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15-AMB-0014

JAN 27 2015

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Addressees:

COMPLETION OF THE 2015 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT – FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (TRI-PARTY AGREEMENT) MILESTONE M-036-01E

This letter transmits the 2015 Hanford Lifecycle Scope, Schedule and Cost Report, DOE/RL-2014-11, Revision 0 (2015 Lifecycle Report), which completes Milestone M-036-01E. This transmittal of the 2015 Lifecycle Report is provided in accordance with Tri-Party Agreement Milestone M-036-01E, "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 2015 Lifecycle Report will be available on the Hanford.gov Website (www.hanford.gov) to streamline distribution and achieve Paperwork Reduction Act objectives.

If you have any questions, please contact me, or your staff may contact Gregory A. Jones, Assistant Manager for Business and Financial Operations, at (509) 372-8977.

Sincerely,

Stacy Charboneau

Stacy Charboneau
Manager

AMB:SLK

Attachment

cc: See page 2

cc w/attach:
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Administrative Record, H6-08 (M-036)
Environmental Portal, A3-01

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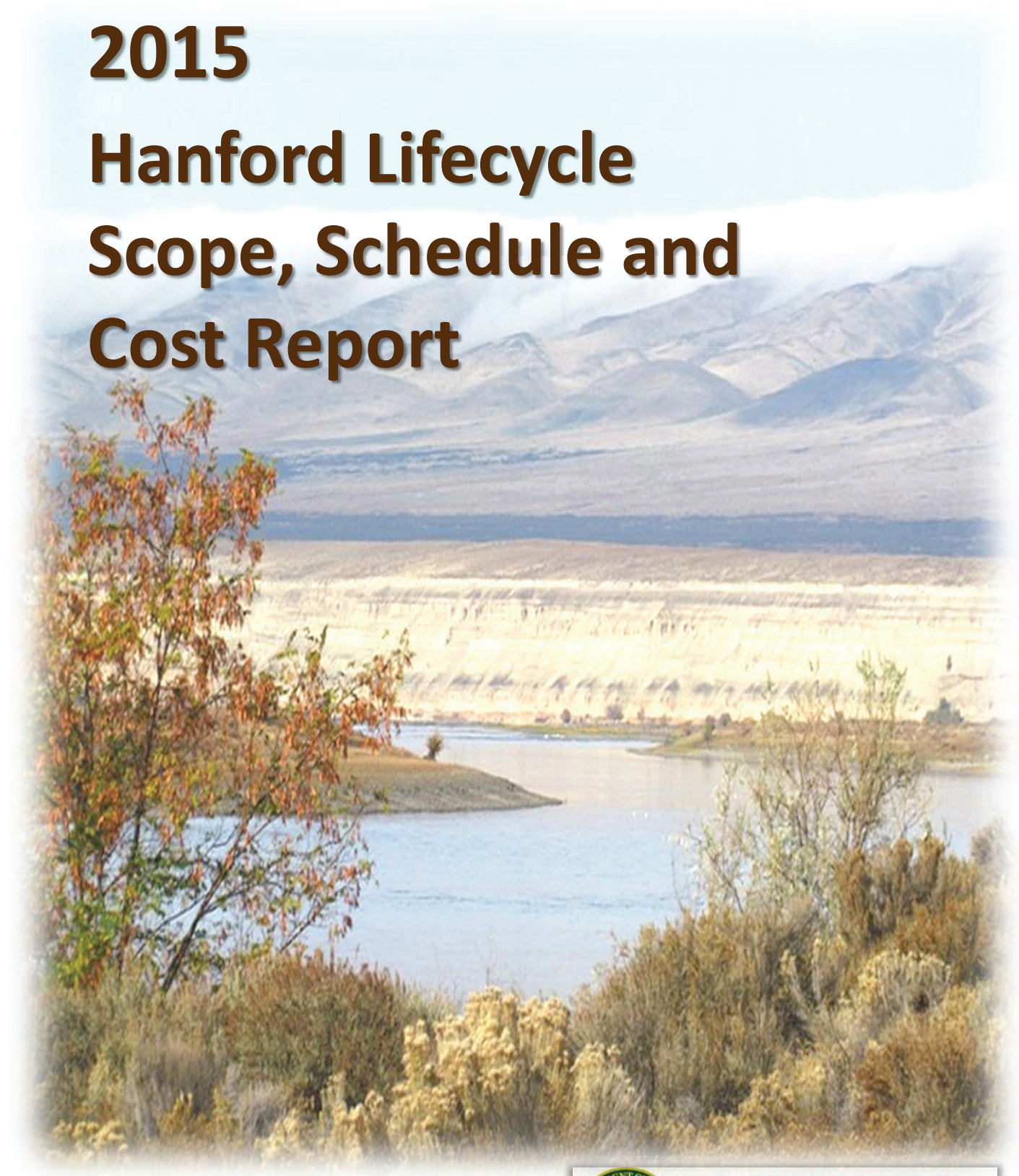
DOE/RL-2014-11
Revision 0

2015 Hanford Lifecycle Scope, Schedule and Cost Report



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U.S. DEPARTMENT OF ENERGY

DOE/RL-2014-11
Revision 0

2015 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT

Date Published
December 2014

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

U.S. DEPARTMENT OF ENERGY | Richland Operations Office

P.O. Box 550, MS A7-75
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APPROVED
By Janis D. Aardal at 10:32 am, Dec 11, 2014

Release Approval Date

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EXECUTIVE SUMMARY

Purpose

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

The LCR is prepared and submitted by DOE to the U.S. Environmental Protection Agency (EPA) and 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.

The LCR 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 LCR supports continued discussions with EPA and Ecology on how and when RL and 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* (42 USC 9601) or *Resource Conservation and Recovery Act of 1976* (42 USC 6901) document. This report does not substitute for, nor preempt, the cleanup decision processes as set forth in the following:

- *Hanford Federal Facility Agreement and Consent Order*[1] (commonly referred to as the Tri-Party Agreement or TPA)
- The Consent Decree in *State of Washington v. Department of Energy*, Case No 08-5085-FVS (E.D. Wa. October 25, 2010) (DOE and Ecology, 2010)
- Other legal requirements.

Background

On October 25, 2010[2], DOE, EPA, and Ecology (Tri-Party agencies) agreed to modify the TPA to incorporate a new milestone, M-036-01, requiring annual submittal of a LCR. The LCR reflects all actions necessary for DOE to meet all applicable environmental obligations.

The 2015 LCR is the fifth version and information reflects scope, schedule and cost status that is current as of August 31, 2014 (exceptions, such as the ORP last certified baseline (2009), are noted in the relevant sections of the LCR). Changes to cleanup obligations and related costs that have occurred after this date are noted in Section 1.5 and will be incorporated into future reports.

Public Involvement Process

The Tri-Party agencies encourage and support public participation, and believe it is essential to the cleanup process (Ecology et al. 2012, *Hanford Public Involvement Plan*).

The ORP planning case in this LCR is the same as that presented in previous LCRs, based on the *River Protection Project System Plan* (ORP-11242, Rev. 4) in order to remain consistent with ORP's last certified baseline and approved baseline change request. ORP expects to update the cost and schedule planning case in the LCR when a new baseline is approved and in place.

[1] Ecology et al. 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.

[2] M-036-01 was negotiated as part of broader negotiations that occurred between the parties, culminating in the above-referenced Consent Decree and a package of TPA modifications, all of which became effective when the Consent Decree was signed and entered into Federal District Court on October 25, 2010.

The Tri-Party agencies will make the 2015 LCR available to all interested parties on the DOE website at www.hanford.gov. Feedback regarding the 2015 LCR will be considered as future reports are developed. Feedback can be emailed until April 30, 2015, to lcssc@rl.gov.

Milestone Requirements

TPA M-036-01 requires that the LCR include all monitoring and related actions necessary to complete cleanup, and that it takes critical resource availability and the practical limits of project acceleration into consideration. Cost and schedule information in the LCR 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 explain the preparation of the LCR, including existing cleanup decisions, future cleanup actions, and detailed cost and schedule information.

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, which is located geographically within the Central Plateau. The cleanup also includes Mission Support activities that provide essential infrastructure and services to Hanford cleanup efforts or contractors.

Hanford's remaining active 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)2015 to FY2060, and LTS extends through FY2090. 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. The Federal Government plans on having a presence at Hanford well beyond FY2090.

This report presents RL and ORP configuration-controlled planning cases. The ORP planning case is the same as that presented in previous LCRs, and cost and schedule information are based on the *River Protection Project System Plan* (ORP-11242, Rev. 4) in order to remain consistent with ORP's last certified baseline and approved baseline change request, which is the current technical baseline for ORP. ORP expects to update the cost and schedule planning case in the LCR when a new baseline is approved and in place.

The Hanford remaining estimated cleanup costs[3] total approximately $110.2 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. Table ES-1 provides a summary of total costs by PBS.

The 2015 LCR total cost estimate is about $0.9 billion less than the costs for the same remaining work in the 2014 LCR. The difference is primarily due to refined estimates for RL work and LTS costs.

Remaining estimated cleanup costs do not include upper bound cost estimates prepared for selected future cleanup actions in prior LCRs. These costs are provided in Appendix B, Table B-5.

Cost Estimate Alternative Analyses for Selected Cleanup Actions

The Tri-Party agencies reviewed the alternative analyses included in the 2011, 2012 and 2013 LCRs, the level of effort required to conduct those analyses, and the benefits and insights gained from those analyses. After considering the remaining cleanup actions to be analyzed (Appendix B, Table B-6), the timing of anticipated regulatory decisions, the potential benefits and the effort required to conduct the analyses, the Tri-Party agencies agreed the 2015 LCR would not include an alternative analysis. Similar studies are performed elsewhere as required by other regulatory processes.

[3] The expression "cleanup costs" is used to represent the costs for those remaining actions that are necessary for DOE to fully meet all applicable environmental obligations and complete the Hanford Site cleanup mission.

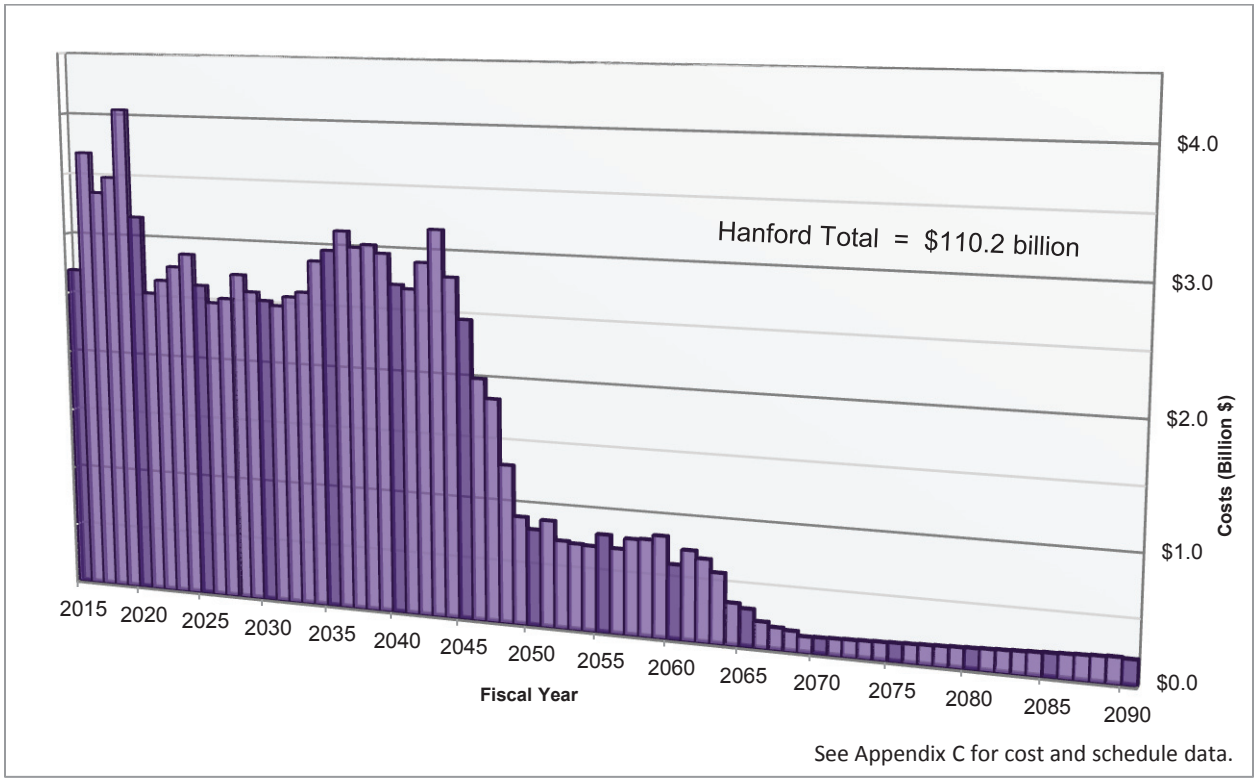

Figure ES-1. Hanford Site Remaining Estimated Cleanup Costs by Fiscal Year (includes both RL and ORP).

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

Project Work Scope	Estimated Cleanup Costs[1] (Billion $)
NM Stabilization and Disposition – PFP (PBS RL-0011)	$0.4 - $0.6
SNF Stabilization and Disposition (PBS RL-0012)	$0.5
Solid Waste Stabilization and Disposition - 200 Area (PBS RL-0013C)	$7.5 - $7.8
Safeguards and Security (PBS RL-0020)	$3.6
Soil and Water Remediation - Groundwater/Vadose Zone (PBS RL-0030)	$8.4 - $8.9
Nuclear Facility D&D - Remainder of Hanford (PBS RL-0040)	$14.3 - $18.0
Infrastructure and Services (PBS RL-0040)	$3.9 - $4.0
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)	$0.9 - $1.0
Richland Community and Regulatory Support (PBS RL-0100)	$1.2
Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014)	$54.4
Major Construction - Waste Treatment Plant (PBS ORP-0060)	$2.2
Hanford Site Total Remaining Estimated Cleanup Costs	**$98.7 - $103.5**
Long-Term Stewardship (PBS RL-LTS)[2]	$4.8
Final Reactor Disposition[2]	$1.9
DOE-Office of Environmental Management Total Remaining Estimated Cleanup Costs	**$105.4 - $110.2**

[1] 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 C for details.
[2] Shown separate to align with DOE-Headquarters fund source accounting.

D&D = decontamination and decommissioning.
DOE = U.S. Department of Energy.
NM = nuclear materials.
ORP = U.S. Department of Energy, Office of River Protection.
PBS = project baseline summary.
PFP = Plutonium Finishing Plant.
RL = U.S. Department of Energy, Richland Operations Office.
SNF = spent nuclear fuel.

