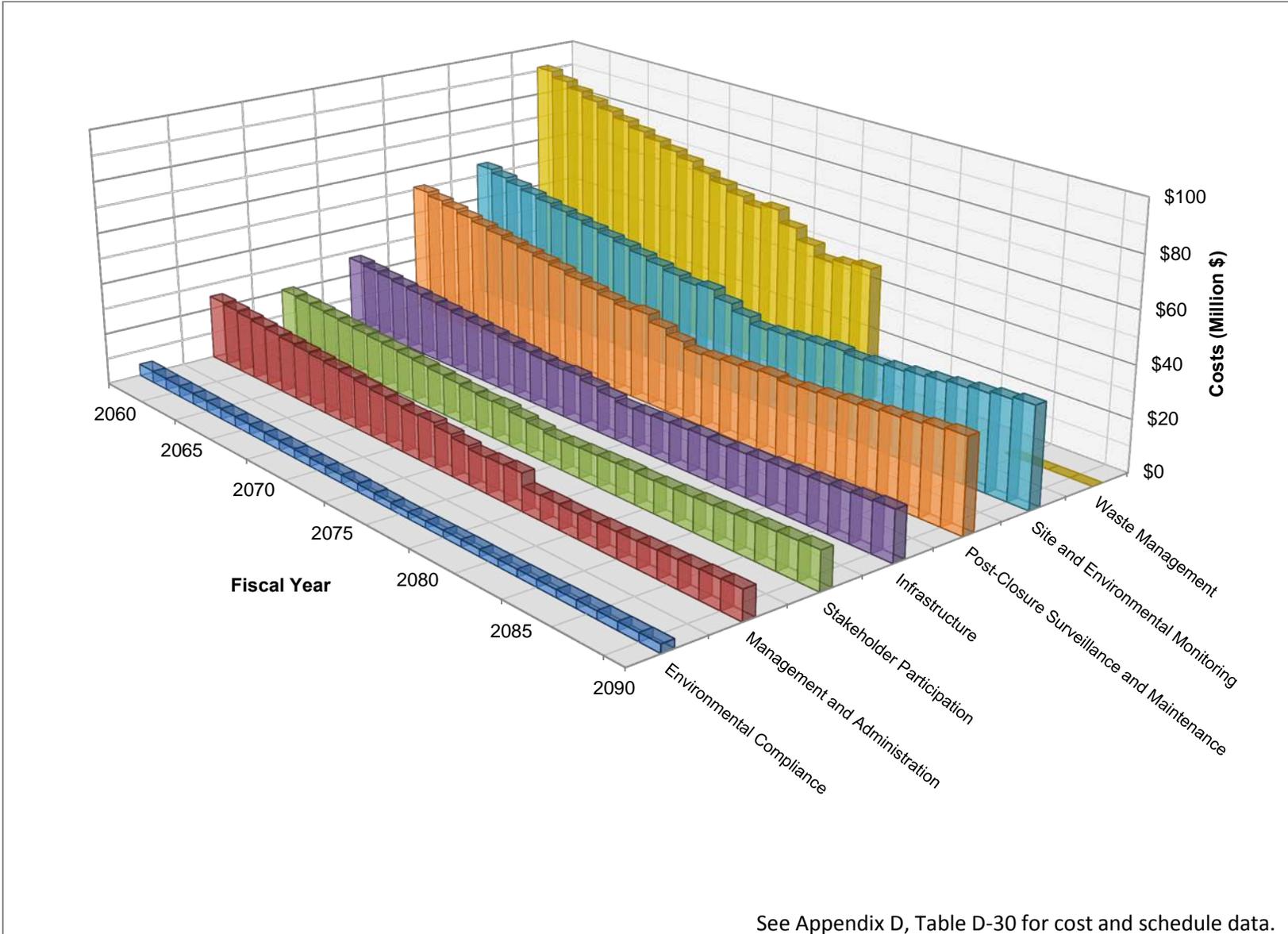


Figure 7-10. Long-Term Stewardship (PBS RL-LTS) Remaining Estimated Costs by Fiscal Year.



See Appendix D, Table D-30 for cost and schedule data.

Figure 7-11. Long-Term Stewardship (PBS RL-LTS) Remaining Estimated Costs by Work Element.

## 8.0 REPORT LIMITATIONS

### 8.1 SCHEDULE AND COST LIMITATIONS

The Lifecycle Report is based on an annual compilation of estimated scope, schedule, and cost information. In order to finish preparing the Lifecycle Report, it is necessary to select a deadline each year when the scope, schedule and cost information used to prepare the report will be “locked down.”

For the 2013 Lifecycle Report, August 31, 2012, serves as the cutoff date. Unless noted otherwise, changes in the TPA and other applicable requirements, budget requests, appropriations, program funding allocations, and other scope, schedule and cost changes after the cutoff date are not reflected in the 2013 Lifecycle Report.

### 8.2 OTHER LIMITATIONS

Some of the activities described in the Lifecycle Report are subject to the analysis and decision-making requirements of CERCLA, RCRA, or other applicable statutes and regulations. The information included in the Lifecycle Report is for planning purposes only, not for regulatory decision making, which will be conducted following the applicable statutory and regulatory programs.

The Lifecycle Report does not include resources that may be required to accomplish significant restoration of natural resources related to any liability of the United States for NRDAR.

Several non-DOE entities operate and manage property on the Hanford Site, typically under lease agreements with DOE. Examples include:

- Energy Northwest, a consortium of public utility companies that oversee the Columbia Generating Station nuclear power reactor.
- Laser Interferometer Gravitational Wave Observatory, operated by a consortium of the California Institute of Technology and the Massachusetts Institute of Technology.
- State of Washington, which in turn leases land to US Ecology, Inc., a private firm that operates burial grounds for commercial low-level radioactive waste.

Operation, maintenance, and any subsequent future cleanup associated with activities at these facilities are subject to the terms and conditions of the leases (and/or other agreements) in place between the operating entities and DOE. Potential environmental liabilities for these and similar non-DOE operations are not currently considered to be part of the Hanford Site cleanup, and so are not included in the DOE-EM program. Consequently, lifecycle scope, schedule and cost for these non-DOE operations are not included in the Lifecycle Report.

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**APPENDIX A**

**HANFORD SITE CLEANUP ACTIONS AND PLAUSIBLE ALTERNATIVES**

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## TERMS

ABAR	aggregate barrier
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CSNA	confirmatory sampling to support no further cleanup action
D&D	decontamination and decommissioning
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESD	explanation of significant differences
ETF	Effluent Treatment Facility
FBSR	fluidized bed steam reforming
FETF	Fast Flux Test Facility
HLW	high-level waste
IBAR	individual barrier
IC	institutional controls
IDF	Integrated Disposal Facility
ILAW	immobilized low-activity waste
INL	Idaho National Laboratory
ISS	interim safe storage
LAW	low-activity waste
LERF	Liquid Effluent Retention Facility
MESC	maintain existing soil cover
MNA	monitored natural attenuation
NPL	National Priorities List
NRDWL	Nonradioactive Dangerous Waste Landfill
P&T	pump-and-treat
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction (Plant)
RAO	remedial action objective
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
REDOX	Reduction-Oxidation Facility (S Plant)
RI/FS	remedial investigation/feasibility study
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
RTD	remove, treat, and dispose
SALDS	State-Approved Land Disposal Site
SSE	safe storage enclosure
SST	single-shell tank
SWL	solid waste landfill
TBD	to be determined

TC&WM EIS	Tank Closure and Waste Management Environmental Impact Statement
TPA	Tri-Party Agreement
TRU	transuranic
TSD	treatment, storage, and disposal
WAC	<i>Washington Administrative Code</i>
WESF	Waste Encapsulation and Storage Facility
WRAP	Waste Receiving and Processing Plant
WTP	Waste Treatment and Immobilization Plant

## APPENDIX A

### HANFORD SITE CLEANUP ACTIONS AND PLAUSIBLE ALTERNATIVES

In accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as the Tri-Party Agreement (TPA), Milestone M-036-01 requires that where final cleanup decisions have not yet been made, the *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report) is to consider ranges of alternatives and present a reasonable upper bound:

**“In circumstances where final cleanup decisions have not yet been made, the report shall be based upon the reasonable upper bound of the range of plausible alternatives or may set forth a range of alternative costs including such a reasonable upper bound.”**

The TPA milestone specifies that when making assumptions (e.g., about alternative cleanup actions), the U.S. Department of Energy (DOE) is to take into account the views of the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology), as well as the values expressed by affected Tribal Governments and Hanford stakeholders.

Cleanup decisions are made so that DOE can conduct cleanup actions at the Hanford Site. As discussed in Section A.1, the Lifecycle Report has grouped remaining Hanford Site cleanup work into approximately 38 separate cleanup actions. This approach helps focus discussions on cleanup work that remains to be performed at the Hanford Site and promotes consistency with the ongoing cleanup decision-making process under the TPA.

Because final cleanup decisions (see Appendix C) have not yet been made for much of the remaining Hanford Site cleanup work, this Lifecycle Report must consider the range of plausible alternatives (or alternative costs) and present a reasonable upper bound. DOE has decided that information about the range of plausible alternatives, rather than just a range of alternative costs, would be most useful for this Lifecycle Report. DOE also believes that in most cases, cost estimates include allowances for uncertainties in current planning that encompass a wide range of potential alternatives. Section A.2 includes information about the range of plausible alternatives for each cleanup action.

Because many final decisions remain to be made, a reasonable upper bound will need to be defined, along with schedule and costs, for a number of remaining Hanford Site cleanup actions. To give each action a sufficient level of analysis and detail, DOE has decided to take a methodical and planned approach to developing in-depth analyses of cleanup action alternatives, including definition of reasonable upper bound schedules and costs.

Section A.3 proposes a rationale and schedule for when different cleanup actions will undergo in-depth alternatives analyses in the Lifecycle Report. This approach limits the complexity of the individual reports by presenting in-depth analysis for a few select actions in each annual report. The approach also provides timely information to support budget planning and other decisions that are focused on more near-term actions, and provides an appropriate level of detail in a user-friendly report.

The information provided in this appendix has been developed for the sole purpose of preparing the Lifecycle Report and fulfilling the requirements of TPA Milestone M-036-01; the Lifecycle Report is not a decision-making document. Cleanup actions and decisions discussed in this appendix are still undergoing formal development, review, and eventual approval pursuant to the procedures established in the TPA and applicable Federal and State requirements.

The information in this appendix does not presume nor is it intended to prejudice the outcome of the requirements that must be followed by the TPA agencies (DOE, Ecology, and EPA). Any errors or discrepancies in this appendix will be superseded by the results of the legally applicable decision-making processes.

## **A.1 IDENTIFYING CLEANUP ACTIONS FOR THE HANFORD SITE**

In this Lifecycle Report, the term “cleanup action” is used to conceptually describe similar, related work that enables cleanup to proceed for common or related contaminants that occur in a relatively well-defined environmental media (or waste management system) within a generally contiguous geographic area. This concept breaks down into three main ideas:

- A cleanup action should include similar, related work, which means that the work performed should be of like kind and directed at achieving a common goal. Examples of similar, related work would be installing and operating a groundwater pump-and-treat system, removing and disposing of contaminated soil in an engineered landfill, and retrieving and treating waste from underground tanks. Further, if the work does not itself achieve cleanup (e.g., maintaining overall Hanford Site infrastructure), then it is typically not considered to be a specific cleanup action.
- A cleanup action should address common or related contaminants that occur in a relatively well-defined environmental media or waste management system. In most cases around the Hanford Site, distinct industrial processes generated the materials and wastes that were managed through discharge to the environment, or treatment and storage in various containment systems. The generating processes typically produced residues that were chemically and/or radiologically similar with respect to each process (i.e., the residues were often common and related to each other) and that often ended up in the same places (e.g., burial grounds, cribs, ponds, tanks, basins).
- A cleanup action should occur within a generally contiguous geographic area. This represents primarily the need to be able to develop and implement cleanup actions in a manageable way. The Hanford Site covers a large space, and cleanup actions can be conducted more efficiently if the cleanup work is not scattered across dozens of small, widely separated locations.

This cleanup action concept is consistent with the operable unit cleanup approach taken in the TPA and enables cleanup actions and alternatives to be addressed in a manner consistent with the way cleanup decisions are being made for the Hanford Site. This approach also provides a reasonable middle ground for looking at the cleanup work that is performed on the Hanford Site. Too narrow a concept could result in individual cleanup actions covering single, discrete activities (e.g., the remediation of one ditch, the retrieval of a few drums of waste). Too broad a concept could lead to the other extreme, covering for example all the work needed for an entire portion of the Hanford Site (e.g., cleanup of all the facilities, soils, and groundwater throughout the 200 Area).

The TPA agencies applied the concepts described in the preceding paragraphs to the current Hanford Site configuration to develop a set of approximately 38 separate cleanup actions for the Lifecycle Report. Table A-1 lists the Hanford Site cleanup actions for which final cleanup decisions do not yet exist and for which alternatives will be considered in the Lifecycle Report. The path to final cleanup can be complicated and includes the consideration of cleanup alternatives, identification of a preferred alternative, including regulatory agency and public input, decision-making, and finally design and implementation of the selected cleanup action.

Cleanup work at the Hanford Site can be complex and extend over long periods. Frequently, interim decisions are made and incremental cleanup steps are taken, followed by improved decisions as more is learned and other, better alternatives become available. Even relatively simple cleanup actions can encompass many sequenced activities and a substantial amount of work lasting several years. Thus, many of the cleanup actions discussed in the Lifecycle Report will evolve over time and may have a different scope in future reports as progress is made in completing Hanford Site cleanup.

**Table A-1. List of Remaining Hanford Site Cleanup Actions for Lifecycle Report. (2 pages)**

<b>River Corridor Cleanup Actions</b>
<ul style="list-style-type: none"> <li>• Disposition N Reactor</li> <li>• Disposition 100 Area K West Basin</li> <li>• Remediate 100 Area Contaminated Soil Sites</li> <li>• Restore 100-BC-5 Groundwater Operable Unit to Beneficial Use</li> <li>• Restore 100-KR-4 Groundwater Operable Unit to Beneficial Use</li> <li>• Restore 100-NR-2 Groundwater Operable Unit to Beneficial Use</li> <li>• Restore 100-HR-3 Groundwater Operable Unit to Beneficial Use</li> <li>• Restore 100-FR-3 Groundwater Operable Unit to Beneficial Use</li> <li>• Disposition 300 Area Facilities Retained by Pacific Northwest National Laboratory</li> <li>• Remediate 300 Area Contaminated Soil Sites</li> <li>• Restore 300 Area Groundwater to Beneficial Use</li> <li>• Disposition of 100 Area former Orchard Contaminated Soil Sites (100-OL-1 Operable Unit)</li> </ul>
<b>Central Plateau Cleanup Actions</b>
<ul style="list-style-type: none"> <li>• Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 Operable Unit)</li> <li>• Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 Operable Units)</li> <li>• Disposition Below-Grade Portions of Plutonium Finishing Plant</li> <li>• Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 Operable Unit)</li> <li>• Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 Operable Unit)</li> <li>• Disposition PUREX Storage Tunnels (200-CP-1 Operable Unit)</li> <li>• Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 Operable Unit)</li> <li>• Disposition T Plant Canyon Building/Associated Waste Sites</li> <li>• Disposition Cesium/Strontium Capsules</li> <li>• Remediate 200-SW-1 Operable Unit</li> <li>• Disposition Remaining Liquid Waste Disposal Facilities</li> <li>• Disposition Remaining Waste Treatment, Storage, and Disposal Facilities</li> <li>• Remediate 200-IS-1 Operable Unit</li> <li>• Remediate 200-SW-2 Operable Unit</li> <li>• Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 Operable Unit)</li> <li>• Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 Operable Unit)</li> <li>• Disposition Fast Flux Test Facility Complex</li> </ul>

**Table A-1. List of Remaining Hanford Site Cleanup Actions for Lifecycle Report. (2 pages)**

<ul style="list-style-type: none"> <li>• Disposition Remaining Buildings and Facilities Within Fast Flux Test Facility Complex</li> <li>• Disposition Remaining Inner Area Buildings and Facilities</li> <li>• Remediate Contaminated Deep Vadose Zone (200-DV-1 Operable Unit)</li> <li>• Restore 200 West Groundwater to Beneficial Use (200-UP-1 Operable Units)</li> <li>• Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 Operable Units)</li> </ul>
<b>Tank Waste Cleanup Actions</b>
<ul style="list-style-type: none"> <li>• Tank Retrieval and Single-Shell Tank Farm Closure</li> <li>• Tank Waste Treatment</li> <li>• Secondary Waste Treatment</li> <li>• Double-Shell Tank Closure</li> <li>• Waste Treatment and Immobilization Plant Closure</li> </ul>
PUREX = Plutonium Uranium Extraction (Plant). REDOX = Reduction-Oxidation Facility (S Plant).

## **A.2 IDENTIFYING RANGES OF PLAUSIBLE ALTERNATIVES AND ANALYZING ALTERNATIVES FOR HANFORD SITE CLEANUP ACTIONS**

The Lifecycle Report provides information about ranges of plausible alternatives for cleanup actions. The range of plausible alternatives for a cleanup action includes DOE's current assumptions about future efforts. Alternatives are included based on current understandings among the TPA agencies, the status of existing and forthcoming cleanup decisions, and whether current planning already adequately encompasses the range of plausible alternatives. In a series of working sessions, the TPA agencies developed the range of plausible alternatives presented in Section A.2.1.

As discussed further in Section A.2.2, a more in-depth analyses of the alternatives for individual cleanup actions will be performed in order to describe a reasonable upper bound for the scope and costs of a specific cleanup action. The TPA agencies have agreed to take a graded approach and to analyze alternatives and develop a reasonable upper bound scope and cost estimate as a sensitivity analysis for a limited set of cleanup actions in each annual Lifecycle Report. The main reasons for this approach include the following:

- Developing and analyzing alternatives for every separate cleanup action in every annual edition of the Lifecycle Report would be resource intensive and inefficient.
- Final cleanup decisions are expected soon for a number of cleanup actions, and the decision process will produce thorough and detailed analyses of potential alternatives.
- Many interim cleanup actions currently are underway, the results of which will improve the ability to analyze alternatives in future Lifecycle Reports.

In lieu of analyzing alternatives for all cleanup actions every year, the Lifecycle Report proposes a schedule and rationale for when different cleanup actions will undergo in-depth analyses. Section A.3 provides this information.

### **A.2.1 RANGE OF PLAUSIBLE ALTERNATIVES**

Ranges of plausible alternatives have been identified for cleanup actions, consistent with existing and yet to be made cleanup decisions, ongoing interim work (if any), and status and maturity of efforts. The range of plausible alternatives has been identified to help ensure completeness with respect to the work needed to accomplish the Hanford Site cleanup mission and to provide regulatory agencies, Tribal Governments, and affected stakeholders with sufficient information to help inform and guide discussions about priorities and contents for future Lifecycle Reports.

The range of plausible alternatives for each cleanup action was developed through a series of working sessions involving the TPA agencies' subject matter experts applying their knowledge of Hanford Site cleanup work and best professional judgment. Each range of plausible alternatives, in the opinion of the agency experts, has alternatives that include a maximum cleanup effort (e.g., a likely upper bound) for that cleanup action. In addition, the ranges of plausible alternatives exclude alternatives that could not be part of a reasonable upper bound (e.g., no action). Determination of the range of plausible alternatives and likely upper bounding cleanup effort took into account, among other factors, current requirements under the TPA and other environmental obligations, and the status of alternatives being considered under existing and forthcoming cleanup decisions. The range of plausible alternatives for each cleanup action also was intended to encompass the most current planning assumptions with respect to that cleanup action.

Tables A-2, A-3, and A-4 list and are organized by the identified cleanup actions for River Corridor, Central Plateau, and Tank Waste, respectively. These tables of cleanup actions and plausible alternatives provide regulatory agencies, Tribal Governments, and affected stakeholders with information to help inform and guide discussions about priorities and scoping of future cleanup work. In addition, these tables include the following information:

- For each cleanup action, a summary of the current cleanup decisions that have been made pursuant to the TPA and other environmental obligations, and a list of relevant cleanup decision documents.
- For each cleanup action, a list that encompasses the likely range of plausible alternatives.

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

CLEANUP ACTION:	RC-1a <sup>1</sup> River Corridor – Disposition N Reactor
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>In September 1993, DOE issued 58 FR 48509, “<i>Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington</i>,” which implements the recommendation for safe storage followed by deferred one-piece removal of the surplus reactors. N Reactor was not included in the EIS as it was not available for decommissioning at the time of the NEPA EIS and interim safe storage was approved through the CERCLA process. Final disposition of N Reactor will be determined by a subsequent NEPA or CERCLA decision process.</p> <ul style="list-style-type: none"> <li>• DOE and Ecology, 2000, “Action Memorandum: United States Department of Energy Hanford 100 Area National Priorities List (NPL); 105-D and 105-H Reactor Facilities and Ancillary Facilities; Hanford Site; Benton County, Washington,” U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington, December 8.</li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Demolition of the reactor block in ISS, and transport of the reactor block, intact on a tractor transporter, from the present 100 Area location to the 200 West Area for disposal.</li> <li>• Safe storage for a period of up to 75 years of surveillance, monitoring, and maintenance; at the end of the safe storage period, demolition of the reactor block and transport of the reactor block, intact on a tractor transporter, from the present 100 Area location to the 200 West Area for disposal.</li> <li>• Safe storage for a period of up to 75 years of surveillance, monitoring, and maintenance; at the end of the safe storage period, demolition of the reactor buildings and piece by piece dismantlement of the reactor core and transport of radioactive waste to the 200 West Area for burial.</li> <li>• Demolition of the reactor buildings and SSE and filling voids beneath and around the reactor block, the reactor block, adjacent shield walls, and the spent fuel storage basin together with the contained radioactivity, gravel, and grout covered to a depth of at least 5 meters with a mound containing earth and gravel.</li> </ul>
CLEANUP ACTION:	RC-2 River Corridor – Disposition 100 Area K West Basin
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>An interim ROD, ROD amendment, and action memorandum are in place for the removal, treatment, and interim onsite storage of spent nuclear fuel and sludge from the K Basins.</p> <ul style="list-style-type: none"> <li>• <u>EPA/ROD/R10-99/059</u>, 1999, <i>Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>DOE and EPA, 2004</u>, <i>Action Memorandum: Request for Time Critical Response for Treatment and Disposal of Sludge from the 105-K East North Loadout Pit, USDOE Hanford Site</i>, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, June 4.</li> <li>• <u>EPA, 2005</u>, <i>Interim Remedial Action Record of Decision Amendment, Declaration, U.S. Department of Energy, 100 K Area K Basins, Hanford Site - 100 Area, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Remove, treat, and transfer sludge for interim storage at T Plant; transfer fuel scrap for interim storage at Canister Storage Building; D4 K West Basin and ancillary structures; remediate below-grade portions consistent with 100 Area contaminated soil sites.*</li> </ul> <p>* May require removal of K Reactors to access below-grade contaminated soils. K East Basin was demolished in 2009.</p>

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

CLEANUP ACTION:	<b>RC-3 River Corridor – Remediate 100 Area Contaminated Soil Sites</b>
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Interim RODs, ROD amendments, ESDs, and Annual Fact Sheets (100 Area “Plug-In” and Candidate Waste Sites for Fiscal Year 2010) are in place to remove contaminated soil, structures, debris, and burial grounds using the observational and plug-in approaches with onsite disposal at the ERDF.</p> <ul style="list-style-type: none"> <li>• <u>EPA, 2004a</u>, <i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2007</u>, <i>Explanation of Significant Difference for the Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units (100 Area Burial Grounds)</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2009a</u>, <i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-95/126</u>, 1995, <i>Declaration of the Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/AMD/R10-97/044</u>, 1997, <i>Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-99/039</u>, 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</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ESD/R10-00/045</u>, 2000, <i>Explanation of Significant Difference for the 100 Area Remaining Sites ROD, USDOE Hanford 100 Area, 100-IU-6 Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-00/120</u>, 2000, <i>Interim Remedial Action Record of Decision for the 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ESD/R10-03/605</u>, 2003, <i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-00/121</u>, 2000, <i>Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, 100-KR-2 Operable Units</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <i>Resource Conservation and Recovery Act of 1976, 42 USC 6901</i>, et seq.</li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• RTD contaminated soil sites to achieve RAOs* and applicable closure performance standards**; backfill, contour, and revegetate excavations. (Note: The 100 Area interim RODs for waste sites will be covered by the six final RODs for the River Corridor currently being worked through a final RI/FS process.)</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>* In accordance with applicable interim action RODs.</p> <p>** Closure of several 100-N facilities will be according to approved RCRA closure plans.</p>

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

CLEANUP ACTION:	<b>RC-4.1 River Corridor – Restore 100-BC-5 Groundwater Operable Unit To Beneficial Use</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made for this operable unit. Groundwater monitoring and annual reporting continue to track groundwater contamination in this operable unit.</p> <ul style="list-style-type: none"> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington.</li> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Install P&amp;T system in 100-BC-5; transition to surveillance and maintenance for post-treatment groundwater monitoring.</li> <li>• Incorporate bioremediation for chromium.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	<b>RC-4.2 River Corridor – Restore 100-KR-4 Groundwater Operable Unit To Beneficial Use</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>An interim ROD is in place to clean up hexavalent chromium in the groundwater using P&amp;T.</p> <ul style="list-style-type: none"> <li>• <u>EPA/ROD/R10-96/134</u>, 1996, <i>Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington.</li> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Expand P&amp;T system in 100-KR-4; transition to surveillance and maintenance for post-treatment groundwater monitoring.</li> <li>• Continue operation of P&amp;T system with incorporation of bioremediation for chromium.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

CLEANUP ACTION:	<b>RC-4.3 River Corridor – Restore 100-NR-2 Groundwater Operable Unit To Beneficial Use</b>
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>An action memorandum, interim ROD, and ESD are in place to clean up strontium-90 in the groundwater using P&amp;T and physical barriers. An in situ apatite barrier and phytoremediation treatability tests are being evaluated for use in the cleanup of strontium-90 in groundwater.</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2009-54</u>, 2010, <i>Proposed Plan for Amendment of 100-NR-1/NR-2 Interim Action Record of Decision</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>Ecology and EPA</u>, 1994, “Action Memorandum; N Springs Expedited Response Action Cleanup U.S. Department of Energy Hanford Site, Richland, WA” (letter to R. Izatt, U.S. Department of Energy, Richland Operations Office from R.F. Smith, U.S. Environmental Protection Agency and D. Butler, Washington State Department of Ecology), U.S. Environmental Protection Agency, Richland, Washington, September 23.</li> <li>• <u>EPA/ESD/R10-03/605</u>, 2003, <i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-99/112</u>, 1999, <i>Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul> </li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <p>Alternatives are being addressed as part of <u>DOE/RL-2009-54</u>, <i>Proposed Plan for Amendment of 100-NR-1/NR-2 Operable Unit Interim Action Record of Decision</i>; pending completion, the following reflect alternatives from the proposed plan, but are not intended to presume the outcome of the ongoing decision-making process:</p> <ul style="list-style-type: none"> <li>• Resume operation of existing pump-and-treat system; operate and expand system as necessary until cleanup objectives are achieved; transition to surveillance and maintenance for post-treatment groundwater monitoring.</li> <li>• Construct an impermeable barrier along the shoreline to re-direct groundwater flow and increase travel times for radioactive decay to achieve cleanup objectives.</li> <li>• Expand the apatite permeable reactive barrier to promote sequestration of strontium-90.</li> <li>• Incorporate phytotechnology.</li> <li>• Use sequestration and immobilization technologies for inner portion of strontium-90 plume.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

CLEANUP ACTION:	<b>RC-4.4 River Corridor – Restore 100-HR-3 Groundwater Operable Unit To Beneficial Use</b>
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>An interim ROD, ROD amendment, and ESDs are in place to clean up hexavalent chromium in the groundwater using P&amp;T and an in situ oxidation/reduction (“redox”) manipulation barrier.</p> <ul style="list-style-type: none"> <li>• <u>EPA/ROD/R10-96/134</u>, 1996, <i>Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/AMD/R10-00/122</u>, 1999, <i>Interim Remedial Action Record of Decision Amendment: 100-HR-3 Operable Unit</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2002</u>, <i>Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ESD/R10-03/606</u>, 2003, <i>Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision, USDOE Hanford 100 Area, 100-HR-3 Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2009b</u>, <i>Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul> </li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Expand P&amp;T system in 100-HR-3; transition to surveillance and maintenance for post-treatment groundwater monitoring.</li> <li>• Maintain and repair in situ redox manipulation barrier.</li> <li>• Incorporate bioremediation.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>
CLEANUP ACTION:	<b>RC-4.5 River Corridor – Restore 100-FR-3 Groundwater Operable Unit To Beneficial Use</b>
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made for this operable unit. Groundwater monitoring and annual reporting continue to track groundwater contamination.</p> <ul style="list-style-type: none"> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act - Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul> </li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Install P&amp;T system in 100-FR-3; transition to surveillance and maintenance for post-treatment groundwater monitoring.</li> <li>• Incorporate bioremediation for chromium.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

CLEANUP ACTION:	<b>RC-5 River Corridor – Disposition 300 Area Facilities Retained By PNNL</b>
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Action memoranda are in place for the remaining 300 Area buildings and facilities, and DOE anticipates extending those cleanup decisions to include the PNNL-retained facilities once their operations end. DOE considers D&amp;D of buildings and other structures to be final cleanup decisions if the facility is removed in accordance with an applicable action memorandum. The Removal Action Work Plan will need to be modified to address PNNL retained facilities once PNNL declares the facilities as surplus. Alternatives do not need to be considered where such D&amp;D has been completed. Decision documents for D&amp;D of 300 Area buildings and facilities that may have future application for the PNNL-retained facilities are listed here.</p> <ul style="list-style-type: none"> <li>• <u>DOE and EPA, 2005</u>, “Action Memorandum #1 for the 300 Area Facilities,” U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, January 20.</li> <li>• <u>DOE and EPA, 2006</u>, “Action Memorandum #2 for the 300 Area Facilities,” U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, May 16.</li> <li>• <u>DOE and EPA, 2006</u>, “Action Memorandum #3 for the 300 Area Facilities,” U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, November 30.</li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Following end of operational period for PNNL facilities (assumed no earlier than 2023), D4 all buildings and facilities; remediate consistent with 300 Area contaminated soil sites if needed.</li> </ul>
CLEANUP ACTION:	<b>RC-6 River Corridor – Remediate 300 Area Contaminated Soil Sites*</b>
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Final and interim RODs, ESDs, and an action memorandum are in place to remove contaminated soil, structures and debris and dispose of the debris at ERDF or the Waste Isolation Pilot Plant as appropriate.</p> <ul style="list-style-type: none"> <li>• <u>CCN 9103432</u>, 1991, “Action Memorandum Approval: 316-5 Process Trenches, U.S. Department of Energy (DOE) Hanford Site, Richland, Washington” (letter to W. Bixby, U.S. Department of Energy, Richland Operations Office from C.E. Findley and R. Stanley), U.S. Environmental Protection Agency, Seattle, Washington, July 15.</li> <li>• <u>EPA/ROD/R10-96/143</u>, 1996, <i>Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ESD/R10-00/505</u>, 2000, <i>USDOE Hanford 300 Area, 300-FF-1 Operable Unit, Hanford Site, Benton County, Washington Explanation of Significant Difference (ESD)</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ESD/R10-00/524</u>, 2000, <i>Explanation of Significant Difference for the 300-FF-5 Record of Decision</i>, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-01/119</u>, 2001, <i>Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2004b</u>, <i>Explanation of Significant Differences for the 300-FF-2 Operable Unit Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2009c</u>, <i>Explanation of Significant Differences for the 300-FF-2 Operable Unit Interim Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> </ul>

**Table A-2. Summary of Cleanup Actions and Plausible Alternatives – River Corridor. (7 pages)**

<b>Range of Plausible Alternatives</b>			
<ul style="list-style-type: none"> <li>• RTD contaminated soil sites to achieve remedial action objectives**; backfill, contour, and revegetate excavations. (Note: DOE considers the interim RTD actions as the likely final actions for the waste sites that have been or will be remediated under the applicable 300 Area RODs. The 300 Area interim RODs for waste sites will be covered by the six final RODs for the River Corridor currently being worked through a final RI/FS process.)</li> </ul> <p>No other alternatives are contemplated at this time for 300-FF-1 Operable Unit (cleanup action has been completed in accordance with final cleanup decision/ROD for 300-FF-1 and 300-FF-5 Operable Units, <a href="#">EPA/ROD/R10-96/143</a>), or for 300-FF-2 Operable Unit.</p> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>* Includes 618-10 and 618-11 Burial Grounds, and contaminated soils associated with areas outside the FFTF complex.</p> <p>** In accordance with applicable interim action RODs.</p>			
<b>CLEANUP ACTION:</b>	<b>RC-7 River Corridor – Restore 300 Area Groundwater To Beneficial Use</b>		
<b>Cleanup Decision Summary and Relevant Decision Documents</b>			
<p>The interim ROD selected monitoring and institutional controls for uranium contamination in groundwater. Treatability tests to sequester uranium in the vadose zone and groundwater are being evaluated for use in the cleanup of uranium in groundwater.</p> <ul style="list-style-type: none"> <li>• <a href="#">EPA/ROD/R10-96/143</a>, 1996, <i>Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <a href="#">WAC 173-340</a>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> <li>– <a href="#">WAC 173-340-720</a>, “Groundwater Cleanup Standards.”</li> </ul> </li> </ul>			
<b>Range of Plausible Alternatives</b>			
<ul style="list-style-type: none"> <li>• Install in situ phosphate/polyphosphate treatment to sequester uranium in the vadose zone and monitor effectiveness.</li> <li>• Install in situ phosphate/polyphosphate treatment to sequester uranium in the groundwater and monitor effectiveness.</li> <li>• Shear-thinning injection at top of the aquifer to sequester uranium.</li> <li>• RTD of contaminated rewetted zone of the deep vadose zone.</li> <li>• Transition to surveillance and maintenance for post-treatment groundwater monitoring.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p><b>Note:</b> Alternatives based on pumping and treating the groundwater are not considered plausible due to high aquifer permeability and river intrusion.</p>			
D4	= deactivate, decontaminate, decommission, and demolish.	PNNL	= Pacific Northwest National Laboratory.
D&D	= decontamination and decommissioning.	RAO	= remedial action objective.
DOE	= U.S. Department of Energy.	RCRA	= <i>Resource Conservation and Recovery Act</i> .
ERDF	= Environmental Restoration Disposal Facility	RI/FS	= remedial investigation/feasibility study.
ESD	= explanation of significant differences.	ROD	= record of decision.
FFTF	= Fast Flux Test Facility.	RTD	= remove, treat, and dispose.
ISS	= interim safe storage.	SSE	= safe storage enclosure.
P&T	= pump-and-treat.	WAC	= Washington Administrative Code.
<sup>1</sup> RC-1 River Corridor – Disposition 100 Area Reactors (Except B Reactor) was removed from the Lifecycle Report in response to comments that the 1993 National Environmental Policy Act ROD is considered a final action (see Appendix C, Table C-3)			

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	<b>CP-1 Central Plateau – Disposition Remaining Outer Area Buildings And Facilities</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
<p>Action memoranda are in place to D4 buildings and facilities to slab-on-grade and evaluate below-grade portions for contamination. Future cleanup decisions for remaining buildings and facilities will be included in decision documents (e.g., action memoranda, RODs). DOE considers D&amp;D of buildings and other structures to be final cleanup decisions if all regulated contaminants have been removed in accordance with an applicable action memorandum. Alternatives do not need to be considered where such D&amp;D has been completed.</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2008-80-ADD1</u>, 2010, <i>Action Memorandum for the Non-Time Critical Removal Action for the 212-N, 212-P, and 212-R Facilities, Addendum 1: Disposition of Railcars</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2010-22</u>, 2010, <i>Action Memorandum for General Hanford Site Decommissioning Activities</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>• D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions consistent with Central Plateau Outer Area contaminated soil sites.</li> </ul>	
CLEANUP ACTION:	<b>CP-2 Central Plateau – Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 Operable Units)</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
<p>An interim ROD, ESD, and action memoranda are in place to remove contaminated soil, structures, and debris with onsite disposal at ERDF. Future cleanup decisions for remaining soil sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> <li>• <u>EPA/ROD/R10-99/039</u>, 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</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2009a</u>, <i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>DOE/RL-2009-48</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>• RTD contaminated soil sites to achieve RAOs comparable to 100 Areas; backfill, contour, and revegetate excavations.</li> <li>• RTD all sites except ponds; allow monitored natural attenuation for large pond sites with presence of existing vegetated soil covers.</li> <li>• Allow monitored natural attenuation to proceed for all sites under long-term stewardship with appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	CP-3 Central Plateau – Disposition Below-Grade Portions of Plutonium Finishing Plant
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>A non-time critical action memorandum is in place, associated TPA milestone decision documents are complete and approved, and D4 activities are being completed for above-grade structures of PFP. Final decisions and cleanup actions have not been made yet for below-grade structures and contaminated areas that are not identified in the action memorandum.</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2005-13</u>, 2005, <i>Action Memorandum for the Plutonium Finishing Plant, Above-Grade Structures Non-Time Critical Removal Action</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Evaluate below-grade portions for residual contamination; leave remaining below-grade structures and contaminated areas in-place and transition to long-term stewardship with appropriate institutional controls.</li> <li>• RTD all PFP below-grade structures and contaminated areas; backfill and revegetate.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>
CLEANUP ACTION:	CP-4 Central Plateau – Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 Operable Unit)
	<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with onsite disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2009-48</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>
	<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Remove all contents and D4 B Plant Canyon Building, including below-grade foundation; remove all contaminated materials, associated waste sites, and contaminated soils to achieve RAOs; dispose all wastes and debris at approved facility.</li> <li>• Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>• Condition contents, retrieve associated waste site contaminated soils and debris, and place in B Plant Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>• Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	CP-5 Central Plateau – Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 Operable Unit)
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with onsite disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> <li>• <i>DOE/RL-2009-48, 2009, Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</i></li> <li>• <i>DOE/RL-2009-37, 2009, Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</i></li> <li>• <i>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.</i></li> </ul> <p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Remove all contents and D4 PUREX Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soils to achieve remedial action objectives; dispose all wastes and debris at approved facility</li> <li>• Condition contents for placement in spaces below canyon deck level; Stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>• Condition contents, retrieve associated waste site contaminated soils and debris, and place in PUREX Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>• Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including ICs and 5-year reviews of remedy effectiveness.</p> <p>Note: Cleanup decisions affecting Disposition of the PUREX Canyon Building/Associated Waste Sites and Disposition of the PUREX Storage Tunnels should be aligned, and cleanup actions should be coordinated and integrated as much as practical.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	CP-6 Central Plateau – Disposition PUREX Storage Tunnels (200-CP-1 Operable Unit)
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made for the PUREX Storage Tunnels.</p> <ul style="list-style-type: none"> <li>TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>Maintain safe storage; perform hazardous waste facility closure consistent with RCRA Permit; remediate radionuclides consistent with CERCLA; conduct post-closure monitoring.</li> <li>Stabilize wastes and prepare tunnels for in-place disposal; install barrier; perform post-closure care and transition to long-term stewardship.</li> <li>Remove and dispose wastes and contaminated equipment from tunnels; evaluate tunnels for residual contamination; if needed, remediate tunnels consistent with Central Plateau 200 East Inner Area contaminated soil sites.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>Note: Cleanup decisions affecting Disposition of the PUREX Storage Tunnels and Disposition of the PUREX Canyon Building/Associated Waste Sites should be aligned, and cleanup actions should be coordinated and integrated as much as practical.</p>	
CLEANUP ACTION:	CP-7 Central Plateau – Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 Operable Unit)
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with onsite disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> <li><u>DOE/RL-2009-48</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li><u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li><u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>Remove all contents and D4 REDOX Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soils to achieve remedial action objectives; dispose all wastes and debris at approved facility.</li> <li>Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>Condition contents, retrieve associated waste site contaminated soils and debris, and place in REDOX Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	CP-8 Central Plateau – Disposition T Plant Canyon Building/Associated Waste Sites
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made for the T Plant Canyon Building and Associated Waste Sites. Current expectations are that T Plant will be used for several more years to support other remediation and waste management work.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Continue ongoing operations until 2036; Transition to D4 in 2038; fulfill hazardous waste facility closure obligations consistent with RCRA permit</li> <li>• Remove all contents and D4 T Plant Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soils to achieve remedial action objectives; dispose all wastes and debris at approved facility.</li> <li>• Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>• Condition contents, retrieve associated waste site contaminated soils and debris, and place in T Plant Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking.</li> <li>• Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	CP-9 Central Plateau – Disposition Cesium/Strontium Capsules
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made for final disposition of the cesium/strontium capsules. Decisions have been deferred to future decision-making processes.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Package and transport capsules from WESF to dry storage; store capsules pending final disposition; direct dispose of capsules at a geologic repository.</li> <li>• Incorporate capsules into immobilized high-level waste glass at WTP.</li> <li>• Store capsules at Hanford Site for 300 years (approximately 10 half-lives); after natural decay, direct dispose of capsules as mixed low-level radioactive waste.</li> </ul>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	CP-10 Central Plateau – Remediate 200-SW-1 Operable Unit*
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b>            No cleanup decisions have been made for the 200-SW-1 Operable Unit.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b>            The following reflect alternatives being considered as part of <u>DOE/EA-1707D</u>, <i>Environmental Assessment Closure of Nonradioactive Dangerous Waste Landfill (NRDWL) and Solid Waste Landfill (SWL)</i>; the following alternatives are not intended to presume the outcome of the ongoing environmental assessment process:</p> <ul style="list-style-type: none"> <li>• Install an evapotranspiration barrier over both landfills; upgrade monitoring and infrastructure systems; perform post-closure monitoring and caretaking.</li> <li>• Partial RTD with removal of waste material from both landfills and impacted soils as deep as 10 feet below the waste material; backfill and revegetate; if necessary (e.g., contaminated residues remain), perform post-closure monitoring and caretaking.</li> <li>• Remove all waste material from both landfills; excavate and RTD all contaminated soils, to groundwater if necessary; backfill and revegetate.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>* Includes NRDWL and SWL.</p>	
CLEANUP ACTION:	CP-11 Central Plateau – Disposition Remaining Liquid Waste Disposal Facilities*
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b>            No cleanup decisions have been made for the Remaining Liquid Waste Disposal Facilities.            TBD – No decision documents currently available.</p>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Closure of facilities will be according to approved operating plans and closure plans.</li> <li>• If needed, may remediate contaminated soils under zone closure; May include partial RTD with various capping alternatives; Monitoring and institutional controls after closure may be required.</li> <li>• RTD all contaminated soils; backfill and revegetate.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>* Includes State-Approved Land Disposal Site; State Waste Discharge Permit Sites; 100-N Sewage Lagoon; On-Site Sewage Systems; National Pollutant Discharge Elimination System Outfalls; and Underground Injection Control Well Sites.</p>	
CLEANUP ACTION:	CP-12 Central Plateau – Disposition Remaining Waste Treatment, Storage and Disposal Facilities*
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b>            No cleanup decisions have been made for the Remaining Waste Treatment, Storage And Disposal Facilities.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Closure of facilities will be according to approved operating plans and closure plans (e.g., RCRA Closure Plans); consequently, cleanup actions will be determined and accomplished in accordance with applicable regulatory and permit/license requirements. No other alternatives are being considered.</li> </ul> <p>* Includes LERF/ETF, WESF, WRAP, 222-S Laboratory, IDF, and Inert Waste Landfill/Pit 9.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	<b>CP-13 Central Plateau – Remediate 200-IS-1 Operable Unit</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>The 200-IS-1 Operable Unit waste sites include tanks (except those considered to be included in the Tank Farms), pipelines, pits, diversion boxes, and associated ancillary equipment. Several pipelines are being addressed (in part) per 200-MG-1 removal actions; Final remediation decisions will be addressed in RODs; TSD ancillary equipment will be addressed in future RCRA Closure Plan(s); other media may be addressed via CERCLA process.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• RTD all contaminated equipment, materials, debris and soils to a depth that is determined by the TPA agencies to be protective of human health and ecological resources (depth TBD); backfill and revegetate.</li> <li>• RTD all contaminated equipment, materials, debris and soils; backfill and revegetate.</li> <li>• Stabilize select equipment in-place using technologies yet to be determined.</li> <li>• Leave everything in-place; maintain under long-term stewardship with appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	<b>CP-14 Central Plateau – Remediate 200-SW-2 Operable Unit</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made to remediate the 200-SW-2 Operable Unit. (Note that this operable unit is not a single contaminated site, but is actually comprised of a large number of land disposal units.)</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Excavation, treatment (as necessary), and disposal of all waste from within individual landfills.</li> <li>• Excavation, treatment (as necessary), and disposal of waste from selected sections of individual landfills followed by capping of remaining waste; includes continued cap maintenance and monitoring.</li> <li>• Capping of individual landfills; includes continued cap maintenance and monitoring.</li> <li>• In situ treatment/stabilization (e.g., vitrification or grouting) of portions of individual landfills followed by capping; includes continued cap maintenance and monitoring.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