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TERMS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CH	contact-handled
CSB	Canister Storage Building
CWC	Central Waste Complex
D&D	decontamination and decommission
D4	deactivation, decontamination, decommission, and demolition
DOE	U.S. Department of Energy
DQO	data quality objectives
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EM	U.S. Department of Energy, Office of Environmental Management
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
FFTF	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	*Hanford Federal Facility Agreement and Consent Order*
HLW	high-level waste
HQ	U.S. Department of Energy, Headquarters
HWMA	*Hazardous Waste Management Act* (Washington State)
IDF	Integrated Disposal Facility
IHLW	immobilized high-level waste
ISS	interim safe storage
LAW	low-activity waste
LCR	Lifecycle Report
LDR	Land Disposal Restrictions
LERF	Liquid Effluent Retention Facility
LM	Legacy Management
LTS	long-term stewardship
MLLW	mixed low-level waste
MSC	Mission Support Contract
NEPA	*National Environmental Policy Act*
NM	nuclear materials
NRDAR	Natural Resource Damage Assessment and Restoration
OMB	Office of Management and Budget
ORP	U.S. Department of Energy, Office of River Protection
OU	operable unit
PBS	project baseline summary
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PRC	Plateau Remediation Contract
PUREX	Plutonium Uranium Extraction (Plant)
RCCC	River Corridor Closure Contract
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction-Oxidation Facility (S Plant)
RH	remote-handled

RI/FS	remedial investigation/feasibility study
RL	U.S. Department of Energy, Richland Operations Office
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
TOC	Tank Operations Contract
TPA	Tri-Party Agreement
Tri-Party agencies	U.S. Department of Energy, U.S. Environmental Protection Agency, and Washington State Department of Ecology
TRU	transuranic
TRUM	transuranic mixed (waste)
TSD	treatment, storage, and disposal
USDOE	U.S. Department of Energy
WBS	work breakdown structure
WESF	Waste Encapsulation and Storage Facility
WIPP	Waste Isolation Pilot Plant
WRAP	Waste Receiving and Processing (Facility)
WTP	Waste Treatment and Immobilization Plant
WTPC	Waste Treatment and Immobilization Plant Contract

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) (Tri-Party agencies) 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). TPA M-036-01 requires that DOE submit a *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report [LCR]) to EPA and Ecology each year.

This document is the LCR for 2015. This report reflects scope, schedule and cost estimate information from fiscal year (FY)2015 to FY2090. The 2015 LCR information reflects scope, schedule and costs that are current as of August 31, 2014, and are configuration controlled. Changes that have occurred after this cutoff date are noted in Section 1.5 and will be incorporated into future reports. The costs shown have been escalated for inflation.

1.1 PURPOSE OF THE LIFECYCLE REPORT

To plan for the future and make the best use of each year's funding, the Tri-Party agencies work together and share information about the scope, schedule and cost of cleaning up the Hanford Site. TPA M-036-01 states that the LCR should serve:

> **"…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."**

TPA M-036-01 includes a number of requirements for the LCR. Table 1-1 provides the full text of the approved TPA M-036-01.

Detail regarding logic used by the Tri-Party agencies to meet the intent of the milestone can be found in Section 1.5 of the 2013 LCR (DOE/RL-2012-13).

1.2 PREPARING THE LIFECYCLE REPORT

DOE considers input from numerous affected parties, as discussed in the sections below.

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 Perces, 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 Hanford and protection of the land. DOE consults with the Tribal Nations regularly and will continue to update relevant LCR information about their values.

Table 1-1. 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.

1.2.2 Oregon Department of Energy

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

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 cleanup issues. The primary mission of the HAB is to provide informed recommendations and advice to the Tri-Party agencies on selected major policy issues related to cleanup. The HAB is a DOE Office of Environmental Management (EM) Site-Specific Advisory Board, a stakeholder board that provides DOE's Assistant Secretary for EM and designees with independent advice, information, and recommendations on issues affecting the EM program at Hanford.

The HAB recommended a similar approach in 2009, to that of the Consent Decree, that DOE prepare information similar to an LCR. HAB Consensus Advice No. 223, "Lifecycle Cost and Schedule Report of the Proposed Consent Decree and the Tri-Party Agreement (TPA) Modifications," was issued November 6, 2009; HAB Consensus Advice No. 252 was issued November 4, 2011; HAB Consensus Advice No. 267 was issued June 7, 2013; and HAB Consensus Advice No. 276 was issued June 5, 2014.

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

1.3 HANFORD CLEANUP OVERVIEW

The 586-square-mile Hanford Site is located along the Columbia River in southeastern Washington state (Figure 1-1). Beginning in the 1940s with the Manhattan Project, Hanford 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.

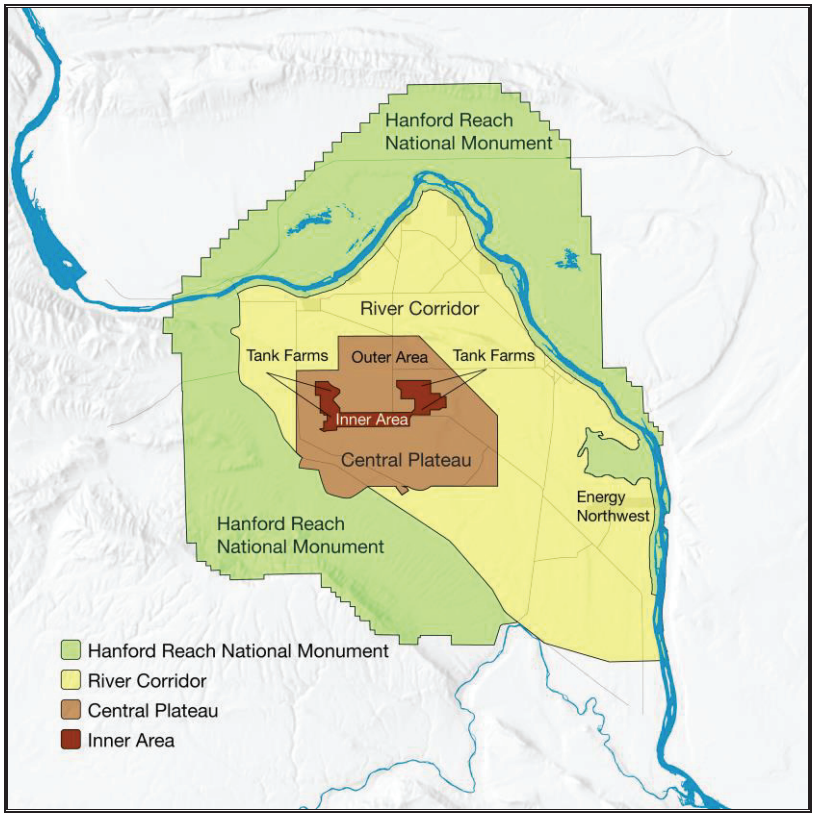

Figure 1-1. Hanford Site Map Showing Principal Areas Designated for Cleanup.

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

1.3.1 Hanford Cleanup Goals

The overarching goals for cleanup are noted in Table 1-2. These goals embody more than 20 years of dialogue among the Tri-Party agencies, Tribal Nations, State of Oregon, stakeholders, and the public. The goals carry forward key values captured in earlier forums such as the Hanford Future Site Uses Working Group, the Tank Waste Task Force, Hanford Summits, and HAB Exposure Scenario Workshops, as well as more than 270 advice letters issued by the HAB (http://www.hanford.gov/page.cfm/hab). These goals help guide all aspects of 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 that flows through the Hanford Site is known as the Hanford Reach and 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 wellbeing 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.[1]

Goals for Cleanup	
Goal 1:	Protect the Columbia River.
Goal 2:	Restore groundwater to its beneficial use to protect human health, the environment, and the Columbia River.
Goal 3:	Clean up River Corridor waste sites and facilities to: • Protect groundwater and the Columbia River • Shrink the active cleanup footprint to the Central Plateau • Support anticipated future land uses.
Goal 4:	Clean up Central Plateau waste sites and facilities to: • Protect groundwater and the Columbia River • Minimize the footprint of areas requiring long-term waste management activities • Support anticipated future land uses.
Goal 5:	Safely mitigate and remove the threat of Hanford's tank waste: • Safely store tank waste until it is retrieved for treatment • Safely and effectively immobilize tank waste • Close tank farms and mitigate the impacts from past releases of tank waste to the ground.
Goal 6:	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.
Goal 7:	Consolidate waste treatment, storage, and disposal operations on the Central Plateau.
Goal 8:	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.

[1] DOE/RL-2009-10, 2013, *Hanford Site Cleanup Completion Framework*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

1.3.2 Hanford Cleanup and Management Areas

Hanford cleanup is overseen at DOE Headquarters (HQ) by the EM, and is directed and implemented locally by two DOE field offices: the Richland Operations Office (RL) and the Office of River Protection

(ORP).[4] 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. 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 Waste Treatment and Immobilization Plant (WTP) to process and immobilize the tank waste in a process known as vitrification; and associated tank farm operation, maintenance, engineering, and construction activities.

Hanford cleanup focuses on two broad geographic areas: The River Corridor and the Central Plateau. Tank Waste Cleanup is a separate cleanup component located in the Central Plateau. The River Corridor includes approximately 220 square miles of the Hanford Site, encompassing the 100 and 300 Areas 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 soil and groundwater. The 300 Area, located north of the city of Richland, contained fuel fabrication facilities, nuclear research and development facilities, and associated solid and liquid waste disposal sites that have contaminated soil and groundwater. The non-operational areas include substantial land area adjacent to the 100 and 300 Areas and extending to the Central Plateau that was never used for production operations.

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 it 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 removes 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 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 (LTS) activities to ensure protection of human health and the environment.

The Central Plateau consists of about 75 square miles in the central portion of the Hanford Site and includes an Inner Area (~10 square miles) and Outer Area (~65 square miles). The Inner Area contains 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, the environment and 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.

[4] 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.

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 73 square miles of contaminated groundwater across the site. 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 limit the area used for long-term waste management activities that require institutional controls to ensure protection of human health and the environment.

Tank Waste Cleanup focuses on retrieving and treating Hanford's tank waste, and closing or remediating the tank farms. The tank farms comprise 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, in total, contain approximately 56 million gallons of chemically hazardous radioactive waste from past processing operations. Sixty-seven of the 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, 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 1-1). 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 Hanford Reach 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's only operating commercial nuclear power reactor, the Columbia Generating Station. These operations are not part of cleanup at Hanford and are not included in the LCR.

1.4 CLEANUP DECISIONS AND ALTERNATIVES

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 Tri-Party 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 Tri-Party 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 Tri-Party agencies have determined when T Plant will not be needed to support Hanford cleanup.

The LCR is required to include scope, schedule and cost information for the entire Hanford Site regardless of whether final cleanup decisions have been made. Where cleanup decisions are not known or only partially defined (i.e., not final), the LCR 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 bases introduce several concepts that are not fully defined in TPA 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 determining 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 A describes the multiple kinds of cleanup decisions made at Hanford and identifies decisions that are considered to be final for the site. Appendix B describes future actions required to complete Hanford cleanup and presents information on plausible alternatives for future cleanup actions. Table 1-3 lists the cleanup actions for which final cleanup decisions have not yet been made.

Table 1-3. Cleanup Actions for which Final Decisions Have Not Been Made. (2 pages)

River Corridor Cleanup Actions	
• Disposition N Reactor • Disposition 100 Area K West Basin • Remediate 100 Area Contaminated Soil Sites • Restore 100-BC-5 Groundwater OU to Beneficial Use • Restore 100-KR-4 Groundwater OU to Beneficial Use	• Restore 100-NR-2 Groundwater OU to Beneficial Use • Restore 100-HR-3 Groundwater OU to Beneficial Use • Disposition 300 Area Facilities Retained by PNNL • Disposition 100 Area former Orchard Contaminated Soil Sites (100-OL-1 OU)
Central Plateau Cleanup Actions	
• Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU) • Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, 200-CW-3 OUs) • Disposition Below-Grade Portions of Plutonium Finishing Plant • Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU) • Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU) • Disposition PUREX Storage Tunnels (200-CP-1 OU) • Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU) • Disposition T Plant Canyon Building/Associated Waste Sites • Disposition Cesium/Strontium Capsules • Remediate 200-SW-1 OU	• Disposition Remaining Waste Treatment, Storage, and Disposal Facilities • Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks (200-IS-1 OU) • Remediate Land Disposal Units (200-SW-2 OU) • Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU) • Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU) • Disposition FFTF Complex • Disposition Remaining Buildings and Facilities within FFTF Complex • Disposition Remaining Inner Area Buildings and Facilities • Remediate Contaminated Deep Vadose Zone (200-DV-1 OU) • Restore 200 West Groundwater (200-UP-1 OU) to Beneficial Use

Table 1-3. Cleanup Actions for which Final Decisions Have Not Been Made. (2 pages)

• Disposition Remaining Liquid Waste Disposal Facilities	• Restore 200 East Groundwater (200-PO-1/200-BP-5 OUs) to Beneficial Use
Tank Waste Cleanup Actions	
• Tank Retrieval and Single-Shell Tank Farm Closure • Tank Waste Treatment • Secondary Waste Treatment	• Double-Shell Tank Closure • Waste Treatment and Immobilization Plant Closure
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 LCR includes many assumptions about future cleanup actions and decisions, considers the ranges of plausible alternatives for specific cleanup actions, and what would be reasonable upper bounds for the ranges of alternatives. 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 Tri-Party agencies have agreed the LCR should consider developing in-depth information about some of the future cleanup actions for which final decisions have not been made. The Tri-Party agencies identified approximately 36 cleanup actions for which final cleanup decisions are still needed (Table 1-3), and Appendix B (Table B-6) proposes a schedule for preparing cost estimate alternative analyses for these cleanup actions. The Tri-Party agencies reviewed the alternative analyses included in the 2011, 2012 and 2013 LCRs, the level of effort required to conduct those analyses and the benefits and insights gained from those analyses. After considering the remaining cleanup actions to be analyzed (Appendix B, Table B-6), the timing of anticipated regulatory decisions, the potential benefits and the effort required to conduct the analyses, the Tri-Party agencies agreed that the 2015 LCR would not include an alternative analysis.

1.5 CHANGES FROM PREVIOUS REPORT

1.5.1 Incorporated Changes

Written feedback related to this LCR and prior LCRs was considered when preparing this report. Comments received on the 2014 LCR are available on the DOE website at www.hanford.gov.

Significant changes made in the 2015 LCR include the following:

- Updated cost and schedule planning basis for each project baseline summary (PBS) to incorporate updated scope, regulatory changes, and contract changes so this information reflects the RL and ORP configuration-controlled planning cases that are current as of August 31, 2014. Significant PBS changes from the 2014 LCR for the same remaining work include the following:
  - RL-0012 SNF Stabilization and Disposition – $113 million increase due to increased operations costs and schedule.
  - RL-0013C Solid Waste Stabilization and Disposition–200 Area - $621 million increase due to increased scope in Sludge Disposition, T-Plant operations, and redistribution of Site-wide Services between RL-0013C and RL-0040 Infrastructure and Services.
  - RL-0020 Safeguards and Security - $470 million increase due to refined estimates.
  - RL-0030 Soil and Water Remediation–Groundwater/Vadose Zone – $432 million increase due to refined estimates for 200-ZP-1 Operable Unit remedial action, Integration and Assessments and Groundwater Monitoring and Performance Assessments.
  - RL-0040 Nuclear Facility D&D–Remainder of Hanford - $1.3 billion increase due to incorporation of the 200-PW-1/-3/-6 and 200-CW-5 operable units record of decision (ROD) remedies, refined estimates for planned out year remedies, and redistribution of Site-wide Services.

- RL-0040 Infrastructure and Services - $2.8 billion decrease due to revised estimates for infrastructure services over the cleanup lifecycle and redistribution of Site-wide Services between RL-0040 Infrastructure and Services and RL-0013C.
- RL-0041 Nuclear Facility D&D–River Corridor Closure Project - $90 million increase due to redistribution of Site-wide Services between RL-0041 and RL-0040 Infrastructure and Services.
- RL-0042 Nuclear Facility D&D–Fast Flux Test Facility Project - $240 million increase due to revision to risk posture and redistribution of Site-wide Services between RL-0042 and RL-0040 Infrastructure and Services.
- RL-0100 Richland Community and Regulatory Support - $788 million decrease due to revised estimates for support activities based on recent actual costs.
- RL-LTS Long-Term Stewardship - $570 million decrease due to refined estimates and liquid waste efficiencies.
- The Site-wide Services work element was renamed Site-wide Services and Other Distributed Costs; this work element includes costs for the previous LCR work elements RL Directed Activities, Usage-Based Services Distributions, and Usage-Based Services, General and Administrative, and Direct Distributions.

- In response to feedback, tables of key TPA milestones are included as part of the PBS scope description.
- The Tank Waste cleanup cost and/or schedule uncertainty has been clarified in Section 5.3 to address highly probable risks that an offsite geologic repository will not be available to accept immobilized high-level waste canisters from the Hanford Site starting in April 2023 and construction of additional interim high-level waste storage on the Hanford Site if the repository is delayed in opening or does not open.
- Reduced the size of the report and made it easier to read. Schedule figures in previous LCRs were removed with concurrence of the Tri-Party agencies because this information is provided in other LCR figures and tables.

1.5.2 Future Report Changes

The scope, schedule and cost information presented in this LCR is current as of August 31, 2014. This section summarizes regulatory decisions and other changes that may have occurred or been completed after the August 31, 2014 cutoff date. Other pending changes that are not reflected in this LCR but will be incorporated in future reports also are noted.

The report presents the RL and ORP current configuration-controlled planning cases. The ORP planning case is the same as that presented in previous LCRs and is the current technical baseline for ORP. ORP expects to update the cost and schedule planning case in the LCR when a new baseline is approved and in place.

The Tri-Party agencies discussed revisions to various TPA milestone due dates. Approved revised milestones that have been incorporated into the planning cases are presented in this LCR. Any future changes to the planning cases will be included in future reports.

Decision documents recently have been released including the 300 Area ROD, the first in a series of RODs pursuant to the *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391, December 2013), and the 100-F and Isolated Unit Area ROD. The scope, schedule and costs of these decisions will be integrated in future LCRs.

1.6 LIFECYCLE REPORT AND HANFORD BUDGET SCHEDULE

In developing the LCR milestone, the Tri-Party 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 1-2). The cycle begins when DOE field offices receive fiscal year budget planning guidance from the President of the United States, 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 HQ and OMB for review, and then the budgets 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.

As shown in Figure 1-2, the Tri-Party agencies scheduled the LCR to be completed in time to support the field offices' budget planning process each year. Each LCR will have the latest information available when planning begins for the next 2-year budget cycle. The period of time for developing the LCR each year overlaps with the funding approval process for the current budget execution year and with the HQ and OMB review of funding requests for the next fiscal year.

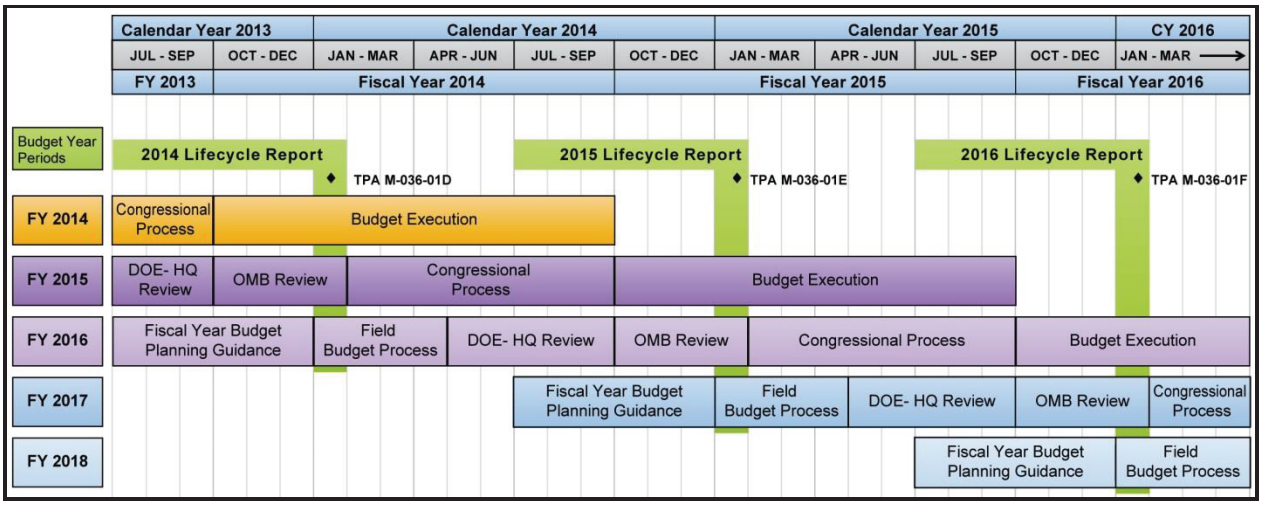

Figure 1-2. Relationship Between DOE Budget Planning and LCR Schedule.

1.7 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 LCR, particularly where information about project costs is presented.

1.7.1 Annual Budget Formulation Process

Each year, DOE formulates budget requests for Congressional appropriations. The planning cycle begins between December and January, nearly 2 years before the start of a budgeted fiscal year. The process begins with budget formulation where funding requirements are analyzed, prioritized, requested and received. Budget requests are submitted by the DOE field offices to HQ in early spring and continue 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.** This is the first phase of DOE's annual budget formulation process. RL and ORP submit field budget data to HQ for use in the corporate review budget process.
2. **HQ Corporate Review Budget Process.** The 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.** This 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.** This process determines DOE's final appropriations for the next Federal fiscal year, based on policy determinations in conjunction with Federal budget deliberations by Congress.

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. Sometimes this can result in cost and schedule changes to reconfigure activities resulting from budget or other constraints. DOE 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. DOE's process for defining and managing projects and their baseline summaries are described below.

1.7.2 U.S. Department of Energy Project Formulation Process

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

Project Baseline Summary (PBS). EM projects that have common attributes, such as 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, as well as other information; e.g., 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; e.g., 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 essential for project management. Cost and schedule uncertainty are included in the development of Total Project Cost and the approved DOE planning case and are reserved to accommodate additional work scope related to risk events that may occur from conditions and events that were not known during project planning and other unanticipated changes or uncertainties. This includes estimates for 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 C tables.

Uncertainty addresses 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 time-related risk impacts and other 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 the scope of the planning case. Uncertainty is calculated based on DOE risks that 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 used in calculating 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. Stochastic modeling is used to develop a probability distribution and to calculate project cost and schedule uncertainty.

Escalation. In a budget request, cost is represented in escalated dollars. Escalation is the provision in a cost estimate for increases in 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. An escalation rate between 2 and 4 percent per year is used.

1.8 SCOPE, SCHEDULE AND COST FOR HANFORD CLEANUP

RL and 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 Hanford. Hanford cleanup encompasses 12 PBSs; 10 managed by RL, and 2 managed by ORP as shown in Table 1-4 and discussed further in other chapters of this LCR.

Table 1-4. Hanford Site Cleanup Project Baseline Summary. (2 pages)

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
TBD	Final Reactor Disposition
ORP-0014	Radioactive Liquid Tank Waste Stabilization and Disposition
ORP-0060	Major Construction–Waste Treatment Plant

Table 1-4. Hanford Site Cleanup Project Baseline Summary. (2 pages)

PBS	Title
D&D = decontamination and decommission. LTS = Long-Term Stewardship. NM = nuclear materials. ORP = U.S. Department of Energy, Office of River Protection.	PBS = project baseline summary. PFP = Plutonium Finishing Plant. RL = U.S. Department of Energy, Richland Operations Office. SNF = spent nuclear fuel. TBD = to be determined.

Table 1-5 shows Level 2 and Level 3 work breakdown associated with a single PBS. This presents a typical EM cleanup project down to a third tier of planning detail. Most work at Hanford is similarly broken down to at least Level 3.

Table 1-5. Example Cleanup Project Baseline Summary and Work Breakdown to Level 3.

PBS (Level 1)	**RL-0012 SNF Stabilization and Disposition**
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.

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

Table 1-6. Example of a Level 6 Work Breakdown Structure.

PBS (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 decommission. PBS = project baseline summary 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 cleanup. Out-year planning estimates are not as well developed as near-term planning (typically no further than Level 3 or Level 4).

Cost information will be updated each year to reflect work completion, recent decisions, and other changes affecting the lifecycle scope (e.g., upgrades or infrastructure modernization to support major projects). Chapters 3.0 through 6.0 summarize information at PBS Level 2, including work breakdown for

each PBS, descriptions of the lifecycle work scope and associated work elements, and schedules for completing the work elements.

Each chapter provides estimated cleanup costs for corresponding work elements, and includes costs that are not work elements directly performed under the respective PBS; e.g., Site-wide Services is not a work element directly performed in each PBS, but an estimated support cost for the entire PBS lifecycle (see Section 6.3.2).

Appendix C provides more detail at Level 3 for near-term work and at Level 2 for all Hanford cleanup.

2.0 HANFORD LIFECYCLE SUMMARY

This chapter presents the overall Hanford cleanup scope, schedule and cost. Chapters 3.0 through 6.0 and Appendix C present additional details on the PBSs that cover the lifecycle cleanup work scope in the three major cleanup components and Mission Support.

2.1 HANFORD SITE LIFECYCLE SCOPE

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). Cleanup also includes Mission Support activities that provide key infrastructure and services for Hanford. Cleanup is a complex task that involves multiple contractors performing discrete, yet interdependent, scopes of work. The prime contract related to each PBS is noted in Table 2-1. The scope of cleanup work is broken down into a series of PBSs. Table 2-1 describes the general scope of each PBS and the chapter/section each PBS is addressed.

Table 2-1. Hanford Project Baseline Summaries (PBS)–RL and ORP Contractors. (2 pages)

LCR Section	PBS	Official Title	Alternate Titles	General Scope	Prime Contract
CHAPTER 3.0 – RIVER CORRIDOR CLEANUP					
River Corridor (Section 3.1)	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).	RCCC
				Includes 105-KW SNF Basin deactivation and removal work scope that was transferred from RL-0012 in FY2012.	PRC
River Corridor (Section 3.2)	RL-0012	SNF Stabilization and Disposition	K Basins Closure Project	Removal of the K Basin sludge, found SNF and fuel scrap.	PRC
River Corridor (Section 3.3)	TBD	TBD	Final Reactor Disposition	Disposition of 100 Area production reactors (excluding B Reactor).	TBD
CHAPTER 4.0 – CENTRAL PLATEAU CLEANUP					
Central Plateau (Section 4.1)	RL-0011	NM Stabilization and Disposition–PFP	PFP Closure Project	Demolition of aboveground facilities and structures at PFP.	PRC
Central Plateau (Section 4.2)	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.	PRC
Central Plateau (Section 4.3) and Mission Support (Section 6.3)	RL-0040	Nuclear Facility D&D–Remainder of Hanford	This PBS has two parts: 1. RL-0040.01.1 Central Plateau Remediation	1. Cleanup of the Central Plateau waste sites and facilities, including canyon facilities.	PRC
			2. RL-0040.01.2 Infrastructure and Services or Mission Support Site-wide Services	2. Management, repair, and capital upgrades to infrastructure and other site-wide services.	MSC

Table 2-1. Hanford Project Baseline Summaries (PBS)–RL and ORP Contractors. (2 pages)

LCR Section	PBS	Official Title	Alternate Titles	General Scope	Prime Contract
Central Plateau (Section 4.4)	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.	PRC
Central Plateau (Section 4.5)	RL-0013C	Solid Waste Stabilization and Disposition–200 Area	Solid and Liquid Waste Disposition Project	Waste management operations including treatment, storage, and disposal of Hanford Site waste streams and offsite wastes[1].	PRC
CHAPTER 5.0 – TANK WASTE CLEANUP					
Tank Waste Cleanup (Section 5.1)	ORP-0014	Radioactive Liquid Tank Waste Stabilization and Disposition	None	Operations, retrieval, treatment, and closure of the single-shell and double-shell tanks.	TOC
Tank Waste Cleanup (Section 5.2)	ORP-0060	Major Construction–Waste Treatment Plant	None	Construction of the Waste Treatment Plant.	WTPC
CHAPTER 6.0 – MISSION SUPPORT					
Mission Support (Section 6.1)	RL-0020	Safeguards and Security	None	Protection of the Hanford Site, special materials, resources, and workers.	MSC
Mission Support (Section 6.2)	RL-0100	Richland Community and Regulatory Support	None	Support for community and regulatory interaction, including Hanford Advisory Board, Natural Resource Trustee Council, Oregon Department of Energy, and Washington State Department of Ecology.	Various
Mission Support (Section 6.4)	RL-LTS	Long-Term Stewardship (LTS)	Post-cleanup LTS [2]	Infrastructure support, surveillance and maintenance, community support, and management activities following completion of cleanup activities.	TBD

[1] Waste from other sites will not be received until the Waste Treatment and Immobilization Plant is operational.