<b>CLEANUP ACTION:</b>	<b>CP-15 Central Plateau – Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 Operable Unit)</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
<p>Several action memoranda are in place to remove contaminated soil, structures, and debris from 200 West Inner Area soil sites with disposal at ERDF. Future cleanup decisions for remaining waste sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>• RTD approximately half of waste sites and cap remainder.</li> <li>• RTD all waste sites; backfill and revegetate.</li> <li>• Cap and maintain under long-term stewardship with monitoring and appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
<b>CLEANUP ACTION:</b>	<b>CP-16 Central Plateau – Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 Operable Unit)</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
<p>Several action memoranda are in place to remove contaminated soil, structures, and debris from 200 East Inner Area soil sites with disposal at ERDF. Future cleanup decisions for remaining waste sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> <li>• <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>• RTD approximately half of waste sites and cap remainder.</li> <li>• RTD all waste sites; backfill and revegetate.</li> <li>• Cap and maintain under long-term stewardship with monitoring and appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	<b>CP-17 Central Plateau – Disposition Fast Flux Test Facility (FFTF) Complex</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>In 1995, DOE determined the FFTF would be deactivated. Other decisions have been deferred to future decision-making processes.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <p>The following reflect alternatives being considered as part of <u>DOE/EIS-0391</u>, <i>Draft Tank Closure and Waste Management Environmental Impact Statement</i>; the following alternatives are not intended to presume the outcome of the ongoing environmental impact process:</p> <ul style="list-style-type: none"> <li>• Entombment – Consolidate buildings and wastes, compact, and fill void spaces within the reactor containment building and contaminated ancillary buildings; install a landfill barrier over remaining structures and extend as needed to cover contaminated below-grade portions.</li> <li>• Removal – Remove contaminated equipment and structures; reduce above-grade portions of reactor containment building and ancillary buildings to slab-on-grade; backfill with soil, compact and stabilize remaining below-grade portions; contour and revegetate.</li> <li>• Remove and treat remote-handled special components at Hanford or INL; dispose of treated components at IDF or Nevada Test Site.</li> <li>• Store sodium; convert to caustic sodium hydroxide solution at Hanford or INL; reuse caustic sodium hydroxide solution for tank corrosion control or processing tank waste at WTP.</li> <li>• Leave structures in place with inert gas blanket for sodium residuals; transition to long-term stewardship with appropriate institutional controls.</li> </ul>	
CLEANUP ACTION:	<b>CP-18 Central Plateau – Disposition Remaining Buildings and Facilities Within FFTF Complex</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>In 1995, DOE determined the FFTF would be deactivated. Other decisions have been deferred to future decision-making processes.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• D4 all buildings per appropriate Removal Action Work Plan; if needed, remediate below-grade portions.</li> <li>• Leave structures in-place and transition to long-term stewardship with appropriate institutional controls.</li> </ul>	
CLEANUP ACTION:	<b>CP-19 Central Plateau –Disposition Remaining Inner Area Buildings And Facilities</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Cleanup decisions have been made for D&amp;D of some of the Remaining Inner Area Buildings and Facilities, and the applicable Action Memorandum is expected to cover future D&amp;D activities. DOE considers D&amp;D of buildings and other structures to be final cleanup decisions if all regulated contaminants have been removed in accordance with an applicable Action Memorandum. Alternatives do not need to be considered where such D&amp;D has been completed. (Note that cleanup decisions have been or will be made for the Canyon Buildings and Associated Waste Sites; see separate cleanup actions for these facilities.)</p> <ul style="list-style-type: none"> <li>• <u>DOE/RL-2010-22</u>, 2010, <i>Action Memorandum for General Hanford Site Decommissioning Activities</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions consistent with contiguous contaminated soil sites.</li> <li>• Leave structures in-place and transition to long-term stewardship with appropriate institutional controls.</li> </ul>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	<b>CP-20 Central Plateau – Remediate Contaminated Deep Vadose Zone (200-DV-1 Operable Unit)</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>No cleanup decisions have been made for the Deep Vadose Zone.</p> <ul style="list-style-type: none"> <li>• TBD – No decision documents currently available.</li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Implement results of treatability testing in accordance with CERCLA and/or RCRA final decisions.</li> <li>• RTD all contaminated soils, to groundwater if necessary and technically practical; backfill and revegetate.</li> <li>• In-place treatment to destroy, immobilize, or capture, treat and dispose contaminants.</li> <li>• Soil flushing with pump and treat or pore water removal.</li> <li>• Install surface barriers.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with appropriate institutional controls.</li> </ul>	
CLEANUP ACTION:	<b>CP-21 Central Plateau – Restore 200 West Groundwater To Beneficial Use (200-UP-1 Operable Unit)</b>
<p><b>Cleanup Decision Summary and Relevant Decision Documents</b></p> <p>Interim RODs are in place for cleanup of high concentrations of selected contaminants and a final ROD is in place for the 200-ZP-1 operable unit to address all contaminants. The proposed plan for the 200-UP-1 Groundwater Operable Unit remedy was issued in July 2012.</p> <ul style="list-style-type: none"> <li>• DOE/RL-2010-05, 2012, <i>Proposed Plan for Remediation of the 200-UP-1 Groundwater Operable Unit</i>, U.S. Department of Energy, Richland, Washington, Rev. 0, July.</li> <li>• <u>EPA/ROD/R10-95/114</u>, 1995, <i>Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA/ROD/R10-97/048</u>, 1997, <i>Declaration of the Record of Decision, USDOE Hanford 200-UP-1 Operable Unit, 200 Area, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2009d</u>, <i>Explanation of Significant Differences for the Interim Action Record of Decision for the 200-UP-1 Groundwater Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>EPA, 2008</u>, <i>Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.</li> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul> </li> </ul>	
<p><b>Range of Plausible Alternatives</b></p> <ul style="list-style-type: none"> <li>• Expand 200-ZP-1 extraction, treatment and injection capacity; install extraction and transfer system for 200-UP-1; operate pump and treat to achieve remedial action objectives; continue monitoring.</li> <li>• For 200-UP-1 Only – Allow monitored natural attenuation to proceed under long-term stewardship with appropriate institutional controls.</li> </ul> <p><u>DOE/RL-2009-122</u>, <i>Remedial Investigation/Feasibility Study for the 200-UP-1 Groundwater Operable Unit</i>, includes an evaluation of three remedial alternatives. Each of these alternatives would use P&amp;T, monitored natural attenuation, and hydraulic containment to address technetium-99, uranium, and iodine-129 contamination within different time periods.</p>	

**Table A-3. Summary of Cleanup Actions and Plausible Alternatives – Central Plateau. (11 pages)**

CLEANUP ACTION:	<b>CP-22 Central Plateau – Restore 200 East Groundwater To Beneficial Use (200-PO-1/200-BP-5 Operable Units)</b>	
<b>Cleanup Decision Summary and Relevant Decision Documents</b>		
No cleanup decisions have been made for 200 East Groundwater.		
<ul style="list-style-type: none"> <li>• <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington.</li> <li>– <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.”</li> </ul>		
<b>Range of Plausible Alternatives</b>		
<ul style="list-style-type: none"> <li>• Install pump and treat system for 200-BP-5 Operable Unit; implement monitored natural attenuation for 200-PO-1 Operable Unit; perform well support and maintenance activities.</li> <li>• Allow monitored natural attenuation to proceed under long-term stewardship with appropriate institutional controls.</li> <li>• Install pump and treat system for 200-BP-5 and selective pump and treat for 200-PO-1 hot spots.</li> </ul>		
<b>Note:</b> 400 Area groundwater cleanup actions are included as part of 200-PO-1 Operable Unit.		
<p><u>DOE/EA-1707D</u>, 2011, <i>Environmental Assessment for Closure of Nonradioactive Dangerous Waste Landfill (NRDWL) and Solid Waste Landfill (SWL)</i>, Revised Predecisional Draft, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</p> <p><u>DOE/EIS-0391</u>, 2009, <i>Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site</i>, Richland Washington, Draft, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</p> <p><u>DOE/RL-2009-122</u>, 2010, <i>Remedial Investigation/Feasibility Study for the 200-UP-1 Groundwater Operable Unit, Draft A</i>, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</p>		
CERCLA=	Comprehensive Environmental Response, Compensation, and Liability Act of 1980.	PUREX = Plutonium-Uranium Extraction (Plant).
D&D	= decontamination and decommissioning.	RAO = remedial action objective.
D4	= deactivation, decontamination, decommissioning, and demolition.	RCRA = Resource Conservation and Recovery Act of 1976.
DOE	= U.S. Department of Energy.	ROD = record of decision.
ERDF	= Environmental Restoration Disposal Facility.	RTD = remove, treat, and dispose.
ESD	= explanation of significant difference.	TBD = to be determined.
FFTF	= Fast Flux Test Facility.	TPA = Tri-Party Agreement.
IDF	= Integrated Disposal Facility.	TSD = treatment, storage, and disposal.
INL	= Idaho National Laboratory.	WAC = Washington Administrative Code.
P&T	= pump-and-treat.	WESF = Waste Encapsulation and Storage Facility.
PFP	= Plutonium Finishing Plant.	WTP = Waste Treatment and Immobilization Plant.

**Table A-4. Summary of Cleanup Actions and Plausible Alternatives – Tank Waste. (2 pages)**

CLEANUP ACTION:	<b>TW-1 Tank Waste – Tank Retrieval and Single-Shell Tank Farm Closure</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
In the February 26, 1997 <i>Federal Register</i> , DOE decided to retrieve and treat tank waste (62 FR 8693). Further decisions have been deferred to future decision-making processes.	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>Retrieve SST wastes (assumes two retrieval technologies) to meet milestones in the Consent Decree and TPA Settlement Package (DOE and Ecology, 2010); achieve designated retrieval objectives or limits of technology; remediate structures and soils and install cover/cap to meet closure performance standards; maintain post-closure care and monitoring consistent with RCRA Permit.</li> </ul> <p>The following reflect alternatives being considered as part of the TC&amp;WM EIS (DOE/EIS-0391); the following alternatives are not intended to presume the outcome of the ongoing environmental impact process:</p> <ul style="list-style-type: none"> <li>Grout, cap and close SSTs with residual waste in-place; monitor and implement institutional controls after closure; eventual transition to long-term stewardship.</li> <li>Construct new DST capacity sufficient to complete SST retrieval; close SSTs and implement post-closure care, monitoring, and institutional controls; eventual transition to long-term stewardship.</li> <li>RTD some SSTs and ancillary facilities, residual waste, and contaminated soils; backfill and revegetate.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	<b>TW-2 Tank Waste – Tank Waste Treatment</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
In the February 26, 1997 <i>Federal Register</i> , DOE decided to retrieve, separate, vitrify, and dispose of the tank waste (62 FR 8693). The immobilized LAW would be prepared for onsite disposal and the vitrified HLW would be placed in interim storage pending future disposal at a national geologic repository. Further decisions have been deferred to future decision-making processes.	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>Pretreat, condition and immobilize tank wastes in the WTP to meet TPA milestones and comply with RCRA Permit; operate supplemental treatment systems (assumed to be second LAW) to augment WTP capacity; place immobilized waste in canisters; transfer ILAW for disposal at the IDF; provide capacity to store all immobilized HLW in Hanford Shipping Facility (new) until a final repository is available.</li> <li>Perform blending and waste characterization at a new Enhanced Waste Receiving Facility.</li> </ul>	
CLEANUP ACTION:	<b>TW-3 Tank Waste – Secondary Waste Treatment</b>
<b>Cleanup Decision Summary and Relevant Decision Documents</b>	
No cleanup decisions have been made. Decisions have been deferred to future decision-making processes.	
<ul style="list-style-type: none"> <li>TBD – No decision documents currently available.</li> </ul>	
<b>Range of Plausible Alternatives</b>	
<ul style="list-style-type: none"> <li>Recycle liquid waste streams within WTP; manage residual liquid wastes at LERF/ETF/SALDS; treat solid wastes from WTP and ETF and dispose at the IDF; manage and disposition other secondary waste (e.g., failed melters).</li> </ul> <p>Other plausible alternatives will be determined at a later date.</p> <p>Note: Any radioactive HLW will be stored and eventually shipped to a geologic repository.</p>	

**Table A-4. Summary of Cleanup Actions and Plausible Alternatives – Tank Waste. (2 pages)**

CLEANUP ACTION:	<b>TW-4 Tank Waste – Double-Shell Tank Closure</b>														
<b>Cleanup Decision Summary and Relevant Decision Documents</b>															
No cleanup decisions have been made. Decisions have been deferred to future decision-making processes.															
<b>Range of Plausible Alternatives</b>															
<ul style="list-style-type: none"> <li>• Retrieve DST wastes consistent with TPA; achieve designated retrieval objectives or limits of technology; remediate structures and soils and install cover/cap to meet closure performance standards; maintain post-closure care and monitoring consistent with RCRA Permit.</li> <li>• RTD DSTs and ancillary facilities, residual waste, and contaminated soils; backfill and revegetate.</li> <li>• Stabilize, cap and close DSTs with residual waste in-place; monitor and implement institutional controls after closure; eventual transition to long-term stewardship.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>															
CLEANUP ACTION:	<b>TW-5 Tank Waste – WTP Closure</b>														
<b>Cleanup Decision Summary and Relevant Decision Documents</b>															
<p>The RCRA Hanford Dangerous Waste Permit, Operable Unit-10, Chapter 11 states “Clean closure is the goal for the WTP. The closure plan will be revised if efforts to achieve the clean closure standards for the WTP structures or soil are unsuccessful. The “modified closure” approach may be followed if feasible, as provided in Condition II.K.3 of the Hanford RCRA Permit. It may also be closed as a landfill, as provided in Condition II.K.4 of the Hanford RCRA Permit, if the clean closure standards are not technically or economically feasible. The revised closure plan will be accompanied by a written request for modification of the permit.” Further decisions have been deferred to future decision-making processes.</p> <ul style="list-style-type: none"> <li>• <u>WA7890008967</u>, 2011, <i>Draft Hanford Site Dangerous Waste Permit, (Site-Wide Permit) Revision 9</i>, as amended, Washington State Department of Ecology, Richland, Washington.</li> </ul>															
<b>Range of Plausible Alternatives</b>															
<ul style="list-style-type: none"> <li>• Demolish ancillary facilities/structures to the primary containment structure; seal containment structure and construct a soil-based environmental barrier over the containment structure; remediate structures and soils; maintain post-closure care and monitoring consistent with RCRA Permit.</li> <li>• D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions.</li> <li>• Perform clean closure of WTP and all ancillary facilities/structures.</li> <li>• Leave structures in-place and transition to long-term stewardship with appropriate institutional controls.</li> </ul> <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to long-term stewardship, including institutional controls and 5-year reviews of remedy effectiveness.</p>															
<p><u>62 FR 8693</u>, “Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland, WA,” <i>Federal Register</i>, (February 26, 1997).</p> <p><u>DOE/EIS-0391</u>, 2009, <i>Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site</i>, Richland Washington, Draft, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</p> <p><u>DOE and Ecology</u>, 2010, <i>Consent Decree and Tri-Party Agreement Settlement Package</i>, order signed October 25, 2010, settling State of Washington v. Chu, United States District Court, Eastern District of Washington, Case No. CV-08-5085-FVS.</p> <p><i>Resource Conservation and Recovery Act of 1976, 42 USC 6901</i>, et seq.</p> <p><u>WA7890008967</u>, 2011, <i>Draft Hanford Site Dangerous Waste Permit, (Site-Wide Permit), Revision 9</i>, as amended, Washington State Department of Ecology, Richland, Washington.</p>															
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">DST = double-shell tank.</td> <td style="width: 50%;">SALDS = State-Approved Land Disposal Site.</td> </tr> <tr> <td>ETF = Effluent Treatment Facility.</td> <td>SST = single-shell tank.</td> </tr> <tr> <td>HLW = high-level waste.</td> <td>TC&amp;WM EIS = Tank Closure and Waste Management Environmental Impact Statement.</td> </tr> <tr> <td>IDF = Integrated Disposal Facility.</td> <td>TPA = Tri-Party Agreement.</td> </tr> <tr> <td>ILAW = immobilized low-activity waste.</td> <td>WTP = Waste Treatment and Immobilization Plant.</td> </tr> <tr> <td>LAW = low-activity waste.</td> <td></td> </tr> <tr> <td>LERF = Liquid Effluent Retention Facility.</td> <td></td> </tr> </table>		DST = double-shell tank.	SALDS = State-Approved Land Disposal Site.	ETF = Effluent Treatment Facility.	SST = single-shell tank.	HLW = high-level waste.	TC&WM EIS = Tank Closure and Waste Management Environmental Impact Statement.	IDF = Integrated Disposal Facility.	TPA = Tri-Party Agreement.	ILAW = immobilized low-activity waste.	WTP = Waste Treatment and Immobilization Plant.	LAW = low-activity waste.		LERF = Liquid Effluent Retention Facility.	
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The TPA agencies determined that the 2013 Lifecycle Report should analyze the Central Plateau cleanup actions identified in Appendix A, Table A-3 as: 1) Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 Operable Units), and 2) Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 Operable Unit). The TPA agencies considered that a range of cleanup alternatives with a significant Remove, Treat and Dispose (RTD) component would describe the reasonable upper bound alternative for these operable unit waste sites. Because the DOE planning case includes a significant RTD component, the TPA agencies agreed that this alternatives analysis would document the DOE planning case range of alternatives, costs and schedule for cleanup of the waste sites in these operable units. The alternatives analysis is presented in Section 5.7 of this Lifecycle Report.

### **A.2.2 DOE’S APPROACH FOR ANALYZING ALTERNATIVES AND DESCRIBING THE REASONABLE UPPER BOUND**

TPA Milestone M-036-01 refers to a “reasonable upper bound” with respect to presenting information about cleanup alternatives, but the milestone does not include a ready definition for “reasonable upper bound.” To ensure the Lifecycle Report provides information that meets the requirement and intent of the milestone, DOE has relied on the following conceptual framework.

The reasonable upper bound for a range of alternatives or alternative costs describes a cleanup action alternative that most people can agree:

- Is near or at the maximum feasible extent of the available engineered solutions.
- Provides an acceptable level of health and environmental protection when complete.
- Is appropriate relative to the effort expended and the benefits achieved.

Applying this concept presumes the ability to satisfy several related and dependent conditions:

- First, that mutual agreement can be achieved among responsible individuals who have sufficient information available to them, and are able to objectively consider the relevant science and applicable standards within the context of fiscal and public policy considerations.
- Second, that potential health and environmental concerns are sufficiently understood, and that an alternative will be effective at reducing the potential concerns as claimed.
- Last, that an alternative exists that bounds the upper range of a set of choices, and this upper-bounding alternative can provide tangible advantages that the other available choices would not.

DOE will apply these conditions and the framework outlined above in the process of analyzing alternatives and identifying the reasonable upper bound for the cleanup actions that are evaluated in-depth in the Lifecycle Report.

The purpose of analyzing and selecting alternatives is to formally evaluate alternative project solutions (e.g., designs) so that the alternative that best meets the project need is selected. DOE has applied a systematic process for individual cleanup actions to more definitively describe a range of plausible alternatives; identify a reasonable upper bound for that range of alternatives; and develop schedule and cost information associated with implementing that upper bounding cleanup alternative. For the process followed for the cost estimate alternative analyses,

DOE has adapted and broadly applied the approach it follows in developing and selecting alternatives for other types of engineering and construction projects. This approach is summarized further below, and includes the following main steps:

1. Describe the functional requirements the project must meet.
2. Identify any constraints that could affect the project's conduct.
3. Develop and analyze potential solutions until a preferred project alternative emerges.

Alternative development and analysis begins with preparation of functional requirements to describe what the project is expected to do. The functional requirements define the objectives or standards that must be achieved, and focus primarily on physical, transformational, safety, environmental, operational, and other essential characteristics of a project's function. A graded approach is followed so that more effort is expended on developing functional requirements for complex, highly hazardous, and first-of-kind projects than for simple projects that have been implemented many times before.

After the functional requirements are developed, project constraints are identified, and applied to compare and evaluate different potential solutions. Constraints are anything that may impact or alter the implementation of a proposed solution. Examples of constraints include:

- **Time.** If a potential solution cannot be implemented on the required schedule, then that alternative is not feasible, regardless of its merits.
- **Organizational/Human Factors.** If a potential solution requires more expertise than is available within reasonable or existing cost and schedule limits, then that alternative may not be as good as a less technically challenging, but adequate solution.
- **Regulatory Requirements.** For environmental cleanup projects, the final closure may drive alternative selection, as only one or two concepts may deliver the mandatory final closure (e.g., approved CERCLA [42 USC 9601] ROD). Similarly, stewardship and ownership issues of the site during or after project completion can affect alternative selection.
- **Stakeholder Issues.** Some alternatives, regardless of how "good" they may be, will be unacceptable to important project stakeholders. In such cases, another less controversial solution will have to be found.
- **Risk.** All alternatives will contain risks. Other factors being approximately equal, that solution with the lowest risk would be preferred.
- **Estimated Cleanup Cost.** A potential solution with higher initial cost, but lower costs over the life of the project may be preferable to an alternative with cheaper construction costs, but higher estimated cleanup cost.

Once the main requirements and constraints are known, a number of alternative solutions can be developed that could accomplish the project need. The number and variety of alternatives will be influenced by technical issues and stakeholder interests.

Next, potential solutions (i.e., cleanup alternatives) that meet the project need are further analyzed to determine an optimal balance between meeting the functional requirements and performing the work in accordance with funding, schedule, and other constraints. For the Lifecycle Report, this analysis also includes assessing which alternative scenario is most likely to represent the reasonable upper bound of the plausible alternatives.

When complete, the process should show that a reasonably full range of design concepts, stakeholder values, safety, technology development, implementability, regulatory requirements, and other relevant factors were considered in the development of the reasonable upper bound for the range of plausible alternatives. Documentation of the alternatives analyzed, the reasonable upper bound selection, schedule and cost information about the reasonable upper bound, and rationale for the selection will be included in the Lifecycle Report for those alternatives that have been analyzed in the current year's report.

It is important to note that the rigorous and extensive system DOE usually applies for formal construction project development has been adapted, rather than fully applied, to analyze alternatives and develop reasonable upper bounds for the Lifecycle Report. Nor should the process applied in the Lifecycle Report be confused with the very scrupulous cleanup study and approval system in place for complying with CERCLA and RCRA regulations. Those requirements are intended to lead to formal, public decision making and employ a series of incremental review and authorization steps intended to achieve compliance with statutory and regulatory obligations. The Lifecycle Report does not equal those formal legal procedures and does not result in analyses that are of the same rigor and completeness as when the CERCLA and RCRA processes are followed.

### **A.3 RATIONALE AND ANTICIPATED SCHEDULE FOR ANNUAL SELECTION OF CLEANUP ACTIONS TO BE ANALYZED**

As discussed in Appendix C, many final Hanford Site cleanup decisions are yet to be made. The TPA Milestone M-036-01 requirement to include alternatives in the Lifecycle Report where there are no final cleanup decisions creates a substantial obligation.

Rather than be overwhelmed with analyzing alternatives for an exhaustive list of non-final decisions or, alternatively, have to prepare a complete but less substantive set of analyses, DOE has chosen to focus in each annual edition of the Lifecycle Report on a limited number of cleanup actions where final decisions have not yet been made. DOE believes that this selective approach has several advantages, in that it:

- Allows more attention to be paid to higher priority cleanup actions.
- Provides more time to consider alternatives and assumptions that better reflect the values of affected parties.
- Enables more thorough development of the bases and assumptions for assembling each set of plausible alternatives and for defining the reasonable upper bound.
- Can focus on cleanup action alternatives when timing coincides better with relevant decision-making processes, including the Federal budget cycle.
- Should promote more insightful and productive dialogues about Hanford Site planning and decision making.
- Makes effective and optimal use of available resources.

Each year, DOE will consider the following and similar criteria to select those cleanup actions for which alternatives will be developed and analyzed in the Lifecycle Report.

These criteria are not exclusive and no priority is implied by the order in which they are presented.

- **Status of Current Actions.** A number of interim actions are underway even in the absence of final decisions. In some cases, significant progress is being made consistent with the expectations and values of the regulatory agencies, Tribal Governments, and affected Hanford stakeholders. DOE believes there would be little value in analyzing alternatives for many of these instances, particularly when cleanup is proceeding with broad external support. In contrast, analyses of alternatives would be more useful where there has been little or no progress or agreement on how to proceed with cleanup.
- **Decision-making Timeframe.** At any given time, there are many cleanup decision-making processes at varying stages of progress. The development of alternatives can help inform these decision making processes, but can be less or more helpful at different times in each decision process. DOE prefers to analyze alternatives that will be supportive of decision-making timeframes.
- **Alternatives Availability.** In some cases, none or very few alternatives may be available for consideration, while in other cases, a large range of options may be available to consider. DOE expects that generally it would not be helpful to analyze alternatives when essentially no choices exist, and that analyses could be quite helpful in framing and/or narrowing choices when there are many potential alternatives and/or a wide variety of interests and values to be considered.
- **Existing Knowledge Base.** Some Hanford Site cleanup actions are already the subject of extensive studies, while others are not well understood. DOE believes it will generally be more helpful to put attention where little is known about particular cleanup actions and for which more and better knowledge could improve decision making. However, there may be instances where a large base of knowledge exists, and the Lifecycle Report could help in aggregating and synthesizing this information into a single discussion.
- **Risk/Benefit.** Cleanup actions will have varying effects on reducing health and environmental risks and achieving benefits for the public, workers, and environment. In selecting cleanup actions to evaluate, DOE will generally prefer those that could contribute most positively to ameliorating Hanford Site risks and gaining health and environmental benefits.
- **Budget Planning.** Information in the Lifecycle Report will be used to help with planning and requesting funding for future cleanup actions. DOE will be likely to develop information about cleanup action alternatives when such information coincides with and be supportive of budget planning cycles.

In addition to the criteria listed above, DOE intends to consider recommendations from EPA and Ecology, government-to-government consultations (e.g., Tribal Nations, Oregon), Hanford Advisory Board advice, input from Hanford stakeholders, and public comments received on previous Lifecycle Reports.

The cleanup actions that have been analyzed in-depth in Lifecycle Reports are summarized in Table A-5. For details about the cost estimate alternative analysis of any of these cleanup actions, see the specific Lifecycle Report referenced in Table A-5.



Table A-6 presents this schedule along with an explanation of the rationale for analyzing alternatives in the recommended Lifecycle Report year.

**Table A-6. Anticipated Schedule for Detailed Analyses of Cleanup Action Alternatives. (4 pages)**

<b>2014 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT</b>	
<b>Cleanup Actions</b>	<b>Rationale/Bases for Analyzing Alternatives This Report Year</b>
<ul style="list-style-type: none"> <li>Central Plateau – Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 Operable Unit)</li> <li>Central Plateau – Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 Operable Unit)</li> <li>Central Plateau – Remediate Contaminated Deep Vadose Zone (200-DV-1 Operable Unit)</li> </ul>	Based on new TPA milestones for these canyon facilities, it is unlikely that extensive evaluation of alternatives will have been performed yet (e.g., in feasibility studies). It may be reasonable to develop alternatives in the 2014 Lifecycle Report that could benefit future planning and budget requests.
<ul style="list-style-type: none"> <li>Central Plateau – Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 Operable Units)</li> </ul>	TPA Milestone M-015-21A requires FS and proposed plan submittal by June 30, 2015. It may be reasonable to develop alternatives in the 2014 Lifecycle Report that could benefit future planning and budget requests.
<b>2015 (or Later) HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT</b>	
<b>Cleanup Actions</b>	<b>Rationale/Bases for Analyzing Alternatives This Report Year</b>
<ul style="list-style-type: none"> <li>Central Plateau – Remediate Tanks, Pipelines, Pits, Boxes, Septic Tank and Drain Fields (200-IS-1 Operable Unit)</li> <li>Central Plateau – Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 Operable Unit)</li> </ul>	The waste sites to be included in the 200-IS-1 and 200-EA-1 Operable Units are subject to ongoing TPA negotiations that are expected to be resolved in the 2013 timeframe. CERCLA/RCRA decision document submittals are scheduled to occur by December 31, 2016 (TPA Milestone M-015-92B). Analyzing potential alternatives in the 2015 Lifecycle Report or later could provide information that would help inform the decision process.
<ul style="list-style-type: none"> <li>Central Plateau – Disposition Below-Grade Portions of PFP</li> <li>Central Plateau – Remediate 200-SW-1 Operable Unit</li> </ul>	Cleanup is proceeding consistent with existing decisions (e.g., interim ROD, Action Memorandum, RCRA interim status/final permit) and is reflected in current planning documents. Final decisions could be made within a year or two of 2015 timeframe and are expected to be compatible with interim decisions. Prior to developing the 2015 Lifecycle Report, decide whether alternatives should be analyzed based on status of final cleanup decision making.
<ul style="list-style-type: none"> <li>River Corridor – Disposition 100 Area former orchard contaminated soil sites (100-OL-1 Operable Unit)</li> </ul>	TPA Milestone M-015-95 requires RI/FS work plan submittal by April 30, 2013. It may be reasonable to develop alternatives in the 2015 Lifecycle Report that could benefit future planning and budget requests.
<ul style="list-style-type: none"> <li>Central Plateau – Disposition FFTF Complex</li> </ul>	It is expected that the TC&WM EIS (DOE/EIS-0391) will address decisions related to this cleanup action and that a final ROD will be issued before cleanup action alternatives must begin. If, instead, cleanup decisions have not been made, it may be timely to reassess whether the FFTF cleanup action could be analyzed.
<ul style="list-style-type: none"> <li>Central Plateau – Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 Operable Unit)</li> </ul>	New TPA Milestone M-085-30A requires RI/FS work plan submittal by December 31, 2017. It may be reasonable to develop alternatives after 2015 that could benefit future planning and budget requests.

**Table A-6. Anticipated Schedule for Detailed Analyses of Cleanup Action Alternatives. (4 pages)**

<ul style="list-style-type: none"> <li>Central Plateau – Disposition Cesium/Strontium Capsules</li> </ul>	<p>TPA Milestone M-092-05 requires DOE to determine a disposition path and establish interim milestones for the cesium/strontium capsules by June 30, 2017. Capsules are currently in safe storage and no immediate action is required. Other activities at the DOE complex will provide data and potential problem resolutions that will enhance consideration of alternatives for management and disposition of the cesium/strontium capsules. Prior to developing the 2017 Lifecycle Report, decide whether development of alternatives would benefit future planning and budget requests.</p>
<ul style="list-style-type: none"> <li>Central Plateau – Restore 200 West Groundwater to Beneficial Use (200-UP-1 Operable Units)</li> </ul>	<p>An interim action Record of Decision was issued in September 2012 that superseded the previous 200-UP-1 Operable Unit decisions. Deferral to after 2015 would allow final decisions to be made and coincide with subsequent CERCLA 5-year review.</p>
<ul style="list-style-type: none"> <li>River Corridor – Disposition 300 Area Facilities Retained by PNNL</li> </ul>	<p>Facilities will be maintained operational by PNNL until 2023, which is the assumed date to start closure and disposition of the facilities. Earlier analysis of alternatives would be premature and not needed for out-year budget planning.</p>
<ul style="list-style-type: none"> <li>Central Plateau (Outer Area) – Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 Operable Unit)</li> </ul>	<p>The few remaining structures in the Outer Area do not present imminent or significant threats to health or the environment. Cleanup actions are likely to be non-controversial and focused on RTD, with scope, schedule and cost sufficiently accounted for in planning documents. Analysis of alternatives before 2016 are not likely to contribute more useful information for out-year budget planning.</p>
<ul style="list-style-type: none"> <li>Central Plateau – Disposition PUREX Storage Tunnels (200-CP-1 Operable Unit)</li> </ul>	<p>TPA Milestone M-085-20A requires DOE to submit an RI/FS Work Plan for the 200-CP-1 OU by September 30, 2015. Prior to development of the 2017 Lifecycle Report, decide whether development of alternatives would benefit future planning and budget requests.</p>
<ul style="list-style-type: none"> <li>Central Plateau – Disposition T Plant Canyon Building/Associated Waste Sites</li> <li>Central Plateau – Disposition Remaining Liquid Waste Disposal Facilities</li> <li>Central Plateau – Disposition Remaining Waste Treatment, Storage and Disposal Facilities</li> </ul>	<p>These facility operations are integral to the long-term cleanup mission and will continue well after 2020. Any likely cleanup actions are not expected for at least 20+ years in the future so earlier analyses would be premature and not needed before 2018 for out-year budget planning.</p>
<ul style="list-style-type: none"> <li>Central Plateau – Disposition Remaining Buildings and Facilities Within FFTF Complex</li> <li>Central Plateau – Disposition Any Remaining Inner Area Buildings and Facilities</li> </ul>	<p>Continuing with the current planning bases and uncertainties is sufficient for health and environmental protection and for scope and budget planning prior to 2018. Information about conditions after other cleanup actions have occurred (e.g., disposition of FFTF) would be insufficient for useful analyses. It would be premature to analyze alternatives for these cleanup actions before the 2018 Lifecycle Report.</p>
<ul style="list-style-type: none"> <li>Tank Waste – Double-Shell Tank Closure</li> <li>Tank Waste – WTP Closure</li> </ul>	<p>Closure is not expected to begin any sooner than 2034 (for DST closure) and 2050 (for WTP closure). No imminent or significant health or environmental concerns have been identified that need to be addressed. Earlier planning and budget development would be unnecessary and could probably not account credibly for future decisions and conditions.</p>

**Table A-6. Anticipated Schedule for Detailed Analyses of Cleanup Action Alternatives. (4 pages)**

<b>CLEANUP ACTIONS FOR WHICH ALTERNATIVES WOULD NOT BE ANALYZED</b>
<p><b>River Corridor – B Reactor Preservation</b></p> <p>B Reactor has been designated a National Historic Landmark so no cleanup actions are anticipated. Minor conditioning and maintenance activities will be performed consistent with National Park Service decision making under the <i>National Environmental Policy Act</i> (<u>42 USC 4321</u>) and/or <i>National Historic Preservation Act</i> (<u>16 USC 470</u>).</p>
<p><b>River Corridor - Disposition Remaining 100 Area Buildings and Facilities and Disposition Remaining 300 Area Buildings and Facilities (except for facilities retained for use by PNNL)</b></p> <p>Although cleanup actions are still ongoing for these buildings and facilities, all excess buildings and facilities in the 100 and 300 Areas are expected to undergo D&amp;D in accordance with applicable action memoranda. DOE considers D&amp;D of buildings and other structures to be final cleanup decisions if all regulated contaminants have been removed in accordance with an applicable Action Memorandum so alternatives do not need to be analyzed.</p>
<p><b>River Corridor – Remediate Remaining Contaminated Sites Within Hanford Reach National Monument</b></p> <p>National Monument remediation is being implemented to fulfill obligations established under a Presidential Proclamation which establishes a <i>de facto</i> final decision. RTD and decontamination in the Monument areas are expected to be substantially complete by 2012 (Some residual cleanup in the 100 Area portions of the Monument will be addressed after 2012).</p>
<p><b>River Corridor - Disposition 100 Area K West Basin</b>  <b>River Corridor - Remediate 100 Area Contaminated Soil Sites</b>  <b>River Corridor - Restore 100-BC-5 Groundwater Operable Unit to Beneficial Use</b>  <b>River Corridor - Restore 100-KR-4 Groundwater Operable Unit to Beneficial Use</b>  <b>River Corridor - Restore 100-NR-2 Groundwater Operable Unit to Beneficial Use</b>  <b>River Corridor - Restore 100-HR-3 Groundwater Operable Unit to Beneficial Use</b>  <b>River Corridor - Restore 100-FR-3 Groundwater Operable Unit to Beneficial Use</b>  <b>River Corridor - Remediate 300 Area Contaminated Soil Sites</b>  <b>River Corridor - Restore 300 Area Groundwater to Beneficial Use</b></p> <p>The TPA agencies agreed that for cleanup actions that are close to having final decisions there would be little value in presenting cost estimate alternatives analysis in the Lifecycle Report. Since the 100 Area K West Basin clean up action was limited to only one alternative (Table A-2) the agencies also agreed to remove this cleanup action from the alternatives analysis in the Lifecycle Report.</p>
<p><b>Central Plateau – Disposition U Plant (Canyon Building/Associated Waste Sites)</b></p> <p>U Plant remediation has been approved in accordance with a CERCLA Final ROD. If performed, further analysis of alternatives should be done as part of the process under which the current final cleanup decisions were made.</p>
<p><b>Central Plateau – Manage ERDF</b></p> <p>ERDF has been approved in accordance with a CERCLA Final ROD and closure and post-closure care are already part of the operating documentation. Alternatives need not be analyzed, unless future decisions are made that modify the current final ERDF decisions.</p>
<p>Comprehensive Environmental Response, Compensation, and Liability Act of 1980, <u>42 USC 9601</u> et seq.  DOE/EIS-0391, 2009, <i>Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site</i>, Richland Washington, Draft, U.S. Department of Energy, Richland Operations Office, Richland, Washington.  <i>National Environmental Policy Act of 1969</i>, <u>42 USC 4321</u>, et seq.  <i>National Historic Preservation Act of 1966</i>, <u>16 USC 470</u>, et seq.  Presidential Proclamation 7319, 2000, <i>Establishment of the Hanford Reach National Monument</i>, William J. Clinton, June 9.  <i>Resource Conservation and Recovery Act of 1976</i>, <u>42 USC 6901</u>, et seq.</p>

**Table A-6. Anticipated Schedule for Detailed Analyses of Cleanup Action Alternatives. (4 pages)**

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980.	PUREX = Plutonium-Uranium Extraction (Plant).
D&D = decontamination and decommissioning.	RCRA = <i>Resource Conservation and Recovery Act of 1976</i> .
DOE = U.S. Department of Energy.	RI/FS = remedial investigation/feasibility study.
DST = double-shell tank.	ROD = record of decision.
ERDF = Environmental Restoration Disposal Facility.	RTD = remove, treat, and dispose.
FFTF = Fast Flux Test Facility.	TPA = Tri-Party Agreement.
PNNL = Pacific Northwest National Laboratory.	WTP = Waste Treatment and Immobilization Plant.

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*National Environmental Policy Act of 1969*, 42 USC 4321, et seq.

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

Presidential Proclamation 7319, 2000, *Establishment of the Hanford Reach National Monument*, William J. Clinton, June 9.

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

WA7890008967, 2011, *Draft Hanford Site Dangerous Waste Permit (Site-Wide Permit), Revision 9*, as amended, Washington State Department of Ecology, Richland, Washington.

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

WAC 173-340-720, “Groundwater Cleanup Standards,” *Washington Administrative Code*, Olympia, Washington.

**APPENDIX B**

**APPLICATION OF KEY TRI-PARTY AGREEMENT REQUIREMENTS**

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## **TERMS**

DOE  
Ecology  
EPA  
TPA

U.S. Department of Energy  
Washington State Department of Ecology  
U.S. Environmental Protection Agency  
Tri-Party Agreement

## APPENDIX B

### APPLICATION OF KEY TRI-PARTY AGREEMENT REQUIREMENTS

The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and Washington State Department of Ecology (Ecology) encountered several issues while preparing the initial *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report). The DOE, EPA, and Ecology worked together to ensure a common understanding of the issues; these mutual understandings are summarized in this appendix, which will be updated as necessary to reflect changes and evolution in these understandings.

#### B.1 LIFECYCLE REPORT PROCESS TIMEFRAMES

Pursuant to the *Hanford Federal Facility Agreement and Consent Order* ([Ecology et al. 1989](#)), commonly referred to as the Tri-Party Agreement (TPA), Milestone M-036-01 requires that after DOE submits the Lifecycle Report, EPA and Ecology can provide comments, and the TPA agencies (DOE, EPA, and Ecology) will work together to revise the report. The milestone does not indicate how long this comment/revision period can take, nor does it specify whether the milestone is completed when the Lifecycle Report is submitted or when EPA and Ecology's comments are incorporated and DOE issues a revised Lifecycle Report. Depending on how long the comment/revision process takes, there is a risk of missing milestone due dates and/or overlapping from a previous report into the period for the next report.

Discussions among the TPA agencies concluded that for each year, TPA Milestone M-036-01 should be considered complete on the date DOE submits to EPA and Ecology the annual Lifecycle Report for that year. The comment and revision process will continue to be a requirement under the milestone, but milestone completion occurs on the date the report is submitted. In addition, the TPA agencies concluded that there should be no time limit placed on the comment period (in keeping with the Lifecycle Report being a "living document"), but that revision of the most recent Lifecycle Report (if determined to be necessary) would be limited to a reasonable period after the report's submittal. The general expectation is that comments will be accepted but not accounted for until the next annual submittal of the Lifecycle Report.

#### B.2 TYPE OF TRI-PARTY AGREEMENT DOCUMENT

Most documents required by the TPA are classified as Primary, Secondary, or Other. The document type, or classification, generally is based on the significance of the document for making cleanup decisions, and is used to direct documents through particular procedures for review, comment, and dispute resolution and for administrative recordkeeping. TPA Milestone M-036-01 does not specify what type of TPA document the Lifecycle Report is, and the TPA document classifications do not clearly align with the nature of the Lifecycle Report as an advisory, but not decision-making, document.

The TPA agencies agreed that this matter would be best resolved through the project management processes laid out in the TPA. The TPA agencies will decide on the type of document, the formal methods for resolving issues and disagreements, and how to satisfy public involvement consistent with the *Hanford Site Tri-Party Agreement Public Involvement*

*Community Relations Plan* (Ecology et al. 2002). This paragraph will be updated to describe the document type and management process once agreement is reached by the TPA agencies.

### **B.3 FINAL CLEANUP DECISIONS**

TPA Milestone M-036-01 requires the Lifecycle Report to consider alternatives for circumstances where “final cleanup decisions” have not yet been made. Discussions among the TPA agencies revealed a variety of opinions about what constitutes a “final” versus “non-final” cleanup decision. For example, many legally final decisions are still subject to periodic review and could change based on new information or conditions. There also are final decisions that have been made under other Federal and State programs and for other DOE operations that directly or indirectly affect decisions about the Hanford Site cleanup mission.

The TPA agencies concluded that it is important to document the decisions considered relevant to the Hanford Site cleanup mission and to indicate which ones are considered final. This information is provided in Appendix C of the Lifecycle Report.

### **B.4 GRADED APPROACH TO DEVELOPING CLEANUP ALTERNATIVES**

TPA Milestone M-036-01 requires that where final cleanup decisions have not yet been made, the Lifecycle Report is to consider ranges of alternatives and present a reasonable upper bound. Final cleanup decisions have not been made for many Hanford Site cleanup actions, which implies that there are several alternatives to be considered. Further, the milestone does not specify what the scope of an “alternative” should include. At one extreme, an alternative could cover a single, discrete activity (e.g., remediation of one ditch), or at another extreme could cover all the work needed for an entire portion of the Hanford Site (e.g., cleanup of all the 300 Area).

Discussions among the TPA agencies concluded that alternatives should be addressed in a manner consistent with the way final and interim cleanup decisions are already being made for the Hanford Site. This approach bundles similar work that enables cleanup to proceed for common or related contaminants that occur in a relatively well-defined environmental media (or waste management system) within a generally contiguous geographic area. Examples of cleanup actions for which alternatives may be considered include dispositioning the 100 Area reactors, remediating all contaminated soils in the outer portions of the 200 Area, and restoring 300 Area groundwater to beneficial use. This is a practical scale at which alternatives can be addressed in the Lifecycle Report.

The TPA agencies also determined that the number of cleanup actions for which final decisions do not yet exist is large, and that the Lifecycle Report effort could quickly become overwhelming if it were to address all the potential alternatives at once. In addition, the TPA agencies recognized that it would be neither helpful nor necessary, for purposes of supporting budget planning and other decisions, to immediately perform detailed analyses on every potential alternative. As a result, the Lifecycle Report proposes a schedule and rationale for when different cleanup actions will undergo in-depth alternatives analyses.

Appendix A of the Lifecycle Report provides additional information on how cleanup action alternatives have been identified and scheduled for consideration.

## **B.5 RANGE OF PLAUSIBLE ALTERNATIVES AND REASONABLE UPPER BOUND**

TPA Milestone M-036-01 states, “where final cleanup decisions have not yet been made, the report will be based upon the reasonable upper bound of the range of plausible alternatives or a range of alternative costs including a reasonable upper bound.” The milestone does not define what a “range of plausible alternatives” is or what would be a “reasonable upper bound.” Numerous discussions among the TPA agencies produced general consensus on how to address these concepts, and they are discussed further in Section 1.6 and Appendix A.

## **B.6 DISTINGUISHING PLAUSIBLE ALTERNATIVES FROM STANDARD PLANNING UNCERTAINTIES**

DOE’s planning typically includes “built-in” construction or operating uncertainties in anticipation of identified risks and opportunities. While having the appearance of being different alternatives, these cost and/or schedule uncertainties often present predictable variations for a particular cleanup approach. Developing an alternative analysis on the basis of planned cost and/or schedule uncertainties would be redundant, and would not be useful in considering and evaluating ranges of plausible alternatives for cleanup actions.

The TPA agencies generally have agreed that cost and/or schedule uncertainties, management reserve, and other standard planning practices used to account for risks and opportunities will not normally constitute distinct alternatives. For example, an alternative based on removal, treatment, and disposal of contaminated soils would be a distinct alternative, but allowances for uncertainties that cover larger than expected excavation work (e.g., that twice as much soil must be removed than originally planned) would not be a distinct alternative. Where alternatives are presented in the Lifecycle Report, the discussion will be clear on how cost and/or schedule uncertainty is part of the planned costs (to avoid double counting) and, where this is not the case, whether and how costs have been specifically developed in planning for project uncertainty and risk.