[2] See Section 6.3.2 for the current ongoing LTS program.

D&D = decontamination and decommission.
LCR = Lifecycle Report.
LTS = long-term stewardship.
MSC = Mission Support Contract.
NM = nuclear materials.
ORP = U.S. Department of Energy, Office of River Protection.
PBS = project baseline summary.
PFP = Plutonium Finishing Plant.
PRC = Plateau Remediation Contract.
RCCC = River Corridor Closure Contract.
RL = U.S. Department of Energy, Richland Operations Office.
SNF = spent nuclear fuel.
TBD = to be determined
TOC = Tank Operations Contract.
WTPC = Waste Treatment and Immobilization Plant Contract.

2.2 HANFORD CLEANUP SCHEDULE

The remaining cleanup schedule covers activities for waste cleanup and waste management, leading to transition of portions of the Hanford Site to LTS. Chapters 3.0 through 6.0 and Appendix C present additional schedule details for the River Corridor, Central Plateau, Tank Waste, and Mission Support activities.

To support cleanup, RL has responsibility for Mission Support activities related to safeguards and security, community and regulatory support, and Hanford Site infrastructure and site-wide services. These activities align with the cleanup through FY2060. RL also has planned for an LTS period that runs from FY2060 through FY2090 as part of Mission Support.

Figure 2-1 shows River Corridor Cleanup complete by FY2024, Final Reactor Disposition complete by FY2068, Tank Waste Cleanup complete by FY2050, and Central Plateau Cleanup complete by FY2065 (including schedule uncertainty).

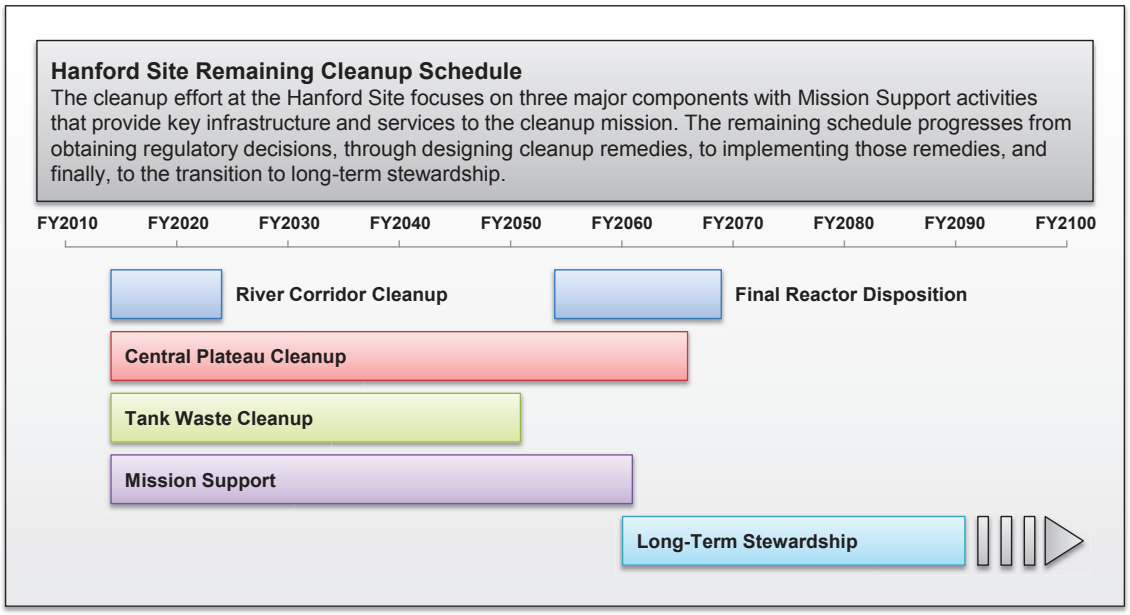

Figure 2-1. Hanford Site Remaining Cleanup Schedule.

2.3 HANFORD SITE ESTIMATED CLEANUP COSTS

The remaining cleanup costs[5] are estimated to be about $110.2 billion to complete the scope for the River Corridor, Final Reactor Disposition, Central Plateau, Tank Waste, Mission Support activities, and LTS. RL's scope accounts for about $53.6 billion of the total costs and ORP's scope accounts for about $56.6 billion. 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 2-2 summarizes the estimated remaining cleanup cost between RL and ORP. Figure 2-3 shows the remaining cleanup costs by year for RL and ORP. Figure 2-4 summarizes the estimated cleanup costs by RL and ORP PBSs. Table 2-2 provides a summary of total estimated cleanup costs for each PBS.

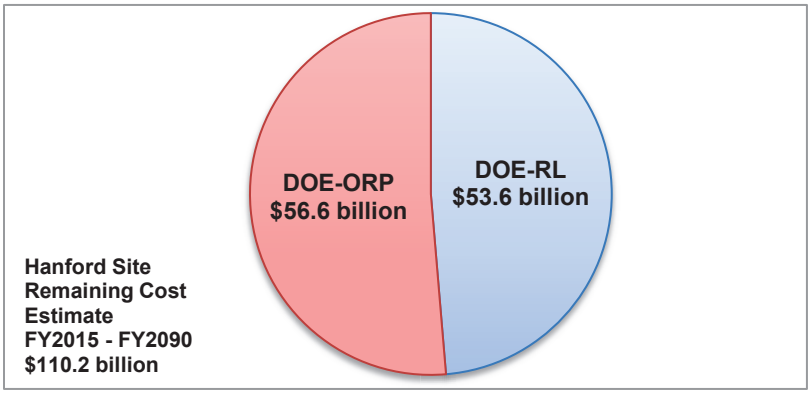

Figure 2-2. Hanford Site Estimated Cleanup Cost Distribution by DOE Field Office.

[5] The expression "cleanup costs" is used to represent the costs for those remaining actions that are necessary for DOE to fully meet all applicable environmental obligations and complete the Hanford Site cleanup mission.

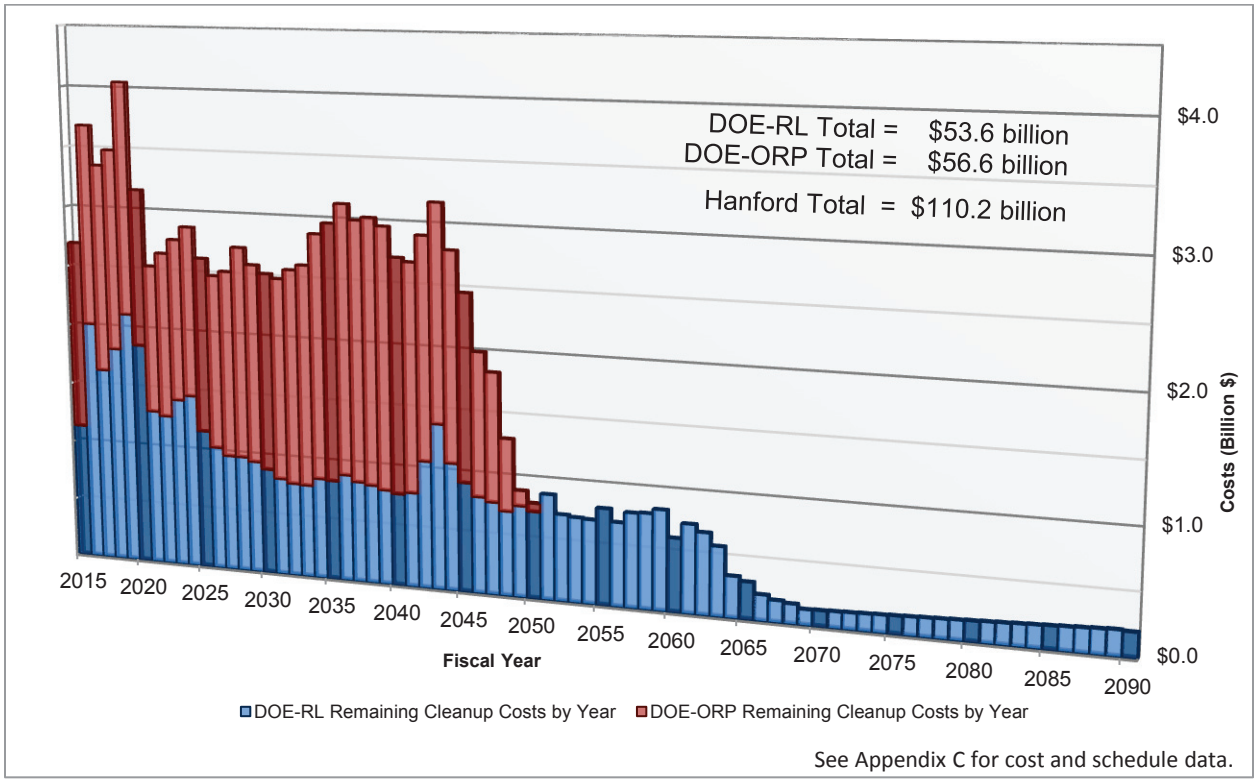

Figure 2-3. Hanford Site Remaining Cleanup Costs by Fiscal Year.

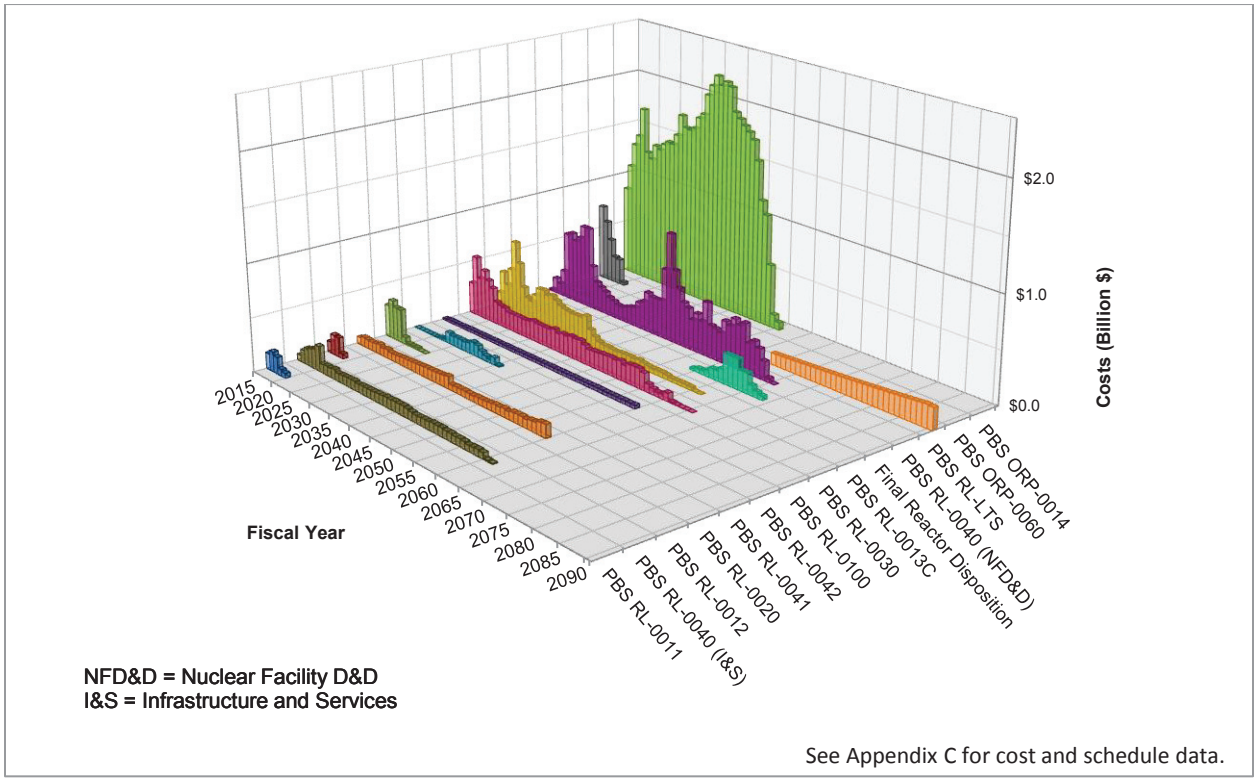

Figure 2-4. Hanford Site Remaining Cleanup Costs by Project Baseline Summary.

Table 2-2. Hanford Site Remaining Cleanup Cost Estimates by PBS.

Project Work Scope	Estimated Cleanup Costs[1] (Billion $)
RL Total Remaining Estimated Costs	**$48.8 - $53.6**
NM Stabilization and Disposition – PFP (PBS RL-0011)	$0.4 - $0.6
SNF Stabilization and Disposition (PBS RL-0012)	$0.5
Solid Waste Stabilization and Disposition - 200 Area (PBS RL-0013C)	$7.5 - $7.8
Safeguards and Security (PBS RL-0020)	$3.6
Soil and Water Remediation - Groundwater/Vadose Zone (PBS RL-0030)	$8.4 - $8.9
Nuclear Facility D&D - Remainder of Hanford (PBS RL-0040)	$14.3 - $18.0
Infrastructure and Services (PBS RL-0040)	$3.9 - $4.0
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)	$0.9 - $1.0
Richland Community and Regulatory Support (PBS RL-0100)	$1.2
Long-Term Stewardship (PBS RL-LTS)	$4.8
Final Reactor Disposition	$1.9
ORP Total Remaining Estimated Costs	**$56.6**
Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014)	$54.4
Major Construction – Waste Treatment Plant (PBS ORP-0060)	$2.2
Total Remaining Estimated Costs	**$105.4 - $110.2**

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

[1] 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 C for details.

D&D = decontamination and decommission.
LTS = long-term stewardship.
NM = nuclear materials.
ORP = U.S. Department of Energy, Office of River Protection.
PBS = project baseline summary.
PFP = Plutonium Finishing Plant.
RL = U.S. Department of Energy, Richland Operations Office.
SNF = spent nuclear fuel.

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3.0 RIVER CORRIDOR CLEANUP

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

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

The majority of the River Corridor Cleanup is on track for completion by FY2020. Final remedial activities (excluding final reactor disposition) may extend until FY2024. DOE manages the River Corridor Cleanup through two projects that are planned and funded under separate PBSs:

1. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) addresses 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 Environmental Restoration Disposal Facility (ERDF) located on the Central Plateau, which is the disposal location for the remediation waste from the River Corridor and other Hanford cleanup operations. Section 3.1 discusses the scope of this project.
2. SNF Stabilization and Disposition (PBS RL-0012) addresses 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 3.2 discusses the scope of this project.

Although currently not considered to be a project, Final Reactor Disposition will address cleanup of the 100 Area surplus production reactors. Section 3.3 discusses the scope of this activity.