## **B.7 ALTERNATIVES AND ACCELERATED CLEANUP ACTIONS**

During discussions with the Hanford Advisory Board, Hanford stakeholders, and others, terms like “acceleration” and “accelerated scenarios” have been used when describing the need to consider alternatives and types of alternatives that are of interest. The TPA agencies recognize that many parties are interested in being able to consider the acceleration of different cleanup actions. However, the TPA agencies have determined that in most cases, acceleration is not in fact a separate alternative to a cleanup action, and that acceleration only hastens a cleanup action alternative that already has been or is being developed in support of a cleanup decision (whether interim or final). Thus, project acceleration will not normally be included in this Lifecycle Report, and existing decision-making processes (e.g., under *Comprehensive Environmental Response, Compensation, and Liability Act* [42 USC 9601, et seq.] and *Resource Conservation and Recovery Act* [(42 USC 6901 et seq.)] will be relied on to consider the timing and schedule for implementing proposed alternatives. Nevertheless, the TPA agencies do reserve the option to consider in the Lifecycle Report specific cleanup action alternatives even though they may chiefly or only affect cleanup schedules.

## **B.8 COST INFORMATION DECISIONS AND DOCUMENTATION**

The TPA agencies discussed a number of issues related to how cost information should be developed and documented in the Lifecycle Report. These discussions resulted in several important decisions, as follows:

- In order to prepare schedule and cost information about future work, DOE and its contractors make assumptions about anticipated activities. Their planning assumes reasonable outcomes for decisions that have not yet been made, accounts for uncertainties where existing information is inadequate, and allows work to proceed without precluding other future choices. In effect, such planning is one available cleanup action alternative, and is used to develop future funding requests. To promote clarity and understanding about the Hanford Site cleanup mission, the Lifecycle Report will include information about assumptions used to develop DOE's planning and associated costs.
- The requirements for long-term stewardship and institutional controls will not be well defined for many years, and will depend greatly on the outcome of existing and future cleanup decisions. Even so, the costs of long-term stewardship and institutional controls, to the extent predictable, will be included in the Lifecycle Report. Chapter 7.0 addresses this subject, although the information provided is likely to be broad and generic, reflecting the uncertainty and long time horizons involved. As decisions are made and long-term stewardship and institutional controls are better identified, more specific cost information will be presented in the Lifecycle Report as part of the related cleanup actions.
- The TPA agencies recognize that Natural Resource Damage Assessment costs eventually need to be included in the Lifecycle Report. However, the general opinion is that it would be premature to include such cost estimates, and that time should be allowed for the Hanford Natural Resource Trustee Council to begin developing reasonable methods and bases for calculating Natural Resource Damage Assessment costs at the Hanford Site. However, the costs associated with supporting the Natural Resource Trustee Council will be included.

## **B.9 REFERENCES**

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

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*,  
Washington State Department of Ecology, U.S. Environmental Protection Agency, and  
U.S. Department of Energy, Olympia, Washington, as amended.

Ecology, EPA, and DOE, 2002, *Hanford Site Tri-Party Agreement Public Involvement  
Community Relations Plan*, Washington State Department of Ecology,  
U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia,  
Washington.

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

**APPENDIX C**

**HANFORD SITE CLEANUP DECISIONS**

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**TERMS**

2,4-D	2,4-dichlorophenoxyacetic acid
AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
CCN	correspondence control number
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
D&D	decontamination and decommissioning
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DOE/RL	U.S. Department of Energy, Richland Operations Office
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERA	expedited response action
ERDF	Environmental Restoration Disposal Facility
ESD	explanation of significant differences
ETF	Effluent Treatment Facility
FETF	Fast Flux Test Facility
HCP-EIS	Hanford Comprehensive Land-Use Plan Environmental Impact Statement
HLW	high-level waste
IC	institutional controls
INL	Idaho National Laboratory
ISS	interim safe storage
MCL	maximum contaminant limit
OU	operable unit
P&T	pump-and-treat
PCB	polychlorinated biphenyl
PFP	Plutonium Finishing Plant
PUREX	Plutonium Uranium Extraction (Plant)
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RD/RAWP	remedial design/remedial action work plan
ROD	record of decision
RTD	remove, treat, and dispose
SST	single-shell tank
TCRA	time critical removal action
TPA	Tri-Party Agreement
TSD	treatment, storage, and disposal
WIDS	Waste Information Data System
WIPP	Waste Isolation Pilot Plant
WTP	Waste Treatment and Immobilization Plant

## APPENDIX C

### HANFORD SITE CLEANUP DECISIONS

Pursuant to the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as the Tri-Party Agreement (TPA), Milestone M-036-01 requires the U.S. Department of Energy (DOE) to prepare an annual *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report). The Lifecycle Report is expected to reflect all actions necessary for DOE to meet all applicable environmental obligations as it completes the Hanford Site cleanup mission. These environmental obligations are established in accordance with various decision-making processes that DOE, the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and other agencies conduct under Federal and State regulatory programs.

A number of decisions affecting the Hanford Site cleanup mission have been made, and actions to implement these decisions have been completed, or are or will soon be under way. Many other cleanup decisions, however, cannot be made yet, are in preliminary planning stages, and/or are the subject of final agreements that are being developed. The absence of final decisions is addressed in the TPA Milestone M-036-01:

**“In circumstances where final cleanup decisions have not yet been made, the report shall be based upon the reasonable upper bound of the range of plausible alternatives or may set forth a range of alternative costs including such a reasonable upper bound.”**

Several sections of this Lifecycle Report present cleanup action alternatives for “...circumstances where final cleanup decisions have not yet been made...”

(TPA Milestone M-036-01). Any discussion of alternatives in this report needs to begin with an understanding of what “final cleanup decisions” are, which in turn requires answering several related questions:

- What is a decision?
- What is a cleanup decision?
- What makes some decisions final and others not?

This appendix provides current information about decisions that affect the Hanford cleanup mission, and when these decisions might be considered to be final cleanup decisions for Lifecycle Report purposes. Specifically:

- **Section C.1** provides a general overview of the principal processes that are employed at the Hanford Site to reach decisions about cleanup actions.
- **Section C.2** describes in more detail the Federal and State decisions that can affect Hanford Site cleanup, the legal and/or regulatory authorities on which the decision making is based, and the types of documents used to embody and formalize these decisions.
- **Section C.3** summarizes the current decisions that, for purposes of this Lifecycle Report, are considered to be Hanford Site cleanup decisions and which of these cleanup decisions can be identified as final cleanup decisions.

This appendix will be updated to reflect new and changed final cleanup decisions, and to provide a basis each year for determining cleanup actions to evaluate in the latest Lifecycle Report.

## C.1 PRINCIPAL HANFORD SITE CLEANUP DECISION MAKING PROCESSES

To implement the Hanford Site cleanup mission, DOE, with EPA and Ecology, reach decisions about what actions need to be performed to protect public and worker health and the environment. Cleanup decisions are based on a variety of legal and regulatory authorities such as the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA) (42 USC 9601) and the *Resource Conservation and Recovery Act of 1976* (RCRA) (42 USC 6901) that require the consideration of various alternatives before selecting cleanup actions. In some cases, the agencies develop interim or partial decisions that enable cleanup work to proceed pending the ability to make final decisions (e.g., to alleviate urgent concerns, acquire better information, develop technological advances, obtain needed funding).

The TPA is the primary legal framework that DOE, EPA, and Ecology are using to achieve cleanup of the Hanford Site. Cleanup decisions made through the TPA integrate and implement primarily the following regulatory processes:

- CERCLA processes will support remedial decision making for most past-practice waste sites, canyon facilities, and structures that contain radioactive contamination or other hazardous substances. The TPA also identifies a subset of waste sites as RCRA past-practice sites. Consistent with EPA directives and guidance, the TPA establishes the expectation that either a RCRA corrective action or a CERCLA remedial action will lead to an equivalent cleanup result. In practice, this expectation becomes complicated when radioactive materials are present because RCRA authority does not extend to radionuclides. Regardless of this issue with RCRA, Hanford Site cleanup of radionuclides in RCRA waste sites will be protective and consistent with CERCLA cleanup practices.
- RCRA closure processes generally will be used to achieve final closure decisions for active RCRA treatment, storage, and disposal (TSD) facilities. RCRA corrective action processes also are applicable when RCRA wastes from past hazardous waste practices must be cleaned up. EPA has delegated implementation of the RCRA program to the State of Washington. Ecology implements the program via RCRA-equivalent State regulations and through facility-specific permits. RCRA closure and post-closure requirements are contained in the Hanford Site RCRA Permit ([WA7890008967](#), 2011, *Draft Hanford Facility Dangerous Waste Permit (Site-Wide Permit), Revision 9*).

The clear intent of the TPA is to minimize duplication and overlap of regulatory authorities while ensuring compliance with applicable requirements. As noted above, RCRA authority does not extend to the cleanup of radionuclides, while CERCLA does. The TPA states that the cleanup process selected for an operable unit (OU) will be sufficiently comprehensive to satisfy the technical requirements of both authorities and the respective regulations.

In addition to RCRA and CERCLA, DOE is responsible for regulating the radioactive materials that it manages, including setting standards that affect cleanup decisions for radionuclides. [DOE O 435.1](#), *Radioactive Waste Management*, defines additional requirements and processes that are applicable to cleaning up radioactive facilities and media. DOE develops and implements cleanup decisions under this regulatory program.

Land use is also an important factor in making cleanup decisions because remedial action objectives are to reflect the reasonably anticipated future land uses(s). These future land-use assumptions allow risk assessments and feasibility studies to focus on developing practical and cost-effective remedial alternatives. These alternatives should then support future site activities that are consistent with the reasonably anticipated future land use. DOE is responsible for designating land uses on the Hanford Site and for identifying future land uses that will guide risk assessments and cleanup decisions. Pursuant to a record of decision (ROD) published on November 2, 1999 (64 FR 61615, “Record of Decision: Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS)”) and amended ROD published on September 26, 2008 (73 FR 55824, “Amended Record of Decision for the Hanford Comprehensive Land-Use Plan Environmental Impact Statement”), DOE has adopted and implemented a comprehensive land-use plan for the Hanford Site. As DOE’s decision stated:

“The purpose of this land-use plan and its implementing policies and procedures is to facilitate decision making about the site’s uses and facilities over at least the next 50 years. The Department’s decision seeks to balance the Department’s continuing land-use needs at Hanford with its desire to preserve important ecological and cultural values of the site and allow for economic development in the area.” (64 FR 61615 – 61616)

An area as large and complex as the Hanford Site has an extraordinary number of decisions that need to be made to carry out the cleanup mission. While many cleanup decisions have been made, only some of these decisions are considered to be final; many are either interim decisions, or decisions that lay the groundwork for future final decisions. The rest of this appendix provides a more extensive discussion of the decisions that have been made and that affect cleanup of the Hanford Site, and includes several tables that list and summarize the effects of these decisions.

## **C.2 DECISIONS THAT CAN AFFECT HANFORD SITE CLEANUP**

For purposes of TPA Milestone M-036-01 and this Lifecycle Report, a cleanup decision should:

1. Be promulgated under applicable statutory and/or regulatory authorities of responsible Federal and State agencies, and
2. Establish an enforceable environmental obligation which results in actions or events that affect cleanup of the Hanford Site.

Not all decisions meet both of these criteria. There are many statutory/regulatory authorities that apply to Hanford but that do not establish environmental obligations. Examples include requirements related to property and services acquisition, software design, cyber security, occupational medicine, equal opportunity, or privacy protection. Alternatively, there are many statutes and regulations that establish environmental obligations for the Hanford Site, but not all of them promulgate decisions that affect cleanup of the Site. Some examples include requirements for pesticide or herbicide application, drinking water purveyor reporting, storm water management, greenhouse gas and ozone depleting substances, emergency planning and community right-to-know, and selection of green products.

Statutory/regulatory authorities that result in decisions that can affect Hanford Site cleanup are identified and discussed in more detail in the following sections.

### **C.2.1 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 DECISIONS**

CERCLA, as modified by the *Superfund Amendments and Reauthorization Act 1986* (42 USC 103), established the Federal program to clean up uncontrolled or abandoned waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Under 40 CFR 300, “National Oil and Hazardous Substances Pollution Contingency Plan,” DOE is the lead agency with lead agency responsibilities by both the National Contingency Plan and Executive Order 12580. EPA is the lead regulatory agency under the Tri-Party Agreement (TPA) and oversees the cleanup activities conducted under 40 CFR 300. EPA also has certain oversight authorities granted through CERCLA and the TPA. The most common documentation used to implement cleanup decisions under CERCLA includes the following.

- **CERCLA ROD.** The CERCLA ROD is a public document, developed from information generated during the remedial investigation/feasibility study that explains which remediation alternatives will be used to clean up a site. An ROD contains information about the site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, scope and role of response action, and the remedy selected for cleanup. Records of decision can be final or interim; interim records of decision are used to allow cleanup actions to proceed until a final decision can be reached.
- **Explanation of Significant Differences and ROD Amendment.** Documents used to modify or clarify an existing ROD. The explanation of significant difference is used when changes to a component of a remedy do not fundamentally alter the overall cleanup approach. The amendment is used when there are fundamental changes, or a number of significant changes, that together have the effect of a fundamental change to the remedy selected in the ROD.
- **Action Memorandum.** A public document used to exercise the CERCLA removal authority and enable cleanup action to proceed where a site presents a relatively time-sensitive, non-complex problem that can and should be readily addressed.

A number of CERCLA documents have been completed that include or have resulted in decisions that affect Hanford Site cleanup. These CERCLA documents and summaries of the relevant cleanup decisions are listed in Section C.3.

### **C.2.2 PERMITS, LICENSES, AND OTHER STATUTORY/REGULATORY PROGRAM APPROVALS**

RCRA, as modified by the *Hazardous and Solid Waste Amendments of 1984*, gave EPA the authority to control the generation, transportation, and TSD of hazardous waste. The amendments expanded the scope of RCRA to require corrective action for certain releases of hazardous waste constituents to the environment from RCRA facilities regardless of time of release (similar to CERCLA remedial action). Unlike CERCLA, EPA may delegate authority for implementing RCRA to the States, and in Washington, Ecology has lead authority for most elements of RCRA. The principal documents used to implement Hanford Site cleanup decisions under RCRA include:

- **Final Status Permit.** A final status permit includes explicit descriptions of the conditions and requirements that must be met by a facility at which TSD of regulated hazardous waste (or dangerous waste, in Washington State) occur. A TSD facility may receive a final status permit even though it is closed and not operating, if there are ongoing caretaking activities that must be maintained after closure (i.e., during the post-closure care period). At the Hanford Site, a single final status permit covers the entire Hanford Site, but it is being issued in phases because of the number of TSD facilities that exist. The final status permit includes decisions about how Federal and State statutes, regulations, and guidance have been interpreted and applied to the specific activities conducted at each TSD facility.
- **Closure/Post-Closure Plan.** Some Hanford Site TSD facilities have closed or may close before they are covered under the final status permit. In such cases, a closure plan must be prepared to describe the activities necessary to close the TSD facility and address any remaining dangerous wastes. If dangerous waste will remain after closure, a post-closure plan is also required to address residual contamination. Ecology must approve closure and post-closure plans before they are implemented, and in the process decisions will be made and included in the closure/post-closure plans about how to close the TSD facility and, where required, conduct post-closure care.
- **Corrective Action.** Corrective actions, to clean up releases from RCRA TSD facilities, may be required before a final status permit is issued. Decisions about the degree and methods for cleanup will be made and implemented through a corrective action plan that is approved by Ecology.

In addition to RCRA, there are numerous other programs, authorized under existing Federal and State statutes and regulations that require permits, licenses and other approvals that can affect cleanup at the Hanford Site. These other decision documents establish, among other conditions, limits on emissions of radionuclides and other hazardous constituents to the air, water, and ground. Section C.3 lists the various permits, licenses, and other types of approvals authorized under applicable regulatory and statutory programs that include or have resulted in decisions affecting Hanford Site cleanup.

### C.2.3 TRI-PARTY AGREEMENT DECISIONS

Among other functions, the TPA helps define how the CERCLA and RCRA programs will be implemented when they have overlapping authorities. The TPA is used to determine which decision-making process and documentation (e.g., CERCLA ROD, RCRA permit) will be used to establish cleanup actions for the different waste sites and facilities across the Hanford Site, but it is that subsequent documentation (not the TPA itself) where the cleanup decisions are formally established. The TPA itself does, however, include some decisions that affect cleanup at the Hanford Site. These may include, for example, provisions that set specific waste retrieval objectives and technology performance standards for certain types of cleanup actions. These TPA-based decisions are listed in Section C.3.

### C.2.4 OTHER FEDERAL AND STATE DECISIONS

There are a variety of other decisions embodied in executive, legislative, and judicial documents that can affect cleanup of the Hanford Site. Section C.3 lists the various Executive Orders,

Presidential Proclamations, Congressional Acts, judicial orders and decrees, and other types of Federal and State decisions that may affect Hanford Site cleanup.

### **C.3 SUMMARY OF HANFORD SITE CLEANUP DECISIONS – FINAL AND NOT YET FINAL**

The statutory/regulatory authorities discussed in Section C.2 have resulted in a multitude of national, regional, and/or State decisions across numerous projects and programs. Some of these decisions do establish environmental obligations that affect the Hanford Site cleanup mission. These Hanford Site cleanup decisions are summarized in this Section C.3.

While some decisions more clearly affect the Hanford Site than others, care has been taken to include decisions that have indirect effects on Hanford cleanup. Examples of such indirect decisions might include those that define national standards for risk-based exposure limits, enable offsite activities that contribute contaminants to Hanford environmental media, or constrain the ability to disposition materials or wastes at or from the Hanford Site.

As stated earlier in this appendix, the Lifecycle Report is required to consider cleanup alternatives “where final cleanup decisions have not yet been made” (TPA Milestone M-36-01, third paragraph) at the Hanford Site. Some cleanup decisions may appear to be final but are not:

- They may be only interim remedies until a final cleanup decision can be made, or
- They may only be partial actions within a much larger cleanup effort.

Even where final decisions have been made, there are legal mandates to perform periodic reviews to ensure that selected remedies continue to be effective; new decisions may be needed depending on how well cleanup actions are working.

To stay as simple as possible, the term final has been interpreted literally. For purposes of this Lifecycle Report, a cleanup decision will be treated as a final cleanup decision if:

- The decision is embodied in a statutory/regulatory document that is titled final (e.g., final permit, final ROD); or
- The decision is explicitly represented as final in a document, and such representation is compliant with the statutory/regulatory authority that produced the document.

The Hanford Site cleanup decisions summarized in Tables C-1, C-3, and C-5 indicate whether the decision is considered to be final by inclusion of the word **FINAL** after the decision title in the first column.

In addition to decisions that have been made, whether final or not, there are many cleanup decisions that are yet to be made for the Hanford Site. By definition, the absence of a decision means there is not a final cleanup decision. It would not be possible to develop an exhaustive list of all the decisions that still need to be made to complete the Hanford cleanup mission. However, as these decisions are reached, they will be incorporated into this section of the Lifecycle Report.

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

<b>Record of Decision</b>			
<p><b>Title:</b> <i>Record of Decision, USDOE Hanford 1100 Area (EPA/ROD/R10-93/063)</i> <b>FINAL</b>  <b>ROD Type:</b> CERCLA Final ROD  <b>Area:</b> 1100  <b>Date Approved:</b> Sep-93  <b>Initial Decision:</b> Cap Horn Rapids Landfill; offsite disposal of PCB-contaminated soils; offsite incineration of bis (2-ethylhexyl) phthalate contaminated soils; monitored natural attenuation of groundwater contamination.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>Explanation of Significant Differences for the Record of Decision for the USDOE Hanford 1100 Area Benton County, Washington (EPA 2010a)</i>	ESD	Sep-10	This ESD documents significant differences to the selected remedies in the ROD. In summary, this ESD clarifies the institutional control requirements for the Horn Rapids Landfill.
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Declaration of the Record of Decision for the Environmental Restoration Disposal Facility (EPA/ROD/R10-95/100)</i> <b>FINAL</b>  <b>ROD Type:</b> CERCLA Final ROD  <b>Area:</b> 200 West  <b>Date Approved:</b> Jan-95  <b>Initial Decision:</b> Initial construction of two cells; maximum size of 1.6 sq mi; landfill construction in accordance with RCRA; capped at completion.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>USDOE Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Difference (ESD) (EPA/ESD/R10-96/145)</i>	ESD	Jul-96	Allow disposal of investigation-derived waste and RCRA past-practice waste to ERDF; allow disposal of non-process inactive TSD waste to ERDF; allow use of ERDF leachate for dust suppression and compaction activities at ERDF.
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary, (see also proposed plan for amendment) (EPA/AMD/R10-97/101)</i>	ROD Amendment	Sep-97	Authorizes two additional disposal cells and the option of treating waste as needed by containerization and encapsulation at ERDF instead of at the OU.
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary, (see also proposed plan for amendment) (EPA/AMD/R10-99/038)</i>	ROD Amendment	Mar-99	Establishes conditional approval for delisting of the ERDF leachate.
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary, (see also</i>	ROD Amendment	Jan-02	Authorizes four additional disposal cells and the option of staging waste at ERDF pending treatment and/or disposal.

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

proposed plan for amendment) (EPA/AMD/R10-02/030)			
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site-200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary (EPA 2007a)</i>	ROD Amendment	May-07	Allows specific Hanford-generated waste, such as waste associated with surveillance and maintenance of Hanford facilities, environmental research and development activities, sample analyses, liquid effluent waste treatment, infrastructure support, and environmental monitoring programs, to be disposed at ERDF; identifies a plug-in approach for ERDF disposal of additional similar Hanford cleanup waste generated in support of RCRA/CERCLA cleanup actions.
<i>Declaration: U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site - 200 Area, Benton County, Washington (EPA 2009a)</i>	ROD Amendment and ESD	Aug-09	Amendment allows for ERDF expansion of an area equal to four cells or two super cells; the ESD updates the cell design to allow super cell concept and allows for ERDF expansion via EPA approval and fact sheets rather than ROD amendments.
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit (EPA/ROD/R10-95/114)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 200 West; 200-ZP-1 OU</p> <p><b>Date Approved:</b> May-95</p> <p><b>Initial Decision:</b> Pump and treat to address carbon tetrachloride, chloroform, and trichloroethylene; treatment with air stripping and vapor phase activated carbon; interim action to continue until final action instituted; reinjection of treated water.</p>			
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Record of Decision, Hanford 200 Area, 200-ZP-1 Operable Unit Superfund Site, Benton County, Washington (EPA 2008) FINAL</i></p> <p><b>ROD Type:</b> CERCLA Final ROD</p> <p><b>Area:</b> 200 West; 200-ZP-1 OU</p> <p><b>Date Approved:</b> Sep-08</p> <p><b>Initial Decision:</b> Pump and treat to address carbon tetrachloride, nitrate, chromium, trichloroethylene, iodine-129, technetium-99, and tritium; monitored natural attenuation; flow-path control through injection of treated water; and institutional controls.</p>			
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Declaration of the Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-95/126)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 100; 100-BC-1, 100-DR-1, and 100-HR-1 OUs</p> <p><b>Date Approved:</b> Sep-95</p> <p><b>Initial Decision:</b> Remove contaminated soil, structures and debris using the Observational Approach; treatment, by thermal desorption to remove organics and/or soil washing for volume reduction, or as needed to meet waste disposal criteria; disposal of contaminated materials at ERDF; backfill of excavated areas followed by revegetation.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington (see Draft B ESD and Proposed Amendment)</i>	ROD Amendment	Apr-97	Incorporates 34 additional waste sites into ROD; refines remedial cost estimate for original 37 sites and additional 34 sites based on actual data, streamlining, and lessons learned; documents that soil

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

documents preceding this ROD amendment) (EPA/AMD/R10-97/044)			washing is not effective treatment.
<b>Record of Decision</b>			
<p><b>Title:</b> Declaration of the Record of Decision for the 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-96/151) <b>FINAL</b></p> <p><b>ROD Type:</b> CERCLA Final ROD</p> <p><b>Area:</b> 100; 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 OUs</p> <p><b>Date Approved:</b> Feb-96</p> <p><b>Initial Decision:</b> No action.</p>			
<b>Record of Decision</b>			
<p><b>Title:</b> Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-96/134)</p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 100; 100-H, 100-K</p> <p><b>Date Approved:</b> Mar-96</p> <p><b>Initial Decision:</b> Interim action to remove hexavalent chromium from groundwater; 30 extraction wells; ion exchange treatment; reinject treated effluent; monitor; institute institutional controls.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>U.S. Department of Energy Hanford Site – 100 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary (EPA/AMD/R10-00/122)</i>	ROD Amendment	Oct-99	Implements In Situ Redox Manipulation barrier for second chromium plume in 100-HR-3 OU; existing P&Ts remain in operation.
<i>Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision (EPA 2002)</i>	ESD	Oct-02	Provides justification for increased schedule and cost from the 1999 Amendment associated with a greater number of wells and aquifer thickness that affected implementation of the ISRM barrier.
<i>Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision (EPA/ESD/R10-03/606)</i>	ESD	Mar-03	Provides justification for increased schedule/cost from the 1999 Amendment associated with a greater number of wells and aquifer thickness that affected implementation of the ISRM barrier.
<i>Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009b)</i>	ESD	Aug-09	Provides justification for increased cost and location of reinjection wells from the 1999 Amendment associated with operation beyond initial 5-year estimate and need to control plume migration.
<b>Record of Decision</b>			
<p><b>Title:</b> Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington, (EPA/ROD/R10-96/143)</p> <p>Note: The ROD is only <b>FINAL</b> for the 300-FF-1 OU; it is an interim action for 300-FF-5 OU.</p> <p><b>ROD Type:</b> CERCLA Final ROD</p> <p><b>Area:</b> 300; 300-FF-1 and 300-FF-5 OUs</p> <p><b>Date Approved:</b> Jul-96</p> <p><b>Initial Decision:</b> 300-FF-1: removal of contaminated soil and debris; disposal to ERDF; backfill and recontouring; institutional controls. 300-FF-5: monitoring and institutional controls for groundwater.</p>			

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

Revision Title	Revision Type	Revision Date	Revised Decision
<i>USDOE Hanford 300 Area, 300-FF-1 Operable Unit, Hanford Site, Benton County, Washington Explanation of Significant Difference (ESD) (EPA/ESD/R10-00/505)</i>	ESD	Jan-00	Provides a site-specific land disposal restriction treatability variance for lead contamination found in the 628-4 or Landfill 1D waste site.
<i>Explanation of Significant Difference for the 300-FF-5 Record of Decision (EPA/ESD/R10-00/524)</i>	ESD	Jun-00	Expanded scope of 300-FF-5 ROD to include all of the groundwater in 300 Area, including the 300-FF-2 sites and any sites plugged into the 300-FF-1 ROD.
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Record of Decision, Hanford 200 Area, Superfund Site 200-CW-5 and 200-PW-1, 200-PW-3 and 200-PW-6 Operable Units Hanford Site, Benton County, Washington (EPA 2011c) FINAL</i></p> <p><b>ROD Type:</b> CERCLA Final ROD</p> <p><b>Area:</b> 200 East and 200 West</p> <p><b>Date Approved:</b> Sep-11</p> <p><b>Initial Decision:</b> RTD of soil and debris to specified depths or specified cleanup levels for plutonium-contaminated soils and subsurface structures and debris. Soil vapor extraction at three of the 200-PW-1 waste sites will continue until vadose zone cleanup levels are met. Soil covers will be used to provide coverage to a depth of at least 15 feet over cesium-contaminated soils. Removal of sludge followed by tank stabilization for two tanks. No action for two waste sites. Institutional controls and long-term monitoring for waste sites where contamination is left in place and an unrestricted land use is precluded.</p>			
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Declaration of the Record of Decision, USDOE Hanford 200 Area, Hanford Site, Benton County, Washington (EPA/ROD/R10-97/048)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 200 West; 200-UP-1 OU</p> <p><b>Date Approved:</b> Feb-97</p> <p><b>Initial Decision:</b> Extract groundwater from high concentration zone of uranium and technetium-99 plumes and treat at Effluent Treatment Facility.</p>			
Revision Title	Revision Type	Revision Date	Revised Decision
<i>Explanation of Significant Differences for the Interim Action Record of Decision for the 200-UP-1 Groundwater Operable Unit, Hanford Site, Benton County, Washington (EPA 2009c)</i>	ESD	Feb-09	Adds National MCL of 30 µg/L for uranium as ARAR for treating extracted water; replaces 190 gal/min pumping requirement with a pumping requirement from existing and new wells consistent with approved RD/RAWP until uranium and technetium-99 concentrations are less than 10 times the MCL for 4 consecutive quarters; also adds sampling requirements and updates cost estimates and institutional control requirements.
<i>Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site 200-UP-1 Operable Unit (EPA 2012)</i>	Interim Action ROD	Sep-12	Supersedes the previous interim action ROD (Feb-97) and ESD (Feb-09). Includes groundwater extraction and treatment (with flow path control through injection of treated water) in combination with monitored natural attenuation for technetium-99, uranium, chromium (total and hexavalent), nitrate, carbon

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

			tetrachloride and tritium; hydraulic containment and further treatment technology evaluation for iodine-129; remedy performance monitoring and institutional controls.
Record of Decision			
<p><b>Title:</b> <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 (EPA/ROD/R10-99/039)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 100, 200 North</p> <p><b>Date Approved:</b> Jul-99</p> <p><b>Initial Decision:</b> RTD for 46 sites; plug-in approach for remaining 100 Area and 200 North sites; plug-in approach for newly identified 100 Area sites; disposal of debris from B, D, H, and K reactors to ERDF; provides decision framework for leaving waste in place, generally below 15-ft depth.</p>			
Revision Title	Revision Type	Revision Date	Revised Decision
<i>Explanation of Significant Difference for the 100 Area Remaining Sites ROD, USDOE Hanford 100 Area, 100-IU-6 Operable Unit, Hanford Site, Benton County, Washington (EPA/ESD/R10-00/045)</i>	ESD	Jun-00	Plugs in 600-23 and JA Jones #1 waste sites to the Remaining Sites ROD.
<i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision (EPA 2004a)</i>	ESD	Feb-04	Adds 28 sites to ROD; adds 10 CFR 1022 and 40 CFR 6, Appendix A as ARARs to ROD; revises annual institutional controls report date to be coincident with the due date for the Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions.
<i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009d)</i>	ESD	Aug-09	Authorizes addition of 200-CW-3 OU wastes sites, 99 newly discovered waste sites, and 87 candidate sites using the "plug-in" approach in the ROD, as well as any additional newly discovered waste sites that will be documented in the Administrative Record and in an annual fact sheet.
Record of Decision			
<p><b>Title:</b> <i>Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington (EPA/ROD/R10-99/059)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 100-K</p> <p><b>Date Approved:</b> Sep-99</p> <p><b>Initial Decision:</b> Remove spent nuclear fuel from basins; remove sludge from basins; treat and remove water from the basins; remove debris from the basins; deactivate the basins; and institute institutional controls.</p>			
Revision Title	Revision Type	Revision Date	Revised Decision
<i>Interim Remedial Action Record of Decision Amendment, U.S. Department of Energy; 100 K Area K Basins, Hanford Site - 100 Area, Benton County,</i>	ROD Amendment	Jun-05	Modifies remedy for sludge by including sludge treatment prior to interim storage and shipment to a national repository; modifies remedy for debris by including

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

Washington (EPA 2005a)			grouting in place some of the basin debris followed by removal along with the removal of the basins.
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-99/112)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 100-N</p> <p><b>Date Approved:</b> Sep-99</p> <p><b>Initial Decision:</b> Institutional controls for shoreline site; in situ and RTD with ex situ bioremediation for petroleum sites; RTD for remainder of sites in 100-NR-1; maintain ERA P&amp;T for 100-NR-2.</p>			
Revision Title	Revision Type	Revision Date	Revised Decision
<p><i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision (EPA/ESD/R10-03/605)</i></p>	ESD	May-03	Removes July 31 annual institutional controls reporting requirement and consolidates the reporting with the site-wide IC annual report; eliminates the requirement to evaluate application of 30 in of irrigation water to determine if remaining contaminants will impact groundwater; identifies need for additional ICs to preclude access to contaminated groundwater which will be incorporated into site-wide IC document.
<p><i>U.S. Department of Energy, 100-NR-1 and NR-2 Operable Units, Hanford Site - 100 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary (EPA 2010b)</i></p>	ROD Amendment	Sep-10	Deploys the apatite sequestration technology for remediation of Sr-90 in the 100-NR-2 Groundwater OU by extending the existing apatite permeable reactive barrier to approximately 2,500 ft, allows for deployment of the apatite sequestration technology elsewhere within the 100-NR-2 OU in accordance with an Ecology approved work plan, and includes decommissioning the treatment components of the existing P&T system.
<p><i>Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2011a)</i></p>	ESD	Mar-11	Adds 45 additional waste sites in the 100-NR-1 OU for remediation by RTD (characterized per the 100-N Area sampling and analysis plan) and increases the total cost 38% to \$67,510,386.

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

<b>Record of Decision</b>			
<p><b>Title:</b> <i>Interim Remedial Action Record of Decision Declaration, U.S. Department of Energy 100 Area, 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington (EPA/ROD/R10-00/120)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD for 2 RCRA TSDs and an associated site</p> <p><b>Area:</b> 100-N</p> <p><b>Date Approved:</b> Jan-00</p> <p><b>Initial Decision:</b> RTD of 116-N-1 and 116-N-3 Cribs with ERDF disposal; backfill and revegetate; any pipelines will be removed or sampled and left in place based on sample results.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision (EPA/ESD/R10-03/605)</i>	ESD	May-03	Removes July 31 annual institutional controls reporting requirement and consolidates the reporting with the site-wide IC annual report; eliminates the requirement to evaluate application of 30 in of irrigation water to determine if remaining contaminants will impact groundwater; identifies need for additional ICs to preclude access to contaminated groundwater which will be incorporated into site-wide IC document.
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Units (EPA/ROD/R10-00/121)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 100</p> <p><b>Date Approved:</b> Sep-00</p> <p><b>Initial Decision:</b> Remove contaminated soil, structures, and debris; treat as needed; dispose at ERDF; backfill and revegetate. Applies to 45 100-Area burial grounds.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>Explanation of Significant Difference for the Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units (100 Area Burial Grounds) (EPA 2007b)</i>	ESD	Nov-07	Established limit of RTD excavation at the 118-B-1 Burial Ground considering the balancing factors in the ROD and required additional institutional controls for protection of groundwater and the Columbia River.
<b>Record of Decision</b>			
<p><b>Title:</b> <i>Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit (EPA/ROD/R10-01/119)</i></p> <p><b>ROD Type:</b> CERCLA Interim Action ROD</p> <p><b>Area:</b> 300; 300-FF-2 OU</p> <p><b>Date Approved:</b> Apr-01</p> <p><b>Initial Decision:</b> Remove contaminated soil, structures, and debris; treat as needed; dispose at ERDF, WIPP, or other; backfill and revegetate; establish institutional controls; continued groundwater monitoring; and define plug-in approach.</p>			
<b>Revision Title</b>	<b>Revision Type</b>	<b>Revision Date</b>	<b>Revised Decision</b>
<i>Explanation of Significant Differences for the 300-FF-2 Operable Unit Record of Decision (EPA 2004b)</i>	ESD	May-04	Modified the uranium soil cleanup level from 350 to 267 pCi/g based on an engineering study to ensure protectiveness of the groundwater and river; modified the land-use assumption for 8 outlying waste

**Table C-1. CERCLA Records of Decision and Associated Changes. (8 pages)**

			sites from industrial to unrestricted and changed the cleanup levels for these sites to those consistent with the 100 Area cleanups.
<i>Explanation of Significant Differences for the 300-FF-2 Operable Unit Interim Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009e)</i>	ESD	Aug-09	Incorporates 14 plug-in sites into the ROD and subsequent ESDs; incorporates 2 newly discovered sites into the ROD and subsequent ESDs; allows future newly discovered sites to be incorporated into the ROD and ESDs as long as cost impacts are within specified limits.
<i>Explanation of Significant Differences, Hanford 300 Area, 300-FF-2 Operable Unit, 618-10 Burial Ground (EPA 2011b)</i>	ESD	Aug-11	Modified remedy to allow for necessary treatment of liquid waste in bottles, up to 1 gallon per bottle, to occur in trays within the excavation area in accordance with an approved work plan.
<b>Record of Decision</b>			
<p><b>Title:</b> Record of Decision 221-U Facility (Canyon Disposition Initiative), Hanford Site, Washington (EPA 2005b)  <b>FINAL</b>  <b>ROD Type:</b> CERCLA Final ROD  <b>Area:</b> 200 West  <b>Date Approved:</b> Oct-05  <b>Initial Decision:</b> Removal of waste from vessels and equipment in the facility with levels of transuranic isotopes greater than 100 nCi/g and eventual disposal of that waste at WIPP; removal of liquids from the facility or treatment to remove liquids; partial removal of contaminated equipment and piping from the gallery side of the facility and disposal at ERDF; demolition and subsequent stabilization of the railroad tunnel, 271-U, 276-U, 291-U, and 292-U structures and the 291-U-1 and 296-U-10 stacks and disposal at ERDF; construction of an engineered barrier; planting of semiarid-adapted vegetation on the barrier; institutional controls; post-closure care; and ongoing barrier performance and groundwater monitoring.</p>			
ARAR = applicable or relevant and appropriate requirement.		OU = operable unit.	
bgs = below ground surface.		P&T = pump-and-treat.	
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act.		PCB = polychlorinated biphenyl.	
EPA = U.S. Environmental Protection Agency.		RCRA = Resource Conservation and Recovery Act of 1976.	
ERDF = Environmental Restoration Disposal Facility.		RD/RAWP= remedial design/remedial action work plan.	
ESD = explanation of significant differences.		ROD = record of decision.	
IC = institutional controls.		RTD = remove, treat, dispose.	
MCL = maximum contaminant limit.		TSD = treatment, storage, and disposal.	
		WIPP = Waste Isolation Pilot Plant.	

Unless otherwise noted in Table C-2, decisions made through Action Memoranda are considered final. These Action Memoranda are available in the TPA Administrative Record (<http://www2.hanford.gov/arpir/>). These decisions focus mainly on the D4 of buildings, which are generally considered final actions since the buildings are demolished and the waste disposed to approved facilities, or on the removal, treatment, and disposal (RTD) of contaminated soil from waste sites, which are also generally considered final actions for individual waste sites. However, slabs and contaminated soils underlying buildings will likely go through additional decision making as part of appropriate source OUs. Similarly, waste sites that undergo RTD as a removal action will likely have a final ROD covering the decision, even though no additional cleanup activities are anticipated.

**Table C-2. CERCLA Action Memoranda. (9 pages)**

Title	Date	Type of Action	Removal Action/Decision
"618-9 Burial Ground Expedited Response Action, Phase I Project Plan" (CCN 9100749)	Feb-91	TCRA	This Expedited Response Action (ERA) provides for trench excavation and removal of drummed liquid wastes from the 618-9 Burial Ground. The treatment and/or disposal of the liquids and contaminated soils (if present) is considered part of the Phase 2 activities and is not considered time critical.
"Action Memorandum Approval: 316-5 Process Trenches, U.S. Department of Energy (DOE) Hanford Site, Richland, Washington" (CCN 9103432)	Jul-91	ERA	The Action Memorandum (AM) provides for excavation of soil from the 316-5 Process Trenches and interim stabilization pending further remedial action as part of the 300-FF-1 OU. This AM was initially not a final action; however, the ROD for 300-FF-1 OU, which covers these trenches, is a final CERCLA action.
"Action Memorandum: Expedited Response Action Proposal for 200 West Area Carbon Tetrachloride Plume" (CCN 9200423)	Jan-92	ERA	The AM identifies installation of a soil vapor extraction system with granular activated carbon recovery and offsite granular activated carbon regeneration at 216-Z-1A initially followed by systems at 216-Z-18 and 216-Z-9. While this ERA is not a final decision; a final decision has been made through the CERCLA remedial process for 200-ZP-1 OU.
"Action Memorandum Approval: Sodium Dichromate Barrel Landfill, U.S. Department of Energy Hanford Site, Richland, WA" (CCN 9307470)	Mar-93	ERA	The AM identifies excavation and disposal of drums and homestead debris from the landfill with sampling of any other wastes encountered during excavation; the expedited reaction would result in cleanup of the landfill to unrestricted levels.
"Action Memorandum: Expedited Response Action Proposal; Riverland Site, U.S. Department of Energy Hanford Site, Richland, Washington" (CCN 9305567)	Jun-93	ERA	The AM provides for cleanup of the Riverland Site, part of the 100-IU-1 OU, through excavation to address pesticide and hydrocarbon contamination, ordnance survey and removal, and sandblasting to decontaminate concrete.
"Action Memorandum: North Slope (Wahluke Slope) Expedited Response Action Cleanup Plan, U.S. Department of Energy Hanford Site, Richland, WA" (Ecology and EPA 1994a)	Mar-94	ERA	The AM provides for mitigation of physical hazards, excavation of the worst-case landfill, characterization of the other landfills, and if needed, excavation of other landfills based on characterization results; includes investigation and as needed, mitigation of ordinance burial pits. As stated in the AM, the intent of this action is to provide for the final removal action taken at the 100-IU-3 OU (the Wahluke Slope).

**Table C-2. CERCLA Action Memoranda. (9 pages)**

Title	Date	Type of Action	Removal Action/Decision
“Action Memorandum, USDOE Hanford 100 Area NPL, 100-IU-3 Operable Unit (Wahluke Slope), Hanford Site, Adams, Grant, and Franklin Counties, Washington” ( <u>Ecology and DOE 1997</u> )	Jul-97	TCRA	The AM addresses contaminated soils and drums at the 2,4-D Burial Ground in the 200-IU-3 OU. The removal action includes excavation of dioxin-contaminated soil for offsite disposal; bioremediation of 2,4-D contaminated soil; and excavation, cleaning, and disposal of the drums to ERDF. Under the 1994 AM for the Wahluke Slope, the 2,4-D Burial Ground was only identified for sampling. Subsequently, additional contamination was found, prompting this additional AM. Completion of this AM action allows continuation of the deletion process for the OU from the NPL.
“Action Memorandum; N Springs Expedited Response Action Cleanup U.S. Department of Energy Hanford Site, Richland, WA” ( <u>Ecology and EPA 1994b</u> )	Sep-94	ERA	The AM identifies a P&T system combined with a vertical barrier for implementation at N Springs. These systems comprise a component of the overall cleanup of N Springs but were also intended to provide additional information to the ongoing CERCLA and RCRA processes. This ERA is not a final decision.
“Action Memorandum: Expedited Response Action Proposal; 100-BC-1 Demonstration Project; U.S. Department of Energy Hanford Site; Richland, Washington” ( <u>EPA and Ecology 1995</u> )	Jun-95	ERA	The AM allows contaminated soils from waste sites 116-B-4, 116-B-5, and 116-C-1 to be excavated and temporarily stored in a safe fashion pending the start of ERDF operations; the actions under this AM would also provide additional information to support remedial design, including cost information, for the 100-BC-1 OU. The ERA was not intended as a final decision; the 100-BC-1 OU has been incorporated into an interim ROD and is undergoing a final ROD process.
“Action Memorandum, 183-H Solar Evaporation Basin Waste Expedited Response Action Cleanup Plan” ( <u>CCN 040739</u> )	Nov-96	ERA	The AM identifies ERDF as the disposal location for 183-H Solar Evaporation Basin waste generated through cleanup activities.
“Action Memorandum; U.S. Department of Energy, 200 West Area, Central Waste Complex, 183-H Solar Evaporation Basin Waste, Hanford Site, Benton County, Washington” ( <u>DOE et al. 2003</u> )	Jun-03	Non-time-critical removal action	The AM allows for the treatment and disposal to ERDF of wastes generated during the RCRA closure of 183-H basins
“Action Memorandum, N Area Waste Expedited Response Action Cleanup Plan” ( <u>CCN 038546</u> )	Nov-96	ERA	The AM identifies ERDF as the disposal location for contaminated sediment and debris from the Emergency Dump Basin, facility deactivation waste, and environmental investigation waste from the 100-N Area.

**Table C-2. CERCLA Action Memoranda. (9 pages)**

Title	Date	Type of Action	Removal Action/Decision
“Action Memorandum; 100-B/C Area Ancillary Facilities and the 108-F Building Removal Action, U.S. Department of Energy Hanford Site, Richland, WA” (EPA 1997)	Jan-97	Non-time-critical removal action	The AM identifies D4 with ERDF disposal for the following facilities in the 100-B and 100-F Areas: 111-B, 115-B, 118-C-4, 119-B, 105-C reactor waste, and 108-F. B Reactor and the ISS of 105-C Reactor are not included in the AM. This action is considered final for the ancillary facilities and demolished portions of the reactor. Additional decisions are expected on the reactor core that is in ISS.
“Action Memorandum: Removal Action at the 233-S Plutonium Concentration Facility, United States Department of Energy (USDOE) Hanford Site, Benton County, Washington” (DOE and EPA 1997)	Mar-97	Non-time-critical removal action	The AM identifies decontamination and demolition as the preferred alternative for the 233-S and 233-SA buildings, including subsurface systems and structures to a depth of 3 ft (further actions beyond the 3-ft depth would be deferred to the associated source OU). Waste meeting the criteria would be disposed to ERDF; other waste would be disposed as appropriate.
“Action Memorandum: USDOE Hanford 100 Area National Priorities List (NPL), 105-F and 105-DR Reactor Buildings and Ancillary Facilities, Hanford Site, Benton County, Washington” (CCN 059689)	Jul-98	Non-time-critical removal action	The AM identifies ISS for the 105-F and 105-DR reactor cores and decontamination and demolition for the reactor components up to the cores and for the 116-D, 116-DR, 117-DR, and 119-DR ancillary facilities. Demolition will extend generally to 3 ft below ground level; however, substructures and/or soil beneath the facilities that exceed cleanup levels will be excavated. This action is considered final for the ancillary facilities and demolished portions of the reactors. Additional decisions are expected on the reactor cores that are in ISS.
“Action Memorandum: USDOE Hanford 100 Area National Priorities List, 100-N Area Ancillary Facilities; Hanford Site, Benton County, Washington” (DOE et al. 1998)	Dec-98	Non-time-critical removal action	The AM provides for D&D of the inactive contaminated ancillary facilities in the 100-N Area, the facilities in the buffer zone, the Hanford Generating Plant, and the solid waste management units inside the Hanford Generating Plant support facilities (D&D of 105-N and 109-N are excluded from the AM). Contaminated soils under the facilities would be addressed through the 100-N Area decision documents for waste sites.
“Action Memorandum: U.S. Department of Energy, Hanford 300 Area National Priorities List (NPL), 331-A Virology Laboratory Building, Hanford Site, Benton County, Washington” (DOE and EPA 2000)	Feb-00	Non-time-critical removal action	Per the AM, the walls and floors of the 331-A Building would be demolished and the concrete slab would be scraped to remove physical hazards; wastes would be disposed to ERDF. The concrete slab and underlying soils would remain in place.

**Table C-2. CERCLA Action Memoranda. (9 pages)**

Title	Date	Type of Action	Removal Action/Decision
“Action Memorandum: United States Department of Energy Hanford 100 Area National Priorities List (NPL); 105-D and 105-H Reactor Facilities and Ancillary Facilities; Hanford Site; Benton County, Washington” (DOE and Ecology 2000)	Dec-00	Non-time-critical removal action	The AM identifies ISS for the 105-F and 105-DR Reactor cores and decontamination and demolition for the reactor components up to the cores and for the 116-D, 116-DR, 117-DR, and 119-DR ancillary facilities. Demolition will extend generally to 3 ft below ground level; however, substructures and/or soil beneath the facilities that exceed cleanup levels will be excavated. This action is considered final for the ancillary facilities and demolished portions of the reactors. Additional decisions are expected on the reactor cores that are in ISS.
“Action Memorandum; U.S. Department of Energy, Hanford 100 Area National Priorities List (NPL), 105-B Reactor Facility, Hanford Site, Benton County, Washington” (DOE and EPA 2001)	Dec-01	Non-time-critical removal action	The AM identifies appropriate actions at B Reactor to mitigate the threat to Site workers, public health or welfare or the environment by removing hazardous substances from the facility; these actions are consistent with increased public access to the reactor building; surveillance and maintenance activities would continue. Any wastes generated during the mitigation activities would be disposed to ERDF.
“Action Memorandum; U.S. Department of Energy, 200 Area, Burial Ground 218-W-4C Waste Retrieval, Hanford Site, Benton County, Washington” (DOE et al. 2004)	Apr-04	TCRA	The AM provides for the treatment and disposal of low-level and mixed low-level waste at ERDF from the M-091 TRU retrieval activities at the 218-W-4C Burial Ground. TRU is excluded from the AM.
“Action Memorandum: Request for Time Critical Response for Treatment and Disposal of Sludge from the 105-K East North Loadout Pit, USDOE Hanford Site” (DOE and EPA 2004)	Jun-04	TCRA	The AM requires the treatment of 105-K East North Loadout Pit waste prior to temporary storage at Hanford and ultimate disposal at WIPP.
<i>Action Memorandum for the Non-Time Critical Removal Action for the 224-B Plutonium Concentration Facility (DOE/RL-2004-36)</i>	Jun-04	Non-time-critical removal action	The AM provides for removing the nonradiological and radiological hazardous substances from the 224-B Facility, removing equipment and associated piping, decontaminating the structure and/or stabilizing the contamination, demolishing the structure to slab, disposing of the waste generated, and stabilizing the area. Samples will be used to determine the need for additional cleanup of the remaining slab and any subsurface soils; however, these cleanup actions are not included in the AM, but deferred to future activities.

**Table C-2. CERCLA Action Memoranda. (9 pages)**

Title	Date	Type of Action	Removal Action/Decision
“Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Non-Time Critical Removal Action Memorandum for Removal of the 232-Z Contaminated Waste Recovery Process Facility from the Plutonium Finishing Plant” (CCN 0093881)	Nov-04	Non-time-critical removal action	The AM provides for the remaining contaminated equipment to be removed and the building decontaminated, stabilized, and dismantled leaving the building slab, which will be addressed under a future CERCLA action.
<i>Action Memorandum for the Non-Time-Critical Removal Action for the U Plant Ancillary Facilities</i> (DOE/RL-2004-67)	Dec-04	Non-time-critical removal action	The AM provides for removing the non-radiological and radiological hazardous substances from the U Plant Ancillary Facilities, removing equipment and associated piping, decontaminating the structures and/or stabilizing the contamination, demolishing the structures to slab, disposing of the waste generated, and stabilizing the area around U Plant. The AM provides of listing of the specific facilities included. Slabs and underlying soils would be addressed as needed through future CERCLA actions.
“Action Memorandum #1 for the 300 Area Facilities” (DOE and EPA 2005a)	Jan-05	Non-time-critical removal action	The AM provides for the D4 of 72 buildings and structures in the northern part of the 300 Area with D4 wastes going to ERDF. An additional 10 buildings and structures were included in the EE/CA that supports the AM; however, those buildings and structures were demolished and found to have no hazardous materials prior to the AM.
“Action Memorandum #2 for the 300 Area Facilities” (DOE and EPA 2006a)	May-06	Non-time-critical removal action	The AM provides for the D4 of the 324 and 327 Buildings and ancillary facilities in the 300 Area with D4 wastes going to ERDF. The AM provides a list of the ancillary facilities. In general, slabs and subsurface structures would be removed along with about 1 m of surrounding soil; however, on a case-by-case basis, the slabs and/or below-grade structures and soils can be deferred to CERCLA actions associated with the 300-FF-2 OU.
“Action Memorandum #3 for the 300 Area Facilities,” (DOE and EPA 2006b)	Nov-06	Non-time-critical removal action	The AM provides for the D4 of 110 buildings and structures in the southern part of the 300 Area with D4 wastes going to ERDF. An additional 30 buildings and structures were included in the EE/CA that supports the AM; however, those buildings and structures are not included in the AM because DOE has identified alternative uses for them.

Table C-2. CERCLA Action Memoranda. (9 pages)

Title	Date	Type of Action	Removal Action/Decision
“Action Memorandum; United States Department of Energy, 100 Area, 105-N Reactor Facility and 109-N Heat Exchanger Building, Hanford Site, Benton County, Washington” (DOE and Ecology 2005)	Mar-05	Non-time-critical removal action	The AM provides for the D&D of portions of the 105-N and 109-N facilities and construction of a protective cover over the 105-N Reactor block and the 109-N steam generator cells and pipe gallery, placing them into ISS; waste would generally be disposed to ERDF. The final D&D of these facilities would be conducted in the future to allow for decay of radionuclides in the reactor block. AM identifies the ISS period as 64 years. This action is considered final for the demolished portions of the reactor and heat exchange building. Additional decisions are expected on the reactor core and building that are in ISS.
<i>Action Memorandum for the Plutonium Finishing Plant, Above-Grade Structures Non-time Critical Removal Action</i> (DOE/RL-2005-13)	May-05	Non-time-critical removal action	The AM provides for removing the non-radiological and radiological hazardous substances from the PFP above-grade structures, removing equipment and associated piping, decontaminating the structures and/or stabilizing the contamination, demolishing the structures to slab, disposing of the waste generated, and stabilizing and/or covering the area around PFP. The AM provides a listing of the specific structures included. Slabs and underlying soils would be addressed as needed through future CERCLA actions.
“Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities” (DOE and EPA 2005b)	Jun-05	Non-time-critical removal action	The AM provides for the D4 of 27 buildings and structures in the northern part of the 100-K Area with D4 wastes going to ERDF. In general, slabs and subsurface structures would be removed along with about 1 m of surrounding soil; however, on a case-by-case basis, the slabs and/or below-grade structures and soils can be deferred to CERCLA actions associated with the 100-KR-1 and 100-KR-2 source OUs.
<i>Action Memorandum for the Non-Time-Critical Removal Action for the 224-T Plutonium Concentration Facility</i> (DOE/RL-2004-68)	Jun-05	Non-time-critical removal action	The AM provides for removing the nonradiological and radiological hazardous substances from the 224-T Facility, removing equipment and associated piping, decontaminating the structure and/or stabilizing the contamination, demolishing the structure to slab, disposing of the waste generated, and stabilizing the area. Samples will be used to determine the need for additional cleanup of the remaining slab and any subsurface soils; however, these cleanup actions are not included in the AM, but deferred to future activities.

**Table C-2. CERCLA Action Memoranda. (9 pages)**

<b>Title</b>	<b>Date</b>	<b>Type of Action</b>	<b>Removal Action/Decision</b>
<i>Action Memorandum for the Time-Critical Removal Action for Support Activities to 200-UW-1 Operable Unit (DOE/RL-2005-71)</i>	Sep-05	TCRA	The AM provides for activities in support of the U Canyon barrier construction, including removal of part of the 200-W-42 pipeline, rerouting TEDF line and stabilizing/removing a waste water line; complete or partial removal of a concrete slab; removal and sealing of 3 vent risers; and relocation of miscellaneous markers or utilities. The TCRA was used to accelerate work consistent with weather conditions and to take advantage of availability of specialize resources. This action is not considered final; the decision process is ongoing for the waste sites in the U Plant Area. The U Plant barrier ROD, however, is considered final.
“Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities” (DOE and EPA 2007)	Jan-07	Non-time-critical removal action	The AM identifies ISS for the 105-KE and 105-KW Reactor cores and decontamination and demolition for the reactor components up to the cores and for the remaining buildings and structures in the 100-K Area. Subsurface structures will generally be removed to 3 ft below ground level; however, substructures and/or soil beneath the facilities that exceed cleanup levels will be evaluated through source OU cleanup activities. This action is considered final for the ancillary facilities and demolished portions of the reactors. Additional decisions are expected on the reactor cores that are in ISS.
<i>Action Memorandum for the Non-Time-Critical Removal Action for the Northern Part of the BC Controlled Area (UPR-200-E-83) (DOE/RL-2008-21)</i>	May-08	Non-time-critical removal action	The AM provides for the removal, treatment as needed, and disposal, generally to ERDF, of UPR-200-E-83 Zone A soils to a depth of 6 inches, or until PRGs are met, and Zone B soils in areas of elevated radioactivity above PRGs. Excavation activities must consider old growth vegetation and avoid destruction of existing plant life.
<i>Action Memorandum for the Non-Time-Critical Removal Action for the 212-N, -P and -R Facilities (DOE/RL-2008-80)</i>	May-09	Non-time-critical removal action	The AM provides for removing the nonradiological and radiological hazardous substances from the 212-N, -P, and -R Facilities by removing equipment and associated piping, decontaminating the structures and/or stabilizing the contamination, demolishing each basin and underlying soils to a depth of 1 m, disposing of the waste generated, and stabilizing the surrounding area. Samples will be collected from the underlying soils to evaluate the need for additional cleanup activities
<i>Action Memorandum for the Non-Time-Critical Removal Action for the 212-N, 212-P, and 212-R Facilities, Addendum 1: Disposition of Railcars (DOE/RL-2008-80-ADD1)</i>	Dec-10	Non-time-critical removal action	The AM provides for D4 of 16 railcars located in 200 North Area with disposal to ERDF and includes an option to evaluate some of the cars for movement to the B Reactor for preservation. The AM identifies a pathway for addressing contaminated soils either by removal at the time of D4 or transfer to another OU for continued CERCLA action.

**Table C-2. CERCLA Action Memoranda. (9 pages)**

<b>Title</b>	<b>Date</b>	<b>Type of Action</b>	<b>Removal Action/Decision</b>
<i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit (DOE/RL-2009-48)</i>	Jul-09	Non-time-critical removal action	The AM provides for cleanup of 11 waste sites in the 100-MG-1 OU using either a confirmatory sampling/no further action alternative (8 sites) or a removal, treatment, disposal alternative (3 sites). Cleanup levels will be consistent with existing 100 Area cleanup levels. Should the confirmatory sites not meet cleanup levels, they will then be addressed by the RTD alternative.
<i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit (DOE/RL-2009-86)</i>	Apr-10	Non-time-critical removal action	The AM provides for cleanup of 37 waste sites in the 100-MG-1 OU using either a confirmatory sampling/no further action alternative (21 sites) or a removal, treatment, disposal alternative (16 sites). Cleanup levels will be consistent with existing 100 Area cleanup levels. Should the confirmatory sites not meet cleanup levels, they will then be addressed by the RTD alternative. The remainder of the 200-MG-1 OU sites are not included in the AM because contamination may exceed 15 ft below ground surface; they will be address through the CERCLA remedial process.
<i>Investigation-Derived Waste Purgewater Management Action Memorandum (DOE/RL-2009-39)</i>	Aug-09	Non-time-critical removal action	The AM provides for additional purgewater management capacity by relining an existing unit and installing up to 3 new units, each with leak-detection systems. The purgewater management units will be operated in compliance with requirements, monitored during operations, and disassembled and dispositioned to appropriate requirements following the operational period.
<i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit (DOE/RL-2009-37)</i>	Oct-09	Non-time-critical removal action	The AM provides for cleanup of 34 waste sites in the 100-MG-2 OU using either a confirmatory sampling/no further action alternative (16 sites) or an RTD alternative (18 sites). Should the confirmatory sites not meet cleanup levels, they will then be addressed by the RTD alternative. The remainder of the 200-MG-2 OU sites are not included in the AM because contamination may exceed 15 ft below ground surface; they will be address through the CERCLA remedial process.
<i>Action Memorandum for General Hanford Site Decommissioning Activities (DOE/RL-2010-22)</i>	Apr-10	Non-time-critical removal action	The AM establishes D4 for excess industrial buildings and structures and cleanup of miscellaneous debris; provides for removal of contaminated soil or evaluation of contaminated soils for inclusion as a waste site through WIDS; identifies ERDF as the preferred disposal location for wastes meeting ERDF disposal criteria; allows for the possibility of using certain wastes in other remedial actions, such as fill material beneath barriers; and allows for incorporation of additional, similar buildings and structures into the AM.

Table C-2. CERCLA Action Memoranda. (9 pages)

Title	Date	Type of Action	Removal Action/Decision
<i>Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Tier 2 Buildings/Structures (DOE/RL-2010-102)</i>	Feb-11	Non-time-critical removal action	This AM established D4 to slab-on-grade for 57 Tier 2 buildings/structures in the 200 East Area; plug or grout below-grade piping and/or drains; remove equipment; remove and/or fill below-grade voids; send waste to ERDF or other approved facility for treatment and disposal; characterize nature and extent of remaining hazardous substances for future decisions; initiate waste site evaluation through WIDS for sites that may require further work; stabilize the area as needed.
2,4-D = 2,4-dichlorophenoxyacetic acid. AM = Action Memorandum. CCN = correspondence control number. CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i> D4 = deactivate, decontaminate, decommission, and demolish. D&D = decontamination and decommissioning. EE/CA = engineering evaluation/cost analysis. ERA = expedited response action. ERDF = Environmental Restoration Disposal Facility.		ISS = interim safe storage. OU = operable unit. P&T = pump-and-treat. PFP = Plutonium Finishing Plant. PRG = preliminary remediation goal. RCRA = <i>Resource Conservation and Recovery Act of 1976.</i> RAL = remedial action level. ROD = record of decision. RTD = remove, treat, and dispose. TCRA = time critical removal action. TPA = Tri-Party Agreement. TRU = transuranic. WIDS = Waste Information Data System. WIPP = Waste Isolation Pilot Plant.	

**Table C-3. Permits, Licenses, and Other Statutory/Regulatory Program Decisions Affecting Hanford Site Cleanup Mission. (3 pages)**

Document	Summary
<p><i>Draft Hanford Facility Dangerous Waste Permit(Site-Wide Permit), Revision 9, (WA7890008967)</i> (last modified September 30, 2009)</p> <p><b><u>FINAL</u></b></p> <p>The Washington State Department of Ecology issued a Draft Hanford Facility Dangerous Waste Permit, Revision 9, for public review and comment. The public comment period on the draft permit was from May 1, 2012, through October 22, 2012. Until the Department of Ecology reaches a final decision, Revision 8C of the Dangerous Waste Permit remains in effect.</p>	<p>This dangerous waste permit, for the treatment, storage, and disposal of dangerous waste at the Hanford Facility, is the RCRA Permit for the Hanford Facility. The permit allows a step-wise permitting process of the Hanford Facility to ensure the proper implementation of the TPA. In order to accomplish this, the permit consists of six parts.</p> <ul style="list-style-type: none"> <li>• Part I, Standard Conditions</li> <li>• Part II, General Facility Conditions</li> <li>• Part III, Unit-Specific Conditions for Final Status Operations</li> <li>• Part IV, Unit-Specific Conditions for Corrective Action</li> <li>• Part V, Unit-Specific Conditions for Units Undergoing Closure</li> <li>• Part VI, Unit-Specific Conditions for Units in Post-Closure</li> </ul>
<p>Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington (<a href="#">58 FR 48509</a>).</p> <p><b><u>FINAL</u></b></p>	<p>In December 1992, the DOE issued the Final Environmental Impact Statement (EIS) on Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington (DOE/EIS-0119F). The final EIS analyzed alternatives for decommissioning eight water-cooled, graphite-moderated plutonium-production reactors, located along the Columbia River in Washington State. The eight reactors (B, C, D, DR, F, H, KE and KW), operated between the years 1944 and 1971, and have been retired from service. The alternatives analyzed in the EIS included the no action, immediate one-piece removal, safe storage followed by deferred one-piece removal, safe storage followed by deferred dismantlement, and in situ decommissioning alternatives. The record of decision (ROD) was signed September 10, 1993, (<a href="#">58 FR 48509</a>, September 16, 1993). The ROD documented the DOE decision for safe storage followed by deferred one-piece removal of the eight surplus reactors.</p> <p>DOE prepared a supplemental analysis to the EIS in July 2010 (<i>Supplemental Analysis, Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington</i> [DOE/EIS-0119F-SA-01]) to broaden the possible decommissioning approach, retaining the one-piece removal option and including the option for immediate dismantlement. DOE determined that the proposed action is not a substantial change to the alternatives previously analyzed in the EIS so a supplement to DOE/EIS-0119F or new EIS is not needed.</p>
<p>Prevention of Significant Deterioration Permit No. PSD-X80-14, issued to the U.S. Department of Energy, Richland Operations Office by the U.S. Environmental Protection Agency, Region 10</p> <p><b><u>FINAL</u></b></p>	<p>Covers emission of NO<sub>x</sub> to the atmosphere from the Plutonium Uranium Extraction Plant and the Uranium-Trioxide Plant. No expiration date.</p>

**Table C-3. Permits, Licenses, and Other Statutory/Regulatory Program Decisions Affecting Hanford Site Cleanup Mission. (3 pages)**

<b>Document</b>	<b>Summary</b>
Hanford Site Air Operating Permit 00-05-006, Renewal 1 <u><b>FINAL</b></u>	Covers operations on the Hanford Site having a potential to emit airborne emissions. The permit provides a compilation of applicable <i>Clean Air Act of 1977 (42 USC 7401)</i> requirements both for radioactive and non-radioactive emissions at the Hanford Site. It will be implemented through Federal and State programs. Attachment 1 contains the State of Washington Department of Ecology (Ecology) permit terms and conditions. Attachment 2 contains the State of Washington Department of Health (Health) Radioactive Air Emissions License (FF-01) as permit terms and conditions. Attachment 3 contains the Benton Clean Air Agency (BCAA) permit terms and conditions applicable to the regulations of open burning and asbestos.
Permit WA-002591-7, Clean Water Act of 1977 – National Pollutant Discharge Elimination System Permit <u><b>FINAL</b></u>	Authorizes discharge of water from 100 Area facilities to the Columbia River from Outfall 004 in accordance with discharge point, effluent limitations, monitoring requirements and other conditions. Effective December 1, 2009 through July 31, 2014.
Permit WAR10B90F, Clean Water Act of 1977 – National Pollutant Discharge Elimination System General Permit <u><b>FINAL</b></u>	Authorizes storm water discharges associated with construction activities from the Hanford Site to the Columbia River in accordance with a Storm Water Pollution Prevention Plan. No expiration date is specified; the estimated project completion date identified in the most recent Notice of Intent is May 27, 2014.
Permit CR-IU005, Clean Water Act of 1977 – National Pollutant Discharge Elimination System Permit <u><b>FINAL</b></u>	Allows wastewater from the Environmental Molecular Sciences Laboratory to be discharged to the city of Richland’s wastewater treatment facility.
Permit ST 4500, Washington State Department of Ecology – State Wastewater Permit <u><b>FINAL</b></u>	Allows treated wastewater from the Effluent Treatment Facility to be discharged to the State-Approved Land Disposal Site. This permit expired August 1, 2005, and has not been reissued. The old permit will remain in effect until the new permit is issued.
Permit ST 4501, Washington State Department of Ecology – State Wastewater Permit <u><b>FINAL</b></u>	Allows for the discharge of cooling water and other primarily uncontaminated wastewater from 400 Area facilities to two ponds located north-northeast of the 400 Area perimeter fence. This permit was effective October 1, 2003, and expired on October 1, 2008. It remains in effect pending proposed consolidation into Permit ST 4511.
Permit ST 4502, Washington State Department of Ecology – State Wastewater Permit <u><b>FINAL</b></u>	Allows treated effluent from the 200-East and 200-West Areas to be discharged to the 200 Area Treated Effluent Disposal Facility. This permit expired in May 2005 and remains in effect pending reissuance. A draft revised Permit ST0004502 underwent public review and comment in November 2011 and is awaiting final Ecology action.
Permit ST 4507, Washington State Department of Ecology – State Wastewater Permit <u><b>FINAL</b></u>	Allows domestic wastewater to be discharged to the 100-N Area sewage lagoon. This permit expired in May 2002. A renewal application was submitted allowing the old permit will remain in effect. The current lagoon is being replaced with a new non-discharging lagoon (see Permit ST0045514) and upon closure Permit ST 4507 would be terminated.

**Table C-3. Permits, Licenses, and Other Statutory/Regulatory Program Decisions Affecting Hanford Site Cleanup Mission. (3 pages)**

Document	Summary
Permit ST 4511 , Washington State Department of Ecology – State Wastewater Permit <b><u>FINAL</u></b>	Consolidation of permits: ST 4508, ST 4509, and ST 4510. This Categorical State Waste Discharge Permit authorizes the discharge of wastewater from maintenance, construction, and hydrotesting activities and allows for cooling water, condensate, and industrial storm water discharges at the Hanford Site. This permit was issued February 16, 2005 and was set to expire February 16, 2010. A renewal application was submitted to Ecology in August 2009, and a supplemental request was submitted in April 2010 to incorporate Permit ST 4501 as well. The renewal application is awaiting Ecology action.
Permit ST0045514 , Washington State Department of Ecology – State Wastewater Permit	A new non-discharging, lined evaporative lagoon is being constructed northeast of the 200 West Area for treatment of domestic wastewater. A draft permit has been prepared, public review and comment was received in May and June of 2012, and final Ecology action is pending.
Permit WAG-50-5180, Washington State Department of Ecology – State Sand and Gravel General Permit <b><u>FINAL</u></b>	Permit for wastewater discharges associated with handling sand and gravel for the Concrete Batch Plant in the 200-East Area. Effective October 1, 2010 through October 1, 2015.
Permit WAG-50-5181, Washington State Department of Ecology – State Sand and Gravel General Permit <b><u>FINAL</u></b>	Permit for wastewater discharges associated with Pit 30 Quarry operations in the 200-East Area. Effective October 1, 2010 through October 1, 2015.
Large Onsite Sewage Systems (LOSS) “Permit to Operate” HAN099 <b><u>FINAL</u></b>	Lists systems in the various areas
Underground Injection Control (UIC) Wells	Hanford has a number of UIC wells – storm water, non-storm water and septic systems. The Mission Support Contractor maintains the inventory and locations of active and inactive wells.

**Table C-4. Tri-Party Agreement Decisions Affecting Hanford Site Cleanup Mission.**

TPA Documentation	Summary of Decision
<ul style="list-style-type: none"> <li>• M-045-00 and</li> <li>• Appendix C Part 1: Required Retrieval Technologies</li> <li>• Appendix H</li> </ul>	Closure will follow retrieval of as much tank waste as technically possible, with tank waste residues not to exceed 360 ft <sup>3</sup> in each of the 100-series tanks, 30 ft <sup>3</sup> in each of the 200-series tanks, or the limit of waste retrieval technology capability.
<ul style="list-style-type: none"> <li>• Work to Be Performed</li> <li>• Section IV.A.3</li> <li>• M-062-21</li> </ul>	Under this decree, initial plant operations is defined as, over a rolling period of at least three months leading to the milestone date, operating the WTP to produce high-level waste glass at an average rate of at least 4.2 metric tons of glass/day, and low-activity waste glass at an average rate of at least 21 metric tons of glass/day.
WTP =	Waste Treatment Plant.

**Table C-5. Other Federal and State Decisions Affecting Hanford Site Cleanup Mission. (5 pages)**

Other Federal/State Decision	Summary of Decision
<u>Executive Order 11514</u> , <i>Protection and Enhancement of Environmental Quality</i> , as amended by Executive Order 11991	This Executive Order requires Federal agencies to continually monitor and control their activities to (1) protect and enhance the quality of the environment and (2) develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs that may have potential environmental impact so that interested parties can submit their views. DOE has issued regulations ( <u>10 CFR 1021</u> , “National Environmental Policy Act Implementing Procedures”) and <u>DOE O 451.1B</u> , <i>National Environmental Policy Act Compliance Program</i> , for compliance with this Executive order.
<u>Executive Order 12088</u> , <i>Federal Compliance with Pollution Control Standards</i>	This Executive Order directs Federal agencies to comply with applicable administrative and procedural pollution control standards established by, but not limited to, the <i>Clean Air Act of 1977</i> ( <u>42 USC 7401</u> ), the <i>Noise Control Act of 1972</i> , the <i>Clean Water Act of 1977</i> , the <i>Safe Drinking Water Act of 1974</i> , the <i>Toxic Substances Control Act of 1976</i> , and RCRA.
<u>Executive Order 12580</u> , <i>Superfund Implementation</i>	This Executive Order delegates to a number of Federal departments and agencies the authority and responsibility to implement certain provisions of CERCLA. The policies and procedures for implementing these provisions (e.g., carrying out response actions and fulfilling natural resource trusteeship responsibilities) are spelled out in the National Contingency Plan.

**Table C-5. Other Federal and State Decisions Affecting Hanford Site Cleanup Mission. (5 pages)**

Other Federal/State Decision	Summary of Decision
<p><i>Nuclear Waste Policy Act of 1982</i> <b>FINAL</b></p>	<p>This Act directed DOE to characterize and evaluate the Yucca Mountain, Nevada, site for suitability as a potential repository for disposal of commercial spent nuclear fuel and HLW. The act also directed the President to evaluate the need for a separate repository for HLW resulting from atomic energy defense activities. On April 30, 1985, President Reagan completed this evaluation, the result of which was that high-level waste from atomic energy defense activities may be disposed of in the proposed repository along with spent nuclear fuel. After passage by the U.S. House of Representatives and U.S. Senate, on July 23, 2002, President Bush signed House Joint Resolution 87 approving the site at Yucca Mountain for the development of a repository for the disposal of HLW and spent nuclear fuel, pursuant to the <i>Nuclear Waste Policy Act of 1982</i>.</p> <p>As indicated in the Obama Administration's FY 2010 budget request, the Administration intends to terminate the Yucca Mountain program while developing nuclear waste disposal alternatives. Notwithstanding the decision to terminate the Yucca Mountain program, DOE remains committed to meeting its obligations to manage and ultimately dispose of HLW and spent nuclear fuel. The Administration directed the establishment of the Blue Ribbon Commission on America's Nuclear Future (Commission) to evaluate alternative approaches for meeting these obligations. The Commission submitted its final report to the Secretary of Energy in January 2012. The Commission did not evaluate Yucca Mountain or any other location and recommended a waste management approach to resolve the current impasse, which has eight key elements:</p> <ol style="list-style-type: none"> <li>1. A new, consent-based approach to siting future nuclear waste management facilities.</li> <li>2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.</li> <li>3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.</li> <li>4. Prompt efforts to develop one or more geologic disposal facilities.</li> <li>5. Prompt efforts to develop one or more consolidated storage facilities.</li> <li>6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.</li> <li>7. Support for continued U.S. innovation in nuclear energy technology and for workforce development.</li> <li>8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.</li> </ol>

**Table C-5. Other Federal and State Decisions Affecting Hanford Site Cleanup Mission. (5 pages)**

Other Federal/State Decision	Summary of Decision
<p><u><i>Federal Facilities Compliance Act of 1992</i></u> <b>FINAL</b></p>	<p>This Act, enacted on October 6, 1992, amended RCRA, Section 6961 and other sections and requires DOE to prepare plans that develop treatment capacity for mixed waste stored or generated at each facility, except for those facilities subject to a permit that establishes a schedule for treatment of such waste or an existing agreement or order governing the treatment of such waste to which the State is a party. The host state and/or EPA must approve each plan. The State of Washington, EPA, and DOE had an existing plan (i.e., the TPA) addressing compliance with the storage prohibition for mixed waste at the time this law was enacted. Therefore, Hanford was not required to develop a new plan. A violation of the TPA may concurrently be a violation of the <i>Federal Facilities Compliance Act of 1992</i> (i.e., the State of Washington may seek judicial enforcement under RCRA (42 USC 6901).</p>
<p><u><i>Waste Isolation Pilot Plant Land Withdrawal Act</i></u> (Public Law 102-579). <b>FINAL</b></p>	<p>The act withdrew land from the public domain for the purposes of creating and operating WIPP, the geologic repository in New Mexico designated as the national disposal site for defense transuranic waste. In addition to establishing the location for the facility, the <i>Waste Isolation Pilot Plant Land Withdrawal Act</i> also defines the characteristics and amount of waste that will be disposed of at the facility. The amendments to the Waste Isolation Pilot Plant Land Withdrawal Act exempt waste designated by the Secretary of Energy for disposal at WIPP from the RCRA land disposal restrictions. However, these amendments do not exempt mixed transuranic waste from other RCRA requirements. WIPP does have an RCRA permit and can accept mixed transuranic waste. On May 15, 2003, EPA Region 6 approved DOE's request to dispose of transuranic waste and mixed transuranic waste containing PCBs at WIPP subject to certain "conditions of approval."</p>
<p><u><i>Spent Fuel Settlement Agreement</i></u> (No. CV-91-0035-S-EJL and No. CV-91-0054-S-EJL), October 17, 1995</p>	<p>This agreement allows INL to receive spent nuclear fuel and mixed waste from off site and establishes schedules for the treatment of existing high-level waste, transuranic waste, mixed waste, and removal of spent nuclear fuel from the State.</p>
<p>Consent Decree for Stabilization of SSTs at Hanford Site between U.S. Department of Energy and Washington State Department of Ecology (No. <u>CT-99-5076-EFS</u>) September 29, 1999 <b>FINAL</b></p>	<p>This consent decree established a court-enforceable, technically sound schedule for pumping liquid nuclear waste from the remaining 29 unstabilized SSTs. The key elements of the consent decree included:</p> <ul style="list-style-type: none"> <li>• Pumping the tanks that pose the greatest environmental risk first, thus providing additional protection for the Columbia River and public health.</li> <li>• Accelerating the schedule for pumping so that 98 percent of approximately 23.5 million liters (6.2 million gallons) of remaining pumpable liquid is removed by September 30, 2003, with the final 2 percent scheduled to be removed by September 30, 2004 (this was completed).</li> <li>• Increasing DOE funding to a level that supports successful execution of the new schedule for tank stabilization.</li> <li>• Work under the consent decree has been completed and the court has terminated the consent decree.</li> </ul>

**Table C-5. Other Federal and State Decisions Affecting Hanford Site Cleanup Mission. (5 pages)**

Other Federal/State Decision	Summary of Decision
<p><u>Presidential Proclamation 7319</u>, <i>Establishment of the Hanford Reach National Monument</i> (June 9, 2000) <b><u>FINAL</u></b></p>	<p>This proclamation set apart and reserved the Hanford Reach National Monument to protect all lands and interests in lands owned or controlled by the United States within the boundaries of the monument area. The lands reserved consist of approximately 195,000 acres, and are appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws. The monument is to be managed by the U.S. Fish and Wildlife Service under existing agreements with DOE. DOE retains its responsibilities under applicable environmental laws, including the remediation of hazardous substances or the restoration of natural resources at the Hanford Site.</p>
<p><u>Executive Order 13175</u>, <i>Consultation and Coordination with Indian Tribal Governments</i> (November 6, 2000). <b><u>FINAL</u></b></p>	<p>This Executive Order supplements “Government-to-Government Relations with Native American Tribal Governments” (59 FR 22951), and states that each executive department and agency shall consult, to the greatest extent practicable and to the extent permitted by law, with Tribal Nations prior to taking actions that affect Federally recognized tribal governments. This order also states that each executive department and agency shall assess the impact of Federal government plans, projects, programs, and activities on tribal trust resources and ensure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities.</p>
<p>U.S. Department of Interior Announcement, National Historic Landmark, August 19, 2008.</p>	<p>Hanford’s B Reactor, has been designated a National Historic Landmark by the U.S. Department of Interior. Since then, efforts have continued to include B Reactor in a new National Historical Park and on September 20, 2012, a majority of members of the House of Representatives voted in favor of the Manhattan Project National Historical Park Act, H.R. 5987. However, the bill failed to receive the two-thirds majority necessary to pass under suspension of House Rules.</p>
<p>Consent Decree and Tri-Party Agreement Settlement Package, order signed October 25, 2010, settling <i>State of Washington v. Chu</i>, United States District Court, Eastern District of Washington, Case No. <u>CV-08-5085-FVS</u></p>	<p>The Consent Decree and TPA Settlement Package imposes milestones for the construction, commissioning, and startup of the Waste Treatment and Immobilization Plant (WTP), as well as continued retrieval of waste from Hanford’s SSTs. Significant milestones in the Consent Decree require DOE to meet deadlines for the WTP’s facilities to keep construction on pace; start treating tank waste through the WTP by 2019; achieve initial plant operations by 2022; retrieve the waste from the remaining 10 tanks in the “C” tank farm by 2014; identify nine other SSTs to retrieve waste from by 2014; and finish retrieving the waste from those nine other tanks by 2022. The Consent Decree also covers reporting requirements for waste retrievals from SSTs, regulatory coordination, and a process to resolve disputes between the agencies.</p>

**Table C-5. Other Federal and State Decisions Affecting Hanford Site Cleanup Mission. (5 pages)**

Other Federal/State Decision	Summary of Decision
Settlement Agreement between the State of Washington and the U.S. Department of Energy (No. 2: <u>03CV-05018-AAM</u> January 6, 2006) <b><u>FINAL</u></b>	Prior to the issuance of the <i>Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington</i> (HSW EIS) ( <u>DOE/EIS-0286F</u> ) and record of decision ( <u>69 FR 39449</u> , "Record of Decision for the Solid Waste Program, Hanford Site, Richland, WA: Storage and Treatment of Low-Level Waste and Mixed Low-Level Waste; Disposal of Low-Level Waste and Mixed Low-Level Waste, and Storage, Processing, and Certification of Transuranic Waste for Shipment to the Waste Isolation Pilot Plant"), the State of Washington (the State) initiated litigation on issues related to the importation, treatment, and disposal of radioactive and hazardous waste generated off the Hanford Site as a result of nuclear defense and research activities. The court enjoined shipment of offsite transuranic waste to Hanford for processing and storage pending shipment to the Waste Isolation Pilot Plant near Carlsbad, New Mexico. DOE, the State, and the U.S. Department of Justice signed a Settlement Agreement ending the litigation on January 6, 2006. The agreement is intended to resolve the State's concerns about HSW EIS ( <u>DOE/EIS-0286F</u> ) groundwater and other analyses. The agreement also stipulates that when the <i>Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington</i> ( <u>DOE/EIS-0391</u> ) has been completed, it will supersede the HSW EIS. Until that time, DOE will not rely on HSW EIS groundwater analyses for decision-making, and DOE will not import offsite waste to Hanford, with certain limited exemptions as specified in the agreement.
CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i> DOE = U.S. Department of Energy. EPA = U.S. Environmental Protection Agency. HLW = high-level waste. HSW EIS = <i>Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington.</i>	INL = Idaho National Laboratory. PCB = polychlorinated biphenyl. RCRA = <i>Resource Conservation and Recovery Act of 1976.</i> SST = single-shell tank. TPA = Tri-Party Agreement. WIPP = Waste Isolation Pilot Plant. WTP = Waste Treatment Plant.

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**APPENDIX D**

**HANFORD ESTIMATED CLEANUP COST AND SCHEDULE STATUS**

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## TERMS

ALARA	as low as reasonably achievable
BOF	Balance of Facilities
CCP	Central Characterization Project
CENRTC	capital equipment not related to construction
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CH	contact-handled
CSB	Canister Storage Building
CVDF	Cold Vacuum Drying Facility
CWC	Central Waste Complex
D&D	decontamination and decommissioning
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DOE-ORP	U.S. Department of Energy, Office of River Protection
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
DST	double-shell tank
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESH&Q	environmental safety, health and quality
ETF	Effluent Treatment Facility
FFTF	Fast Flux Test Facility
FY	fiscal year
G&A	general and administrative
GM	groundwater monitoring
GRP	Groundwater Remediation Project
HAMMER	Hazardous Materials Management and Emergency Response (Facility)
HLW	high-level waste
HVAC	heating, ventilation and air conditioning
IDF	Integrated Disposal Facility
IDFE	Integrated Disposal Facility East
IFW	Integrated Field Work
IHLW	immobilized high-level waste
ILAW	immobilized low-activity waste
ISA	Interim Storage Area
ISS	interim safe storage
KE	K East Basin
KW	K West Basin
KOP	knock-out pot
KPS	KOP Processing System
LAW	low-activity waste

LERF	Liquid Effluent Retention Facility
LLBG	low-level burial ground
LOE	level of effort
LTS	Long-Term Stewardship
MCO	multi-canister overpack
MLLW	mixed low-level waste
NEPA	<i>National Environmental Policy Act</i>
NM	nuclear material
NRDWL	non-radioactive dangerous waste landfill
OSHA	Occupational Safety and Health Administration
OU	operable unit
PA	performance assessment
PBS	project baseline summary
PFP	Plutonium Finishing Plant
PPSL	Plutonium Process Support Laboratories
PT	pretreatment
PUREX	Plutonium Uranium Extraction (Plant)
RH	remote-handled
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
REDOX	Reduction-Oxidation Facility (S Plant)
RMA	remote mechanical operations “A” line
RMC	remote mechanical operations “C” line
ROD	record of decision
RTD	remove, treat, and dispose
RTS	Retention/Transfer System
S&M	surveillance and maintenance
SAP	sampling and analysis plan
SNF	spent nuclear fuel
SST	single-shell tank
STP	Sludge Treatment Project
STSC	Sludge Transfer Storage Container
SWOC	Solid Waste Operations Complex
TEDF	Treated Effluent Disposal Facility
TOC	total organic compound
TPA	Tri-Party Agreement
TRU	transuranic
TSD	treatment, storage, and disposal
WAC	<i>Washington Administrative Code</i>
WDOH	Washington Department of Health
WIPP	Waste Isolation Pilot Plant
WESF	Waste Encapsulation and Storage Facility
WM	Waste Management
WRAP	Waste Receiving and Processing (Facility)
WTP	Waste Treatment and Immobilization Plant

## APPENDIX D

### HANFORD CLEANUP LIFECYCLE SCHEDULE AND COST DETAILS

As directed in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), also referred to as the Tri-Party Agreement (TPA)<sup>1</sup>, Milestone M-036-01, additional schedule and cost details are provided in appendices to the *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report). The schedules and costs are provided by project baseline summary (PBS) and reflect the scope discussed in Chapters 4.0 through 7.0 of the Lifecycle Report. Where not adequately addressed in these chapters, additional scope information is provided in this appendix in summary form.

The schedules and costs provided in this appendix are reported to Level 2 for the entire lifecycle and to Level 3 for the execution year (Fiscal Year [FY] 2013) and a period of approximately 5 more years. Due to the complexity of the Level 3 schedules, the information is reported in table format with costs by year. The start and finish of each Level 3 work element is reflected by the initial and final years that include costs.

Information for each of the PBSs is provided in the following subsections as a series of tables:

- A scope table that summarizes the Level 3 work elements. In some instances, the scope descriptions have been developed only to Level 2. In these cases, the information has been presented in the main chapters of the report and is not repeated here. These PBSs are identified in the appropriate subsections.
- A cost and schedule table for the remaining lifecycle is presented at Level 2 by fiscal year. The costs are escalated and include site-wide service allocations and cost and/or schedule uncertainty (also referred to as contingency in the Waste Treatment and Immobilization Plant [WTP] PBS). Costs are presented from FY 2013 through the final year of the lifecycle for all PBSs. PBS RL-LTS extends from FY 2060 through FY 2090.
- A near-term cost and schedule table at Level 3 by fiscal year that extends for approximately 5 years.

Risk management is an essential function of project management. Cost and schedule uncertainty are included in the development of the Total Project Cost and the approved U.S. Department of Energy (DOE) planning case, and are reserved to accommodate additional work scope related to risk events that may stem from conditions and events that were not known during project planning, and other unanticipated changes or uncertainties. Information provided in this Lifecycle Report includes estimates for both cost and schedule uncertainty based on risk analysis methods that comply with DOE guidelines and orders. These estimates are identified as “cost and/or schedule uncertainty” in the tables in this appendix. Additional information about uncertainty and project risk is included in Section 2.1.2.

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<sup>1</sup> Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

## D.1 RICHLAND OPERATIONS OFFICE PROJECT BASELINE SUMMARY INFORMATION

The U.S. Department of Energy (DOE), Richland Operations Office (RL) manages their assigned cleanup mission through the following PBSs (at Level 1):

- Nuclear Materials Stabilization and Disposition–PFP, PBS RL-0011
- SNF Stabilization and Disposition, PBS RL-0012
- Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C
- Safeguards and Security, PBS RL-0020
- Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030
- Nuclear Facility D&D–Remainder of Hanford, PBS RL-0040
- Infrastructure and Services, PBS RL-0040
- Nuclear Facility D&D–River Corridor Cleanup Project, PBS RL-0041
- Nuclear Facility D&D–Fast Flux Test Facility Project, PBS RL-0042
- Richland Community and Regulatory Support, PBS RL-0100
- Long-Term Stewardship, PBS RL-LTS
- Final Reactor Disposition.

### D.1.1 NM STABILIZATION AND DISPOSITION–PFP (PBS RL-0011) SCHEDULE AND COST DETAILS

**Table D-1. NM Stabilization and Disposition–PFP (PBS RL-0011) Level 3 Scope Summary.**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Maintain Safe and Compliant PFP	Maintain Safe and Compliant PFP	Provides safety, emergency management, OSHA, fire protection programs, environmental management and administration, permitting, NEPA support, ensures the facility configuration minimizes risks, protects the environment, and remains in a safe and compliant condition, provides resources to manage and implement the PFP maintenance program, and provides special projects to safely sustain required facility capabilities.
Disposition PFP Facility	Disposition PFP Facility	Addresses progressive deactivation and dismantling of systems, components, and structures in compliance with CERCLA process and resulting in established criteria (i.e., clean-slab-on-grade). Activities include necessary maintenance during D&D and activities to maintain temporary safe configurations.
	PFP Closeout Activities	
Project Management and Support	Project Management and Support	Provides for management functions, including management and technical/engineering support to the project mission.
Site-wide Services – RL-0011	Site-wide Services	Includes proportional share of costs for site services and infrastructure. See Table D-18 for details.
<p><b>NOTE:</b> See Tables D-2 and D-3 for schedule and budget information.</p> <p>CERCLA= <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>      NEPA = <i>National Environmental Policy Act.</i>  D&amp;D = decontamination and decommissioning.      NM = nuclear materials.  PFP = Plutonium Finishing Plant.</p>		

**Table D-2. NM Stabilization and Disposition–PFP (PBS RL-0011) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

Fiscal Year	2013	2014	2015	2016	2017	2018	Total
Maintain Safe and Compliant PFP	25,243	28,572	8,814	168	0	0	<b>62,797</b>
Disposition PFP Facility	95,070	128,823	157,310	144,110	90,154	57,309	<b>672,776</b>
Project Management and Support	2,460	7,135	1,692	0	0	0	<b>11,287</b>
Usage-Based Services Distributions	2,899	3,026	1,952	0	0	0	<b>7,877</b>
Usage-Based Services, G&A, Direct Distribution	10,695	10,603	5,347	202	0	0	<b>26,846</b>
Site-wide Services	12,468	37,990	15,000	562	0	0	<b>66,020</b>
<b>Total</b>	<b>148,834</b>	<b>216,149</b>	<b>190,115</b>	<b>145,042</b>	<b>90,154</b>	<b>57,309</b>	<b>847,604</b>

G&A = General and Administrative.  
 NM = nuclear materials.  
 PBS = project baseline summary.  
 PFP = Plutonium Finishing Plant.