Groundwater cleanup is ongoing in the River Corridor. 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. Groundwater associated with the River Corridor is discussed in the Central Plateau Cleanup in Section 4.2.

Cleanup is performed in accordance with interim and final RODs and action memoranda as listed in Appendix A and with key TPA milestones listed in Table 3-1. These TPA milestones provide the structure that the Tri-Party agencies have agreed to for Hanford priorities and scope sequencing.

Table 3-1. River Corridor Cleanup Key Tri-Party Agreement Milestones. (2 pages)

Milestone	Title	Compliance Date
Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041)		
M-016-00A	Complete all response actions for the 100 Areas, excluding K Area.	03/31/2017
M-016-00B	Complete all interim 300 Area remedial actions.	09/30/2018
M-016-00C	Complete all response actions for the 100-K Area.	12/31/2020
M-016-69	Complete all interim 300 Area remedial actions (300-FF-2 OU waste sites).	09/30/2015
M-016-143	Complete the interim response actions for the 100-K Area within the perimeter boundary and to the river for Phase 2 actions.	12/31/2015
M-089-00	Complete closure of mixed waste units in 324 Building Cells B and D.	TBD
M-093-00	Complete final disposal of 100 Areas surplus production reactor buildings.	TBD
M-093-27	Complete 105-KE and KW Reactor ISS.	12/31/2019
M-094-00	Complete disposition of 300 Area surplus facilities.	09/30/2018
M-016-178	Initiate Deactivation of 105-KW Fuel Storage Basin.	12/31/2015

Table 3-1. River Corridor Cleanup Key Tri-Party Agreement Milestones. (2 pages)

Milestone	Title	Compliance Date
M-016-181	Complete Deactivation, Demolition and Removal of 105-KW Fuel Storage Basin.	09/30/2019
M-016-186	Initiate Soil Remediation Under 105-KW Fuel Storage Basin.	12/31/2019
SNF Stabilization and Disposition (PBS RL-0012)		
M-016-173	Select K Basin sludge treatment and packaging technology and propose new interim sludge treatment and packaging milestones.	03/31/2015
M-016-176	Complete sludge removal from 105-KW Fuel Storage Basin.	12/31/2015

D&D = decontamination and decommissioning.
ISS = interim safe storage.
OU = operable unit.
PBS = project baseline summary.
TBD = to be determined.

3.1 NUCLEAR FACILITY D&D–RIVER CORRIDOR CLOSURE PROJECT (PBS RL-0041)

The Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) will clean up the areas of Hanford located in the Columbia River Corridor in accordance with existing RODs (see Appendix A). Anticipated land uses for the River Corridor are described in DOE/EIS-0222-F and in the pursuant ROD. The River Corridor Closure Project established the following cleanup objectives:

- Remediate waste sites.
- Deactivation, decontamination, decommission, and demolition (D4) of facilities.
- Place eight plutonium production reactors into ISS. Figure 3-1 and Figure 3-2 depict C Reactor before and after the ISS process. Table 3-2 provides the status of the reactors. Note B Reactor's status as part of the newly established Manhattan Project National Historical Park.
- Operate ERDF to support disposal of waste generated during D4, field remediation, ISS, and support to other Hanford 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.

Figure 3-1. C Reactor Before Interim Safe Storage.

Figure 3-2. C Reactor in Interim Safe Storage.

Table 3-2. Reactor Status.

Reactor	Status	Remaining Activity
B	Named National Historic Landmark by U.S. Department of Interior in 2008. Reactor open for escorted public tours.	On December 19, 2014, the Manhattan Project National Historical Park was authorized, which includes B Reactor as the world's first production reactor.
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.
KE	Fuel storage basin demolished; continued deactivation, decommissioning, and demolition activities in preparation for emplacement of safe storage enclosure.	Reactor ISS began in 2011 and is scheduled for completion by 2019; 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 is scheduled for completion by 2019; final disposition of reactor block.
N	Reactor placed in ISS.	Final end state of the reactor has not been determined.

ISS = interim safe storage.

Table 3-3 summarizes the scope for the Level 2 work elements.

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

Work Element	Scope Description
D4 Closure	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. 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). The D4 process includes obtaining regulatory approvals; characterizing 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 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 cleanup criteria are met, and the sites are backfilled and revegetated.
Field Remediation Closure	Includes performing CERCLA field remediation and closure of contaminated waste sites in the River Corridor (liquid waste disposal facilities, burial grounds, burn pits, disposal pits, unplanned release sites, and contaminated pipelines), including confirmatory sampling, remediation design, RTD activities, verification sampling, and closure documentation. RODs for the Field Remediation Closure work scope generally identify RTD as the preferred alternative (RODs are identified in Appendix A).
	In addition to RTD, sites were identified that require confirmatory sampling to determine the need for RTD. Following sampling, these sites become RTD sites or are closed as no-action sites. 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.

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

Work Element	Scope Description
Waste Operations	Includes the transportation, disposal, and treatment (if required) of waste from the River Corridor Cleanup activities, as well as from other Hanford 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.
End State/Final Closure	Includes preparing an integrated River Corridor work plan for a CERCLA baseline risk assessment; preparing a baseline risk assessment for 100 and 300 Areas; conducting a risk evaluation for River Corridor areas outside 100 and 300 Areas; conducting orphan site evaluations; conducting surface soil surveys; preparing remedial action reports that document 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 and turnover packages for the six geographic areas for transition to Hanford Long-Term Stewardship.
Mission Support/ General Support	Includes functional support and business operations necessary to achieve River Corridor Closure and field project objectives, 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.
Plateau Remediation Contract River Zone Environmental	Includes work remaining to complete 100-K Area remediation, demolition of K East Basin, disposition of K East and K West Reactors, and D4 of support structures. In K West Basin, near-term deactivation includes removal of containerized sludge and any found scrap/scrap fuel, and finally removal of the fuel basin.
Site Infrastructure & Utility/Logistics & Transportation (B Reactor)	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. After PBS RL-0041 ends, this scope will transfer to PBS RL-0040.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.3.2 for details. • Includes administrative and technical support, service assessment pool, and other activities. Details are provided in Table C-21. • Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-21. • Includes contractor's fee, pension, management reserve and Government & Administrative allocations.

CERCLA= *Comprehensive Environmental Response, Compensation, and Liability Act,* 42 USC 9601.
D4 = deactivation, decontamination, decommission, and demolition.
D&D = decontamination and decommission.
ERDF = Environmental Restoration Disposal Facility.
PBS = project baseline summary.
ROD = record of decision.
RTD = remove, treat, and dispose.
RL = U.S. Department of Energy, Richland Operations Office.

Figure 3-3 presents the remaining cleanup costs for PBS RL-0041 by fiscal year, and Figure 3-4 presents the remaining estimated costs by work element.

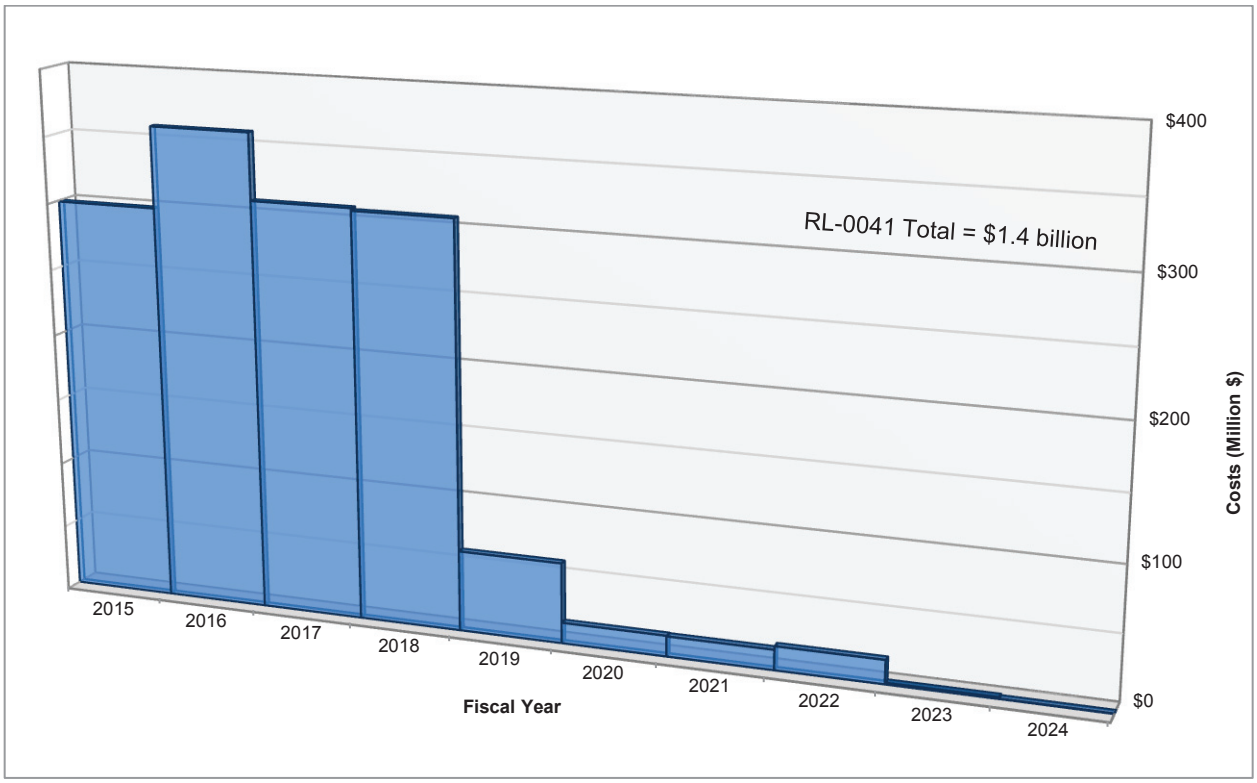

Figure 3-3. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) Remaining Estimated Cleanup Costs by Fiscal Year.

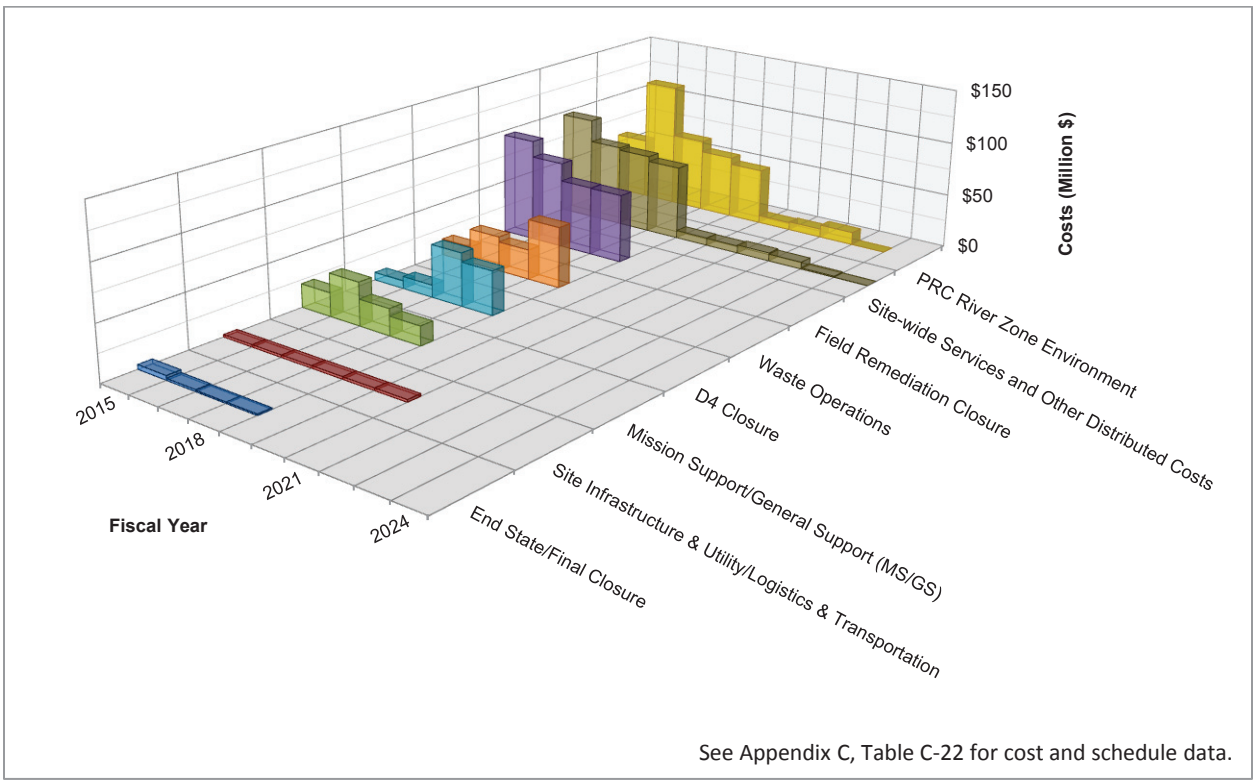

Figure 3-4. Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) Remaining Estimated Cleanup Costs by Work Element.

3.2 SNF STABILIZATION AND DISPOSITION (PBS RL-0012)

The SNF Stabilization and Disposition Project (PBS RL-0012) provides for safe stabilization, packaging, and interim storage of SNF sludge. After removing the sludge, 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. Major cleanup objectives for the SNF Stabilization and Disposition Project are:

- All SNF will be removed from 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 transferred to another project (PBS RL-0013C, Solid Waste Stabilization and Disposition–200 Area; see Table 4-6 Sludge Disposition) for final disposition to the Waste Isolation Pilot Plant (WIPP) in New Mexico or other disposal facility.
- The remaining sludge will be retrieved and shipped to an interim onsite storage facility (T Plant), then treated and packaged for shipment to an offsite disposal facility.
- Debris within the 105-KW Basin will be packaged and transported for disposal.

Additional scope information on these work elements is provided in Table 3-4.

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

Work Element	Scope Description
Program Management	Provides project management for 100-K Area work activities.
K Basins Operations and Maintenance	Includes dose data gathering and analysis; sampling and characterization of radioactive and hazardous waste to maintain compliance in 105-KW Basin (note that 105-KE Basin has been demolished); basic plant maintenance; and general duties and operations to keep 105-KW Basin and the Cold Vacuum Drying Facility in a safe and compliant condition.
Facility Operations	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	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 Hanford. Once stabilized and placed into storage, the waste stream will be transferred to another project area (PBS RL-0013C, Solid Waste Stabilization and Disposition–200 Area) for final disposition to WIPP or other disposal facilities.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site-wide services and infrastructure. See Section 6.3.2 for details. - Includes administrative and technical support and other activities. Details are provided in Table C-4. - Includes services that are charged based on predetermined rates and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-4. - Includes contractor's fee and management reserve.