**Table D-3. NM Stabilization and Disposition–PFP (PBS RL-0011) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>NM Stabilization and Disposition – PFP (PBS RL-0011)</b>							
<b>2</b>	<b>Maintain Safe and Compliant PFP</b>	<b>25,243</b>	<b>28,572</b>	<b>8,814</b>	<b>168</b>	<b>0</b>	<b>0</b>	<b>62,797</b>
3	Maintain Safe and Compliance PFP	28,823	27,871	8,594	164	0	0	<b>65,452</b>
3	Cost and/or Schedule Uncertainty - Maintain Safe and Compliant	0	701	220	4	0	0	<b>926</b>
3	Productivity Challenge Adjustment	-3,580	0	0	0	0	0	<b>-3,580</b>
<b>2</b>	<b>Disposition PFP Facility</b>	<b>95,070</b>	<b>128,823</b>	<b>157,310</b>	<b>144,110</b>	<b>90,154</b>	<b>57,309</b>	<b>672,776</b>
3	Disposition PFP Facility	102,742	90,802	42,939	2,500	0	0	<b>238,983</b>
3	PFP Closeout Activities	0	0	0	591	0	0	<b>591</b>
3	Cost and/or Schedule Uncertainty - Disposition PFP Facility	0	38,022	114,371	141,018	90,154	57,309	<b>440,874</b>
3	Productivity Challenge Adjustment	-7,673	0	0	0	0	0	<b>-7,673</b>
<b>2</b>	<b>Project Management and Support</b>	<b>2,460</b>	<b>7,135</b>	<b>1,692</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11,287</b>
3	Project Management & Support	7,064	6,959	1,651	0	0	0	<b>15,673</b>
3	Cost and/or Schedule Uncertainty - Project Management & Support	0	176	41	0	0	0	<b>218</b>

**Table D-3. NM Stabilization and Disposition–PFP (PBS RL-0011) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).  
(2 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	Productivity Challenge Adjustment	-4,604	0	0	0	0	0	<b>-4,604</b>
<b>2</b>	<b>Usage-Based Services Distributions</b>	<b>2,899</b>	<b>3,026</b>	<b>1,952</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7,877</b>
3	Assessments for MSC Services to PRC	2,899	2,951	1,904	0	0	0	<b>7,754</b>
3	Cost and/or Schedule Uncertainty - UBS Distributions	0	75	48	0	0	0	<b>123</b>
<b>2</b>	<b>Usage-Based Services G&amp;A, Direct Distribution</b>	<b>10,695</b>	<b>10,603</b>	<b>5,347</b>	<b>202</b>	<b>0</b>	<b>0</b>	<b>26,846</b>
3	Fee and Management Reserve	10,695	10,603	5,347	202	0	0	<b>26,846</b>
<b>2</b>	<b>Site-wide Services</b>	<b>12,468</b>	<b>37,990</b>	<b>15,000</b>	<b>562</b>	<b>0</b>	<b>0</b>	<b>66,020</b>
3	Site-wide Services	6,057	33,303	12,957	485	0	0	<b>52,802</b>
3	Fee and Management Reserve	6,718	4,687	2,043	77	0	0	<b>13,525</b>
3	Productivity Challenge	-307	0	0	0	0	0	<b>-307</b>
<b>Total</b>		<b>148,834</b>	<b>216,149</b>	<b>190,115</b>	<b>145,042</b>	<b>90,154</b>	<b>57,309</b>	<b>847,604</b>
G&A = General and Administrative.		PFP = Plutonium Finishing Plant.						
MSC = Mission Support Contract.		PRC = Plateau Remediation Contract.						
		UBS = usage-based services.						

## D.1.2 SNF STABILIZATION AND DISPOSITION (PBS RL-0012) SCHEDULE AND COST DETAILS

**Table D-4. SNF Stabilization and Disposition (PBS RL-0012) Level 3 Scope Summary. (2 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Program Management	100-K Area Project Management	This work element provides for overarching project management for the 100-K Area work activities.
K Basins Operations and Maintenance	KW Basin	Provides for operations support to keep the KW Basin in a safe and compliant mode until finish of dewatering and turn over to decontamination and decommissioning (D&D); includes support to preventative maintenance, operation of equipment, system walk downs, daily routines, management oversight, review and approve work package, and safety inspections.
Facility Operations	100-K Facility Operations and Support	Provides infrastructure maintenance support for non-reactor buildings (e.g., janitorial services, project support, direct supervision, sampling support, corrective maintenance, modifications); includes activities to operate all support facilities required to maintain the KW Basin safe and compliant, including operation of the water plant and all potable water services for the project; routine surveillance, sampling, maintenance support in compliance with state and federal drinking water requirements; operation of facilities, including auxiliary systems (boilers; compressor; heating, ventilation, and air conditioning units; fire systems, etc.) at KE, KW, and CVDF; and management of the National Pollution Discharge Environmental System at 100-K Area; also provides for field operations for waste handling support for waste flows not specific to sludge treatment and D&D, including waste characterization and designation, planning, preparation of waste management plans, waste area operations, and shipment documentation and coordination.
Sludge Treatment Project (STP)	Management and Support	Provides for project management; engineering; training; safety and health support activities; dose data gathering and analysis, sampling, and characterization of both radioactive and hazardous waste; baseline management; and updating the waste volume projections.
	Process Containerized Sludge	This work element includes designing and testing a system to retrieve, package, and transport the sludge being stored in engineered containers in the KW Basin to an interim storage facility on the Central Plateau; procuring the Containerized Sludge Retrieval and transportation system; modifications to the existing 105 KW Facility and the construction of a new facility, including installation of all equipment necessary in the KW Facility and the new Annex; readiness and startup activities; retrieving sludge from the engineered containers in the KW Basin, loading the sludge into Sludge Transfer Storage Containers (STSC), transporting the STSCs to T Plant, receiving the STSCs at T Plant and placing them into interim storage; nuclear safety support; containerized sludge testing; sludge sampling and analysis; performing sludge treatment and packaging; T Plant modifications including project management, clear deck as required and clean out cells, modify additional cells, and update safety documentation.

**Table D-4. SNF Stabilization and Disposition (PBS RL-0012) Level 3 Scope Summary. (2 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary		
Sludge Disposition	Sludge Disposition	This work element includes design, procurement, fabrication, installation, testing, startup, operation, D&D of the equipment necessary to treat and package the sludge for ultimate disposition at the Waste Isolation Pilot Plant. This material is KE Basin and KW Basin floor sludge and settler tube sludge currently stored in engineered containers. The stabilization and packaging of sludge for offsite disposal is part of the K Basins <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1986</i> Interim Remedial Action. Treatment processes and system requirements will be developed through the project definition and conceptual design phase.		
Site-wide Services – RL-0012	Site-wide Services	Includes proportional share of costs for site services and infrastructure. See Table D-18 for details.		
<p><b>NOTE:</b> See Tables D-5 and D-6 for schedule and budget information.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> ALARA = as low as reasonably achievable.  CVDF = Cold Vacuum Drying Facility.  D&amp;D = decontamination and decommissioning.  ERDF = Environmental Restoration Disposal Facility. </td> <td style="width: 50%; vertical-align: top;"> KE = K East.  KW = K West.  PBS = project baseline summary.  STP = Sludge Treatment Project.  STSC = Sludge Transfer Storage Container </td> </tr> </table>			ALARA = as low as reasonably achievable. CVDF = Cold Vacuum Drying Facility. D&D = decontamination and decommissioning. ERDF = Environmental Restoration Disposal Facility.	KE = K East. KW = K West. PBS = project baseline summary. STP = Sludge Treatment Project. STSC = Sludge Transfer Storage Container
ALARA = as low as reasonably achievable. CVDF = Cold Vacuum Drying Facility. D&D = decontamination and decommissioning. ERDF = Environmental Restoration Disposal Facility.	KE = K East. KW = K West. PBS = project baseline summary. STP = Sludge Treatment Project. STSC = Sludge Transfer Storage Container			

**Table D-5. SNF Stabilization and Disposition (PBS RL-0012) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

Fiscal Year	2013	2014	2015	2016	Total
Program Management	2,468	2,461	0	0	4,930
K Basins Operations and Maintenance	8,962	12,743	9,941	3,285	34,931
Facility Operations	7,625	7,183	5,245	1,742	21,796
Sludge Treatment Project	51,721	53,637	31,401	19,612	156,370
Sludge Disposition	0	58,950	45,058	0	104,008
Usage-Based Services Distributions	3,730	3,727	3,841	1,941	13,239
RL-12 Usage-Based Services, General and Administrative, and Direct Distribution	5,134	4,584	5,472	1,561	16,751
Site-wide Services - RL-0012	29,014	36,996	21,873	2,115	89,997
<b>Total</b>	<b>108,655</b>	<b>180,281</b>	<b>122,831</b>	<b>30,255</b>	<b>442,021</b>

**Table D-6. SNF Stabilization and Disposition (PBS RL-0012) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year				Total
		2013	2014	2015	2016	
<b>1</b>	<b>SNF Stabilization and Disposition (PBS RL-0012)</b>					
<b>2</b>	<b>Program Management</b>	<b>2,468</b>	<b>2,461</b>	<b>0</b>	<b>0</b>	<b>4,930</b>
3	100K Area Project Management	2,411	2,401	0	0	4,811
3	Cost and/or Schedule Uncertainty - Program Management	58	61	0	0	119
<b>2</b>	<b>K Basins Operations and Maintenance</b>	<b>8,962</b>	<b>12,743</b>	<b>9,941</b>	<b>3,285</b>	<b>34,931</b>
3	KW Basin	12,389	12,311	9,510	3,203	37,414
3	Cost and/or Schedule Uncertainty - Basins Operations & Maintenance	-3,427	432	432	81	-2,482
<b>2</b>	<b>Facility Operations</b>	<b>7,625</b>	<b>7,183</b>	<b>5,245</b>	<b>1,742</b>	<b>21,796</b>
3	100K Facility Operations & Support	7,625	6,937	5,029	1,694	21,285
3	Cost and/or Schedule Uncertainty - Facility Operations	0	246	216	48	510
<b>2</b>	<b>Sludge Treatment Project</b>	<b>51,721</b>	<b>53,637</b>	<b>31,401</b>	<b>19,612</b>	<b>156,370</b>
3	Management and Support	5,060	5,040	4,698	2,110	16,908
3	Process Containerized Sludge	50,876	35,944	12,287	3,348	102,456

**Table D-6. SNF Stabilization and Disposition (PBS RL-0012) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year				Total
		2013	2014	2015	2016	
3	Cost and or Schedule Uncertainty - Sludge Treatment Project	-4,215	12,652	14,416	14,154	37,007
2	<b>Sludge Disposition</b>	<b>0</b>	<b>58,950</b>	<b>45,058</b>	<b>0</b>	<b>104,008</b>
3	Sludge Disposition	0	58,950	45,058	0	104,008
2	<b>Usage-Based Services Distributions</b>	<b>3,730</b>	<b>3,727</b>	<b>3,841</b>	<b>1,941</b>	<b>13,239</b>
3	Assessments for MSC Services to PRC	3,730	3,635	3,746	1,893	13,005
3	Cost and/or Schedule Uncertainty - UBS Distributions	0	92	94	48	234
2	<b>UBS, G&amp;A, and Direct Distribution</b>	<b>5,134</b>	<b>4,584</b>	<b>5,472</b>	<b>1,561</b>	<b>16,751</b>
3	Fee and Management Reserve	5,134	4,584	5,472	1,561	16,751
2	<b>Site-wide Services – RL-0012</b>	<b>29,014</b>	<b>36,996</b>	<b>21,873</b>	<b>2,115</b>	<b>89,997</b>
3	Site-wide Services – RL-0012	29,014	36,996	21,873	2,115	89,997
<b>Total</b>		<b>108,655</b>	<b>180,281</b>	<b>122,831</b>	<b>30,255</b>	<b>442,021</b>
G&A = General and Administrative.		PBS = project baseline summary.				
KW = K West.		PRC = Plateau Remediation Contract.				
MSC = Mission Support Contract.		UBS = usage-based services.				

### D.1.3 SOLID WASTE STABILIZATION AND DISPOSITION–200 AREA (PBS RL-0013C) SCHEDULE AND COST DETAILS

**Table D-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary.  
(6 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Project Management	Project Management	Provides for overall management function in support of the waste management mission.
Capsule Storage and Disposition	WESF Base Operations	Includes activities to safely store the cesium and strontium capsules in the WESF pool cells, operate and maintain the WESF facilities and associated waste sites, structures, operating systems and equipment, and monitoring systems within the authorization envelope, prepare and package waste streams for disposition as required and dispose as appropriate, and maintain systems necessary for environmental compliance, radiological control, personnel safety and capsule integrity.
	Transition WESF	Provides for the WESF operating crews to transition the facility to a condition ready for D&D after transfer of the capsules and facility shutdown.
	Cesium/Strontium Capsule Disposition	Includes retrieval of cesium/strontium capsules from the WESF pool cells and packaging, transportation, and placement of the capsules into dry storage. Provides for the construction of, including contracting and construction management oversight during construction, and operations and maintenance of the interim dry storage area.
Canister Storage Building (CSB)	Canister Storage Building	Includes activities to safely store SNF (primarily from K Basins) and IHLW from the WTP, while awaiting final disposition at a national repository. Includes operation and maintenance of the CSB facilities and associated structures, operating systems and equipment, and monitoring systems. Also includes various corrective maintenance tasks, facility modifications, or capital projects that are necessary to continue safe, cost-effective, and compliant operations throughout the operating life of the facility.
	200 Area Interim Storage Area (ISA)	Provides for the safe storage of SNF in dry cask storage systems while awaiting final disposition at a national repository, including surveillance and maintenance activities of stored spent nuclear fuel within the fenced area.

**Table D-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary.  
(6 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Mixed Low-Level Waste (MLLW) Treatment	Tri-Party Agreement Milestone M-91-42 (MLLW)	Prepare M-91-42 MLLW packages in aboveground storage at SWOC facilities (including the Waste Retrieval Project) for treatment, as required to meet regulatory requirements. This scope includes the management of offsite commercial MLLW treatment/disposal contracts, as well as the receipt of MLLW packages into the Onsite Mixed Waste Disposal Trenches for disposal once the treatment has been completed and the packages have been determined to be land disposal restriction compliant. Development of alternative methods for treatment and disposal of orphan waste may include seeking land disposal restrictions variance approvals, expanding commercial treatment facilities permit limits and construction and operation of additional onsite treatment capabilities.
	M-91-43 (MLLW)	Prepare large MLLW containers and remote handled packages in aboveground storage at Solid Waste Operations Complex facilities or retrieved from the Low-Level Burial Grounds for treatment, as required to meet regulatory requirements. This scope includes the management of offsite commercial MLLW treatment contracts, as well as the receipt of MLLW packages into the onsite Mixed Waste Disposal Trenches for disposal once the treatment has been completed and the package determined to be land disposal restriction compliant.
	Other Treatment Activities	This scope includes the identification and disposition of low-level waste packages in aboveground storage at Solid Waste Operation Complex facilities to meet rad waste storage compliance requirements. Disposition of these containers includes onsite and offsite processing and/or treatment activities. As such, this scope also includes the management of offsite commercial contracts. This scope includes final disposition of the processed containers (e.g., the management of receipt into appropriate disposal facility).
	MLLW Project Management	This scope includes the managing and maintenance of the MLLW treatment and disposal project as well as the management of offsite commercial MLLW treatment/disposal contracts. It also includes the receipt of MLLW packages into the Onsite Mixed Waste Disposal Trenches for disposal once the treatment has been completed and the packages have been determined to be land disposal restriction compliant.
TRU Retrieval	CH Waste Retrieval Operations	Provides for retrieval, designation, and transfer to a TSD facility of CH suspect TRU waste from LLBGs 218-W-4C, 218-W-4B, 218-E-12B, and 218-W-3B.
	RH Waste Retrieval Operations	Provides for retrieval, designation, and transfer to a TSD facility of RH suspect TRU waste from LLBGs 218-W-4C, 218-W-4B, 218-E-12B, and 218-W-3B.
TRU Repackaging	TRU Repackaging	Provides for Waste Isolation Pilot Plant production, TRU repacking operations at T Plant and WRAP, TRU program support for repack, and RH/large packaging Capabilities. It includes staffing, contracts and consumables directly related to operations.

**Table D-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary.  
(6 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Waste Receiving and Processing Facility (WRAP)	WRAP Base Operations	Provides for operations and maintenance of the WRAP facility to support shipping and receiving activities associated with WIPP shipments.
	WRAP Transition	Following operations, WRAP facility will be transitioned to a condition ready for D&D.
	WRAP Min Safe Operations	Provides for surveillance and maintenance of structures, systems, components, and processes to ensure operation within the approved safety and compliance requirements envelope, including preventive maintenance, repair of failed and malfunctioning equipment, walkdown of safety systems, equipment, and facility grounds (operational surveillance); and routine radiological surveys during non-operational period and during transuranic package transporter only operational period.
T Plant	T Plant Base Operations	Provides for the services necessary to maintain the T Plant Complex in a ready-to-serve status (base operations) for waste processing operations.
	T Plant Upgrades	Provides for upgrades to waste processing equipment, systems components, and computer interface equipment at the T Plant facilities, and includes physical upgrades to the T Plant Facility.
	T Plant Transition	Following operations, T Plant will be transitioned to a condition ready for D&D.
Central Waste Complex (CWC)	CWC	Provides for the services necessary to maintain the CWC in a ready-to-serve status (base operations) for the interim storage of LLW, MLLW, TRU waste and waste receipts from DOE-RL approved generators.
	CWC CENRTC	Provides for CENRTC that may be required to maintain the CWC facility in a ready-to-operate condition and includes the procurement of forklifts and other equipment necessary to maintain compliant facility operations for CWC, the LLBG, and the Mixed Waste Trenches.
	CWC Transition	Following operations, CWC will be transitioned to a condition ready for D&D.
	Low-Level Waste Burial Grounds	Provides for the operation of the LLBGs in a safe, compliant, and cost-effective manner, including activities such as emergency preparedness, assessments and surveillances, environmental monitoring and sampling, fire protection, engineering, and training.
Environmental Restoration Disposal Facility (ERDF)	ERDF Cell Expansion	Provides for the expansion of ERDF as needed to support site cleanup efforts.
	ERDF Interim Cover	Provides for interim covers to be placed over ERDF cells as they are filled.
	ERDF Operations	Includes ERDF operations-related activities, such as leachate pump preventive maintenance, pump replacement, and air monitoring. Disposal and transportation costs are not included here, but are included for individual PBSs generating waste.

**Table D-7. Solid Waste Stabilization and Disposition—200 Area (PBS RL-0013C) Level 3 Scope Summary.  
(6 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Liquid Effluent Facilities	200 Area Liquid Effluent Facilities Base Operations	Provides for safe, cost-effective, and environmentally compliant operation and maintenance of the LERF, ETF, and TEDF, and includes receiving, storing, treating, and disposing of liquid effluents from Hanford Site cleanup activities. From FY2019 to FY2049 DOE-ORP will operate these facilities as part of Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure under PBS ORP-0014.
	200 Area Liquid Effluent Facilities Upgrades	Provides for modifications to the ETF, TEDF, and LERF to improve operations, extend the useful life, ensure regulatory compliance, and/or correct identified deficiencies.
	200 Area Liquid Effluent Facilities CENRTC	Provides for CENRTC that may be required to maintain the 200 Area Liquid Effluents facilities in a ready-to-operate condition.
	300 Area Liquid Effluent Facilities Base Operations	Provides for maintenance of the 300 Area Treated Effluent Disposal Facility (310 TEDF) until it is transferred to decommissioning activities, surveillance and maintenance of the 340 Waste Handling Facility (340 Facility) until it is transferred to decommissioning activities, and operation of the 310 Retention/Transfer System (310 RTS) which receives, samples, and disposes of liquid effluents generated in the 300 Area to the city of Richland sewer system.
Integrated Disposal Facility (IDF)	IDF Operations	Provides for the operation of the IDF in a safe, compliant, and cost-effective manner, including activities such as emergency preparedness; assessments and surveillances; environmental monitoring and sampling; fire protection; engineering; and training.
	IDF Regulatory and Safety	Includes safety oversight and Industrial Safety, such as assisting in the review of documents for safety impacts, performing safety surveillances, inspections and support, assisting in the maintenance of the Health and Safety Plan, and updating the baseline hazards assessments; includes regulatory support, such as performance assessment, associated permit modifications, and other requirements (e.g., operational readiness reviews) needed for the existing IDF to be in “ready-to-serve” status.
	IDF-East Construction	Provides for additional onsite, expandable, integrated, disposal capacity for compliant ILAW waste stream packages produced at the WTP and for MLLW and LLW; includes project management, permitting and safety, project support, and engineering, procurement, and construction.
Solid Waste Base Operations	Solid Waste Ready to Serve	Provides for the minimum staffing to maintain a viable waste management program and to capture those waste support activities that are essentially fixed cost in nature.

**Table D-7. Solid Waste Stabilization and Disposition—200 Area (PBS RL-0013C) Level 3 Scope Summary.  
(6 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
TRU Disposition	Central Characterization Project (CCP) Support	Provides resources to develop and maintain an interface with Hanford site generators and the CCP to perform TRU Certification activities. Includes support for generators of TRU waste to define the CH and RH waste volumes and packaging requirements and resources to perform WIPP closeout activities to the current Hanford WIPP Program.
	Establish Shipping Capability	This work element includes modifications to an existing CWC 2404 series structure to provide an additional or alternative CH shipping capabilities and establishing RH shipping capabilities, including all capital funded activities.
	TRU Shipping	Provides for the WRAP facility to support TRU waste characterization in support of the CCP, including staffing, overtime and consumables directly related to providing waste containers and operating equipment under the guidance or control of CCP.
Spent Nuclear Fuel (SNF) Disposition	Fuel Prep Facility	This work element includes design, construction and turnover to operations of a Fuel Preparation Facility to repackage fuel stored at the 200 Area Interim Storage Area into DOE Standard Canisters that satisfy repository acceptance requirements. The facility will include a shielded hot cell and remote welding capabilities.
	Offsite SNF Disposition	This work element includes Hanford Site activities to facilitate final disposition of Hanford SNF inventories at a National Repository including compliance document review, technical and programmatic interface with National Spent Nuclear Fuel and Office of Civilian Radioactive Waste Management, SNF data package compliance, and planning for SNF disposition.
Mixed Waste Disposal Trenches	Mixed Waste Disposal Trenches Base Operations	Provides for the operation of the Mixed Waste Disposal Trenches in a safe, compliant, and cost-effective manner, including activities such as emergency preparedness; assessments and surveillances; environmental monitoring and sampling; fire protection; engineering; and training.
	Mixed Waste Disposal Trenches Upgrades	Provides for the design, construction, and other activities necessary to add operational layers in the Mixed Waste Disposal Trenches to maintain their ready-to-serve status and for placing temporary caps on the trenches prior to turnover to PBS RL-0040 for final cleanup and closure.
Sludge Disposition	Sludge Disposition	The scope includes activities to stabilize and package the sludge from the 105 KW Basin for final disposition to WIPP or other disposal facilities, including Phase 2 treatment and packaging, shutdown and deactivation of needed equipment, and management and support.

**Table D-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary.  
(6 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Site-wide Services – RL-0013C	Site-wide Services	Includes proportional share of costs for site services and infrastructure. See Table D-18 for details.
<b>NOTE:</b> See Tables D-8 and D-9 for schedule and budget information.		
CCP = Central Characterization Project. CENRTC= capital equipment not related to construction. CH = contact-handled. CSB = Canister Storage Building. CWC = Central Waste Complex. D&D = decontamination and decommissioning. ERDF = Environmental Restoration Disposal Facility. ETF = Effluent Treatment Facility. IDF = Integrated Disposal Facility. IHLW = immobilized high-level waste. ILAW = immobilized low-activity waste. ISA = Interim Storage Area. LERF = Liquid Effluent Retention Facility.		LLBG = Low-Level Burial Grounds. MLLW = mixed low-level waste. NEPA = <i>National Environmental Policy Act</i> . PBS = project baseline summary. RH = remote-handled. RTS = Retention/Transfer System. SNF = spent nuclear fuel. STP = Sludge Treatment Project. SWOC = Solid Waste Operations Complex. TEDF = Treated Effluent Disposal Facility. TRU = transuranic. TSD = treatment, storage, and disposal. WESF = Waste Encapsulation Storage Facility. WRAP = Waste Receiving and Processing (Facility). WTP = Waste Treatment and Immobilization Plant.

**Table D-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Fiscal Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Canister Storage Building	5,005	7,765	6,483	6,554	6,622	6,935	9,626	9,578	9,020	9,961
Capsule Storage & Disposition	6,506	6,448	14,178	54,946	31,402	15,915	31,337	36,791	9,957	11,051
Central Waste Complex	5,395	14,476	9,673	9,569	9,716	10,248	13,137	13,540	14,300	14,318
Environmental Restoration Disposal Facility	39	1,591	3,363	3,995	2,543	806	11,448	6,910	11,130	831
Integrated Disposal Facility	825	1,195	4,976	893	364	380	4,525	4,377	4,490	4,619
Liquid Effluent Facilities	20,186	20,988	264	1,240	2,043	725	0	0	0	0
Mixed Low-Level Waste Treatment	0	0	102	13,823	8,576	7,507	546	562	576	593
Mixed Waste Disposal Trenches	596	599	617	623	2,739	5,132	2	0	0	0
Site-wide Services	43,464	27,434	36,734	82,572	83,603	92,970	53,885	45,947	46,309	36,009
UBS, G&A, and Direct Distribution	1,943	4,080	7,640	15,761	17,968	17,241	0	0	0	0
Project Management -PBS RL-0013	13,708	12,532	13,134	13,924	14,289	15,378	26,521	27,352	28,062	28,868
Sludge Disposition	0	0	9,315	113,711	244,174	153,823	34,112	50,658	51,914	54,781
SNF Disposition	260	263	3,693	22,891	39,745	34,735	39,421	35,597	36,505	5,209
Solid Waste Base Operations	2,871	2,904	2,994	3,018	3,064	3,195	0	0	0	0
T-Plant	14,306	14,439	15,722	18,915	19,359	26,711	22,934	23,634	24,237	24,925
TRU Disposition	2,046	209	1,264	33,397	47,610	44,301	42,164	38,766	39,784	40,934
TRU Repackaging	0	0	26,824	90,189	66,226	46,553	1,440	634	646	661
TRU Retrieval	0	406	11,641	116,772	98,027	58,064	19,757	4,067	119	0
UBS Distributions -PBS RL-0013	8,008	7,265	9,269	10,813	10,772	11,520	0	0	0	0
Waste Receiving and Processing Facility	3,015	5,052	12,245	19,056	12,083	19,511	21,358	4	0	0
<b>Total</b>	<b>128,173</b>	<b>127,648</b>	<b>190,132</b>	<b>632,664</b>	<b>720,926</b>	<b>571,650</b>	<b>332,212</b>	<b>298,418</b>	<b>277,051</b>	<b>232,760</b>
Fiscal Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Canister Storage Building	8,382	8,704	8,746	8,243	8,530	9,730	9,063	9,127	9,983	10,296
Capsule Storage & Disposition	23,783	23,964	2,575	265	276	302	10,033	14,209	15,241	16,050
Central Waste Complex	14,635	15,144	7,632	8,418	8,220	8,587	8,823	8,936	5,909	5,487
Environmental Restoration Disposal Facility	156	161	164	167	174	180	186	190	198	202
Integrated Disposal Facility	4,722	8,246	22,529	39,994	10,580	5,646	5,679	5,741	6,071	6,172
Liquid Effluent Facilities	0	0	0	0	0	0	0	0	0	0
Mixed Low-Level Waste Treatment	606	628	638	661	681	711	728	741	780	796

**Table D-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Site-wide Services	33,554	57,791	55,232	61,692	53,325	63,263	66,484	61,489	55,993	52,564
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
Project Management -PBS RL-0013	29,517	30,654	31,034	19,187	7,916	8,281	8,508	8,664	9,116	9,308
Sludge Disposition	56,017	26,478	113,156	18,196	0	0	0	0	0	0
SNF Disposition	4,769	4,955	5,024	5,225	5,392	5,645	10,060	10,236	10,826	11,036
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0
T-Plant	25,481	92,927	107,638	101,035	104,144	108,557	111,448	113,430	118,384	120,951
TRU Disposition	41,860	43,491	44,096	45,859	47,320	49,544	50,758	51,647	0	0
TRU Repackaging	674	692	708	724	741	758	772	793	32,013	9,295
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
UBS Distributions -PBS RL-0013	0	0	0	0	0	0	0	0	0	0
Waste Receiving and Processing Facility	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>244,156</b>	<b>313,836</b>	<b>399,171</b>	<b>309,667</b>	<b>247,298</b>	<b>261,204</b>	<b>282,543</b>	<b>285,203</b>	<b>264,517</b>	<b>242,159</b>
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
Canister Storage Building	10,741	11,090	12,265	15,760	17,544	7,905	7,879	8,350	8,274	8,953
Capsule Storage & Disposition	14,424	12,073	8,668	6,294	4,971	5,379	2,870	2,309	1,855	1,317
Central Waste Complex	5,721	5,944	6,680	23,580	0	0	0	0	0	0
Environmental Restoration Disposal Facility	210	219	224	219	230	265	297	275	256	259
Integrated Disposal Facility	6,476	6,681	6,862	6,582	7,006	8,043	8,889	8,418	7,875	8,015
Liquid Effluent Facilities	0	0	0	0	0	0	0	0	0	0
Mixed Low-Level Waste Treatment	830	855	877	852	903	1,015	1,111	1,063	1,004	1,021
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Site-wide Services	61,485	65,353	65,942	43,381	28,620	34,852	25,330	18,528	11,431	10,622
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
Project Management -PBS RL-0013	9,739	10,056	10,317	9,917	10,615	12,036	13,293	12,613	11,813	12,006
Sludge Disposition	0	0	0	0	0	0	0	0	0	0
SNF Disposition	11,551	11,925	12,245	11,752	24,740	28,297	31,307	29,682	27,629	28,054
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0
T-Plant	126,200	130,554	134,240	127,784	41,112	45,416	5,342	433	974	494

**Table D-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (5 pages)**

TRU Disposition	0	0	0	0	0	0	0	0	0	0
TRU Repackaging	0	0	0	0	0	0	0	0	0	0
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
UBS Distributions -PBS RL-0013	0	0	0	0	0	0	0	0	0	0
Waste Receiving and Processing Facility	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>247,377</b>	<b>254,750</b>	<b>258,322</b>	<b>246,121</b>	<b>135,742</b>	<b>143,208</b>	<b>96,318</b>	<b>81,670</b>	<b>71,110</b>	<b>70,740</b>
<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>
Canister Storage Building	9,965	10,881	8,027	7,395	4,681	4,216	2,276	1,668	440	0
Capsule Storage & Disposition	676	483	280	133	0	0	0	0	0	0
Central Waste Complex	0	0	0	0	0	0	0	0	0	0
Environmental Restoration Disposal Facility	313	306	289	295	309	6,745	7,419	343	0	0
Integrated Disposal Facility	9,590	9,412	8,839	5,122	5,514	5,449	1,988	1,877	2,054	960
Liquid Effluent Facilities	0	0	0	0	0	0	0	96,050	92,745	94,041
Mixed Low Level Waste Treatment	1,199	1,182	1,126	1,153	1,202	1,262	1,399	1,338	1,425	1,253
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Site-wide Services	8,871	7,089	4,855	3,571	3,685	5,168	5,954	19,104	19,518	16,842
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
Project Management -PBS RL-0013	14,386	14,066	13,300	13,625	14,224	14,998	16,837	15,913	17,025	16,932
Sludge Disposition	0	0	0	0	0	0	0	0	0	0
SNF Disposition	134	0	0	0	0	0	0	0	0	0
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0
T-Plant	4,138	4,570	5,027	5,633	4,350	2,522	2,513	3,844	3,972	2,017
TRU Disposition	0	0	0	0	0	0	0	0	0	0
TRU Repackaging	0	0	0	0	0	0	0	0	0	0
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
UBS Distributions -PBS RL-0013	0	0	0	0	0	0	0	0	0	0
Waste Receiving and Processing Facility	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>49,273</b>	<b>47,990</b>	<b>41,742</b>	<b>36,928</b>	<b>33,964</b>	<b>40,359</b>	<b>38,386</b>	<b>140,136</b>	<b>137,178</b>	<b>132,044</b>

**Table D-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (5 pages)**

<b>Fiscal Year</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	<b>2058</b>	<b>2059</b>	<b>2060</b>	<b>2061</b>	<b>2062</b>
Canister Storage Building	0	0	0	0	0	0	0	0	0	0
Capsule Storage & Disposition	0	0	0	0	0	0	0	0	0	0
Central Waste Complex	0	0	0	0	0	0	0	0	0	0
Environmental Restoration Disposal Facility	0	0	0	0	0	0	0	0	0	0
Integrated Disposal Facility	741	218	10	0	0	0	0	0	0	0
Liquid Effluent Facilities	97,917	103,710	118,231	125,530	130,755	122,857	113,397	33,106	23,320	13,004
Mixed Low-Level Waste Treatment	1,305	826	0	0	0	0	0	0	0	0
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Site-wide Services	15,926	11,816	8,657	11,183	14,824	15,695	10,510	0	0	0
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
Project Management -PBS RL-0013	16,992	16,736	16,618	18,003	19,759	20,413	18,657	0	0	0
Sludge Disposition	0	0	0	0	0	0	0	0	0	0
SNF Disposition	0	0	0	0	0	0	0	0	0	0
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0
T-Plant	1,841	2,664	1,719	1,353	540	461	315	14	0	0
TRU Disposition	0	0	0	0	0	0	0	0	0	0
TRU Repackaging	0	0	0	0	0	0	0	0	0	0
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
UBS Distributions -PBS RL-0013	0	0	0	0	0	0	0	0	0	0
Waste Receiving and Processing Facility	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>134,722</b>	<b>135,970</b>	<b>145,235</b>	<b>156,069</b>	<b>165,878</b>	<b>159,425</b>	<b>142,879</b>	<b>33,120</b>	<b>23,320</b>	<b>13,004</b>
<b>Fiscal Year</b>	<b>2063</b>	<b>2064</b>	<b>2065</b>	<b>Total</b>						
Canister Storage Building	0	0	0	<b>326,664</b>						
Capsule Storage & Disposition	0	0	0	<b>386,962</b>						
Central Waste Complex	0	0	0	<b>248,089</b>						
Environmental Restoration Disposal Facility	0	0	0	<b>62,909</b>						
Integrated Disposal Facility	0	0	0	<b>268,648</b>						
Liquid Effluent Facilities	13,303	6,974	7,134	<b>1,237,519</b>						
Mixed Low-Level Waste Treatment	0	0	0	<b>63,454</b>						

**Table D-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Mixed Waste Disposal Trenches	0	0	0	<b>10,309</b>	
Site-wide Services	0	0	0	<b>1,659,127</b>	
UBS, G&A, and Direct Distribution	0	0	0	<b>64,634</b>	
Project Management -PBS RL-0013	0	0	0	<b>746,842</b>	
Sludge Disposition	0	0	0	<b>926,337</b>	
SNF Disposition	0	0	0	<b>508,803</b>	
Solid Waste Base Operations	0	0	0	<b>18,047</b>	
T-Plant	0	0	0	<b>1,869,219</b>	
TRU Disposition	0	0	0	<b>665,050</b>	
TRU Repackaging	0	0	0	<b>280,345</b>	
TRU Retrieval	0	0	0	<b>308,853</b>	
UBS Distributions -PBS RL-0013	0	0	0	<b>57,648</b>	
Waste Receiving and Processing Facility	0	0	0	<b>92,324</b>	
<b>Total</b>	<b>13,303</b>	<b>6,974</b>	<b>7,134</b>	<b>9,801,782</b>	
G&A = General and Administrative. PBS = project baseline summary. SNF = spent nuclear fuel. TRU = transuranic. UBS = usage-based services.					

**Table D-9. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (3 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C)</b>							
<b>2</b>	<b>Project Management</b>	<b>13,708</b>	<b>12,532</b>	<b>13,134</b>	<b>13,924</b>	<b>14,289</b>	<b>15,378</b>	<b>82,966</b>
3	Project Management	12,091	12,147	12,792	13,519	13,895	14,971	<b>79,415</b>
3	Cost and/or Schedule Uncertainty - Project Management	1,617	386	342	405	394	407	<b>3,551</b>
<b>2</b>	<b>Capsule Storage and Disposition</b>	<b>6,506</b>	<b>6,448</b>	<b>14,178</b>	<b>54,946</b>	<b>31,402</b>	<b>15,915</b>	<b>129,395</b>
3	WESF Base Operations	6,353	6,289	6,483	16,001	12,875	6,915	<b>54,916</b>
3	Cesium/Strontium Capsule Disposition	0	0	7,349	23,791	18,100	8,548	<b>57,788</b>
3	Cost and/or Schedule Uncertainty - Capsule Storage and Disposal	153	159	346	15,154	427	452	<b>16,691</b>
<b>2</b>	<b>Canister Storage Building (CSB)</b>	<b>5,005</b>	<b>7,765</b>	<b>6,483</b>	<b>6,554</b>	<b>6,622</b>	<b>6,935</b>	<b>39,363</b>
3	Canister Storage Building	4,853	7,544	6,264	6,330	6,437	6,684	<b>38,112</b>
3	Cost and/or Schedule Uncertainty - CSB	152	221	218	224	185	251	<b>1,251</b>
<b>2</b>	<b>Mixed Low-Level Waste (MLLW) Treatment</b>	<b>0</b>	<b>0</b>	<b>102</b>	<b>13,823</b>	<b>8,576</b>	<b>7,507</b>	<b>30,011</b>
3	M-91-42 (MLLW)	0	0	0	4,745	7,216	6,223	<b>18,184</b>
3	M-91-43 (MLLW)	0	0	0	716	460	197	<b>1,373</b>
3	Other Treatment Activities	0	0	0	144	30	0	<b>174</b>
3	MLLW Project Management	0	0	100	351	357	371	<b>1,178</b>
3	Cost and/or Schedule Uncertainty - MLLW Treatment	0	0	3	7,867	514	719	<b>9,102</b>
<b>2</b>	<b>TRU Retrieval</b>	<b>0</b>	<b>406</b>	<b>11,641</b>	<b>116,772</b>	<b>98,027</b>	<b>58,064</b>	<b>284,908</b>
3	Contact-Handled Waste Retrieval Operations	0	0	3,667	86,693	53,557	46,426	<b>190,343</b>
3	Remote-Handled Waste Retrieval Operations	0	0	7,393	18,849	28,937	5,297	<b>60,476</b>
3	Cost and/or Schedule Uncertainty - TRU Retrieval of Stored Waste	0	406	581	11,229	15,533	6,340	<b>34,089</b>
<b>2</b>	<b>TRU Repackaging</b>	<b>0</b>	<b>0</b>	<b>26,824</b>	<b>90,189</b>	<b>66,226</b>	<b>46,553</b>	<b>229,795</b>
3	TRU Repackaging	0	0	25,145	82,521	51,398	43,516	<b>202,580</b>
3	Cost and/or Schedule Uncertainty - TRU Repackaging	0	0	1,679	7,669	14,828	3,038	<b>27,214</b>
<b>2</b>	<b>Waste Receiving and Processing Facility (WRAP)</b>	<b>3,015</b>	<b>5,052</b>	<b>12,245</b>	<b>19,056</b>	<b>12,083</b>	<b>19,511</b>	<b>70,962</b>
3	WRAP Base Operations	0	0	7,406	7,290	7,409	0	<b>22,105</b>
3	WRAP Transition	0	2,045	0	0	0	10,063	<b>12,108</b>
3	Min-Safe Operation	2,944	2,927	4,275	4,319	4,390	0	<b>18,855</b>
3	Cost and/or Schedule Uncertainty - WRAP	71	81	565	7,446	284	9,448	<b>17,895</b>

**Table D-9. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (3 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>2</b>	<b>T-Plant</b>	<b>14,306</b>	<b>14,439</b>	<b>15,722</b>	<b>18,915</b>	<b>19,359</b>	<b>26,711</b>	<b>109,451</b>
3	T-Plant Base Operations	13,969	13,999	15,318	14,523	14,698	15,335	<b>87,842</b>
3	T-Plant Upgrades	0	0	0	3,805	4,164	10,449	<b>18,418</b>
3	Cost and/or Schedule Uncertainty - T-Plant	337	440	403	587	497	927	<b>3,191</b>
<b>2</b>	<b>Central Waste Complex (CWC)</b>	<b>5,395</b>	<b>14,476</b>	<b>9,673</b>	<b>9,569</b>	<b>9,716</b>	<b>10,248</b>	<b>59,078</b>
3	CWC Base Operations	4,455	13,110	8,803	8,852	8,987	9,438	<b>53,645</b>
3	Low-Level Waste Burial Grounds	709	1,145	644	497	505	525	<b>4,025</b>
3	Cost and/or Schedule Uncertainty - CWC	231	222	226	220	224	285	<b>1,408</b>
<b>2</b>	<b>Environmental Restoration Disposal Facility (ERDF)</b>	<b>39</b>	<b>1,591</b>	<b>3,363</b>	<b>3,995</b>	<b>2,543</b>	<b>806</b>	<b>12,337</b>
3	ERDF Cell Expansion	0	7	3,091	2,361	2,387	734	<b>8,580</b>
3	ERDF Interim Cover	0	1,381	0	1,438	0	0	<b>2,819</b>
3	ERDF Operations	38	81	38	39	39	49	<b>284</b>
3	Cost and/or Schedule Uncertainty - ERDF	1	122	234	157	117	23	<b>654</b>
<b>2</b>	<b>Liquid Effluent Facilities</b>	<b>20,186</b>	<b>20,988</b>	<b>264</b>	<b>1,240</b>	<b>2,043</b>	<b>725</b>	<b>45,445</b>
3	200 Area Liquid Effluent Facilities Base Operations	19,698	20,295	20,363	20,576	20,896	5,315	<b>107,143</b>
3	200 Area Liquid Effluent Facilities Upgrades	288	520	-20,304	-19,516	-19,508	-4,919	<b>-63,439</b>
3	300 Area Liquid Effluent Facilities Base Operations	200	173	205	180	211	190	<b>1,159</b>
3	Cost and/or Schedule Uncertainty - Liquid Effluent Facilities	0	0	0	0	443	139	<b>582</b>
<b>2</b>	<b>Integrated Disposal Facility (IDF)</b>	<b>825</b>	<b>1,195</b>	<b>4,976</b>	<b>893</b>	<b>364</b>	<b>380</b>	<b>8,634</b>
3	IDF Operations	338	330	341	344	350	363	<b>2,066</b>
3	Cost and/or Schedule Uncertainty - IDF	487	865	4,636	549	14	17	<b>6,568</b>
<b>2</b>	<b>Solid Waste Base Operations</b>	<b>2,871</b>	<b>2,904</b>	<b>2,994</b>	<b>3,018</b>	<b>3,064</b>	<b>3,195</b>	<b>18,046</b>
3	Solid Waste Ready to Serve	2,803	2,813	2,899	2,929	2,977	3,093	<b>17,514</b>
3	Cost and/or Schedule Uncertainty - Solid Waste Base Operations	68	91	95	89	87	102	<b>532</b>
<b>2</b>	<b>TRU Disposition</b>	<b>2,046</b>	<b>209</b>	<b>1,264</b>	<b>33,397</b>	<b>47,610</b>	<b>44,301</b>	<b>128,827</b>
3	CCP Support	0	0	0	0	568	591	<b>1,159</b>
3	Establish Shipping Capability	2,046	209	1,106	33,364	43,629	43,024	<b>123,378</b>
3	TRU Shipping	0	0	0	0	2,920	0	<b>2,920</b>
3	Cost and/or Schedule Uncertainty - TRU Disposition	0	0	159	33	492	687	<b>1,371</b>

**Table D-9. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (3 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>2</b>	<b>Spent Nuclear Fuel (SNF) Disposition</b>	<b>260</b>	<b>263</b>	<b>3,693</b>	<b>22,891</b>	<b>39,745</b>	<b>34,735</b>	<b>101,589</b>
3	Fuel Prep Facility	0	0	2,947	2,974	3,020	3,144	<b>12,085</b>
3	Offsite SNF Disposition	246	248	255	19,412	36,216	31,064	<b>87,441</b>
3	Cost and/or Schedule Uncertainty - SNF Disposition	14	15	491	505	510	528	<b>2,063</b>
<b>2</b>	<b>Mixed Waste Disposal Trenches</b>	<b>596</b>	<b>599</b>	<b>617</b>	<b>623</b>	<b>2,739</b>	<b>5,132</b>	<b>10,305</b>
3	Mixed Waste Disposal Trenches Base Operations	582	583	601	607	617	641	<b>3,631</b>
3	Mixed Waste Disposal Trenches Upgrades	0	0	0	0	2,018	4,257	<b>6,275</b>
3	Cost and/or Schedule Uncertainty - Mixed Waste Disposal Trenches	14	16	16	15	104	234	<b>399</b>
<b>2</b>	<b>Sludge Disposition</b>	<b>0</b>	<b>0</b>	<b>9,315</b>	<b>113,711</b>	<b>244,174</b>	<b>153,823</b>	<b>521,024</b>
3	Sludge Disposition	0	0	9,315	113,711	231,214	147,193	<b>501,433</b>
3	Cost and or Schedule Uncertainty - Sludge Treatment	0	0	0	0	12,961	6,630	<b>19,591</b>
<b>2</b>	<b>Usage Based Services (UBS) Distributions</b>	<b>8,008</b>	<b>7,265</b>	<b>9,269</b>	<b>10,813</b>	<b>10,772</b>	<b>11,520</b>	<b>57,648</b>
3	Assessments for MSC Services to PRC	3,214	2,518	3,073	4,218	4,093	4,411	<b>21,527</b>
3	Assessments -Other Provided Services to PRC	4,606	4,489	5,950	6,191	6,336	6,745	<b>34,317</b>
3	Cost and/or Schedule Uncertainty - UBS Distributions	189	258	247	404	343	364	<b>1,805</b>
<b>2</b>	<b>UBS, G&amp;A, and Direct Distribution</b>	<b>1,943</b>	<b>4,080</b>	<b>7,640</b>	<b>15,761</b>	<b>17,968</b>	<b>17,241</b>	<b>64,633</b>
3	PRC Fee and Management Reserve	1,943	4,080	7,640	15,761	17,968	17,241	<b>64,633</b>
<b>2</b>	<b>Site-Wide Services</b>	<b>43,464</b>	<b>27,434</b>	<b>36,734</b>	<b>82,572</b>	<b>83,603</b>	<b>92,970</b>	<b>366,777</b>
<b>Total</b>		<b>128,174</b>	<b>124,648</b>	<b>182,726</b>	<b>625,371</b>	<b>713,518</b>	<b>571,654</b>	<b>2,346,091</b>
CCP = Central Characterization Project.		PRC = Plateau Remediation Contract.						
CSB = Canister Storage Building.		PBS = project baseline summary.						
CWC = Central Waste Complex.		SNF = spent nuclear fuel.						
ERDF = Environmental Restoration Disposal Facility.		TRU = transuranic.						
G&A = General and Administrative.		UBS = usage-based services.						
IDF = Integrated Disposal Facility.		WESF = Waste Encapsulation Storage Facility.						
MSC = Mission Support Contract.		WRAP = Waste Receiving and Processing (Facility).						
MLLW = Mixed Low-Level Waste.								