PBS = project baseline summary.
RL = U.S. Department of Energy, Richland Operations Office.
SNF = special nuclear fuel.
WIPP = Waste Isolation Pilot Plant.

Figure 3-5 presents remaining estimated cleanup costs for SNF Stabilization and Disposition (PBS RL-0012) by fiscal year, and Figure 3-6 presents remaining estimated cleanup costs by work element.

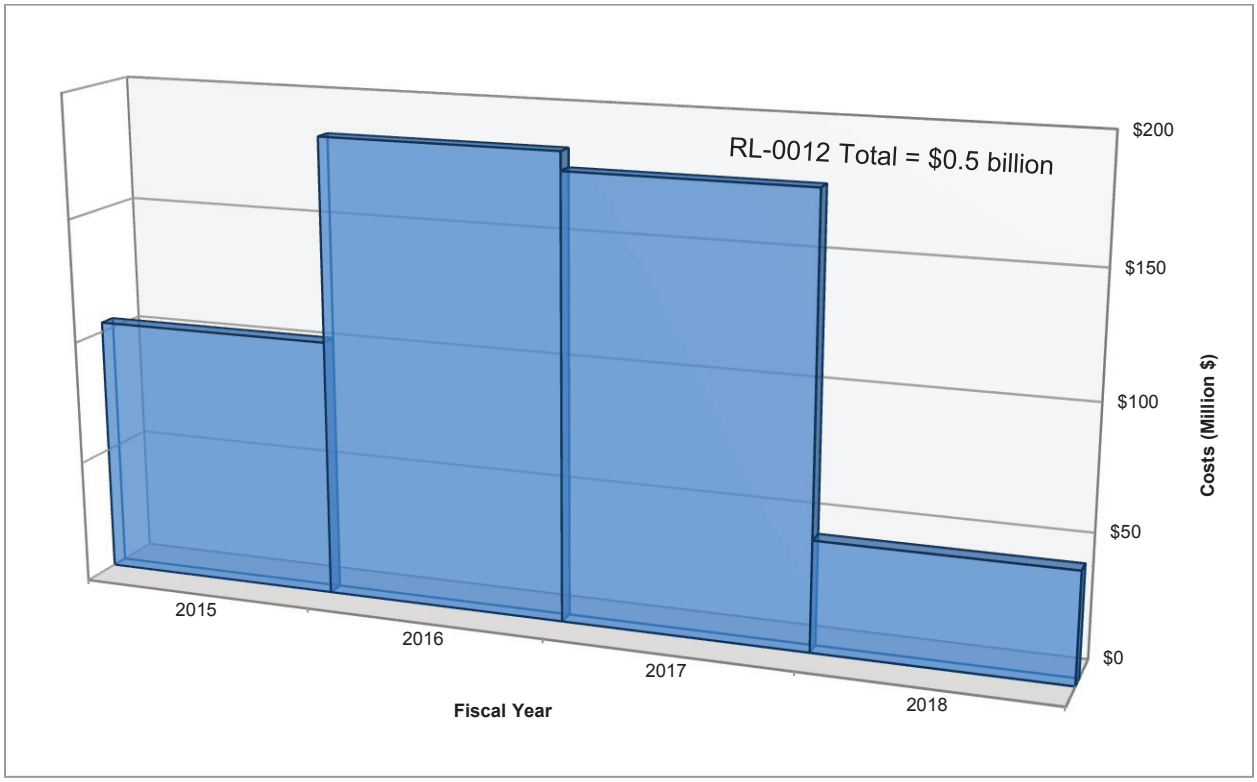

Figure 3-5. SNF Stabilization and Disposition (PBS RL-0012) Remaining Estimated Cleanup Costs by Fiscal Year.

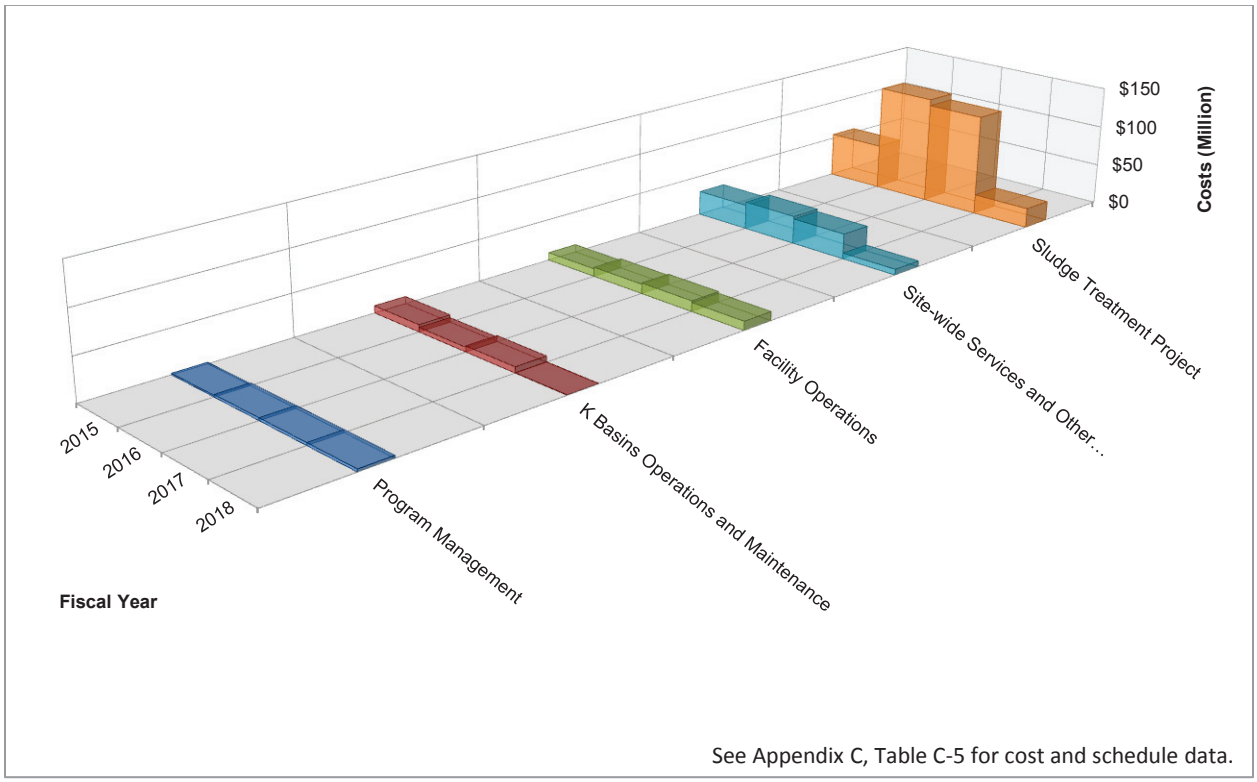

Figure 3-6. SNF Stabilization and Disposition (PBS RL-0012) Remaining Estimated Cleanup Costs by Work Element.

3.3 FINAL REACTOR DISPOSITION

Final Reactor Disposition will address cleanup of the 100 Area surplus production reactors in accordance with TPA M-093-00. Disposition of the 100 Area reactors (except for B Reactor which is part of the newly established Manhattan Project National Historical Park) was one of the cost estimate alternative analyses evaluated in the 2011 LCR (DOE/RL-2010-25). See summary in Appendix B, Table B-5, River Corridor - Disposition 100 Area Reactors.

Six reactors (C, D, DR, F, H, and N) have been placed in ISS configuration (see Table 3-2). KE Reactor has completed interim ISS and is in a minimum safe state; KE Reactor and KW Reactor are scheduled to complete ISS by FY2019. After being placed in ISS, the reactors will undergo surveillance, monitoring, and maintenance for 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 LCR 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, *Final Environmental Impact Statement Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*) and in a subsequent engineering evaluation (DOE/RL-2005-45, *Surplus Reactor Final Disposition Engineering Evaluation*). DOE issued 58 FR 48509, "Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington," in September 1993, 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 *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (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 3-7 provides the remaining estimated costs by fiscal year. The schedule is based on a 14-year implementation period for one-piece removal and completion of reactor removal by FY2068 based on the ROD issue date of 1993 with a maximum 75-year storage period. Reactor removal must start by FY2054. The estimated $1.9 billion to complete Final Reactor Disposition by FY2068 is the escalated $676 million removal cost (in 2010 constant dollars) presented in Table 4-5 of the 2011 LCR.

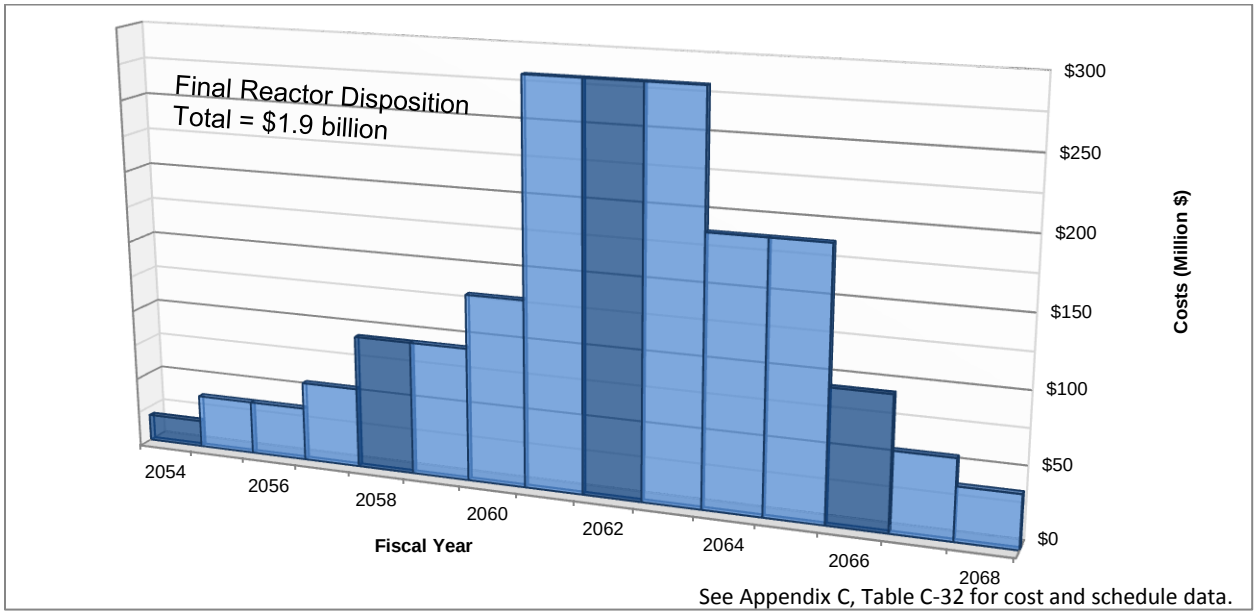

Figure 3-7. Final Reactor Disposition Remaining Estimated Cleanup Costs by Fiscal Year.

3.4 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 were identified for Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) work scope:

- 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. After PBS RL-0041 is completed, the facility D&D/waste site cleanup work will transfer to PBS RL-0040 Nuclear Facility D&D – Remainder of Hanford.
- The Natural Resource Damage Assessment and Restoration (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 process will not significantly affect cost or schedule.

For SNF Stabilization and Disposition (PBS RL-0012), the following assumptions were 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 performed by the 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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4.0 CENTRAL PLATEAU CLEANUP

The Central Plateau is a 75-square-mile area located near the center of Hanford, which contains about 900 excess facilities, including five massive chemical processing facilities called canyons, and roughly 800 non-tank farm waste sites. The Central Plateau is 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. These facilities, waste sites, canyons, and ongoing waste management operations and infrastructure are spread across the Central Plateau. The tank waste and WTP facilities on the Central Plateau are discussed in Chapter 5.0 as part of 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 that exceed drinking water standards with a combined area of approximately 73 square miles (DOE/RL-2014-32, *Hanford Site Groundwater Monitoring Report for 2013*). A significant portion of 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 Operable Unit [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 FY2012. The ROD for plutonium-contaminated and cesium-contaminated soil sites (200-PW-1/3/6 and 200-CW-5 OUs) was signed in FY2011 (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*) and a new interim action ROD for 200-UP-1 groundwater OU was approved in 2012 (EPA 2012, *Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site, 200-UP-1 Operable Unit*). The Central Plateau cleanup is organized into the following three principal components (DOE/RL-2009-10):

- **Inner Area** – The 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 as long as a potential hazard exists. The Inner Area contains the majority of Hanford's active waste treatment, storage and disposal facilities, including hundreds of waste sites, surplus facilities, 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** – 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 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.

The 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 Inner and Outer Areas and the River Corridor).
- Nuclear Facility D&D–Remainder of Hanford, PBS RL-0040 (geographical cleanup of waste sites and facilities, including the remaining canyon facilities in the Inner and Outer Areas).
- Nuclear Facility D&D–Fast Flux Test Facility Project, PBS RL-0042 (includes FFTF located in River Corridor).
- Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C (Inner Area).

Cleanup is being performed in accordance with RODs and action memoranda as listed in Appendix A and with key TPA milestones listed in Table 4-1.

Table 4-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)

Milestone	Description	Compliance Date
NM Stabilization and Disposition–PFP, PBS RL-0011		
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
M-083-00A	Complete PFP facility transition and selected disposition activities.	09/30/2016
Nuclear Facility D&D–Remainder of Hanford, PBS RL-0040		
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.	09/30/2022
Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C		
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 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 M-091-01A and M-091-01B

Table 4-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)

Milestone	Description	Compliance Date
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
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 WAC 173-303-140.	09/30/2017
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
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
Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030		
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.	10/30/2015

Table 4-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)

Milestone	Description	Compliance Date
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-015-110B	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

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.
Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.
WAC 173-303-140, "Land Disposal Restrictions," *Washington Administrative Code*, Olympia, Washington.

CERCLA= *Comprehensive Environmental Response, Compensation, and Liability Act.*
CH = contact-handled.
D&D = decontamination and decommissioning.
Ecology = Washington State Department of Ecology.
EPA = U.S. Environmental Protection Agency.
LDR = Land Disposal Restrictions.
MLLW = mixed low-level waste.
NM = nuclear material.
OU = operable unit.
PBS = project baseline summary.
PFP = Plutonium Finishing Plant.
PUREX = Plutonium Uranium Extraction (Plant).
RCRA = *Resource Conservation and Recovery Act.*
REDOX = Reduction-Oxidation Facility (S Plant).
RH = remote-handled.
RI/FS = remedial investigation/feasibility study.
TBD = to be determined.
TRUM = transuranic mixed (waste).
TSD = treatment, storage, and disposal.
WIPP = Waste Isolation Pilot Plant.