#### D.1.4 SAFEGUARDS AND SECURITY (PBS RL-0020) SCHEDULE AND COST DETAILS

Scope information for Safeguards and Security, PBS RL-0020, is presented in Table D-10. This PBS is not broken down to Level 3 details, so no additional scope is presented; however, both near-term and remaining estimated cleanup cost information is provided.

**Table D-10. Safeguards and Securities (PBS RL-0020) Level 2 Scope Summary.**

Work Element	Scope Description
Safeguards and Security	This work element includes management, training, and equipment for staff; physical protective systems, such as intrusion protection, Hanford Site access, and badging; information and cyber security; personnel security; material control and accountability; and security program management.
<p><b>NOTE:</b> See Table D-11 for schedule and budget information. PBS = project baseline summary.</p>	

**Table D-11. Safeguards and Security (PBS RL-0020) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Safeguards and Security	64,127	67,290	66,789	69,215	70,051	76,970	101,003	62,876	64,780	66,650
<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
Safeguards and Security	68,428	70,806	71,795	74,657	77,031	80,639	82,941	84,064	88,893	90,261
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
Safeguards and Security	94,828	98,281	100,920	96,133	103,104	54,320	59,809	57,183	53,367	54,217
<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>
Safeguards and Security	64,503	63,127	60,251	61,708	64,162	67,201	75,335	71,646	76,910	77,799
<b>Fiscal Year</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	<b>2058</b>	<b>2059</b>			
Safeguards and Security	80,987	79,873	79,400	85,837	93,981	97,060	89,059			
<b>Total</b>	<b>3,560,265</b>									

## D.1.5 SOIL AND WATER REMEDIATION–GROUNDWATER / VADOSE ZONE (PBS RL-0030) SCHEDULE AND COST DETAILS

**Table D-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (5 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Integration and Assessments	Strategic Integration	Coordinates and focuses on site characterization and assessment efforts to ensure consistency and technical defensibility in the application of CERCLA processes, eliminate information gaps and overlaps, apply science and technology new to Hanford, foster technical peer review, integrate remediation decisions, and develop necessary and sufficient strategies.
	Technical Integration	
	Remediation Decision Support	
	Remediation Science and Technology	
	Sample Management and Reporting	
	Environmental Databases	
	Value Engineering Studies	
Drilling	Systematic Planning Integration	Planning, coordinating, and implementing well drilling and well decommissioning for Hanford Site wells according to project-specific requirements.
	100-KR-4 Drilling	
	100-NR-2 Drilling	
	100-HR-3 Drilling	
	200-BP-5 Drilling	
	200-PO-1 Drilling	
	200-UP-1 Drilling	
	200-ZP-1 Drilling	
	200-PW-1 Drilling	
	TPA M-24-00 Well Drilling	
	Miscellaneous Well Drilling	
	Decommission Non-Tank Farm Wells	
	100-BC-5 Well Drilling	
	100-FR-3 Well Drilling	
300-FF-5 Well Drilling		
Deep Vadose Zone		
Project Management	Project Management and Support	Planning, management direction, evaluation, and management system outputs for this PBS.
	Project Management and Support – Training	
Integrated Field Work (IFW)	IFW – Operations and Maintenance	Includes general and common activities, services, infrastructure, material, equipment, labor, and contracts used to plan, support, and perform non-OU specific field work, including non-OU-related well maintenance, monitoring, and reporting.
	IFW – GRP Field Work Projects	
	IFW – Field Equipment Purchases (CENRTC)	
	RL-30 Spare Parts	

**Table D-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (5 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Groundwater Monitoring and Performance Assessments	Modutanks	Scope includes operation, maintenance, sampling, and dismantlement of the Modutanks used for disposal of groundwater from onsite well sampling and maintenance; management, oversight, and performance of borehole and geophysical logging; groundwater sampling, water level monitoring, laboratory analysis, data management, monitoring, evaluation, and reporting for RCRA treatment, storage and disposal facilities, CERCLA OUs, and other permitted facilities and sites; operation and maintenance of the Hanford Geotechnical Sample Library which is the repository for historical sediment, core, and other soil and sediments samples used for scientific studies including laboratory studies, bench tests, conceptual model development, and fate and transport evaluations for contaminant migration; well maintenance; and development of an updated soil survey map of the Hanford Site.
	Geophysical Sciences and Logging	
	Groundwater Lab Analysis and Data Management	
	Groundwater Sample Collection	
	Hanford Geotechnical Sample Library	
	Groundwater Data Evaluation and Reporting	
	Well Maintenance, Monitoring and Reporting	
	Hanford Soil Survey	
100-BC-5 Operable Unit	100-BC-5 Operable Unit Project Management	Scope includes project management, CERCLA process implementation for final remedy, remedial actions, well support, monitoring and reporting, and field studies and deployment.
	100-BC-5 CERCLA Process Implementation	
	100-BC-5 Remedial Actions - Interim and Final	
	100-BC-5 Well Support	
	100-BC-5 Monitoring and Reporting	
	100-BC-5 Field Studies and Deployment	
100-KR-4 Operable Unit	100-KR-4 Operable Unit Project Management	Scope includes project management, CERCLA process implementation for final remedy, remedial actions, well support, monitoring and reporting, and final deactivation and decommissioning of remedy components.
	100-KR-4 CERCLA Process Implementation	
	100-KR-4 Remedial Actions - Interim and Final	
	100-KR-4 Well Support	
	100-KR-4 Monitoring and Reporting	
	100-KR-4 Modifications and Expansions	
	100-KR-4 D&D	
100-NR-2 Operable Unit	100-NR-2 Project Management	Scope includes project management, CERCLA process implementation for final remedy, remedial actions, well support, monitoring and reporting, and final deactivation and decommissioning of remedy components.
	100-NR-2 CERCLA Process Implementation	
	100-NR-2 Remedial Actions - Interim and Final	
	100-NR-2 Well Support	
	100-NR-2 Monitoring and Reporting	
	100-NR-2 D&D	

**Table D-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (5 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
100-HR-3 Operable Unit	100-HR-3 Project Management	Scope includes project management, decision documents for final remedy, remedial actions, well support, monitoring and reporting, modifications and expansions, and decommissioning of remedy components.
	100-HR-3 Decision Documentation	
	100-HR-3 Remedial Actions - Interim and Final	
	100-HR-3 Well Support	
	100-HR-3 Monitoring and Reporting	
	100-HR-3 Modifications and Expansions	
	100-HR-3 D&D	
100-FR-3 Operable Unit	100-FR-3 OU Project Management	Scope includes project management, CERCLA process implementation for final remedy, remedial actions, well support, and monitoring and reporting.
	100-FR-3 CERCLA Process Implementation	
	100-FR-3 Remedial Actions - Interim and Final	
	100-FR-3 Well Support	
	100-FR-3 Monitoring and Reporting	
200-BP-5 Operable Unit	200-BP-5 Project Management	Scope includes project management, decision documents for final remedy, remedial actions, well support, and field studies and deployment.
	200-BP-5 Decision Documentation	
	200-BP-5 Remedial Actions - Interim and Final	
	200-BP-5 Well Support	
	200-BP-5 Field Studies and Deployment	
200-PO-1 Operable Unit	200-PO-1 Project Management	Scope includes project management, decision documents for final remedy, remedial actions, and well support.
	200-PO-1 Decision Documentation	
	200-PO-1 Remedial Actions - Interim and Final	
	200-PO-1 Well Support	
200-UP-1 Operable Unit	200-UP-1 Project Management	Scope includes project management, remedial actions, well support, monitoring and reporting, and final deactivation and decommissioning of remedy components.
	200-UP-1 Remedial Actions (Interim and Final)	
	200-UP-1 Well Support	
	200-UP-1 Monitoring and Reporting	
	200-UP-1 D&D	

**Table D-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (5 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
200-ZP-1 Operable Unit	200-ZP-1 Project Management	Scope includes project management, remedial actions, and final deactivation and decommissioning of remedy components.
	200-ZP-1 Remedial Actions - Interim and Final	
	200-ZP-1 D&D	
200-PW-1 Operable Unit	200-PW-1 Project Management	Scope includes project management, remedial actions, and final deactivation and decommissioning of remedy components.
	200-PW-1 Remedial Actions - Interim and Final	
	200-PW-1 D&D	
300-FF-5 Operable Unit	300-FF-5 Project Management	Scope includes project management, decision documents for final remedy, remedial actions, well support, monitoring and reporting, and field studies and deployment.
	300-FF-5 Decision Documentation	
	300-FF-5 Remedial Actions (Interim and Final)	
	300-FF-5 Well Support	
	300-FF-5 Monitoring and Reporting	
	300-FF-5 Field Studies and Deployment	
Regulatory Decisions and Closure Integration <sup>1</sup>	B/C Cribs and Trenches Area Remediation 200-BC-1	Scope includes CERCLA and RCRA assessment activities for the Central Plateau source operable units, including project management, planning, documentation, and field and other activities necessary to complete the final remedy decision process.
	200-TW-1/PW-5 Scavenged Waste	
	200-PW-2/4 Uranium-Rich Process	
	200-PW-1/3/6 Plutonium-Rich Waste Group	
	200-LW-1/2 200A Chem Lab Waste Group	
	200-UR-1 Unplanned Releases Waste Group	
	200-SW-1/2 Solid Waste Disposal Areas	
	200-IS-1 Tanks, Lines, Pits and Boxes	
	Burial Ground Sampling and Analysis	
	Closure Zones	
Deep Vadose Zone Treatability Tests	Deep Vadose Zone Treatability Tests	Scope includes planning for and conducting both laboratory and field treatability tests to investigate options for remediating the deep vadose zone in the Central Plateau.
Deep Vadose Zone Operable Unit	Deep Vadose Zone Operable Unit	The Deep Vadose Zone Operable Unit will address mitigation of the contamination present at the Hanford Site in the deep vadose zone. The initial actions planned for this OU are the development of the decision documents, field studies, and deployment activities.
	Deep Vadose Zone Decision Documentation	

**Table D-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (5 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary																														
	Deep Vadose Zone Field Studies and Deployment	Other tasks for this OU, such as remedial action planning and implementation; well support activities; monitoring and reporting support; OU modifications and expansions; and final deactivation and decommissioning of the OU remediation activities at the conclusion of the project, will be included following the decision process.																														
Site-wide Services – RL-0030	Site-wide Services	Includes proportional share of costs for site services and infrastructure. See Table D-18 for details.																														
<p><b>NOTE:</b> See Tables D-13 and D-14 for schedule and budget information.</p> <p><sup>1</sup> Transition of scope, schedule and cost information into the new Central Plateau operable units is not yet complete, so this information is presented by old operable units in the report.</p> <table> <tbody> <tr> <td>CENRTC=</td> <td>capital equipment not related to construction.</td> <td>IFW</td> <td>=</td> <td>Integrated Field Work.</td> </tr> <tr> <td>CERCLA=</td> <td><i>Comprehensive Environmental Response, Compensation, and Liability Act.</i></td> <td>OU</td> <td>=</td> <td>operable unit.</td> </tr> <tr> <td>D&amp;D</td> <td>= deactivation and decommissioning.</td> <td>PBS</td> <td>=</td> <td>project baseline summary.</td> </tr> <tr> <td>DQO</td> <td>= data quality objective.</td> <td>RCRA</td> <td>=</td> <td><i>Resource Conservation and Recovery Act.</i></td> </tr> <tr> <td>GRP</td> <td>= Groundwater Remediation Project.</td> <td>SAP</td> <td>=</td> <td>Sampling and Analysis Plan.</td> </tr> <tr> <td></td> <td></td> <td>TPA</td> <td>=</td> <td>Tri-Party Agreement.</td> </tr> </tbody> </table>			CENRTC=	capital equipment not related to construction.	IFW	=	Integrated Field Work.	CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	OU	=	operable unit.	D&D	= deactivation and decommissioning.	PBS	=	project baseline summary.	DQO	= data quality objective.	RCRA	=	<i>Resource Conservation and Recovery Act.</i>	GRP	= Groundwater Remediation Project.	SAP	=	Sampling and Analysis Plan.			TPA	=	Tri-Party Agreement.
CENRTC=	capital equipment not related to construction.	IFW	=	Integrated Field Work.																												
CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	OU	=	operable unit.																												
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		TPA	=	Tri-Party Agreement.																												

**Table D-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (6 pages)**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
100-BC-5 Operable Unit	452	4,652	13,631	13,972	1,501	1,391	2,637	2,713	2,784	17,181
100-FR-3 Operable Unit	748	3,013	2,249	679	515	253	2,734	2,733	2,816	2,912
100-HR-3 Operable Unit	6,510	15,017	19,196	10,260	11,469	12,471	15,110	2,899	1,544	2,473
100-KR-4 Operable Unit	8,174	28,843	40,557	35,538	31,060	32,124	6,510	6,774	5,557	4,936
100-NR-2 Operable Unit	5,397	16,259	3,891	2,406	5,924	4,940	14,104	14,377	13,981	9,718
200-BP-5 Operable Unit	929	7,418	14,539	6,582	7,900	9,364	11,030	12,223	4,264	4,419
200-PO-1 Operable Unit	335	9,792	4,013	13,233	1,205	583	979	1,269	611	490
200-PW-1 Operable Unit	1,541	1,527	1,968	1,995	2,263	2,584	2,045	2,106	2,647	2,563
200-UP-1 Operable Unit	569	2,117	3,230	38,698	35,805	40,643	3,344	3,538	890	977
200-ZP-1 Operable Unit	10,391	11,053	11,011	11,233	13,606	10,853	21,874	21,859	22,947	58,570
300-FF-5 Operable Unit	5,932	44,261	31,357	31,910	29,040	25,071	1,981	2,305	13,823	13,507
Deep Vadose Zone Operable Unit	0	22,986	5,167	7,186	3,115	3,500	41,045	59,879	80,804	59,062
Deep Vadose Zone Treatability Tests	1,748	2,050	1,836	942	470	468	658	19,265	7,984	0
Drilling	13,350	37,150	41,494	19,776	16,307	19,400	6,884	5,369	4,747	10,637
Groundwater Monitoring and Performance Assessments	20,890	21,152	18,730	20,312	20,028	23,494	17,742	17,431	18,188	18,679
Integrated Field Work	7,513	7,265	7,036	7,040	7,403	7,676	12,742	13,131	13,489	13,845
Integration and Assessments	11,453	10,171	12,264	12,233	15,224	12,698	16,463	16,880	17,413	15,856
Site-wide Services	52,588	64,479	59,255	40,138	54,619	44,406	34,238	42,834	45,789	49,820
Regulatory Decisions/Closure Integration	3,927	4,243	17,262	26,055	181,823	3,906	0	37,094	22,236	2,825
Fee and Management Reserve	6,229	6,227	6,258	6,602	7,777	8,124	0	0	0	0
Project Management	5,689	8,277	8,524	8,627	9,141	9,491	14,501	14,952	15,340	10,875
UBS Distribution	5,587	5,487	5,758	8,907	7,772	6,639	2	2	1	2
<b>Total</b>	<b>169,954</b>	<b>333,440</b>	<b>329,226</b>	<b>324,323</b>	<b>463,967</b>	<b>280,078</b>	<b>226,624</b>	<b>299,632</b>	<b>297,854</b>	<b>299,348</b>

**Table D-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (6 pages)**

<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
100-BC-5 Operable Unit	17,568	18,252	3,101	3,208	1,332	284	290	295	311	315
100-FR-3 Operable Unit	1,011	297	279	293	311	331	345	325	392	345
100-HR-3 Operable Unit	2,369	2,712	2,758	658	331	343	297	303	393	352
100-KR-4 Operable Unit	27,388	3,937	41,523	10,608	5,362	449	7,424	347	462	294
100-NR-2 Operable Unit	4,442	4,548	4,650	4,774	4,873	4,991	5,106	5,117	5,176	5,294
200-BP-5 Operable Unit	3,910	3,527	3,223	2,575	2,400	2,088	1,784	1,167	898	562
200-PO-1 Operable Unit	483	481	848	518	559	571	561	989	620	638
200-PW-1 Operable Unit	3,691	2,284	126	132	136	142	146	148	157	185
200-UP-1 Operable Unit	6,385	587	510	486	458	464	442	449	499	502
200-ZP-1 Operable Unit	30,011	25,171	25,684	26,745	67,750	28,863	29,226	30,073	31,261	79,363
300-FF-5 Operable Unit	13,542	8,297	245	253	260	270	276	282	294	300
Deep Vadose Zone Operable Unit	18,913	1,632	1,081	0	0	0	0	0	0	0
Deep Vadose Zone Treatability Tests	0	0	0	0	0	0	0	0	0	0
Drilling	10,286	8,982	8,163	13,107	7,144	7,817	7,394	7,371	8,318	6,959
Groundwater Monitoring and Performance Assessments	19,129	19,818	19,966	20,813	21,152	22,093	22,655	23,149	24,362	24,759
Integrated Field Work	14,151	14,354	14,610	12,737	13,157	11,861	12,134	12,307	6,943	7,053
Integration and Assessments	16,036	16,563	17,020	17,555	18,601	19,113	19,568	19,672	20,776	21,770
Site-wide Services	33,253	32,038	25,089	29,043	40,640	31,459	32,303	30,017	33,326	46,825
Regulatory Decisions/Closure Integration	1,023	970	287	328	1,039	9	9	9	10	10
Fee and Management Reserve	0	0	0	0	0	0	0	0	0	0
Project Management	11,121	11,058	11,299	11,738	12,099	8,735	8,923	9,125	4,523	4,662
UBS Distribution	1	2	3	3	3	3	2	3	3	2
<b>Total</b>	<b>234,712</b>	<b>175,508</b>	<b>180,466</b>	<b>155,573</b>	<b>197,606</b>	<b>139,886</b>	<b>148,883</b>	<b>141,150</b>	<b>138,722</b>	<b>200,191</b>

**Table D-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (6 pages)**

<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
100-BC-5 Operable Unit	330	341	352	340	362	412	455	432	403	406
100-FR-3 Operable Unit	392	404	343	354	357	436	465	414	443	384
100-HR-3 Operable Unit	415	354	357	390	394	490	468	434	464	389
100-KR-4 Operable Unit	272	183	187	312	345	290	255	230	317	242
100-NR-2 Operable Unit	5,419	5,559	5,673	5,795	5,934	6,102	6,239	6,370	6,501	6,668
200-BP-5 Operable Unit	437	457	502	487	608	568	557	530	557	494
200-PO-1 Operable Unit	672	666	1,181	672	733	831	878	1,448	806	797
200-PW-1 Operable Unit	118	122	125	120	129	147	162	154	143	145
200-UP-1 Operable Unit	502	477	489	525	433	486	481	298	317	335
200-ZP-1 Operable Unit	33,729	34,604	35,696	34,306	36,685	3,818	3,908	4,121	4,260	3,633
300-FF-5 Operable Unit	311	321	328	323	339	370	398	388	375	383
Deep Vadose Zone Operable Unit	0	0	0	0	0	0	0	0	0	0
Deep Vadose Zone Treatability Tests	0	0	0	0	0	0	0	0	0	0
Drilling	7,578	7,218	7,412	767	249	494	2	2	934	290
Groundwater Monitoring and Performance Assessments	25,899	26,720	27,579	26,448	27,977	32,524	36,424	33,757	31,466	31,981
Integrated Field Work	7,391	7,436	7,739	7,319	7,871	8,954	9,879	9,318	8,733	8,852
Integration and Assessments	21,955	22,633	23,063	22,196	23,734	26,785	29,787	28,121	26,570	26,761
Site-wide Services	36,229	38,497	38,923	24,829	31,300	29,697	38,522	28,414	17,392	16,137
Regulatory Decisions/Closure Integration	10	11	11	12,113	5,057	1,473	68	0	0	0
Fee and Management Reserve	0	0	0	0	0	0	0	0	0	0
Project Management	4,888	4,688	4,810	4,630	4,951	5,604	6,209	5,900	5,520	5,631
UBS Distribution	2	2	3	4	3	4	2	3	4	4
<b>Total</b>	<b>146,552</b>	<b>150,693</b>	<b>154,773</b>	<b>141,930</b>	<b>147,461</b>	<b>119,483</b>	<b>135,159</b>	<b>120,332</b>	<b>105,208</b>	<b>103,534</b>

**Table D-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (6 pages)**

<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>
100-BC-5 Operable Unit	485	483	458	462	482	511	569	537	578	587
100-FR-3 Operable Unit	493	524	448	530	456	498	587	520	637	556
100-HR-3 Operable Unit	573	477	452	590	307	296	268	27	159	142
100-KR-4 Operable Unit	383	246	234	351	260	225	140	139	317	147
100-NR-2 Operable Unit	6,830	6,979	7,125	7,309	7,461	7,638	7,832	8,018	8,190	8,377
200-BP-5 Operable Unit	630	613	598	619	831	789	701	666	725	742
200-PO-1 Operable Unit	970	928	1,526	929	959	1,021	1,103	1,053	1,163	1,160
200-PW-1 Operable Unit	1	0	0	0	0	0	0	0	0	0
200-UP-1 Operable Unit	389	332	313	382	397	412	398	377	460	468
200-ZP-1 Operable Unit	2,545	1,172	2,622	4,583	2,859	1,370	3,550	4,362	2,008	1,170
300-FF-5 Operable Unit	431	429	418	429	444	462	500	488	514	523
Deep Vadose Zone Operable Unit	0	0	0	0	0	0	0	0	0	0
Deep Vadose Zone Treatability Tests	0	0	0	0	0	0	0	0	0	0
Drilling	475	2	2	1,173	312	442	2	2	1,425	349
Groundwater Monitoring and Performance Assessments	38,256	37,538	35,461	36,283	37,910	39,978	44,692	42,400	45,302	46,056
Integrated Field Work	10,618	10,370	9,805	10,084	10,526	11,147	12,462	11,755	12,587	12,850
Integration and Assessments	30,406	29,429	27,800	25,828	26,026	27,276	30,565	28,995	31,145	31,592
Site-wide Services	31,187	24,945	17,227	15,859	16,104	16,991	23,192	15,870	17,711	15,333
Regulatory Decisions/Closure Integration	0	0	0	0	0	0	0	0	0	0
Fee and Management Reserve	0	0	0	0	0	0	0	0	0	0
Project Management	6,685	6,591	6,208	6,351	6,631	6,963	7,853	7,411	7,981	8,062
UBS Distribution	6	7	8	5	5	7	7	7	7	7
<b>Total</b>	<b>131,363</b>	<b>121,064</b>	<b>110,706</b>	<b>111,764</b>	<b>111,970</b>	<b>116,025</b>	<b>134,420</b>	<b>122,627</b>	<b>130,910</b>	<b>128,122</b>

**Table D-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (6 pages)**

<b>Fiscal Year</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	<b>2058</b>	<b>2059</b>	<b>2060</b>	<b>2061</b>	<b>2062</b>
100-BC-5 Operable Unit	612	603	596	648	711	735	671	9	0	0
100-FR-3 Operable Unit	615	622	577	659	678	757	643	7	0	0
100-HR-3 Operable Unit	23	57	61	3,898	1,214	8,467	1,120	1,146	1,172	0
100-KR-4 Operable Unit	267	145	150	156	181	187	173	20	0	0
100-NR-2 Operable Unit	8,574	8,785	8,956	9,176	9,405	9,624	9,815	9,787	0	0
200-BP-5 Operable Unit	778	706	699	759	875	955	843	55	32	2
200-PO-1 Operable Unit	1,218	1,166	1,162	1,257	1,386	1,431	1,313	77	0	0
200-PW-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
200-UP-1 Operable Unit	493	419	416	450	525	522	478	23	0	0
200-ZP-1 Operable Unit	1,154	0	0	0	1,517	0	0	0	0	0
300-FF-5 Operable Unit	542	541	542	576	616	634	603	238	0	0
Deep Vadose Zone Operable Unit	0	0	0	0	0	0	0	0	0	0
Deep Vadose Zone Treatability Tests	0	0	0	0	0	0	0	0	0	0
Drilling	325	2	2	2	80	82	84	86	0	0
Groundwater Monitoring and Performance Assessments	47,913	47,408	47,258	50,874	55,854	57,698	52,786	1,964	0	0
Integrated Field Work	13,317	13,170	13,037	14,114	15,518	16,031	14,653	416	0	0
Integration and Assessments	32,861	32,263	32,263	34,851	38,079	39,332	36,026	1,733	0	0
Site-wide Services	14,582	10,864	8,019	10,359	13,732	14,538	9,736	0	0	0
Regulatory Decisions/Closure Integration	0	0	0	0	0	0	0	0	0	0
Fee and Management Reserve	0	0	0	0	0	0	0	0	0	0
Project Management	8,455	8,278	8,291	8,958	9,594	10,127	9,212	223	228	0
UBS Distribution	7	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>131,734</b>	<b>125,029</b>	<b>122,030</b>	<b>136,737</b>	<b>149,965</b>	<b>161,121</b>	<b>138,155</b>	<b>15,786</b>	<b>1,432</b>	<b>2</b>

**Table D-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (6 pages)**

<b>Fiscal Year</b>	<b>2063</b>	<b>2064</b>	<b>2065</b>	<b>Total</b>
100-BC-5 Operable Unit	0	0	0	<b>119,436</b>
100-FR-3 Operable Unit	0	0	0	<b>36,381</b>
100-HR-3 Operable Unit	0	0	0	<b>132,068</b>
100-KR-4 Operable Unit	0	0	0	<b>304,222</b>
100-NR-2 Operable Unit	0	0	0	<b>350,107</b>
200-BP-5 Operable Unit	0	12	11	<b>118,640</b>
200-PO-1 Operable Unit	0	0	0	<b>67,285</b>
200-PW-1 Operable Unit	0	0	0	<b>29,751</b>
200-UP-1 Operable Unit	0	0	0	<b>152,190</b>
200-ZP-1 Operable Unit	0	0	0	<b>791,219</b>
300-FF-5 Operable Unit	0	0	0	<b>235,672</b>
Deep Vadose Zone Operable Unit	0	0	0	<b>304,369</b>
Deep Vadose Zone Treatability Tests	0	0	0	<b>35,421</b>
Drilling	0	0	0	<b>290,448</b>
Groundwater Monitoring and Performance Assessments	0	0	0	<b>1,480,948</b>
Integrated Field Work	0	0	0	<b>512,402</b>
Integration and Assessments	0	0	0	<b>1,115,404</b>
Site-wide Services	0	0	0	<b>1,398,348</b>
Regulatory Decisions/Closure Integration	0	0	0	<b>321,809</b>
Fee and Management Reserve	0	0	0	<b>41,216</b>
Project Management	0	0	0	<b>385,633</b>
UBS Distribution	0	0	0	<b>40,288</b>
<b>Total</b>	<b>0</b>	<b>12</b>	<b>11</b>	<b>8,263,253</b>
UBS = usage-based services.				

**Table D-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Soil and Water Remediation-Groundwater/Vadose Zone, PBS RL-0030</b>							
<b>2</b>	<b>Integration and Assessments</b>	<b>11,453</b>	<b>10,171</b>	<b>12,264</b>	<b>12,233</b>	<b>15,224</b>	<b>12,698</b>	<b>74,043</b>
3	Strategic Integration	636	640	660	668	675	704	<b>3,984</b>
3	Technical Integration	1,332	1,318	3,193	2,582	3,970	3,117	<b>15,513</b>
3	Remediation Decision Support	199	201	220	529	407	483	<b>2,039</b>
3	Remediation Science and Technology	5,070	2,813	2,335	2,129	2,164	2,248	<b>16,760</b>
3	Sample Management and Reporting	1,998	2,079	2,218	2,723	2,540	2,413	<b>13,972</b>
3	Environmental Databases	1,933	1,926	2,240	2,393	2,432	2,118	<b>13,043</b>
3	Value Engineering Studies	0	352	363	367	0	0	<b>1,083</b>
3	Systematic Planning Integration	468	562	771	585	501	520	<b>3,407</b>
3	Cost and/or Schedule Uncertainty – Integration and Assessment	-183	279	264	256	2,535	1,095	<b>4,246</b>
<b>2</b>	<b>Drilling</b>	<b>13,350</b>	<b>37,150</b>	<b>41,494</b>	<b>19,776</b>	<b>16,307</b>	<b>19,400</b>	<b>147,480</b>
3	100-KR-4 Drilling	2,296	9,158	13,524	1,279	1,300	1,351	<b>28,908</b>
	100-NR-2 Drilling	0	0	0	1,584	241	1,351	<b>3,176</b>
3	100-HR-3 Drilling	2,399	9,267	13,670	625	635	660	<b>27,256</b>
3	200-BP-5 Drilling	0	0	832	0	3,151	0	<b>3,982</b>
3	200-PO-1 Drilling	0	0	1,038	1,395	0	1,282	<b>3,716</b>
3	200-UP-1 Drilling	916	11,450	6,714	0	-478	-60	<b>18,542</b>
3	200-ZP-1 Drilling	4,623	4,726	262	4,186	4,446	4,370	<b>22,614</b>
3	200-PW-1 Drilling	0	0	0	0	0	502	<b>502</b>
3	M-24-00 Well Drilling	1,960	51	1,007	1,038	1,408	1,463	<b>6,927</b>
3	Miscellaneous Well Drilling	588	585	603	609	619	643	<b>3,648</b>
3	Decommission Non-Tank Farm Wells	0	0	0	2,928	2,973	3,358	<b>9,260</b>
3	100-BC-5 Well Drilling	0	919	3,579	4,133	0	3,738	<b>12,370</b>
3	100-FR-3 Well Drilling	0	0	0	498	0	524	<b>1,023</b>
3	300-FF-5 Well Drilling	0	0	0	1,014	1,031	0	<b>2,045</b>
3	Deep Vadose Zone	569	815	0	240	0	0	<b>1,624</b>
3	Cost and/or Schedule Uncertainty - Drilling	0	179	265	246	981	219	<b>1,890</b>
<b>2</b>	<b>Project Management</b>	<b>5,689</b>	<b>8,277</b>	<b>8,524</b>	<b>8,627</b>	<b>9,141</b>	<b>9,491</b>	<b>49,750</b>
3	Project Management and Support	5,689	8,157	8,406	8,493	8,632	8,969	<b>48,346</b>
3	Cost and/or Schedule Uncertainty - Project Management	0	120	119	133	509	522	<b>1,403</b>

**Table D-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>2</b>	<b>Integrated Field Work (IFW)</b>	<b>7,513</b>	<b>7,265</b>	<b>7,036</b>	<b>7,040</b>	<b>7,403</b>	<b>7,676</b>	<b>43,933</b>
3	IFW - Operations and Maintenance	7,269	6,677	6,659	6,729	6,839	7,105	<b>41,278</b>
3	IFW - Field Equipment Purchases (CENRTC)	0	217	0	0	0	0	<b>217</b>
3	Spare Parts	244	238	246	165	168	175	<b>1,236</b>
3	Cost and/or Schedule Uncertainty - IFW	0	133	131	145	397	396	<b>1,202</b>
<b>2</b>	<b>Groundwater Monitoring and Performance Assessments</b>	<b>20,890</b>	<b>21,152</b>	<b>18,730</b>	<b>20,312</b>	<b>20,028</b>	<b>23,494</b>	<b>124,614</b>
3	Modutanks	538	544	561	567	576	592	<b>3,377</b>
3	Geophysical Sciences and Logging	2,568	2,519	2,596	2,623	2,666	4,186	<b>17,158</b>
3	Groundwater Lab Analysis and Data Management	7,198	7,054	5,846	5,907	6,004	6,238	<b>38,247</b>
3	Groundwater Sample Collection	5,713	5,752	4,149	4,193	4,261	4,427	<b>28,495</b>
3	Hanford Geotechnical Sample Library	148	145	149	151	154	160	<b>907</b>
3	Groundwater Data Evaluation and Reporting	2,303	2,310	2,516	2,570	2,137	2,540	<b>14,376</b>
3	Well Maintenance, Monitoring and Reporting	2,423	2,418	2,499	2,518	2,559	2,659	<b>15,076</b>
3	Hanford Soil Survey	0	0	0	1,355	826	850	<b>3,031</b>
3	Cost and/or Schedule Uncertainty - Groundwater Monitoring and Performance Assessments	0	410	420	428	845	1,843	<b>3,946</b>
<b>2</b>	<b>100-BC-5 Operable Unit</b>	<b>452</b>	<b>4,652</b>	<b>13,631</b>	<b>13,972</b>	<b>1,501</b>	<b>1,391</b>	<b>35,597</b>
3	100-BC-5 Operable Unit Project Management	192	194	147	149	151	157	<b>990</b>
3	100-BC-5 CERCLA Process Implementation	259	237	0	0	0	0	<b>496</b>
3	100-BC-5 Remedial Actions (Interim and Final)	0	3,140	13,382	13,690	1,120	1,146	<b>32,478</b>
3	Cost and/or Schedule Uncertainty - 100-BC-5 Operable Unit	0	1,082	101	133	229	88	<b>1,633</b>
<b>2</b>	<b>100-KR-4 Operable Unit</b>	<b>8,174</b>	<b>28,843</b>	<b>40,557</b>	<b>35,538</b>	<b>31,060</b>	<b>32,124</b>	<b>175,574</b>
3	100-KR-4 Project Management	312	315	272	275	279	290	<b>1,742</b>
3	100-KR-4 CERCLA Process Implementation	477	75	0	0	0	0	<b>552</b>
3	100-KR-4 Remedial Actions (Interim and Final)	6,170	20,765	28,770	23,416	23,826	24,687	<b>127,634</b>
3	100-KR-4 Monitoring and Reporting	268	405	174	176	179	186	<b>1,388</b>
3	100-KR-4 Modifications and Expansions	947	911	891	824	963	1,001	<b>5,537</b>
3	100-KR-4 D&D	0	0	0	0	0	148	<b>148</b>
3	Cost and/or Schedule Uncertainty - 100-KR-4 Operable Unit	0	6,373	10,450	10,848	5,813	5,813	<b>38,572</b>
<b>2</b>	<b>100-NR-2 Operable Unit</b>	<b>5,397</b>	<b>16,259</b>	<b>3,891</b>	<b>2,406</b>	<b>5,924</b>	<b>4,940</b>	<b>38,818</b>
3	100-NR-2 Project Management	250	193	171	139	130	135	<b>1,017</b>

**Table D-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	100-NR-2 CERCLA Process Implementation	581	271	0	0	0	0	<b>852</b>
3	100-NR-2 Remedial Actions (Interim and Final)	4,520	13,415	1,298	345	351	364	<b>20,293</b>
3	100-NR-2 Monitoring and Reporting	46	43	43	39	40	41	<b>252</b>
3	100-NR-2 D&D	0	0	0	0	0	314	<b>314</b>
3	Cost and/or Schedule Uncertainty - 100-NR-2 Operable Unit	0	2,337	2,379	1,883	5,404	4,086	<b>16,089</b>
<b>2</b>	<b>100-HR-3 Operable Unit</b>	<b>6,510</b>	<b>15,017</b>	<b>19,196</b>	<b>10,260</b>	<b>11,469</b>	<b>12,471</b>	<b>74,923</b>
3	100-HR-3 Project Management	348	349	360	363	369	384	<b>2,173</b>
3	100-HR-3 Decision Documentation	405	348	0	0	126	131	<b>1,011</b>
3	100-HR-3 Remedial Actions (Interim and Final)	5,007	13,325	17,928	8,962	9,133	9,428	<b>63,783</b>
3	100-HR-3 Monitoring and Reporting	192	290	136	138	140	146	<b>1,042</b>
3	100-HR-3 Modifications and Expansions	558	549	566	571	581	603	<b>3,428</b>
3	100-HR-3 D&D	0	0	0	0	0	717	<b>717</b>
3	Cost and/or Schedule Uncertainty - 100-HR-3 Operable Unit	0	157	206	225	1,119	1,063	<b>2,770</b>
<b>2</b>	<b>100-FR-3 Operable Unit</b>	<b>748</b>	<b>3,013</b>	<b>2,249</b>	<b>679</b>	<b>515</b>	<b>253</b>	<b>7,458</b>
3	100-FR-3 Operable Unit Project Management	192	194	147	149	151	157	<b>990</b>
3	100-FR-3 CERCLA Process Implementation	556	193	0	0	0	0	<b>749</b>
3	Cost and/or Schedule Uncertainty - 100-FR-3 Operable Unit	0	2,626	2,102	531	363	96	<b>5,718</b>
<b>2</b>	<b>200-BP-5 Operable Unit</b>	<b>929</b>	<b>7,418</b>	<b>14,539</b>	<b>6,582</b>	<b>7,900</b>	<b>9,364</b>	<b>46,732</b>
3	200-BP-5 Project Management	185	187	193	195	198	206	<b>1,165</b>
3	200-BP-5 Decision Documentation	647	759	315	452	77	0	<b>2,250</b>
3	200-BP-5 Remedial Actions (Interim and Final)	0	0	0	0	3,716	6,310	<b>10,026</b>
3	200-BP-5 Field Studies and Deployment	96	0	0	0	0	0	<b>96</b>
3	Cost and/or Schedule Uncertainty - 200-BP-5 Operable Unit	0	6,472	14,031	5,935	3,910	2,848	<b>33,196</b>
<b>2</b>	<b>200-PO-1 Operable Unit</b>	<b>335</b>	<b>9,792</b>	<b>4,013</b>	<b>13,233</b>	<b>1,205</b>	<b>583</b>	<b>29,468</b>
3	200-PO-1 Project Management	185	187	193	195	198	206	<b>1,165</b>
3	200-PO-1 Decision Documentation	150	428	293	89	0	0	<b>960</b>
	200-PO-1 Remedial Actions (Interim and Final)	0	0	0	84	116	82	<b>282</b>
3	Cost and/or Schedule Uncertainty - 200-PO-1 Operable Unit	0	9,177	3,527	12,865	890	295	<b>27,062</b>
<b>2</b>	<b>200-UP-1 Operable Unit</b>	<b>569</b>	<b>2,117</b>	<b>3,230</b>	<b>38,698</b>	<b>35,805</b>	<b>40,643</b>	<b>121,064</b>
3	200-UP-1 Project Management	210	0	0	69	71	73	<b>423</b>
3	200-UP-1 Remedial Actions (Interim and Final)	292	2,093	3,212	38,606	35,560	40,559	<b>120,322</b>

**Table D-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	200-UP-1 Monitoring and Reporting	68	0	0	0	0	0	68
3	Cost and/or Schedule Uncertainty - 200-UP-1 Operable Unit	0	24	19	22	175	11	251
<b>2</b>	<b>200-ZP-1 Operable Unit</b>	<b>10,391</b>	<b>11,053</b>	<b>11,011</b>	<b>11,233</b>	<b>13,606</b>	<b>10,853</b>	<b>68,048</b>
3	200-ZP-1 Project Management	408	246	419	423	429	448	2,374
3	200-ZP-1 Remedial Actions (Interim and Final)	9,983	9,547	9,569	10,107	11,267	9,399	59,773
3	Cost and/or Schedule Uncertainty - 200-ZP-1 Operable Unit	0	1,259	1,023	704	1,911	1,005	5,902
<b>2</b>	<b>200-PW-1 Operable Unit</b>	<b>1,541</b>	<b>1,527</b>	<b>1,968</b>	<b>1,995</b>	<b>2,263</b>	<b>2,584</b>	<b>11,878</b>
3	200-PW-1 Project Management	205	205	490	498	508	524	2,430
3	200-PW-1 Remedial Actions (Interim and Final)	1,336	1,281	1,430	1,445	1,469	1,767	8,728
3	Cost and/or Schedule Uncertainty - 200-PW-1 Operable Unit	0	41	48	51	286	294	720
<b>2</b>	<b>300-FF-5 Operable Unit</b>	<b>5,932</b>	<b>44,261</b>	<b>31,357</b>	<b>31,910</b>	<b>29,040</b>	<b>25,071</b>	<b>167,571</b>
3	300-FF-5 Project Management	281	284	293	296	301	313	1,768
3	300-FF-5 Decision Documentation	417	27	0	0	0	0	444
3	300-FF-5 Remedial Actions (Interim and Final)	5,144	30,869	19,955	20,845	21,772	22,639	121,224
3	300-FF-5 Monitoring and Reporting	359	199	204	206	210	218	1,396
3	300-FF-5 Field Studies and Deployment	-269	-319	-10	0	0	0	-598
3	Cost and/or Schedule Uncertainty - 300-FF-5 Operable Unit	0	13,201	10,914	10,563	6,757	1,902	43,337
<b>2</b>	<b>Regulatory Decisions and Closure Integration</b>	<b>3,927</b>	<b>4,243</b>	<b>17,262</b>	<b>26,055</b>	<b>181,823</b>	<b>3,906</b>	<b>234,737</b>
3	Burial Ground Sampling and Analysis	0	0	0	15,092	0	0	15,092
3	Closure Zones	1,669	3,804	17,191	10,952	181,817	3,901	219,334
3	Cost and/or Schedule Uncertainty - Regulatory Decisions	2,258	439	71	12	6	6	311
<b>2</b>	<b>Deep Vadose Zone Treatability Tests</b>	<b>1,748</b>	<b>2,050</b>	<b>1,836</b>	<b>942</b>	<b>470</b>	<b>468</b>	<b>7,514</b>
3	Deep Vadose Zone Treatability Tests	1,748	1,980	1,836	942	14	0	6,520
3	Cost and/or Schedule Uncertainty - Deep Vadose Zone Treatability Tests	0	71	0	0	455	468	994
<b>2</b>	<b>Deep Vadose Zone Operable Unit</b>	<b>0</b>	<b>22,986</b>	<b>5,167</b>	<b>7,186</b>	<b>3,115</b>	<b>3,500</b>	<b>41,955</b>
	Deep Vadose Zone Operable Unit	0	266	392	397	403	419	1,877
3	Deep Vadose Zone Decision Documentation	0	272	1,433	1,552	187	210	3,654
	Deep Vadose Zone Field Studies and Deployment	0	0	3,341	5,237	0	0	8,578
3	Cost and/or Schedule Uncertainty - Deep Vadose Zone Operable Unit	0	22,448	0	0	2,526	2,872	27,846

**Table D-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (5 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
2	<b>UBS Distributions -PBS RL-30</b>	<b>5,587</b>	<b>5,487</b>	<b>5,758</b>	<b>8,907</b>	<b>7,772</b>	<b>6,639</b>	<b>40,150</b>
3	Assessments for MSC Services to PRC	5,529	5,317	5,601	8,697	7,688	6,567	<b>39,399</b>
3	Assessments for Other Provided Services to PRC	58	171	157	210	84	71	<b>751</b>
2	<b>PRC Fee and Management Reserve</b>	<b>6,229</b>	<b>6,227</b>	<b>6,258</b>	<b>6,602</b>	<b>7,777</b>	<b>8,124</b>	<b>41,217</b>
3	PRC Fee and Management Reserve	6,229	6,227	6,258	6,602	7,777	8,124	<b>41,217</b>
2	<b>Site-wide Services - RL-0030</b>	<b>52,588</b>	<b>64,479</b>	<b>59,255</b>	<b>40,138</b>	<b>54,619</b>	<b>44,406</b>	<b>301,590</b>
3	Site-wide Services - RL-0030	38,693	64,479	59,255	40,138	54,619	44,406	<b>301,590</b>
<b>Total</b>		<b>169,954</b>	<b>333,440</b>	<b>329,226</b>	<b>324,323</b>	<b>463,967</b>	<b>280,078</b>	<b>1,900,988</b>
CENRTC= capital equipment not related to construction.				IFW = Integrated Field Work.				
CERCLA= <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>				MSC = Mission Support Contract.				
D&D = decontamination and decommissioning.				PBS = performance baseline summary.				
G&A = General and Administrative.				PRC = Plateau Remediation Contract.				

## D.1.6 NUCLEAR FACILITY D&D–REMAINDER OF HANFORD (PBS RL-0040) SCHEDULE AND COST DETAILS

**Table D-15. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) Level 3 Scope Summary.  
(3 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Regulatory Decisions and Closure Integration	Central Plateau Program Management	Provides for overall management function in support of the nuclear facility D&D mission on the Central Plateau.
	Central Plateau Engineering Studies	Provides for cross-cutting engineering and technical studies and trade-off evaluations necessary to optimize design and execution for Central Plateau facility and waste site remediation/restoration with consideration of groundwater and vadose zone remediation and ongoing operations.
	Emergency Response for Facility/Waste Site ESH&Q	Includes the tasks necessary to address aging facility or waste site conditions that are above and beyond anticipated operational and maintenance plans. Activities may include hazard removal, RTD, stabilization, or increased S&M of waste sites; or D&D or increased S&M of buildings. Activities are focused on unplanned or unforeseen facility or waste site conditions impacting safety, human health, or environment (e.g., major equipment failure, spread of contamination, structural failure).
	Below Slab Remediation ROD Non-Canyon Facilities	Includes preparation of a feasibility study, proposed plan, and ROD for remediation of the non-canyon facility slabs.
	Hazard Reduction	Provides the necessary resources and equipment to establish and execute hazard reduction in advance of scheduled facility D&D.
Zone Environmental Remediation	For each closure zone, provides for remediation definition, remediation of pipelines, installation of barriers, utility relocations, post-ROD confirmatory sampling, S&M/O&M of installed barriers, and zone closure activities. Potential waste site remediation range includes no action, in situ treatment (e.g., grouting), monitored natural attenuation, capping, RTD, or combinations of these techniques. Buildings and structures are assumed to undergo D4 activities, including demolition to slab-on-grade. Below-grade portions will be addressed through the waste site cleanup process. Actual remedial actions will be determined through the appropriate decision process and applied through a geographical implementation strategy. The information in this table is a summary of the planning assumptions.	
	Zone 1, 200-E Admin Zone	This zone contains waste sites, buildings and structures, and pipelines that will be addressed through zone closure.
	Zone 2, 200-E Ponds Zone	This zone contains waste sites, buildings and structures, and pipelines that will be addressed through zone closure. This is the largest remediation zone on the Central Plateau. This zone also constitutes a considerable portion of the newly-defined Outer Zone under DOE/RL-2009-81.
	Zone 3, 200-W Ponds Zone	This zone contains waste sites, buildings and structures, and pipelines that will be addressed through zone closure.
	Zone 4, B Farm Zone	This zone contains waste sites, buildings and structures, and pipelines that will be addressed through zone closure. This zone also contains a tank farm and will require remedial coordination with the tank farm cleanup efforts.
	Zone 5, B Plant Zone	This zone contains a canyon (B Plant), waste sites, buildings and structures, and pipelines that will be addressed through zone closure.

**Table D-15. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) Level 3 Scope Summary.  
(3 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
	Zone 6, C Farm Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure. This zone also contains a tank farm (C Farm) and will require remedial coordination with the tank farm cleanup efforts.
	Zone 7, CSB Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure.
	Zone 8, ERDF Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure.
	Zone 9, ETF Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure.
	Zone 10, PFP Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 11, PUREX Zone	This zone contains a canyon (PUREX), waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 12, REDOX Zone	This zone contains a canyon (REDOX), waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 13, S/U Farm Zone	This zone contains waste sites, buildings and structures, and utility relocations that will be addressed through zone closure. This zone also contains tank farms and will require remedial coordination with the tank farm cleanup efforts.
	Zone 14, Semi-Works Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 15, Solid Waste Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure.
	Zone 16, T Farm Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure. This zone also contains tank farms and will require remedial coordination with the tank farm cleanup efforts.
	Zone 17, T Plant Zone	This zone contains a canyon (T Plant), waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 18, U Plant Zone	This zone contains a canyon (U Plant), waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 19, Waste Management Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	Zone 20, WTP/A Farm Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure. This zone also contains tank farms and will require remedial coordination with the tank farm cleanup efforts.

**Table D-15. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) Level 3 Scope Summary.**  
(3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary																																																																											
	Zone 21, IDF Zone	This zone contains waste sites that will be addressed through zone closure.																																																																											
	Zone 22, NRDWL/BC Control Zone	This zone contains waste sites and pipelines that will be addressed through zone closure.																																																																											
	Zone 23, 100 Area	This zone contains buildings and structures that will be addressed through zone closure.																																																																											
	Zone 24, 600 Area (and Misc.)	This zone contains buildings and structures that will be addressed through zone closure.																																																																											
	Zone 25, 300 Area	This zone does not currently have any identified scope in the lifecycle plan. Cleanup is assumed to be accomplished through RL-0041.																																																																											
	Zone 26, 400 Area	This zone contains buildings and structures that will be addressed through zone closure.																																																																											
	Outer Area	This includes the demolition of structures, remediation of waste sites, construction of barriers, and closure of the zone. Scope includes deactivation of existing structures as applicable, formal evaluation (Facility Decommissioning Evaluation) of deactivated structures to determine if and which CERCLA decommissioning path is appropriate, generation of regulatory and work documents as applicable, demolition of structures, remediation of waste sites and pipelines, closure of wells not required for future monitoring, construction of barriers, O&M, utility relocations, closure of the zone, and post-ROD confirmatory sampling.																																																																											
Surveillance and Maintenance and Min-Safe for Facilities and Waste Sites	100 Area S&M	Scope includes CERCLA 5-year reviews, visual surveillance, surface maintenance, maintain facilities and waste sites in minimum safe condition to protect personnel and the environment, documentation, environmental protection, ISMS, nuclear safety, occupational safety and health, QA, emergency preparedness, radiation protection, safeguards and security, baseline controls, and training.																																																																											
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	400 Area S&M																																																																												
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Site-wide Services – RL-0040	Site-wide Services	Includes proportional share of indirect costs for site services and infrastructure. See Table D-18 for details.																																																																											
<p><b>NOTE:</b> See Tables D-16 and D-17 for schedule and budget information.</p> <p><u>DOE/RL-2009-81</u>, 2009, <i>Central Plateau Cleanup Completion Strategy</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</p> <table> <tr> <td>CERCLA=</td> <td><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i></td> <td>ISMS</td> <td>=</td> <td>Integrated Safety Management System.</td> </tr> <tr> <td>CSB</td> <td>=</td> <td>NRDWL</td> <td>=</td> <td>non-radioactive dangerous waste landfill.</td> </tr> <tr> <td>D&amp;D</td> <td>=</td> <td>O&amp;M</td> <td>=</td> <td>operation and maintenance.</td> </tr> <tr> <td>D4</td> <td>=</td> <td>PBS</td> <td>=</td> <td>project baseline summary.</td> </tr> <tr> <td></td> <td>deactivation, decommissioning, decontamination, and demolition.</td> <td>PFP</td> <td>=</td> <td>Plutonium Finishing Plant.</td> </tr> <tr> <td>ERDF</td> <td>=</td> <td>PUREX</td> <td>=</td> <td>Plutonium Uranium Extraction (Plant).</td> </tr> <tr> <td></td> <td>Environmental Restoration Disposal Facility.</td> <td>QA</td> <td>=</td> <td>quality assurance.</td> </tr> <tr> <td>ESH&amp;Q</td> <td>=</td> <td>REDOX</td> <td>=</td> <td>Reduction-Oxidation (Plant).</td> </tr> <tr> <td></td> <td>Environment, Safety, Health, and Quality.</td> <td>ROD</td> <td>=</td> <td>record of decision.</td> </tr> <tr> <td>ETF</td> <td>=</td> <td>RTD</td> <td>=</td> <td>remove, treat, dispose.</td> </tr> <tr> <td></td> <td>Effluent Treatment Facility.</td> <td>S&amp;M</td> <td>=</td> <td>surveillance and maintenance.</td> </tr> <tr> <td>FY</td> <td>=</td> <td>WTP</td> <td>=</td> <td>Waste Treatment and Immobilization Plant.</td> </tr> <tr> <td></td> <td>fiscal year.</td> <td></td> <td></td> <td></td> </tr> <tr> <td>IDF</td> <td>=</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Integrated Disposal Facility.</td> <td></td> <td></td> <td></td> </tr> </table>			CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i>	ISMS	=	Integrated Safety Management System.	CSB	=	NRDWL	=	non-radioactive dangerous waste landfill.	D&D	=	O&M	=	operation and maintenance.	D4	=	PBS	=	project baseline summary.		deactivation, decommissioning, decontamination, and demolition.	PFP	=	Plutonium Finishing Plant.	ERDF	=	PUREX	=	Plutonium Uranium Extraction (Plant).		Environmental Restoration Disposal Facility.	QA	=	quality assurance.	ESH&Q	=	REDOX	=	Reduction-Oxidation (Plant).		Environment, Safety, Health, and Quality.	ROD	=	record of decision.	ETF	=	RTD	=	remove, treat, dispose.		Effluent Treatment Facility.	S&M	=	surveillance and maintenance.	FY	=	WTP	=	Waste Treatment and Immobilization Plant.		fiscal year.				IDF	=					Integrated Disposal Facility.			
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**Table D-16. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (2 pages)**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
S&M and Min-Safe for Facilities and Waste Sites	12,388	9,155	9,478	9,513	9,692	10,034	13,069	13,431	13,742	13,992
Site-wide Services	230	5,767	39,442	45,680	43,172	42,163	62,400	60,892	66,222	72,787
Regulatory Decisions & Closure Integration	1,319	10,160	10,479	20,572	26,205	28,006	23,405	21,362	21,815	22,441
UBS, G&A, and Direct Distribution	644	670	2,653	5,351	8,742	3,803	0	0	0	0
UBS Distributions - PBS RL-40	935	904	1,377	3,228	6,513	8,355	0	0	0	0
Zone Environmental Remediation	110	0	157,560	340,551	356,362	260,137	386,932	346,865	332,873	357,607
<b>Total</b>	<b>15,627</b>	<b>26,656</b>	<b>220,989</b>	<b>424,895</b>	<b>450,686</b>	<b>352,497</b>	<b>485,806</b>	<b>442,550</b>	<b>434,652</b>	<b>466,826</b>
<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
S&M and Min-Safe for Facilities and Waste Sites	14,965	14,636	14,862	15,454	15,953	16,670	17,130	20,605	21,774	23,269
Site-wide Services	82,725	54,153	60,445	44,990	41,611	34,754	30,219	24,804	37,374	32,476
Regulatory Decisions & Closure Integration	22,946	23,749	23,362	24,170	24,934	26,071	26,731	27,193	28,717	29,270
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
UBS Distributions - PBS RL-40	0	0	0	0	0	0	0	0	0	0
Zone Environmental Remediation	477,696	207,176	243,319	142,638	116,628	81,040	62,086	66,931	69,026	70,842
<b>Total</b>	<b>598,332</b>	<b>299,714</b>	<b>341,987</b>	<b>227,252</b>	<b>199,126</b>	<b>158,535</b>	<b>136,166</b>	<b>139,533</b>	<b>156,891</b>	<b>155,858</b>
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
S&M and Min-Safe for Facilities and Waste Sites	23,212	23,953	24,611	23,633	25,259	28,707	31,684	31,159	30,724	31,534
Site-wide Services	32,288	30,359	27,209	65,564	69,353	59,734	55,399	72,065	89,183	88,196
Regulatory Decisions & Closure Integration	30,583	31,557	32,406	31,200	33,269	37,798	41,705	39,657	37,072	37,655
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
UBS Distributions - PBS RL-40	0	0	0	0	0	0	0	0	0	0
Zone Environmental Remediation	63,586	68,746	92,956	449,198	363,797	250,407	277,059	387,732	580,787	668,461
<b>Total</b>	<b>149,670</b>	<b>154,616</b>	<b>177,183</b>	<b>569,596</b>	<b>491,678</b>	<b>376,647</b>	<b>405,847</b>	<b>530,613</b>	<b>737,767</b>	<b>825,847</b>
<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>
S&M and Min-Safe for Facilities and Waste Sites	36,164	35,455	33,512	34,293	35,812	37,587	11,553	10,897	8,390	8,334
Site-wide Services	67,341	72,214	79,277	77,183	71,652	63,416	48,867	38,689	29,345	28,451
Regulatory Decisions & Closure Integration	44,979	44,128	41,711	42,724	44,625	46,954	52,552	49,887	53,404	54,222
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
UBS Distributions - PBS RL-40	0	0	0	0	0	0	0	0	0	0
Zone Environmental Remediation	471,916	595,849	505,735	459,992	414,740	319,953	188,087	227,513	310,302	281,370
<b>Total</b>	<b>620,400</b>	<b>747,646</b>	<b>660,236</b>	<b>614,192</b>	<b>566,829</b>	<b>467,910</b>	<b>301,058</b>	<b>326,986</b>	<b>401,441</b>	<b>372,377</b>

**Table D-16. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (2 pages)**

<b>Fiscal Year</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	<b>2058</b>	<b>2059</b>	<b>2060</b>	<b>2061</b>	<b>2062</b>
S&M and Min-Safe for Facilities and Waste Sites	8,551	8,437	8,333	9,065	9,916	8,499	4,988	2,983	2,944	2,751
Site-wide Services	23,007	24,065	22,707	20,454	14,287	13,569	24,703	46,250	0	0
Regulatory Decisions/Closure Integration	56,468	55,637	55,252	59,818	65,341	67,765	62,013	37,029	37,291	36,347
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	0	0
UBS Distributions - PBS RL-40	0	0	0	0	0	0	0	0	0	0
Zone Environmental Remediation	258,385	314,737	418,531	321,770	228,945	239,421	405,422	160,826	103,958	41,041
<b>Total</b>	<b>346,412</b>	<b>402,876</b>	<b>504,823</b>	<b>411,107</b>	<b>318,489</b>	<b>329,255</b>	<b>497,126</b>	<b>247,088</b>	<b>144,193</b>	<b>80,138</b>
<b>Fiscal Year</b>	<b>2063</b>	<b>2064</b>	<b>2065</b>	<b>2066</b>	<b>2067</b>	<b>2068</b>	<b>2069</b>	<b>2070</b>	<b>Total</b>	
S&M and Min-Safe for Facilities and Waste Sites	2,605	2,331	2,132	1,770	1,247	551	147	10	893,547	
Site-wide Services	0	0	0	0	0	0	0	0	2,237,134	
Regulatory Decisions/Closure Integration	35,220	33,826	29,778	25,999	17,944	8,001	1,904	271	1,956,896	
UBS, G&A, and Direct Distribution	0	0	0	0	0	0	0	0	21,863	
UBS Distributions - PBS RL-40	0	0	0	0	0	0	0	0	21,313	
Zone Environmental Remediation	36,828	27,491	28,182	11,361	6,304	8,799	3,199	866	13,670,631	
<b>Total</b>	<b>74,653</b>	<b>63,648</b>	<b>60,092</b>	<b>39,130</b>	<b>25,495</b>	<b>17,350</b>	<b>5,250</b>	<b>1,148</b>	<b>18,801,384</b>	
G&A = General and Administrative. PBS = project baseline summary. S&M = surveillance and maintenance. UBS = usage-based services.										

**Table D-17. Nuclear Facility D&D-Remainder of Hanford (PBS RL-0040) Near-Term Schedule and Costs, Level 3,  
by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Nuclear Facility D&amp;D-Remainder of Hanford, PBS RL-0040</b>							
<b>2</b>	<b>Regulatory Decisions &amp; Closure Integration</b>	<b>1,319</b>	<b>10,160</b>	<b>10,479</b>	<b>20,572</b>	<b>26,205</b>	<b>28,006</b>	<b>98,070</b>
3	Central Plateau Project Management	1,104	1,106	3,426	10,787	14,097	15,318	<b>45,838</b>
3	Emergency Response for Facility/Waste Site ESH&Q or Remediation - FY 2014 - FY 2048	468	8,779	6,705	6,765	6,869	7,150	<b>36,736</b>
3	Hazard Reduction	0	0	0	2,211	3,560	4,280	<b>10,051</b>
3	Cost and/or Schedule Uncertainty - Decisions and Closure Integration	-253	275	348	810	1,679	1,257	<b>5,446</b>
<b>2</b>	<b>Zone Environmental Remediation</b>	<b>110</b>	<b>0</b>	<b>157,560</b>	<b>340,551</b>	<b>356,362</b>	<b>260,137</b>	<b>1,114,762</b>
3	200-E Admin Zone	0	0	0	161	0	0	<b>161</b>
3	200-E Ponds Zone	0	0	0	164	0	0	<b>164</b>
3	200-W Ponds Zone in Industrial Exclusive Zone	0	0	860	91,751	46,053	23,951	<b>162,615</b>
3	B Farm Zone	0	0	896	908	1,083	956	<b>3,844</b>
3	B Plant Zone	0	0	2,970	3,001	3,217	3,170	<b>12,359</b>
3	C Farm Zone	0	0	0	0	110	59	<b>169</b>
3	CSB Zone	0	0	0	163	0	0	<b>163</b>
3	ERDF Zone	0	0	26	26	194	28	<b>274</b>
3	ETF Zone	0	0	0	3	164	0	<b>167</b>
3	PFP Zone	0	0	10,027	27,581	58,730	50,794	<b>147,133</b>
3	PUREX Zone	0	0	50,464	74,431	64,380	30,392	<b>219,666</b>
3	REDOX Zone	0	0	359	758	368	383	<b>1,868</b>
3	S/U Farm Zone	0	0	1,108	1,184	1,087	1,130	<b>4,508</b>
3	Semi-Works Zone	0	0	21,275	10,556	15,245	1,101	<b>48,177</b>
3	Solid Waste Zone	0	0	19,319	19,521	19,880	27,506	<b>86,226</b>
3	T Farm Zone	0	0	1,774	1,930	1,848	1,893	<b>7,446</b>
3	T Plant Zone	0	0	4,253	4,418	4,400	4,539	<b>17,611</b>
3	U Plant Zone	0	0	1,788	44,646	100,448	60,063	<b>206,945</b>
3	Waste Management Zone	0	0	21,518	21,803	22,206	22,968	<b>88,495</b>
3	WTP/A Farm Zone	0	0	888	898	912	1,120	<b>3,818</b>
3	600 Area (and Misc.)	0	0	0	17,052	0	0	<b>17,052</b>
3	400 Area	0	0	0	0	141	27	<b>168</b>

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**Table D-17. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	Outer Area	110	0	20,034	19,598	15,896	30,095	<b>85,734</b>
<b>2</b>	<b>S&amp;M and Min-Safe for Facilities and Waste Sites</b>	<b>12,388</b>	<b>9,155</b>	<b>9,478</b>	<b>9,513</b>	<b>9,692</b>	<b>10,034</b>	<b>60,263</b>
3	S&M and Min-Safe for Facilities and Waste Sites	8,430	8,762	9,108	9,190	9,323	9,689	<b>55,021</b>
3	Cost and/or Schedule Uncertainty - S&M and Min-Safe for Facilities and Waste Sites	3,958	392	370	323	369	348	<b>5,242</b>
<b>2</b>	<b>Usage-Based Services Distributions -PBS RL-40</b>	<b>935</b>	<b>904</b>	<b>1,377</b>	<b>3,228</b>	<b>6,513</b>	<b>8,355</b>	<b>21,316</b>
3	Assessments for OHC Services to PRC	894	871	1,326	3,087	6,087	7,908	<b>20,173</b>
3	Cost and/or Schedule Uncertainty - UBS Distributions	41	33	51	141	426	447	<b>1,139</b>
<b>2</b>	<b>UBS, G&amp;A, and Direct Distribution</b>	<b>644</b>	<b>670</b>	<b>2,653</b>	<b>5,351</b>	<b>8,742</b>	<b>3,803</b>	<b>21,863</b>
3	PRC Fee and Management Reserve	644	670	2,653	5,351	8,742	3,803	<b>21,863</b>
<b>2</b>	<b>Site-wide Services</b>	<b>230</b>	<b>5,767</b>	<b>39,442</b>	<b>45,680</b>	<b>43,172</b>	<b>42,163</b>	<b>176,454</b>
3	Site-wide Services	230	5,767	39,442	45,680	43,172	42,163	<b>176,454</b>
<b>Total</b>		<b>15,627</b>	<b>26,656</b>	<b>220,989</b>	<b>424,895</b>	<b>450,686</b>	<b>352,497</b>	<b>1,491,349</b>
CSB = Canister Storage Building. ERDF = Environmental Restoration Disposal Facility. ESH&Q = environment, safety, health, and quality. ETF = Effluent Treatment Facility. FY = fiscal year. IDF = Integrated Disposal Facility. NRDWL = non-radioactive dangerous waste landfill. OHC = Other Hanford Contractor. PBS = project baseline summary.		PFP = Plutonium Finishing Plant. PRC = Plateau Remediation Contract. PUREX = Plutonium Uranium Extraction (Plant). REDOX = Reduction-Oxidation (Plant). ROD = record of decision. S&M = surveillance and maintenance. UBS = usage-based services. WM = Waste Management. WTP = Waste Treatment and Immobilization Plant.						

## D.1.7 INFRASTRUCTURE AND SERVICES (PBS RL-0040) SCHEDULE AND COST DETAILS

**Table D-18. Infrastructure and Services (PBS RL-0040) Level 3 Scope Summary. (2 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Infrastructure and Services	Occupational Medicine	This work element includes occupational medicine; steam systems; contract closeout and acquisition team; legal support; land transfers; cleanup baseline, integration, and development; acquisition of natural gas utility service; and other small contracts.
	Steam Systems	
	Contract Closeout	
	Legal Support	
	Land Transfers	
	Cleanup Baseline, Integration, and Development	
	Acquisition Team	
	Acquisition of Natural Gas Utility Service	
	Small Contracts	
HAMMER Ready to Serve	HAMMER Ready to Serve	This work element includes operations and maintenance activities at the HAMMER facility in support of Hanford Site and other training.
Infrastructure Reliability Projects	Infrastructure Reliability Projects	This work element includes repair and replacement of infrastructure systems and provides capital upgrades to the infrastructure, including larger scale expense projects. This includes construction and capital equipment expenditures associated with replacements for biological control, crane and rigging, electrical system, facilities, Hanford Fire Department, network and telecommunications, sewer system, studies and estimates, transportation – CENTRC, transportation system, water system, emerging facility and infrastructure upgrades and other infrastructure reliability projects.

**Table D-18. Infrastructure and Services (PBS RL-0040) Level 3 Scope Summary. (2 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Site-wide Services – RL-0040	Site-wide Services	Includes proportional share of costs for site services and infrastructure. This work element includes emergency services (safeguards and security, fire and emergency response, emergency management), environmental integration services (site-wide safety standards, environmental integration, public safety and resource protection, radiological site services, and Waste Sampling and Characterization Facility analytical services), information management (information management planning and controls, information systems, content and records management, infrastructure/cyber security, information resources/content management, and information support services), site infrastructure and utilities/logistics and transportation (roads and grounds, biological services, electrical services, water/sewer services, facility services, transportation, mail, property systems/acquisitions, railroad services, technical services, energy management, work management, land and facilities management), support functions (business operations, human resources, safety, health and quality), and portfolio management (portfolio planning, analysis and performance, project acquisition and support, and independent assessment and analysis).
<p><b>NOTE:</b> See Tables D-19 and D-20 for schedule and budget information.</p> <p>CENTRC = capital equipment not related to construction.</p> <p>HAMMER = Hazardous Materials Management and Emergency Response (Facility). The Volpentest HAMMER Training and Education Center.</p> <p>PBS = project baseline summary.</p>		

**Table D-19. Infrastructure and Services (PBS RL-0040) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
HAMMER	7,022	7,173	7,256	7,460	7,592	7,790	7,106	7,330	7,522	6,318
Reliability Projects	17,148	8,437	13,798	58,295	62,765	66,946	71,958	65,627	16,198	15,489
Site-wide Services - RL-0040	572	3,820	4,828	10,948	10,042	15,680	16,713	15,998	5,327	4,720
Infrastructure and Services	47,124	44,980	45,107	66,476	67,580	58,330	32,997	27,878	27,233	14,552
<b>Total</b>	<b>71,865</b>	<b>64,410</b>	<b>70,989</b>	<b>143,178</b>	<b>147,978</b>	<b>148,747</b>	<b>128,774</b>	<b>116,833</b>	<b>56,280</b>	<b>41,078</b>
<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
HAMMER	6,483	6,774	6,880	7,193	6,206	6,506	6,674	6,795	7,241	6,087
Reliability Projects	16,274	16,366	15,349	15,653	16,718	17,209	18,473	17,611	18,589	19,683
Site-wide Services - RL-0040	4,154	5,860	5,542	6,314	6,598	7,752	8,241	7,278	9,098	8,427
Infrastructure and Services	10,145	9,991	11,949	10,212	10,452	10,688	10,889	14,216	14,561	14,941
<b>Total</b>	<b>37,055</b>	<b>38,990</b>	<b>39,720</b>	<b>39,372</b>	<b>39,973</b>	<b>42,155</b>	<b>44,277</b>	<b>45,900</b>	<b>49,489</b>	<b>49,138</b>
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
HAMMER	6,368	6,599	6,786	6,495	5,568	6,365	7,072	6,697	6,207	4,773
Reliability Projects	20,587	21,337	21,844	19,825	20,548	18,903	17,897	16,356	16,874	16,094
Site-wide Services - RL-0040	9,855	10,508	10,542	6,168	7,796	9,706	11,445	8,173	5,427	4,491
Infrastructure and Services	15,271	12,194	14,633	12,873	13,104	13,422	13,730	12,159	12,488	12,775
<b>Total</b>	<b>52,080</b>	<b>50,638</b>	<b>53,805</b>	<b>45,361</b>	<b>47,015</b>	<b>48,396</b>	<b>50,144</b>	<b>43,385</b>	<b>40,996</b>	<b>38,134</b>
<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>
HAMMER	5,711	5,625	5,266	5,424	3,814	3,994	4,515	4,288	4,617	2,305
Reliability Projects	16,381	16,726	16,554	16,458	17,500	18,453	20,818	19,639	21,196	21,415
Site-wide Services - RL-0040	7,811	6,470	4,597	4,306	4,151	4,392	6,020	4,116	4,619	3,635
Infrastructure and Services	13,069	13,423	13,623	13,936	14,314	14,701	14,980	16,843	17,168	17,637
<b>Total</b>	<b>42,972</b>	<b>42,243</b>	<b>40,039</b>	<b>40,124</b>	<b>39,778</b>	<b>41,540</b>	<b>46,333</b>	<b>44,886</b>	<b>47,600</b>	<b>44,991</b>
<b>Fiscal Year</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	<b>2058</b>	<b>2059</b>	<b>2060</b>	<b>2061</b>	<b>2062</b>
HAMMER	2,412	2,372	2,332	2,549	3,239	3,459	3,142	0	0	0
Reliability Projects	22,335	21,938	21,736	0	0	0	0	0	0	0
Site-wide Services - RL-0040	3,460	2,573	1,897	233	357	391	261	0	0	0
Infrastructure and Services	18,042	18,457	18,890	19,348	19,706	20,246	20,704	18,566	18,146	17,453
<b>Total</b>	<b>46,249</b>	<b>45,340</b>	<b>44,856</b>	<b>22,130</b>	<b>23,302</b>	<b>24,096</b>	<b>24,107</b>	<b>18,566</b>	<b>18,146</b>	<b>17,453</b>
<b>Fiscal Year</b>	<b>2063</b>	<b>2064</b>	<b>2065</b>	<b>2066</b>	<b>2067</b>	<b>2068</b>	<b>2069</b>	<b>2070</b>	<b>Total</b>	
HAMMER	0	0	0	0	0	0	0	0	267,402	
Reliability Projects	0	0	0	0	0	0	0	0	1,010,000	
Site-wide Services - RL-0040	0	0	0	0	0	0	0	0	301,309	
Infrastructure and Services	17,015	16,020	13,755	12,110	7,465	3,866	1,984	218	1,094,636	
<b>Total</b>	<b>17,015</b>	<b>16,020</b>	<b>13,755</b>	<b>12,110</b>	<b>7,465</b>	<b>3,866</b>	<b>1,984</b>	<b>218</b>	<b>2,673,346</b>	
HAMMER =	Hazardous Materials Management and Emergency Response (Facility); also known as the Volpentest HAMMER Training and Education Center.									
PBS =	project baseline summary.									

**Table D-20. Infrastructure and Services (PBS RL-0040) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Infrastructure and Services, PBS RL-0040</b>							
<b>2</b>	<b>Infrastructure and Services</b>	<b>47,124</b>	<b>44,980</b>	<b>45,107</b>	<b>66,476</b>	<b>67,580</b>	<b>58,330</b>	<b>329,598</b>
3	Occupational Medicine	12,656	12,948	13,245	13,562	13,849	14,168	<b>80,428</b>
3	Steam Systems	5,881	6,017	6,155	6,322	6,416	6,564	<b>37,355</b>
3	Legal Support	4,092	4,186	2,868	2,945	2,989	3,058	<b>20,138</b>
3	Land Transfers	623	637	652	669	0	0	<b>2,581</b>
3	Cleanup Baseline, Integration, and Development	4,353	4,453	4,555	4,678	4,748	4,857	<b>27,645</b>
3	Natural Gas Line	4,092	1,047	1,071	21,904	22,408	11,416	<b>61,938</b>
3	Small Contracts	13,414	13,723	14,039	14,364	14,690	15,027	<b>85,257</b>
3	Cost and/or Schedule Uncertainty - Infrastructure and Services	2,012	1,971	2,523	2,031	2,479	3,240	<b>14,256</b>
<b>2</b>	<b>Reliability Projects</b>	<b>17,148</b>	<b>8,437</b>	<b>13,798</b>	<b>58,295</b>	<b>62,765</b>	<b>66,946</b>	<b>227,389</b>
3	Electrical System	10,250	5,756	0	4,381	6,722	12,321	<b>39,431</b>
3	Facility System Reliability Projects	0	0	0	12,272	16,957	7,765	<b>36,995</b>
3	Network and Telecommunication Reliability Project	3,099	0	0	13,735	9,912	6,654	<b>33,400</b>
3	Sewer System Reliability Projects	0	0	0	2,372	2,241	6,359	<b>10,972</b>
3	Transportation System	0	0	0	12,641	10,123	18,912	<b>41,676</b>
3	Water System Reliability Projects	1,514	0	0	5,372	10,855	9,827	<b>27,568</b>
3	Emerging Facility and Infrastructure Upgrades	0	0	11,314	0	0	0	<b>11,314</b>
3	Infrastructure Reliability Projects	0	0	0	5,179	2,970	1,921	<b>10,071</b>
3	Management Reserve	2,285	2,681	2,483	2,342	2,984	3,187	<b>15,962</b>
<b>2</b>	<b>HAMMER Ready to Serve</b>	<b>7,022</b>	<b>7,173</b>	<b>7,256</b>	<b>7,460</b>	<b>7,592</b>	<b>7,790</b>	<b>44,292</b>
3	HAMMER Ready to Serve	7,022	7,173	7,256	7,460	7,592	7,790	<b>44,292</b>
<b>2</b>	<b>Site-wide Services - RL-0040</b>	<b>572</b>	<b>3,820</b>	<b>4,828</b>	<b>10,948</b>	<b>10,042</b>	<b>15,680</b>	<b>45,889</b>
3	Site-wide Services - RL-0040	572	3,820	4,828	10,948	10,042	15,680	<b>45,889</b>
	<b>Total</b>	<b>71,865</b>	<b>64,410</b>	<b>70,989</b>	<b>143,178</b>	<b>147,978</b>	<b>148,747</b>	<b>643,034</b>
HAMMER = The Volpentest HAMMER Training and Education Center. Also known as Hazardous Materials Management and Emergency Response (Facility). PBS = project baseline summary.								

## D.1.8 NUCLEAR FACILITY D&D-RIVER CORRIDOR CLOSURE PROJECT (PBS RL-0041) SCHEDULE AND COST DETAILS

**Table D-21. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041) Level 3 Scope Summary.  
(3 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary
D4 Closure	100 Area	<p>This work element includes D4 of approximately 500 facilities, provision of utility and surveillance and maintenance services during D4, and closure of utilities located in the River Corridor. The D4 closure buildings are located throughout the River Corridor in the 100, 300, 400, and 600 Areas of the Hanford Site. Typical hazards associated with the buildings include radiological contamination (e.g., uranium, mixed fission products, activation products, plutonium), hazardous materials (e.g., asbestos, chemicals), and industrial hazards (e.g., elevated working locations, degraded roofs, biological hazards, electrical hazards, excavations).</p> <p>The D4 process includes obtaining regulatory approvals; characterizing the hazards and waste; deactivating the facility by removing loose hazardous materials and equipment; decontaminating the facility to allow open-air demolition; and decommissioning the facility by disconnecting utilities and services. The structure is then demolished using techniques such as heavy equipment (e.g., track hoe, processor, loader, cranes), explosives, cutting equipment, or other methods and the demolition debris is disposed, generally to ERDF. Following demolition, samples are collected to verify that cleanup criteria are met, and the sites are backfilled and revegetated.</p>
	324/327 Area	
	300 Area Sites	
	400 Area	
	Surveillance and Maintenance	Scope addresses activities associated with maintaining buildings in a safe and compliant manner, including performing required surveillances on a periodic basis.
	Operate and Close Utilities	Scope addresses operating utilities during and to support cleanup activities, then closing the utilities once they are no longer needed.
	Management and Support	Scope provides for management function in support of the D4 mission.
Future Requests for Equitable Adjustments	Addresses increased D4 closure scope related to changed conditions such as encountering more contamination than anticipated.	
Reactor ISS Closure	100-B/C Area	<p>This work element includes removal of reactor area buildings and components, leaving the reactor blocks intact in interim safe storage. The reactors will then undergo surveillance, monitoring, and maintenance to allow the reactor source term radionuclides to decay. Following this period (in most cases), the reactor blocks will be removed from their current locations and transported to the Inner Area for disposal as part of Final Reactor Disposition. Although the final end state of N Reactor has not been determined, the planning case is to disposition it the same as the other reactors.</p>
	Management and Support	

**Table D-21. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041) Level 3 Scope Summary.**  
(3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary	
Field Remediation Closure	100-B/C Area	<p>This work element includes performing CERCLA field remediation and closure of contaminated waste sites (liquid waste disposal facilities, burial grounds, burn pits, disposal pits, unplanned release sites, and contaminated pipelines) within the River Corridor. This includes confirmatory sampling, remediation design, remove/treat/dispose (RTD) activities, verification sampling, and closure documentation. The records of decision for the Field Remediation Closure work scope generally identify RTD as the preferred alternative. (Records of decision are identified in Appendix C of the Lifecycle Report.) In addition to RTD, confirmatory sites were identified that require sampling to determine the need for RTD. Following sampling, these sites either become RTD sites or are closed as no-action sites.</p> <p>Contamination in the waste sites and burial grounds of the River Corridor include chemical and radioactive constituents, such as metals, hexavalent chromium, petroleum related compounds, strontium, uranium, and cesium. The cleanup process involves sampling and analyzing the site to determine the extent and type of contamination, excavating contaminated waste materials, and restoring the landscape through site backfill, grading, and revegetation.</p>	
	100-D Area		
	100-F Area		
	100-H Area		
	100-K Area		
	100-N Area		
	100 Area Remaining Sites		
	300 Area Sites		
600 Area			
	Management and Support	Scope provides for management function in support of the field remediation mission.	
	Future Requests for Equitable Adjustments	Addresses increased Field Remediation Closure scope related to changed conditions such as encountering more contamination than anticipated.	
Waste Operations	200 Area Waste Operations	This work element includes the transportation, disposal, and treatment (if required) of waste from the River Corridor cleanup activities, as well as from other Hanford Site cleanup operators. Waste operations will expand and operate the ERDF, and transition the ERDF to a successor operator at the end of the Nuclear Facility D&D–River Corridor Closure Project.	
		Management and Support	Scope provides for management function in support of the waste operations mission.
		Future Requests for Equitable Adjustments	Addresses increased Waste Operations scope related to changed conditions such as encountering more contamination than anticipated.
End State/Final Closure	End State/Final Closure	This work includes preparing an integrated River Corridor work plan for a CERCLA baseline risk assessment; preparing a baseline risk assessment for the 100 and 300 Areas; conducting a risk evaluation for River Corridor areas outside of the 100 and 300 Areas; conducting orphan site evaluations; conducting surface soil surveys; preparing remedial action reports documenting completion of interim remedial actions for each geographic area; conducting closure reviews; preparing an RI/FS and Proposed Plan for six River Corridor source and groundwater areas; and preparing transition turnover packages for the six geographic areas for transition to the Hanford Long-Term Stewardship Program.	
		Management and Support	Scope provides for management function in support of the final closure mission.

**Table D-21. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041) Level 3 Scope Summary. (3 pages)**

Level 2 Work Element	Level 3 Work Element	Scope Summary																												
Mission Support/ General Support	Project Integration	This work element consists of functional support and business operations necessary to achieve River Corridor Closure and field project objectives. This includes providing trained and qualified staff, performance standards, facilities services, and office supplies. General support functions include safety health and quality, regulatory and environmental management, project integration, project services, engineering services, and Office of the Project General Manager.																												
	Project Services																													
	Safety, Health, and Quality																													
	Engineering																													
	Regulatory and Environmental Management																													
	Office of the Project General Manager																													
Site Infrastructure & Utility/Logistics & Transportation	B Reactor	The scope includes management and oversight for B Reactor facility activities, including planning, directing, and providing technical support to maintain, upgrade, and preserve the B Reactor Facility in a safe condition.																												
PRC River Zone Environmental	100-K Area Regulatory Closure Documents	Final remediation of waste sites and D4 buildings and structures in the 100-K Area will be completed when all spent nuclear fuel is removed from the K Basins. The scope includes the ISS of the KE and KW reactors consistent with the other 100 Area reactors.																												
	100-K Group 1 Remediation																													
	100-K Group 2 Remediation																													
	100-K Group 3 Remediation																													
	KW Deactivation																													
	105KE & 105KW Reactor Disposition																													
	100-K Project Management																													
Site-wide Services	Site-wide Services	Includes proportional share of costs for site services and infrastructure. See Table D-18 for details.																												
<p><b>NOTE:</b> See Tables D-22 and D-23 for schedule and budget information.</p> <table> <tbody> <tr> <td>CERCLA=</td> <td><i>Comprehensive Environmental Response, Compensation, and Liability Act.</i></td> <td>ERDF</td> <td>= Environmental Restoration Disposal Facility.</td> </tr> <tr> <td>D&amp;D</td> <td>= decontamination and decommissioning.</td> <td>ISS</td> <td>= interim safe storage.</td> </tr> <tr> <td>D4</td> <td>= deactivation, decontamination, decommissioning, and demolition.</td> <td>KE</td> <td>= K East.</td> </tr> <tr> <td></td> <td></td> <td>KW</td> <td>= K West.</td> </tr> <tr> <td></td> <td></td> <td>PBS</td> <td>= project baseline summary.</td> </tr> <tr> <td></td> <td></td> <td>RCRA</td> <td>= <i>Resource Conservation and Recovery Act.</i></td> </tr> <tr> <td></td> <td></td> <td>RTD</td> <td>= remove, treat, and dispose.</td> </tr> </tbody> </table>			CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	ERDF	= Environmental Restoration Disposal Facility.	D&D	= decontamination and decommissioning.	ISS	= interim safe storage.	D4	= deactivation, decontamination, decommissioning, and demolition.	KE	= K East.			KW	= K West.			PBS	= project baseline summary.			RCRA	= <i>Resource Conservation and Recovery Act.</i>			RTD	= remove, treat, and dispose.
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		PBS	= project baseline summary.																											
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		RTD	= remove, treat, and dispose.																											

**Table D-22. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041), Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>Total</b>
Management Reserve – Nuclear Facility D&D-River Corridor	995	990	985	933	609	583	0	<b>5,096</b>
D4 Closure	91,242	62,161	18,793	0	0	0	0	<b>172,196</b>
End State/Final Closure	7,664	51	0	371	403	0	0	<b>8,488</b>
Field Remediation Closure	67,382	51,909	50,424	10,675	658	0	0	<b>181,048</b>
ISS-Reactor Closure	2,728	0	0	0	0	0	0	<b>2,728</b>
Mission Support/General Support	8,268	4,057	980	0	0	0	0	<b>13,306</b>
Site-wide Services	23,138	23,207	14,182	14,621	9,767	10,702	210	<b>95,826</b>
Cost and/or Schedule Uncertainty - Nuclear Facility D&D–River Corridor	11,175	0	12,883	20,656	20,952	22,754	12,940	<b>101,360</b>
WCH Indirect Costs - Nuclear Facility D&D–River Corridor	14,279	92,501	142,079	0	0	0	0	<b>248,859</b>
PRC River Zone Environmental	53,717	75,445	47,965	79,798	63,046	47,751	0	<b>367,722</b>
Site Infrastructure & Utility/Logistics & Transportation	2,114	2,173	2,237	2,295	1,054	1,089	1,047	<b>12,008</b>
UBS Distributions -PBS RL-41	1,750	2,217	2,919	3,952	2,363	1,227	0	<b>14,429</b>
Waste Operations	60,226	69,473	6,273	0	0	0	0	<b>135,972</b>
<b>Total</b>	<b>344,679</b>	<b>384,184</b>	<b>299,720</b>	<b>133,301</b>	<b>98,852</b>	<b>84,106</b>	<b>14,197</b>	<b>1,359,038</b>
D&D = decontamination and decommissioning. D4 = deactivation, decontamination, decommissioning, and demolition. G&A = General and Administrative. ISS = interim safe storage.				PBS = project baseline summary. PRC = Plateau Remediation Contract. UBS = usage-based service. WCH = Washington Closure Hanford.				