4.1 NM STABILIZATION AND DISPOSITION–PFP (PBS RL-0011)

The Plutonium Finishing Plant (PFP) complex was constructed in the 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 performed 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, CERCLA, *Resource Conservation and Recovery Act of 1976* (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 remediation of the 200-PW-1/3/6 and 200-CW-5 OUs and the new 200-WA-1 OU.

Table 4-2 provides a summary of the scope of each of these work elements.

Table 4-2. NM Stabilization and Disposition–PFP (PBS RL-0011) Level 2 Scope Summary.

Work Element	Scope Description
Maintain Safe and Compliant PFP	Maintain building integrity and safety systems during D4 efforts. Tasks include maintaining worker/public health and environmental safety, an environmentally compliant facility, facility systems and components, the maintenance program, and special projects.
Disposition PFP Facility	Includes planning, preparing, engineering, sampling, procurement, and other tasks necessary to execute 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 buildings and facilities in the PFP area, reducing them to slab-on-grade. 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	Includes project management and support to PFP D4 activities including procurement and project controls. This also includes technical support such as engineering, quality assurance, and procedure and document maintenance.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.3.2 for details. - Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-1. - Includes contractor's fee and management reserve.

D4 = deactivation, decontamination, decommission, and demolition.
D&D = decontamination and decommission.
PBS = project baseline summary.
PFP = Plutonium Finishing Plant.
RL = U.S. Department of Energy, Richland Operations Office.

PFP transition is planned to be complete in FY2016 per TPA M-083-00A. Cost and/or schedule uncertainty extends the schedule beyond FY2016.

Figure 4-1 presents the remaining estimated cleanup costs for NM Stabilization and Disposition-PFP (PBS RL-0011) work scope by fiscal year; Figure 4-2 presents the remaining estimated cleanup costs by work element.

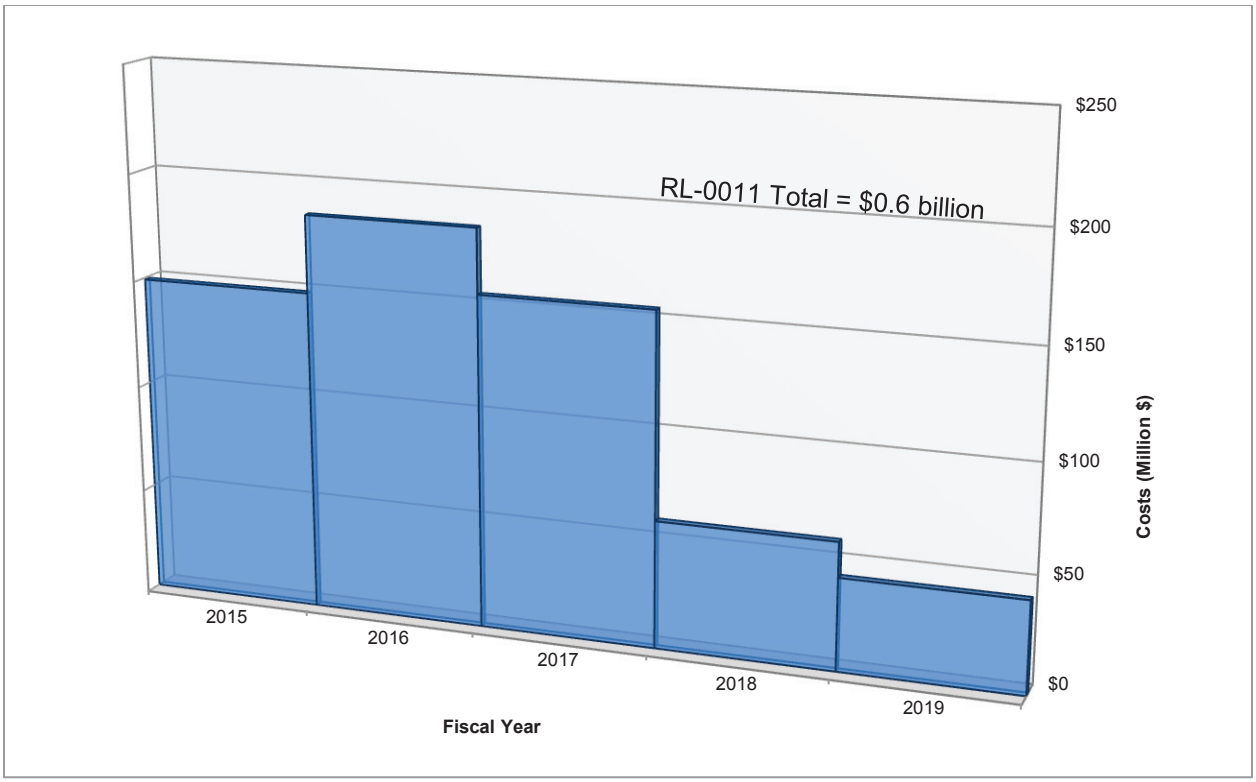

Figure 4-1. NM Stabilization and Disposition–PFP (PBS RL-0011) Remaining Estimated Cleanup Costs by Fiscal Year.

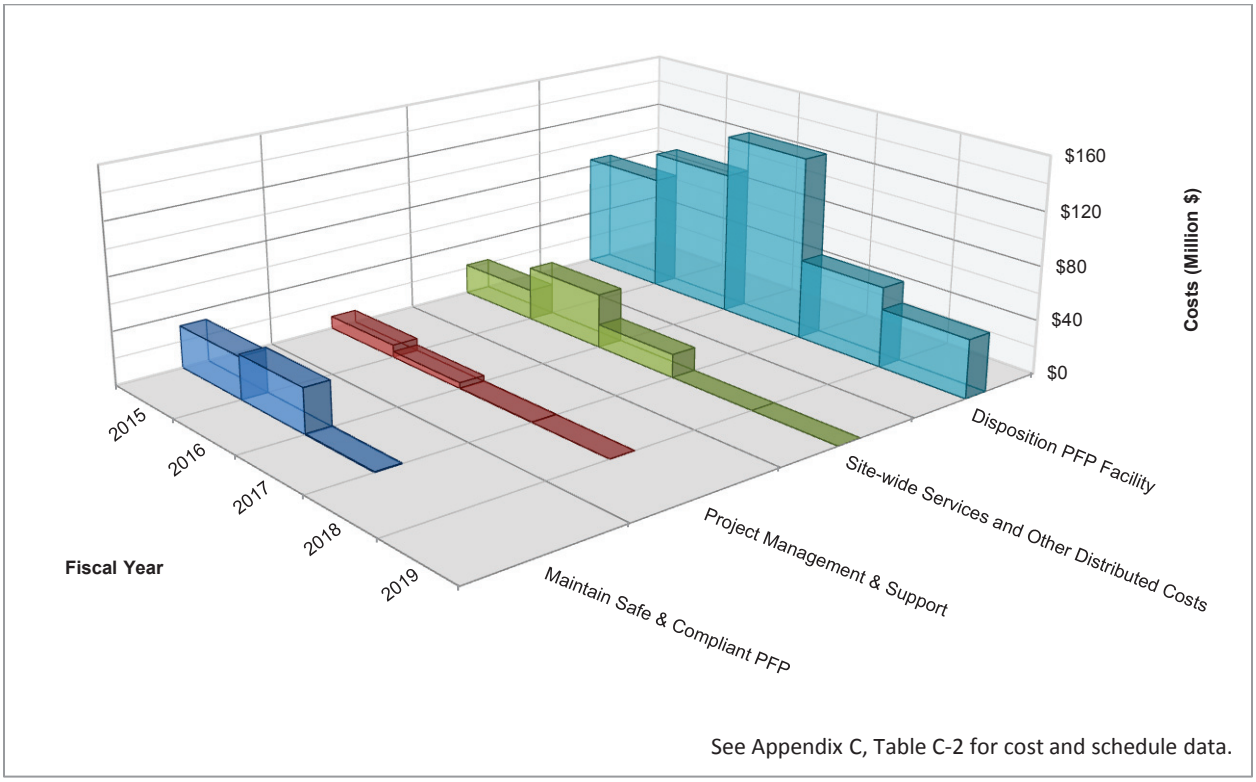

Figure 4-2. NM Stabilization and Disposition–PFP (PBS RL-0011) Remaining Estimated Cleanup Costs by Work Element.

4.2 SOIL AND WATER REMEDIATION–GROUNDWATER/VADOSE ZONE (PBS RL-0030)

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

- Regulatory decision-making process for all groundwater OUs on the Hanford Site.
- Remediation of all groundwater on the Hanford Site in accordance with the groundwater OU decisions.
- Regulatory decision-making process for Central Plateau waste sites (remediation of waste sites is part of the Nuclear Facility D&D–Remainder of Hanford [PBS RL-0040] project scope).
- Regulatory decision-making process and remediation for 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 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 also have reached the Columbia River.

The major chemical contaminants present in the 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 a volatile organic compound (cis-1,2-dichloroethene) and radioactive contaminants (carbon-14, cesium-137, gross beta and plutonium-239/240) (DOE/RL-2014-32). The Groundwater Project (DOE/RL-2002-59, *Hanford Site Groundwater Strategy Protection, Monitoring, and Remediation*) has three major objectives:

- Take actions necessary to prevent degradation of the groundwater
- Remediate groundwater to restore it to beneficial use where practicable and protect the 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. Hanford is divided into ten groundwater OUs; six in the River Corridor (100-BC-5, 100-KR-4, 100-NR-2, 100-HR-3, 100-FR-3, 300-FF-5) and four in the Central Plateau (200-ZP-1, 200-UP-1, 200-BP-5, 200-PO-1). Groundwater monitoring activities are also required by the *Atomic Energy Act*, CERCLA, and the *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste* (WA7890008967). Table 4-3 provides additional details on the scope of work for each of the work elements.

Table 4-3. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 2 Scope Summary. (2 pages)

Work Element	Scope Description
Integration and Assessments	Includes eight elements: Strategic Integration; Technical Integration; Remediation Decision Support; Remediation Science and Technology; Sample Management and Reporting; Environmental Databases; Value Engineering Studies; and Systematic Planning Integration. 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 Hanford, foster technical peer review, and integrate remediation decisions.
Drilling	Includes planning, coordinating, and implementing well drilling and well decommissioning for Hanford wells according to project-specific requirements. This includes drilling wells to Washington State standards and preparing all required submittals and notifications required by Washington State law and providing well-related information for Hanford 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	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	Includes services, infrastructure, material, equipment, labor, and contracts 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 & Performance Assessments	Includes: • 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. • Groundwater sampling, analysis, monitoring, evaluation, assessment, and reporting for RCRA TSDs, CERCLA OUs, and other permitted facilities and sites. • Coordination and management of groundwater sampling and water level determinations. • Operation, maintenance, and relocation of the Hanford 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. • Project management for these activities. • Well maintenance, monitoring, and reporting. • Geophysical sciences and borehole logging.
Groundwater OUs Decision Documents & Remediation	Includes management and implementation of groundwater remediation for Hanford, including: • Implementing the RI/FS process for groundwater OUs by performing RI/FSs leading to final RODs. • Preparing DQO reports, sampling and analysis plans, waste management plans, and other regulatory documentation, as needed, for all groundwater OUs. • Conducting as needed field studies to support decision making and design. • Designing treatment systems in accordance with RODs and remedial action work plans. • Implementing treatment systems in accordance with the design and the ROD requirements or modifying and expanding the remedy to optimize remediation. • Conducting ongoing monitoring and reporting. • Maintaining system and monitoring wells. • Final D&D of remedy components. The work scope is managed by OU and is consistent between the OUs.

Table 4-3. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 2 Scope Summary. (2 pages)

Work Element	Scope Description
Regulatory Decisions & Closure Integration	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&D–Remainder of Hanford (PBS RL-0040).
Deep Vadose Zone Treatability Tests	This involves deep vadose zone treatability testing in accordance with DOE/RL-2007-56, conducting 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. 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.
Deep Vadose Zone OU	Addresses mitigation of the contamination present in the deep vadose zone at Hanford. Initial actions planned for this OU are field studies and deployment activities and developing 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 D&D of the OU remediation activities at the conclusion of the project will be included following the decision process. 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). Also, 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 Hanford, which would be the focal point for investigation and resolution of critical deep vadose zone issues at Hanford and within the DOE complex.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.3.2 for details. - Includes administrative and technical support provided to the project. Details are provided in Table C-12. - Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-12. - Includes contractor's fee and management reserve, allocated pensions and General and Administrative.

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

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.

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

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act.*
D&D = decontamination and decommission.
DOE = U.S. Department of Energy.
DQO = data quality objectives.
OU = operable unit.
PBS = project baseline summary.
RCRA = *Resource Conservation and Recovery Act.*
RI/FS = remedial investigation/feasibility study.
RL = Richland Operations Office.
ROD = record of decision.
TPA = Tri-Party Agreement.
TSD = treatment, storage, and disposal.

Figure 4-3 presents the remaining estimated cleanup costs for Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) by fiscal year; Figure 4-4 presents the remaining estimated cleanup costs by work element.