**Table D-23. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041), Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (3 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Nuclear Facility D&amp;D-River Corridor Closure Project, PBS RL-0041</b>							
<b>2</b>	<b>PRC River Zone Environment</b>	<b>53,717</b>	<b>75,445</b>	<b>47,965</b>	<b>79,798</b>	<b>63,046</b>	<b>47,751</b>	<b>367,722</b>
3	100-K Area Regulatory Closure Documents	0	226	54	55	55	269	<b>659</b>
3	100-K Group 1 Remediation	30,073	51,837	18,566	28,332	1,494	0	<b>130,301</b>
3	100-K Group 2 Remediation	191	951	5	623	83	17	<b>1,871</b>
3	100-K Group 3 Remediation	5,305	4,980	206	313	6,675	2,755	<b>20,235</b>
3	KW Deactivation	401	3,977	15,929	41,113	43,252	25,834	<b>130,506</b>
3	105-KE & 105-KW Reactor Disposition	9,680	5,394	4,595	508	5,407	15,512	<b>41,096</b>
3	100-K Project Management	7,292	6,957	7,745	7,682	5,336	2,336	<b>37,348</b>
3	PRC Fee	774	1,122	866	1,174	743	1,039	<b>5,719</b>
<b>2</b>	<b>UBS Distributions</b>	<b>1,750</b>	<b>2,217</b>	<b>2,919</b>	<b>3,952</b>	<b>2,363</b>	<b>1,227</b>	<b>14,429</b>
3	Assessments for MSC Services to PRC	1,750	2,217	2,919	3,952	2,363	1,227	<b>14,429</b>
<b>2</b>	<b>Management Reserve – Nuclear Facility D&amp;D-River Corridor Closure Project</b>	<b>995</b>	<b>990</b>	<b>985</b>	<b>933</b>	<b>609</b>	<b>583</b>	<b>5,096</b>
3	CH2M Hill Plateau Remediation Company Management Reserve	995	990	985	933	609	583	<b>5,096</b>
<b>2</b>	<b>Site-wide Services</b>	<b>23,138</b>	<b>23,207</b>	<b>14,182</b>	<b>14,621</b>	<b>9,767</b>	<b>10,702</b>	<b>95,617</b>
3	Site-wide Services	23,138	23,207	14,182	14,621	9,767	10,702	<b>95,617</b>
<b>2</b>	<b>D4 Closure</b>	<b>91,242</b>	<b>62,161</b>	<b>18,793</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>172,196</b>
3	D4-100 Area	15,516	0	0	0	0	0	<b>15,516</b>
3	D4-324/327 Area (does not include 300-296 remediation)	20,460	45,001	0	0	0	0	<b>65,461</b>
3	D4-300 Area Sites	32,514	5,111	57	0	0	0	<b>37,683</b>
3	D4-400 Area	1,432	0	0	0	0	0	<b>1,432</b>
3	D4-S&M	512	0	0	0	0	0	<b>512</b>
3	D4-Operate and Close Utilities	626	0	0	0	0	0	<b>626</b>
3	Future Requests for Equitable Adjustments	3,581	10,465	18,735	0	0	0	<b>32,781</b>
3	D4-Management and Support	16,601	1,584	0	0	0	0	<b>18,184</b>
<b>2</b>	<b>ISS-Reactor Closure</b>	<b>2,728</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,728</b>
3	ISS-100 B/C Area	1,957	0	0	0	0	0	<b>1,957</b>

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**Table D-23. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041), Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (3 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	ISS-Management and Support	771	0	0	0	0	0	771
<b>2</b>	<b>Field Remediation Closure</b>	<b>67,382</b>	<b>51,909</b>	<b>50,424</b>	<b>10,675</b>	<b>658</b>	<b>0</b>	<b>181,048</b>
3	Field Remediation - 100 B/C Area	3,904	0	0	0	0	0	3,904
3	Field Remediation - 100 D Area	1,488	1,280	1,016	0	0	0	3,784
3	Field Remediation - 100 F Area	7	0	0	0	0	0	7
3	Field Remediation - 100 H Area	2,058	0	0	0	0	0	2,058
3	Field Remediation - 100 K Area	816	45	0	0	0	0	862
3	Field Remediation - 100 N Area	661	8	0	0	0	0	668
3	Field Remediation - 100 Area Remaining Sites	899	0	0	0	0	0	899
3	Field Remediation - 300 Area Sites (does not include 300-296 remediation)	6,116	14	1,067	1,057	0	0	8,254
3	Field Remediation - 600 Area	15,398	19,127	24,539	9,618	658	0	69,340
3	Future Requests for Equitable Adjustments in Development (does not include 300-296 remediation)	11,344	1,450	585	0	0	0	13,379
3	Future Requests for Equitable Adjustments (does not include 300-296 remediation)	24,322	29,961	23,173	0	0	0	77,456
3	Field Remediation - Management and Support	370	24	44	0	0	0	437
<b>2</b>	<b>Waste Operations</b>	<b>60,226</b>	<b>69,473</b>	<b>6,273</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>135,972</b>
3	200 Area Waste Operations	56,240	49,447	6,216	0	0	0	111,494
3	Future Requests for Equitable Adjustments	0	19,012	0	0	0	0	19,012
3	Management and Support	3,986	1,013	467	0	0	0	5,465
<b>2</b>	<b>End State/Final Closure</b>	<b>7,664</b>	<b>51</b>	<b>0</b>	<b>371</b>	<b>403</b>	<b>0</b>	<b>8,488</b>
3	End State/Final Closure	6,766	18	0	371	403	0	7,557
3	Management and Support	898	33	0	0	0	0	931
<b>2</b>	<b>Mission Support/General Support (MS/GS)</b>	<b>8,268</b>	<b>4,057</b>	<b>980</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13,305</b>
3	MS/GS-Project Integration	1,033	482	116	0	0	0	1,632
3	MS/GS-Project Services	3,050	1,821	440	0	0	0	5,311
3	MS/GS-Safety, Health and Quality	1,665	803	194	0	0	0	2,663
3	MS/GS-Engineering	231	103	25	0	0	0	359
3	MS/GS-Regulatory and Environmental Management	577	157	38	0	0	0	771

**Table D-23. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041), Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (3 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	MS/GS-Office of the Project Gen. Manager	1,712	691	168	0	0	0	<b>2,570</b>
<b>2</b>	<b>WCH Indirect Costs</b>	<b>14,279</b>	<b>92,501</b>	<b>142,079</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>248,859</b>
3	WCH Performance & Incentive Fee	11,226	84,029	142,079	0	0	0	<b>53,510</b>
3	Pension	3,053	8,473	0	0	0	0	<b>11,526</b>
<b>2</b>	<b>Site Infrastructure &amp; Utility/Logistics &amp; Transportation</b>	<b>2,114</b>	<b>2,173</b>	<b>2,237</b>	<b>2,295</b>	<b>1,054</b>	<b>1,089</b>	<b>10,962</b>
3	B Reactor	1,957	2,008	2,064	2,114	865	891	<b>9,899</b>
3	B Reactor Management Reserve	158	165	173	181	189	198	<b>1,063</b>
<b>2</b>	<b>Cost and/or Schedule Uncertainty</b>	<b>11,175</b>	<b>0</b>	<b>12,883</b>	<b>20,656</b>	<b>20,952</b>	<b>22,754</b>	<b>88,420</b>
3	Cost and/or Schedule Uncertainty	11,175	0	12,883	20,656	20,952	22,754	<b>88,420</b>
<b>Total</b>		<b>344,679</b>	<b>384,184</b>	<b>299,720</b>	<b>133,301</b>	<b>98,852</b>	<b>84,106</b>	<b>1,344,842</b>
D&D = decontamination and decommissioning. ISS = interim safe storage. D4 = deactivation, decontamination, decommissioning, and demolition. KE = K East. KW = K West. MSC = Mission Support Contract.		PBS = project baseline summary. PRC = Plateau Remediation Contract. S&M = surveillance and maintenance. UBS = usage-based service. WCH = Washington Closure Hanford.						

## D.1.9 NUCLEAR FACILITY D&D–FAST FLUX TEST FACILITY PROJECT (PBS RL-0042) SCHEDULE AND COST DETAILS

**Table D-24. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Level 3 Scope Summary.**

Level 2 Work Element	Level 3 Work Element	Scope Summary
FFTF Cleanup	Maintain Safe and Compliant FFTF Complex	Provides for monitoring, surveillance, and maintenance of the FFTF while the facility is in a cold and dark state pending future D&D activities.
	Transition FFTF Complex	Provides for the progressive shutdown of facility support systems, including sodium, electrical substations, and cooling systems.
	Disposition FFTF Sodium	Includes removal of sodium residuals throughout the life of the project, sodium shipment and conversion, and the operation of the Sodium Storage Facility.
	Decommission FFTF Complex	While the final closure of the FFTF has not yet been determined, the planning assumptions include: <ul style="list-style-type: none"> <li>• Demolition of all structures within the 400 Area Protected Area, except for reactor containment, to at least three feet below grade followed by backfill and revegetation; decommissioning waste would be disposed to appropriate disposal facilities.</li> <li>• Removal and disposition of the above-grade containment dome.</li> <li>• Grouting of the below grade portion of the reactor containment building and the reactor vessel.</li> <li>• Installation of an engineered barrier over the grouted area.</li> <li>• Installation of monitoring wells for long-term monitoring.</li> </ul>
	FFTF Project Management	Provides for management function in support of the project mission.
	Sodium Reaction Facility	Provides for the design, construction, and turnover to operations of a new facility in the Hanford 400 Area to convert FFTF sodium for use as caustic feed to the Waste Treatment Plant.
Infrastructure Services	Infrastructure Services	This work scope includes activity related to a DOE-RL direct contract.
Site-wide Services	Site-wide Services	Includes proportional share of costs for site services and infrastructure. See Table D-18 for details.
<p><b>NOTE:</b> See Tables D-25 and D-26 for schedule and budget information.</p> <p>D&amp;D = decontamination and decommissioning.  DOE-RL = U.S. Department of Energy, Richland Operations Office.  FFTF = Fast Flux Test Facility.  PBS = project baseline summary.</p>		

**Table D-25. Nuclear Facility D&D-Fast Flux Test Facility Project (PBS RL-0042), Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
FFTF Cleanup	1,729	1,818	1,876	1,891	1,924	1,998	30,932	29,888	30,146	23,795
Site-wide Services	684	525	499	319	280	428	6,520	6,087	5,710	3,420
Usage-Based Services G&A Direct	127	133	134	106	103	143	0	0	0	0
Infrastructure Services	116	119	121	124	127	129	135	138	141	144
Usage-Based Services Distribution	8	8	9	9	9	9	0	0	0	0
<b>Total</b>	<b>2,664</b>	<b>2,603</b>	<b>2,638</b>	<b>2,450</b>	<b>2,443</b>	<b>2,708</b>	<b>37,587</b>	<b>36,113</b>	<b>35,997</b>	<b>27,360</b>
<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
FFTF Cleanup	61,872	50,508	64,260	69,514	63,056	66,272	67,777	120,348	50,799	58,875
Site-wide Services	10,259	11,075	13,673	16,878	15,546	19,153	17,653	29,679	15,686	9,232
Usage-Based Services G&A Direct	0	0	0	0	0	0	0	0	0	0
Infrastructure Services	147	151	116	119	121	124	126	0	0	0
Usage-Based Services Distribution	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>72,278</b>	<b>61,734</b>	<b>78,049</b>	<b>86,510</b>	<b>78,723</b>	<b>85,549</b>	<b>85,556</b>	<b>150,027</b>	<b>66,485</b>	<b>68,107</b>
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>Total</b>					
FFTF Cleanup	51,102	36,024	32,894	5,175	<b>924,473</b>					
Site-wide Services	7,543	383	1	0	<b>191,232</b>					
Usage-Based Services G&A Direct	0	0	0	0	<b>746</b>					
Infrastructure Services	0	0	0	0	<b>2,198</b>					
Usage-Based Services Distribution	0	0	0	0	<b>52</b>					
<b>Total</b>	<b>58,645</b>	<b>36,407</b>	<b>32,895</b>	<b>5,175</b>	<b>1,118,702</b>					
FFTF	=	Fast Flux Test Facility.								
G&A	=	General and Administrative.								
PBS	=	project baseline summary.								

**Table D-26. Nuclear Facility D&D-Fast Flux Test Facility Project (PBS RL-0042), Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).**

Schedule Level	Scope	Fiscal Year						Total	
		2013	2014	2015	2016	2017	2018		
<b>1</b>	<b>Nuclear Facility D&amp;D-Fast Flux Test Facility Project, PBS RL-0042</b>								
<b>2</b>	<b>FFTF Cleanup</b>	<b>1,729</b>	<b>1,818</b>	<b>1,876</b>	<b>1,891</b>	<b>1,924</b>	<b>1,998</b>	<b>11,340</b>	
3	Maintain Safe and Compliant FFTF Complex	1,772	1,762	1,816	1,835	1,865	1,938	<b>10,988</b>	
3	Transition FFTF Complex	7	7	7	7	7	7	<b>41</b>	
3	Cost and/or Schedule Uncertainty - FFTF	-50	50	53	50	52	54	<b>311</b>	
<b>2</b>	<b>Infrastructure Services</b>	<b>116</b>	<b>119</b>	<b>121</b>	<b>124</b>	<b>127</b>	<b>129</b>	<b>735</b>	
3	Infrastructure Services	115	118	120	123	126	129	<b>731</b>	
3	Cost and/or Schedule Uncertainty – RL Directed	1	1	1	1	1	0	<b>4</b>	
<b>2</b>	<b>UBS Distribution</b>	<b>8</b>	<b>8</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>52</b>	
3	Assessments for MSC Services to PRC	8	8	9	9	9	9	<b>52</b>	
3	Cost and/or Schedule Uncertainty - UBS	0	0	0	0	0	0	<b>2</b>	
<b>2</b>	<b>UBS G&amp;A and Direct Distribution</b>	<b>127</b>	<b>133</b>	<b>134</b>	<b>106</b>	<b>103</b>	<b>143</b>	<b>746</b>	
3	PRC Fee and Management Reserve	127	133	134	106	103	143	<b>746</b>	
<b>2</b>	<b>Site-wide Services - RL-0042</b>	<b>684</b>	<b>525</b>	<b>499</b>	<b>319</b>	<b>280</b>	<b>428</b>	<b>2,735</b>	
3	Site-wide Services - RL-0042	684	525	499	319	280	428	<b>2,735</b>	
<b>Total</b>		<b>2,664</b>	<b>2,603</b>	<b>2,638</b>	<b>2,450</b>	<b>2,443</b>	<b>2,708</b>	<b>15,506</b>	
D&D = decontamination and decommissioning.		PBS = project baseline summary.							
FFTF = Fast Flux Test Facility.		PRC = Plateau Remediation Contract.							
G&A = General and Administrative.		UBS = usage-based services.							
MSC = Mission Support Contract.									

### D.1.10 RICHLAND COMMUNITY AND REGULATORY SUPPORT (PBS RL-0100) SCHEDULE AND COST DETAILS

**Table D-27. Richland Community and Regulatory Support (PBS RL-0100) Level 3 Scope Summary.**

Level 2 Work Element	Level 3 Work Element	Scope Summary
Richland Community and Regulatory Support	Community Regulatory Support	This work element includes DOE-RL support to community activities and regulatory agencies, such as the Hanford Advisory Board, the Oregon Department of Energy, the Natural Resource Trustee Council, the Washington State Department of Ecology, Washington State Department of Health, and other entities through grants, permits, and payment of fees. Includes studies for Natural Resource Damage Assessment but does not include significant restoration of natural resources to resolve any liability of the United States for Natural Resource Damage Assessment and Restoration.
	Washington Department of Health (WDOH) Oversight Grant	
	Oregon Department of Energy Grant	
	Washington Military Grant	
	Payment in Lieu of Taxes	
	Washington Department of Ecology RCRA Mixed Waste Fee	
	WDOH Air Emissions	
	Miscellaneous Permits and Fees	
	Natural Resource Damage Assessment	
	Hanford Advisory Board	
	Natural Resource Trustee Council	
<p><b>NOTE:</b> See Table D-28 for schedule and budget information.</p> <p>DOE-RL = U.S. Department of Energy, Richland Operations Office.            PBS = project baseline summary.            RCRA = <i>Resource Conservation and Recovery Act of 1976</i>.            WDOH = Washington Department of Health.</p>		

**Table D-28. Richland Community and Regulatory Support (PBS RL-0100), Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Community and Regulatory Support	19,357	24,583	25,211	25,333	24,523	25,087	25,338	25,592	25,761	26,019
<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
Community and Regulatory Support	26,279	19,711	19,124	19,315	19,509	19,704	19,901	20,100	20,301	20,421
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
Community and Regulatory Support	20,625	20,831	21,040	21,150	21,361	21,575	21,791	22,009	22,123	22,344
<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>2051</b>	<b>2052</b>
Community and Regulatory Support	22,568	22,794	23,022	23,141	23,372	23,606	23,842	24,081	24,321	24,565
<b>Fiscal Year</b>	<b>2053</b>	<b>2054</b>	<b>2055</b>	<b>2056</b>	<b>2057</b>	<b>2058</b>	<b>2059</b>	<b>Total</b>		
Community and Regulatory Support	24,810	25,058	25,309	25,562	25,818	26,076	26,337	<b>1,080,298</b>		
PBS = project baseline summary.										

### D.1.11 LONG-TERM STEWARDSHIP (PBS RL-LTS) SCHEDULE AND COST DETAILS

Scope information for Long-Term Stewardship, PBS RL-LTS, is presented in Table D-29. This PBS is not broken down to Level 3 scope, and there are no near-term cost details for this PBS due to when the work is planned to begin.

**Table D-29. Long-Term Stewardship (PBS RL-LTS) Level 2 Scope Summary.**

<b>Work Element</b>	<b>Scope Description</b>
Infrastructure	The scope includes operation and maintenance of site infrastructure following cleanup activities. Specific scope will include supplying electrical and water utilities, operating and maintaining emergency services (Hanford Fire Department), and maintaining roads as needed to support site LTS activities.
Waste Management	Scope includes operation and maintenance of 200 Area liquid effluent facilities in support of groundwater treatment and monitoring activities.
Site and Environmental Monitoring	Scope includes ongoing site and environmental monitoring of groundwater, soil, and the vadose zone, and monitoring for public safety and resource protection.
Post-Closure Surveillance and Maintenance	Scope includes real estate and site planning, land management, and surveillance and maintenance activities for the 100 and 200 Areas.
Environmental Compliance	Scope includes activities to ensure environmental compliance and protection.
Stakeholder Participation	Scope includes continued support of stakeholder participation through grants, and payment of fees in lieu of taxes.
Management and Administration	Scope provides for management and administration of these LTS activities.
<p><b>NOTE:</b> See Table D-30 for schedule and budget information.</p> <p>LTS = Long-Term Stewardship.            PBS = project baseline summary.</p>	

**Table D-30. Long-Term Stewardship (PBS RL-LTS) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (2 pages)**

<b>Fiscal Year</b>	<b>2060</b>	<b>2061</b>	<b>2062</b>	<b>2063</b>	<b>2064</b>	<b>2065</b>	<b>2066</b>	<b>2067</b>	<b>2068</b>	<b>2069</b>
Environmental Compliance	4,565	4,441	4,320	4,203	4,088	3,977	3,869	3,764	3,661	3,562
Infrastructure	27,367	26,623	25,900	25,194	24,510	23,843	23,194	22,563	21,950	21,352
Management and Administration	25,036	24,355	23,692	23,048	22,421	21,811	21,218	20,641	20,079	19,533
Post-Closure S&M	51,155	49,764	48,410	47,093	45,812	44,566	43,354	42,175	41,028	39,912
Site and Environmental Monitoring	54,967	53,472	52,017	50,602	49,226	47,887	46,584	45,318	44,085	42,886
Stakeholder Participation	20,781	20,216	19,666	19,131	18,611	18,104	17,612	17,133	16,667	16,214
Waste Management	91,520	89,031	86,609	84,254	81,962	79,732	77,564	75,454	73,402	71,405
<b>Total</b>	<b>275,391</b>	<b>267,902</b>	<b>260,614</b>	<b>253,525</b>	<b>246,630</b>	<b>239,920</b>	<b>233,395</b>	<b>227,048</b>	<b>220,872</b>	<b>214,864</b>
<b>Fiscal Year</b>	<b>2070</b>	<b>2071</b>	<b>2072</b>	<b>2073</b>	<b>2074</b>	<b>2075</b>	<b>2076</b>	<b>2077</b>	<b>2078</b>	<b>2079</b>
Environmental Compliance	3,428	3,300	3,176	3,058	3,131	2,885	2,659	2,451	2,510	2,570
Infrastructure	20,554	19,784	19,042	18,331	18,770	17,298	15,942	14,693	15,045	15,407
Management and Administration	18,802	18,098	17,420	16,768	17,170	15,824	14,584	13,440	13,763	14,093
Post-Closure S&M	38,418	36,979	35,594	34,262	35,084	32,333	29,799	27,463	28,122	28,796
Site and Environmental Monitoring	41,280	39,734	38,247	36,815	37,699	34,743	32,019	29,509	30,217	30,942
Stakeholder Participation	15,606	15,022	14,460	13,918	14,252	13,135	12,105	11,156	11,424	11,698
Waste Management	68,732	66,158	63,681	61,297	62,768	57,847	53,312	49,132	50,312	51,519
<b>Total</b>	<b>206,820</b>	<b>199,075</b>	<b>191,620</b>	<b>184,449</b>	<b>188,874</b>	<b>174,065</b>	<b>160,420</b>	<b>147,844</b>	<b>151,393</b>	<b>155,025</b>
<b>Fiscal Year</b>	<b>2080</b>	<b>2081</b>	<b>2082</b>	<b>2083</b>	<b>2084</b>	<b>2085</b>	<b>2086</b>	<b>2087</b>	<b>2088</b>	<b>2089</b>
Environmental Compliance	2,631	2,695	2,621	2,684	2,749	2,815	2,882	2,951	3,022	3,095
Infrastructure	15,775	16,154	15,715	16,092	16,479	16,874	17,279	17,694	18,118	18,553
Management and Administration	9,156	9,376	9,121	9,339	9,564	9,793	10,028	10,270	10,517	10,770
Post-Closure S&M	29,488	30,195	29,374	30,079	30,801	31,540	32,297	33,072	33,866	34,679
Site and Environmental Monitoring	31,685	32,445	31,562	32,320	33,096	33,891	34,703	35,536	36,389	37,263
Stakeholder Participation	11,979	12,266	11,933	12,219	12,512	12,813	13,120	13,435	13,757	14,088
Waste Management	0	0	0	0	0	0	0	7	13	20
<b>Total</b>	<b>100,714</b>	<b>103,131</b>	<b>100,326</b>	<b>102,733</b>	<b>105,201</b>	<b>107,726</b>	<b>110,309</b>	<b>112,965</b>	<b>115,682</b>	<b>118,468</b>

**Table D-30. Long-Term Stewardship (PBS RL-LTS) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (2 pages)**

<b>Fiscal Year</b>	<b>2090</b>	<b>Total</b>
Environmental Compliance	3,169	<b>100,932</b>
Infrastructure	18,998	<b>605,093</b>
Management and Administration	11,029	<b>490,759</b>
Post-Closure S&M	35,511	<b>1,131,021</b>
Site and Environmental Monitoring	38,157	<b>1,215,296</b>
Stakeholder Participation	14,426	<b>459,459</b>
Waste Management	28	<b>1,395,759</b>
<b>Total</b>	<b>121,318</b>	<b>5,398,319</b>
S&M = surveillance and maintenance.		

### D.1.12 FINAL REACTOR DISPOSITION SCHEDULE AND COST DETAILS

Scope information for Final Reactor Disposition is presented in Table D-31. This work is not broken down to Level 3 details, so no additional scope is presented and there are no near-term cost details due to when the work is planned to begin.

**Table D-31. Final Reactor Disposition Level 2 Scope Summary.**

Work Element	Scope Description
Final Reactor Disposition	This work element includes final reactor disposition of the 100 Area surplus production reactors (except for B Reactor which has been recommended to Congress for inclusion in a Manhattan Project National Historic Park). Following a safe storage period of up to 75 years final reactor disposition would include demolition of the interim safe storage enclosure and transport of each of the eight reactor blocks intact on a tractor-transporter from its present location in the 100 Areas to the Central Plateau Inner Area for disposal. Following reactor removal, the site formerly occupied by each reactor would be backfilled, graded, and seeded. Although the final end state of N Reactor has not been determined, the planning case is to disposition it the same as the other reactors.
<b>NOTE:</b> See Table D-32 for schedule and budget information.	

**Table D-32. Final Reactor Disposition Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

Fiscal Year	2054	2055	2056	2057	2058
Final Reactor Disposition	18,811	37,623	37,623	56,434	94,057
Fiscal Year	2059	2060	2061	2062	2063
Final Reactor Disposition	94,057	131,679	282,170	282,170	282,170
Fiscal Year	2064	2065	2066	2067	2068
Final Reactor Disposition	188,113	188,113	94,057	56,434	37,623
<b>Total</b>	<b>1,881,134</b>				

## D.2 OFFICE OF RIVER PROTECTION PROJECT BASELINE SUMMARY INFORMATION

The DOE, Office of River Protection (DOE-ORP) manages their assigned cleanup mission through the following PBSs (at Level 1):

- Radioactive Liquid Tank Waste Stabilization and Disposition, PBS ORP-0014
- Major Construction – Waste Treatment Plant, PBS ORP-0060.

Scope information for PBS ORP-0014 and PBS ORP-0060 is presented in Chapter 6.0 of the Lifecycle Report. No additional scope is presented here. Near-term and estimated cleanup costs are presented below.

**Table D-33. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (2 pages)**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Base Operations	263,931	356,555	366,504	367,605	393,976	380,201	491,668	472,975	445,198	466,041
Facility Closures	0	8	3,484	1,923	912	0	4,604	6,400	2,579	2,893
Retrieve and Close SSTs	88,074	62,587	124,749	238,683	225,082	268,002	218,964	126,326	136,401	108,806
Supplemental Treatment	8,546	44,243	97,424	213,596	304,519	314,010	328,815	30,074	23,061	169,656
Tank Operations Contract - ORP Project Support	33,290	34,101	39,498	43,420	59,917	62,353	48,354	45,702	45,055	45,931
Treat Waste	6,832	19,834	20,310	33,995	105,413	195,452	411,621	410,079	406,116	413,095
Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure	115,732	149,250	189,060	188,453	226,248	197,347	189,059	187,686	168,954	166,352
<b>Total</b>	<b>516,405</b>	<b>666,578</b>	<b>841,029</b>	<b>1,087,674</b>	<b>1,316,067</b>	<b>1,417,366</b>	<b>1,693,084</b>	<b>1,279,242</b>	<b>1,227,364</b>	<b>1,372,775</b>
<b>Fiscal Year</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>
Base Operations	455,013	470,788	496,480	485,865	508,862	567,468	539,960	567,671	548,172	576,550
Facility Closures	5,985	45,140	7,779	4,728	1,394	1,729	1,336	3,214	2,319	1,882
Retrieve and Close SSTs	71,703	54,898	115,761	115,140	174,473	297,347	206,817	163,133	208,752	266,322
Supplemental Treatment	171,626	176,101	179,975	183,935	187,981	192,117	195,564	200,663	205,078	210,421
Tank Operations Contract - ORP Project Support	47,175	52,460	49,210	51,056	51,332	54,637	58,005	56,796	55,192	59,837
Treat Waste	420,508	431,471	440,964	450,665	460,580	470,712	479,159	491,651	502,468	515,560
Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure	175,096	182,990	161,213	151,475	160,483	166,190	163,649	151,105	145,680	146,634
<b>Total</b>	<b>1,347,106</b>	<b>1,413,849</b>	<b>1,451,382</b>	<b>1,442,862</b>	<b>1,545,104</b>	<b>1,750,201</b>	<b>1,644,491</b>	<b>1,634,233</b>	<b>1,667,660</b>	<b>1,777,206</b>
<b>Fiscal Year</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>	<b>2038</b>	<b>2039</b>	<b>2040</b>	<b>2041</b>	<b>2042</b>
Base Operations	582,060	632,972	652,033	648,968	628,511	640,206	646,170	557,148	484,417	462,563
Facility Closures	1,844	2,596	11,213	7,983	11,725	4,113	1,326	747	11,530	10,195
Retrieve and Close SSTs	294,811	418,713	470,008	544,391	458,892	456,142	376,011	216,360	175,960	181,184
Supplemental Treatment	214,200	218,044	222,841	225,396	229,445	234,492	239,651	243,952	250,312	255,819
Tank Operations Contract - ORP Project Support	60,673	65,146	64,184	69,834	71,263	68,816	73,029	70,324	72,943	69,655
Treat Waste	524,820	534,237	545,990	562,448	572,550	585,146	598,020	608,751	624,622	559,604
Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure	148,180	150,839	157,589	168,245	177,266	204,992	225,126	238,573	265,977	295,917
<b>Total</b>	<b>1,826,588</b>	<b>2,022,547</b>	<b>2,123,858</b>	<b>2,227,265</b>	<b>2,149,651</b>	<b>2,193,908</b>	<b>2,159,333</b>	<b>1,935,853</b>	<b>1,885,761</b>	<b>1,834,937</b>

**Table D-33. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated). (2 pages)**

<b>Fiscal Year</b>	<b>2043</b>	<b>2044</b>	<b>2045</b>	<b>2046</b>	<b>2047</b>	<b>2048</b>	<b>2049</b>	<b>2050</b>	<b>Total</b>
Base Operations	447,632	439,638	407,393	300,834	261,134	187,890	93,459	62,485	<b>17,356,996</b>
Facility Closures	15,046	13,392	33,132	83,973	43,314	38,195	11,774	3,253	<b>403,661</b>
Retrieve and Close SSTs	104,817	69,822	104,365	52,641	45,307	18,166	0	0	<b>7,259,614</b>
Supplemental Treatment	260,935	267,210	0	0	0	0	0	0	<b>6,299,701</b>
Tank Operations Contract - ORP Project Support	73,186	73,232	75,827	16,622	12,602	10,295	4,272	2,850	<b>1,948,074</b>
Treat Waste	544,302	528,167	513,673	488,927	500,693	253,327	0	0	<b>15,231,759</b>
Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure	343,051	335,495	409,323	238,259	194,255	85,757	17,388	757	<b>7,039,642</b>
<b>Total</b>	<b>1,788,968</b>	<b>1,726,957</b>	<b>1,543,712</b>	<b>1,181,257</b>	<b>1,057,304</b>	<b>593,630</b>	<b>126,893</b>	<b>69,345</b>	<b>55,539,447</b>
DST = double-shell tank. ORP = U.S. Department of Energy, Office of River Protection. PBS = project baseline summary. SST = single-shell tank.									

**Table D-34. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014), Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Radioactive Liquid Tank Waste Stabilization and Disposition, PBS ORP-0014</b>							
<b>2</b>	<b>Base Operations</b>	<b>263,931</b>	<b>356,555</b>	<b>366,504</b>	<b>367,605</b>	<b>393,976</b>	<b>380,201</b>	<b>2,128,771</b>
3	Base Operations	77,175	80,707	88,836	79,520	77,720	83,444	<b>487,402</b>
3	DST Space Management	7,373	23,956	13,627	10,798	18,442	12,382	<b>86,578</b>
3	TOC Facility Operations	28,104	34,726	41,214	43,054	57,124	35,537	<b>239,760</b>
3	Tank Farm Upgrades	10,339	13,626	10,927	21,278	22,186	12,434	<b>90,789</b>
3	Project Support	140,940	203,540	211,900	212,956	218,504	236,404	<b>1,224,243</b>
<b>2</b>	<b>Retrieve and Close SSTs</b>	<b>88,074</b>	<b>62,587</b>	<b>124,749</b>	<b>238,683</b>	<b>225,082</b>	<b>268,002</b>	<b>1,007,178</b>
3	Retrieval/Closure Program	39,487	23,367	28,756	38,954	101,760	82,909	<b>315,233</b>
3	SST Retrieval East Area	30,155	28,207	51,314	108,421	90,129	81,952	<b>390,178</b>
3	SST Retrieval West Area	0	0	0	10,018	6,151	77,784	<b>93,953</b>
3	Closure Program	1,110	1,675	806	456	627	437	<b>5,111</b>
3	SST Closure	17,322	9,339	43,873	80,834	26,415	24,920	<b>202,703</b>
<b>2</b>	<b>Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure</b>	<b>115,732</b>	<b>149,250</b>	<b>189,060</b>	<b>188,453</b>	<b>226,248</b>	<b>197,347</b>	<b>1,066,090</b>
3	WTP Feed Delivery Program	17,933	20,575	22,203	23,467	24,669	24,879	<b>133,726</b>
3	Construct DST Systems	47,101	59,979	53,872	41,408	40,057	44,232	<b>286,650</b>
3	Immobilization Program	24,869	22,978	51,315	32,497	54,628	33,770	<b>220,057</b>
3	WTP Operational Readiness	3,543	4,425	4,122	4,221	4,322	4,426	<b>25,060</b>
3	Tank Waste Pretreatment Project	1,459	27,083	31,145	39,387	52,772	45,406	<b>197,253</b>
3	Secondary Waste Treatment/ETF	6,943	14,209	26,402	47,473	49,799	44,635	<b>189,461</b>
3	Next Generation Projects	13,883	0	0	0	0	0	<b>13,883</b>
<b>2</b>	<b>Supplemental Treatment</b>	<b>8,546</b>	<b>44,243</b>	<b>97,424</b>	<b>213,596</b>	<b>304,519</b>	<b>314,010</b>	<b>982,338</b>
3	Supplemental Treatment	8,546	44,243	97,424	213,596	304,519	314,010	<b>982,338</b>
<b>2</b>	<b>Treat Waste</b>	<b>6,832</b>	<b>19,834</b>	<b>20,310</b>	<b>33,995</b>	<b>105,413</b>	<b>195,452</b>	<b>381,835</b>
3	Waste Treatment Facility (WTP)	6,832	19,834	20,310	33,995	105,413	195,452	<b>381,835</b>
<b>2</b>	<b>Facility Closures</b>	<b>0</b>	<b>8</b>	<b>3,484</b>	<b>1,923</b>	<b>912</b>	<b>0</b>	<b>6,327</b>
3	TFC Facility and Other Closure	0	8	3,484	1,923	912	0	<b>6,327</b>

**Table D-34. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014), Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated). (2 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
2	<b>Tank Operations Contract - ORP Project Support</b>	<b>33,290</b>	<b>34,101</b>	<b>39,498</b>	<b>43,420</b>	<b>59,917</b>	<b>62,353</b>	<b>272,579</b>
3	Tank Operations Contract - ORP Project Support	33,290	34,101	39,498	43,420	59,917	62,353	<b>272,579</b>
<b>Total</b>		<b>516,405</b>	<b>666,578</b>	<b>841,029</b>	<b>1,087,674</b>	<b>1,316,067</b>	<b>1,417,366</b>	<b>5,845,118</b>
DST = double-shell tank.				SST = single-shell tank.				
ETF = Effluent Treatment Facility.				TOC = Tank Operations Contract.				
ORP = U.S. Department of Energy, Office of River Protection.				WTP = Waste Treatment and Immobilization Plant.				
PBS = project baseline summary.								

**Table D-35. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year (\$1,000, Escalated).**

<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>Total</b>
Analytical Laboratory	17,943	28,416	26,726	39,691	28,184	17,030	18,590	1,345	<b>177,925</b>
Balance of Facilities	57,932	54,965	80,098	52,759	24,728	12,691	10,507	484	<b>294,164</b>
High-Level Waste	142,609	147,372	134,006	97,297	64,996	64,624	64,501	18,718	<b>734,123</b>
Low-Activity Waste	65,851	46,715	33,682	80,325	60,474	31,348	42,382	1,208	<b>361,985</b>
Plant Wide	287,611	266,486	236,250	179,672	132,785	52,156	1,660	0	<b>1,156,620</b>
Pretreatment	405,343	303,973	210,179	131,306	100,888	76,461	103,515	5,436	<b>1,337,101</b>
<b>Total</b>	<b>977,289</b>	<b>847,927</b>	<b>720,941</b>	<b>581,050</b>	<b>412,055</b>	<b>254,310</b>	<b>241,155</b>	<b>27,191</b>	<b>4,061,918</b>
PBS = project baseline summary.									

**Table D-36. Major Construction – Waste Treatment Plant (PBS ORP-0060) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).  
(4 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
<b>1</b>	<b>Major Construction - Waste Treatment Plant, PBS ORP-0060</b>							
<b>2</b>	<b>Pretreatment Facility</b>	<b>405,343</b>	<b>303,973</b>	<b>210,179</b>	<b>131,306</b>	<b>100,888</b>	<b>76,461</b>	<b>1,228,150</b>
3	Engineering Design - PT	36,771	6,542	1,425	480	0	0	45,218
3	Plant Equipment - PT	103,908	59,259	13,722	8,976	0	0	185,865
3	Environmental and Nuclear Safety - PT	997	2,246	2,544	3,444	2,963	2,214	14,408
3	Research and Technology - PT	2,550	0	0	0	0	0	2,550
3	Plant Material - PT	33,794	14,222	0	0	0	0	48,016
3	Startup - PT	181	286	10,982	15,768	0	0	27,217
3	Construction Field Non Manual - PT	17,182	16,788	13,079	3,427	0	0	50,476
3	Crafts (Construction) - PT - Civil	16,451	21,521	12,360	3,625	0	0	53,957
3	Crafts (Construction) - PT - Distribs	4,204	3,238	2,680	656	77	0	10,855
3	Crafts (Construction) - PT - Electrical	20,269	16,037	18,336	4,395	0	0	59,037
3	Crafts (Construction) - PT - Mechanical	11,243	13,895	9,517	396	0	0	35,051
3	Crafts (Construction) - PT - Piping and Instrumentation	53,433	44,843	31,501	7,464	0	0	137,241
3	Construction Subcontracts - PT	11,063	23,909	19,368	3,249	0	0	57,589
3	Liner Plate and Vessel Const Subcontract - PT	223	3,664	1,341	0	0	0	5,228
3	Special Protective Coating Const Subcontract - PT	2,654	4,782	599	3	0	0	8,038
3	Intermech Construction Subcontract - PT	13,272	8,473	2,358	0	0	0	24,103
3	Commissioning - PT	1,267	5,865	18,664	32,688	57,052	33,196	148,732
-	Fee	20,913	16,738	17,279	9,343	18,955	29,886	113,114
-	Cost and/or Schedule Uncertainty	54,968	41,665	34,424	37,392	21,841	11,165	201,455
<b>2</b>	<b>Low-Activity Waste Facility</b>	<b>65,851</b>	<b>46,715</b>	<b>33,682</b>	<b>80,325</b>	<b>60,474</b>	<b>31,348</b>	<b>318,395</b>
3	Engineering Design - LAW	1,383	456	194	19	0	0	2,052
3	Plant Equipment - LAW	8,874	3,795	0	20,780	95	(23,362) <sup>1</sup>	10,182
3	Equipment Engineering - LAW	14	14	14	15	0	0	57
3	Environmental and Nuclear Safety - LAW	1,290	1,106	1,043	2,386	2,219	1,642	9,686
3	Research and Technology - LAW	240	232	239	247	0	0	958
3	Startup - LAW	212	2,594	8,345	2,136	0	0	13,287
3	Construction Field Non Manual - LAW	6,790	5,926	1,318	115	0	0	14,149
3	Crafts (Construction) - LAW	25,786	10,424	0	0	0	0	36,210

**Table D-36. Major Construction – Waste Treatment Plant (PBS ORP-0060) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).  
(4 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	Crafts (Construction) - LAW - Distribs	1,613	1,507	1,082	339	40	0	4,581
3	Construction Subcontracts - LAW	10,708	1,443	0	0	0	0	12,151
3	CB&I Construction Subcontract - LAW	142	0	0	0	0	0	142
3	Special Protective Coating Const Subcontract - LAW	1,057	7	0	0	0	0	1,064
3	Intermech Construction Subcontract - LAW	520	129	0	0	0	0	649
3	Commissioning - LAW	954	5,363	11,330	29,573	38,461	41,717	127,398
-	Fee	761	8,076	914	3,191	10,114	18,304	41,360
-	Cost and/or Schedule Uncertainty	5,507	5,643	9,203	21,524	9,545	(6,953)	44,469
<b>2</b>	<b>High-Level Waste Facility</b>	<b>142,609</b>	<b>147,372</b>	<b>134,006</b>	<b>97,297</b>	<b>64,996</b>	<b>64,624</b>	<b>650,904</b>
3	Engineering Design - HLW	6,086	1,223	1,235	563	20	0	9,127
3	Plant Equipment - HLW	32,557	17,137	12,277	725	4,857	(13,880)	53,673
3	Equipment Engineering - HLW	22	4	34	177	89	0	326
3	Environmental and Nuclear Safety - HLW	548	1,584	2,209	3,337	2,523	1,969	12,170
3	Research and Technology - HLW	335	451	370	252	261	135	1,804
3	Startup - HLW	153	158	255	11,151	5,560	0	17,277
3	Construction Field Non Manual - HLW	11,063	11,138	8,868	3,504	0	0	34,573
3	Crafts (Construction) - HLW - Civil	17,486	16,757	10,700	3,154	0	0	48,097
3	Crafts (Construction) - HLW - Distribs	2,249	2,229	1,679	549	60	0	6,766
3	Crafts (Construction) - HLW - Electrical	6,064	7,497	10,714	7,527	0	0	31,802
3	Crafts (Construction) - HLW - Mechanical	9,347	9,612	7,449	2,275	0	0	28,683
3	Crafts (Construction) - HLW - Piping and Instrumentation	9,632	18,916	18,588	6,387	0	0	53,523
3	Construction Subcontracts - HLW	4,242	12,477	15,671	4,835	0	0	37,225
3	Liner Plate and Vessel Const Subcontract - HLW	5,391	449	14	0	0	0	5,854
3	Special Protective Coating Const Subcontract - HLW	3,468	2,913	1,082	0	0	0	7,463
3	Intermech Construction Subcontract - HLW	5,152	6,723	4,306	2,878	0	0	19,059
3	Commissioning - HLW	661	2,341	8,368	15,456	27,350	41,118	95,294
-	Fee	8,245	10,079	6,189	6,177	12,324	26,596	69,610
-	Cost and/or Schedule Uncertainty	19,908	25,684	23,998	28,350	11,952	8,686	118,578
<b>2</b>	<b>Balance of Facilities</b>	<b>57,932</b>	<b>54,965</b>	<b>80,098</b>	<b>52,759</b>	<b>24,728</b>	<b>12,691</b>	<b>283,173</b>
3	Engineering Design - BOF	3,345	1,080	466	22	25	0	4,938

**Table D-36. Major Construction – Waste Treatment Plant (PBS ORP-0060) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).  
(4 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	Plant Equipment - BOF	11,603	1,980	18,633	0	0	0	32,216
3	Environmental and Nuclear Safety - BOF	516	432	484	502	432	280	2,646
3	Plant Material - BOF	1,067	539	0	0	0	0	1,606
3	Startup - BOF	10,646	11,310	9,153	5,497	0	0	36,606
3	Construction Field Non Manual - BOF	3,755	4,752	5,236	3,000	0	0	16,743
3	Crafts (Construction) - BOF	7,901	12,661	12,070	5,265	62	0	37,959
3	Crafts (Construction) - BOF - Distribs	1,000	1,054	834	301	26	0	3,215
3	Construction Subcontracts - BOF	2,718	5,665	4,184	2,709	144	0	15,420
3	Commissioning - BOF	5,747	6,414	13,258	22,122	20,996	16,768	85,305
-	Fee	3,559	3,034	3,935	1,902	3,510	2,195	18,135
-	Cost and/or Schedule Uncertainty	6,075	6,044	11,845	11,439	(467)	(6,552)	28,384
<b>2</b>	<b>Analytical Laboratory</b>	<b>17,943</b>	<b>28,416</b>	<b>26,726</b>	<b>39,691</b>	<b>28,184</b>	<b>17,030</b>	<b>157,990</b>
3	Engineering Design - Lab	542	66	50	0	0	0	658
3	Plant Equipment - Lab	2,460	6,371	1,671	1,398	0	0	11,900
3	Equipment Engineering - Lab	908	148	0	0	0	0	1,056
3	Environmental and Nuclear Safety - Lab	1,200	691	792	773	689	561	4,706
3	Startup - Lab	1,056	5,507	643	0	0	0	7,206
3	Construction Field Non Manual - Lab	1,706	400	0	0	0	0	2,106
3	Crafts (Construction) - Lab	2,653	216	0	0	0	0	2,869
3	Crafts (Construction) - Lab - Distribs	249	249	195	66	7	0	766
3	Construction Subcontracts - Lab	859	0	0	0	0	0	859
3	Intermech Construction Subcontract - Lab	30	0	0	0	0	0	30
3	Commissioning - Lab	4,442	11,657	19,546	28,499	27,408	22,960	114,512
-	Fee	356	879	1,089	1,508	4,678	2,997	11,507
-	Cost and/or Schedule Uncertainty	1,482	2,232	2,740	7,447	(4,598)	(9,488)	(185)
<b>2</b>	<b>Plant Wide</b>	<b>287,611</b>	<b>266,486</b>	<b>236,250</b>	<b>179,672</b>	<b>132,785</b>	<b>52,156</b>	<b>1,154,960</b>
3	Safety Assurance - General	2,922	3,033	2,678	2,941	2,916	3,011	17,501
3	Procurement & Subcontracts Freight - Plant Wide	2,635	1,529	403	215	115	12	4,909
3	Project Controls - General	10,616	9,030	8,145	7,038	5,082	3,015	42,926
3	Engineering Design - Plant Wide	9,301	4,891	3,105	1,001	409	36	18,743
3	Engineering Design LOE - Plant Wide	10,613	5,853	5,300	3,729	3,368	2,394	31,257

**Table D-36. Major Construction – Waste Treatment Plant (PBS ORP-0060) Near-Term Schedule and Costs, Level 3, by Fiscal Year (\$1,000, Escalated).  
(4 pages)**

Schedule Level	Scope	Fiscal Year						Total
		2013	2014	2015	2016	2017	2018	
3	Engineering Management - Plant Wide	7,052	5,957	3,893	297	260	0	17,459
3	Equipment Engineering - Plant Wide	10,424	5,518	2,464	228	175	176	18,985
3	Environmental & Nuclear Safety - Plant Wide	5,422	5,115	6,202	4,970	4,318	5,738	31,765
3	Environmental & Nuclear Safety LOE - Plant Wide	3,064	3,068	3,358	3,426	2,581	2,546	18,043
3	Material Craft Services - Plant Wide	2,090	1,625	1,108	120	0	0	4,943
3	Plant Material - Plant Wide	5,146	0	0	0	0	0	5,146
3	Procurement & Subcontracts - Procurement - SS	18,462	11,875	6,555	3,810	1,516	770	42,988
3	Quality Assurance - General	8,372	7,646	7,521	6,534	6,464	3,488	40,025
3	Process Engineering and Flowsheet Modeling - Plant Wide	1,067	414	701	302	33	913	3,430
3	Startup - Plant Wide	2,607	4,553	4,642	3,268	605	0	15,675
3	Shared Services - General	50,131	48,019	43,266	40,787	33,747	25,670	241,620
3	Construction Field Non Manual – Shared Services	33,464	33,731	33,797	26,366	12,316	4,923	144,597
3	Crafts (Construction) - SS - Distribs	33,991	27,051	17,783	(7,386)	(6,961)	0	64,478
3	Construction Subcontracts - Plant Wide	7,456	5,019	4,412	3,494	0	0	20,381
3	CB&I Construction Subcontract - Plant Wide	2,751	2,619	0	0	0	0	5,370
3	Construction Subcontracts - Shared Services - Distribs	4,453	3,958	3,689	1,230	0	0	13,330
3	Intermech Construction Subcontract - Plant Wide	3,857	3,489	111	0	0	0	7,457
3	Bulk Material (Civil) - Plant Wide	6,267	3,015	135	461	0	0	9,878
3	Bulk Material (Electrical) - Plant Wide	3,578	4,449	4,608	2	0	0	12,637
3	Bulk Material (Piping & Instrumentation) - Plant Wide	37	108	19	0	0	0	164
3	Commissioning - General	38,077	61,336	68,644	72,948	63,420	(2,146)	302,279
3	Project Operations - General	3,756	3,585	3,711	3,891	2,421	1,610	18,974
<b>Total</b>		<b>977,289</b>	<b>847,927</b>	<b>720,941</b>	<b>581,050</b>	<b>412,055</b>	<b>254,310</b>	<b>3,793,574</b>
<sup>1</sup> Negative numbers are Bechtel National, Inc., planned give backs. BOF = Balance of Facilities. HLW = High-Level Waste (Facility). LAB = Analytical Laboratory. LAW = Low-Activity Waste (Facility).		LOE = level of effort. ORP = U.S. Department of Energy, Office of River Protection. PBS = project baseline summary. PT = Pretreatment (Facility). SS = shared services.						