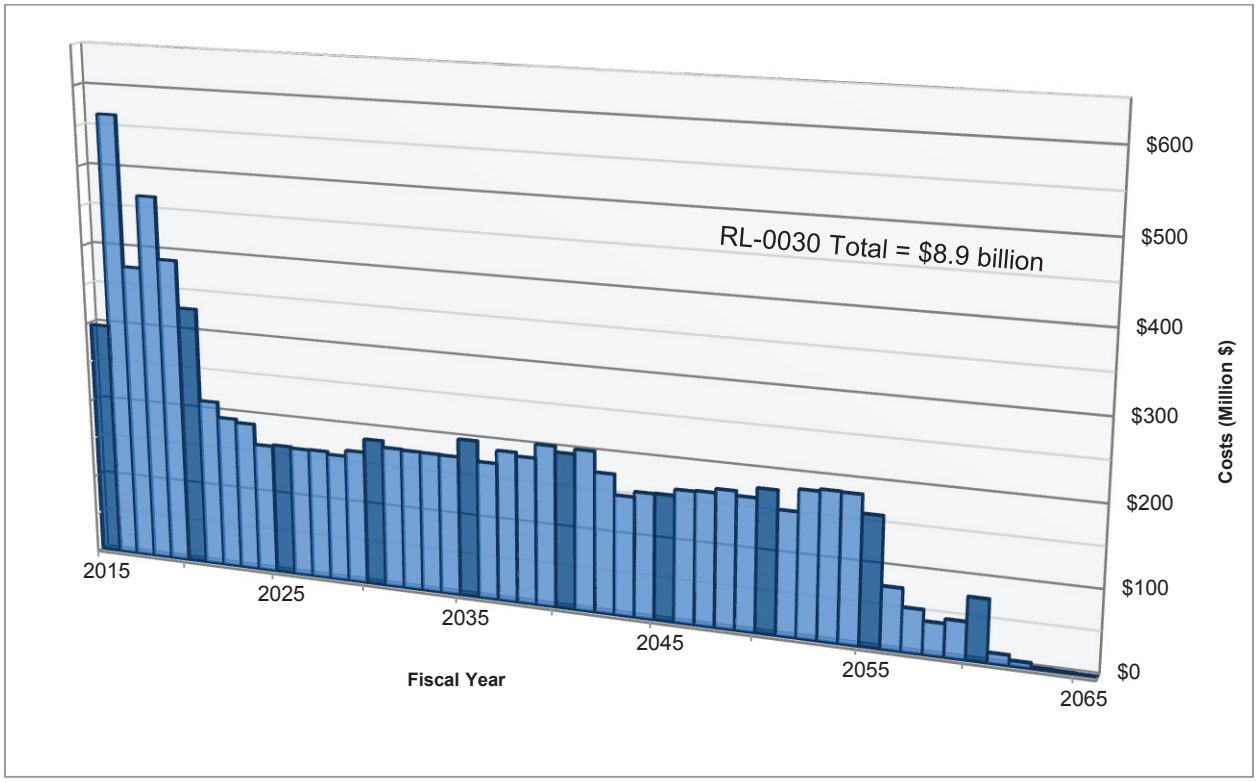

Figure 4-3. Soil and Water Remediation-Groundwater/Vadose Zone (PBS RL-0030) Remaining Estimated Cleanup Costs by Fiscal Year.

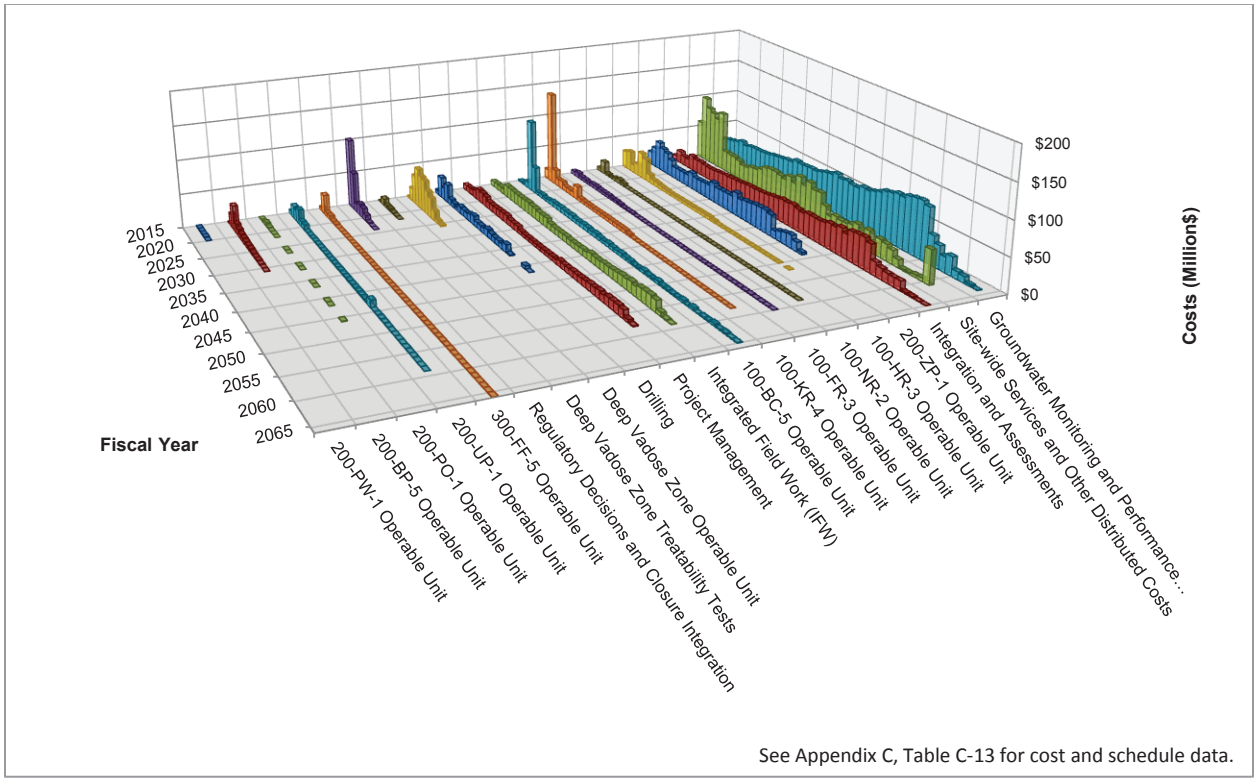

Figure 4-4. Soil and Water Remediation-Groundwater/Vadose Zone (PBS RL-0030) Remaining Estimated Cleanup Costs by Work Element.

4.3 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 6.0. 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 (PBS RL-0040). The Central Plateau Remediation Project scope includes the demolition and remediation scope that is organized into 21 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 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 protection 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 decommission (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 300 Area PNNL facilities have cleanup decisions
- 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. Table 4-4 provides additional details on the scope of work for each of these work elements.

The duration, in part, is dependent on transition of the tank farms to the project for final disposition after closure activities are completed by ORP (see Chapter 5.0). It is also dependent on transition of waste management facilities that are no longer needed to support Hanford cleanup from Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) to the project for final disposition (see Section 4.5).

Table 4-4. Central Plateau Remediation Project (PBS RL-0040) Level 2 Scope Summary.

Work Element	Scope Description
Regulatory Decisions and Closure Integration	Includes general management direction and technical/environment, safety, health, and quality support, 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, regulatory decisions for below-slab remediation for non-canyon facilities, hazard reduction and emergency response tasks necessary to address aging facility or waste site conditions that are above and beyond anticipated operational and maintenance plans.
Zone Environmental Remediation	Includes 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. 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 at the Environmental Restoration Disposal Facility.
S&M and Min-Safe for Facilities and Waste Sites	Includes CERCLA 5-year reviews, surveillance and system, structural, equipment, and other maintenance on Central Plateau facilities/buildings and waste sites.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.3.2 for details: • Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-15. • Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.

CERCLA= *Comprehensive Environmental Response, Compensation, Liability Act.*
PBS = project baseline summary.
S&M = surveillance and maintenance.

Figure 4-5 presents the remaining estimated cleanup costs for the Central Plateau Remediation Project (PBS RL-0040) by fiscal year; Figure 4-6 presents the remaining estimated cleanup costs by work element.

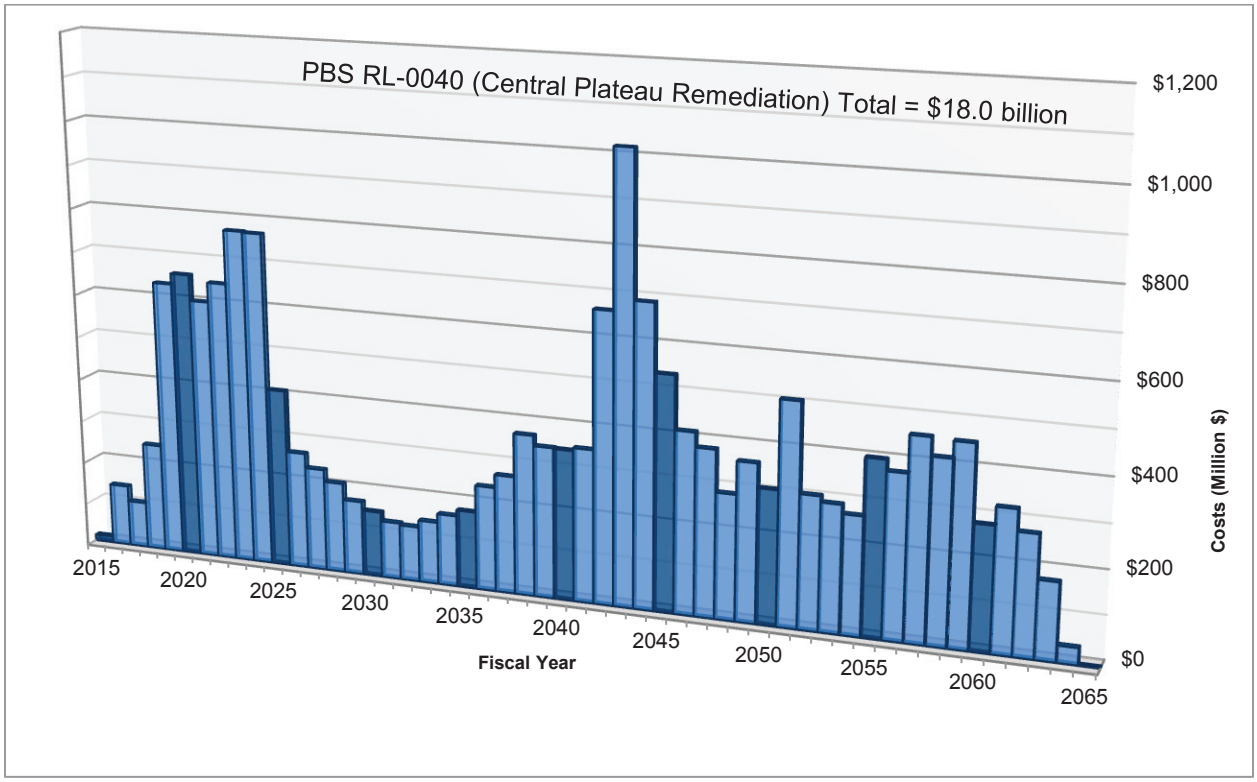

Figure 4-5. Central Plateau Remediation Project (PBS RL-0040) Remaining Estimated Cleanup Costs by Fiscal Year.

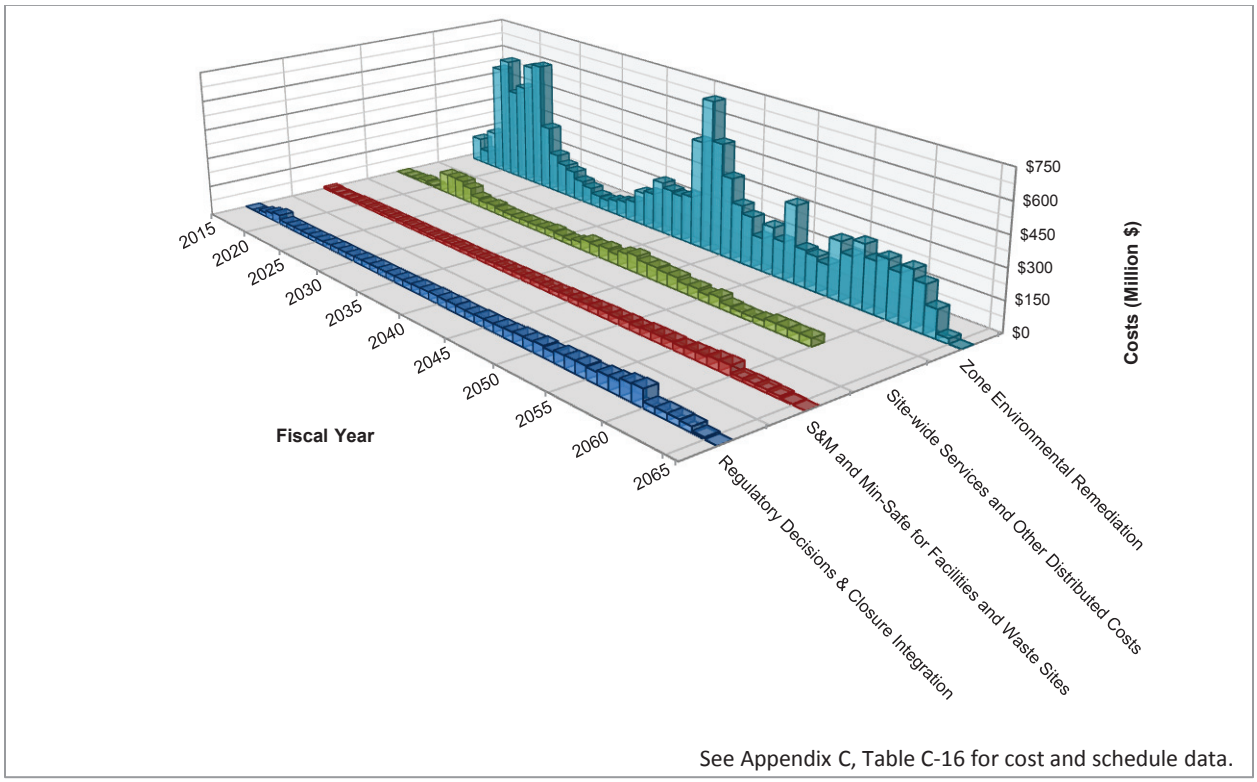

Figure 4-6. Central Plateau Remediation Project (PBS RL-0040) Remaining Estimated Cleanup Costs by Work Element.

4.4 NUCLEAR FACILITY D&D–FAST FLUX TEST FACILITY PROJECT (PBS RL-0042)

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. DOE issued a shutdown order for FFTF in December 1993 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 hazardous/radioactive materials, interim maintenance of facilities, demolition, and disposal of the waste. The mission requires removing and dispositioning sodium coolant, the reactor containment building, reactor support buildings, and auxiliary facilities and support systems. The project's technical objective will achieve the following:

- Remove and disposition sodium coolant and clean residual sodium
- Fill spaces with grout below 550-feet 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 support facilities and structures demolished to 3 feet below grade and backfilled. The FFTF alternatives have been evaluated in DOE/EIS-0391, *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* and a December 13, 2013, ROD (78 FR 75913).

Waste sites in 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). Table 4-5 summarizes the work scope.

Table 4-5. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Level 2 Scope Summary.

Work Element	Scope Description
FFTF Cleanup	Includes monitoring, surveillance, and maintenance of FFTF and surrounding area in a safe and compliant manner until D&D; deactivate FFTF; disposition FFTF sodium; construct a sodium reaction facility; decommission FFTF in accordance with a future record of decision; and project management for these activities.
Infrastructure Services	Includes legal support.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.3.2 for details: • Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-24. • Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.

D&D = decontamination and decommission. PBS = project baseline summary.
FFTF = Fast Flux Test Facility. RL = U.S. Department of Energy, Richland Operations Office.

Figure 4-7 presents the remaining estimated cleanup costs for the Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) by fiscal year; Figure 4-8 shows the remaining estimated cleanup costs by work element.

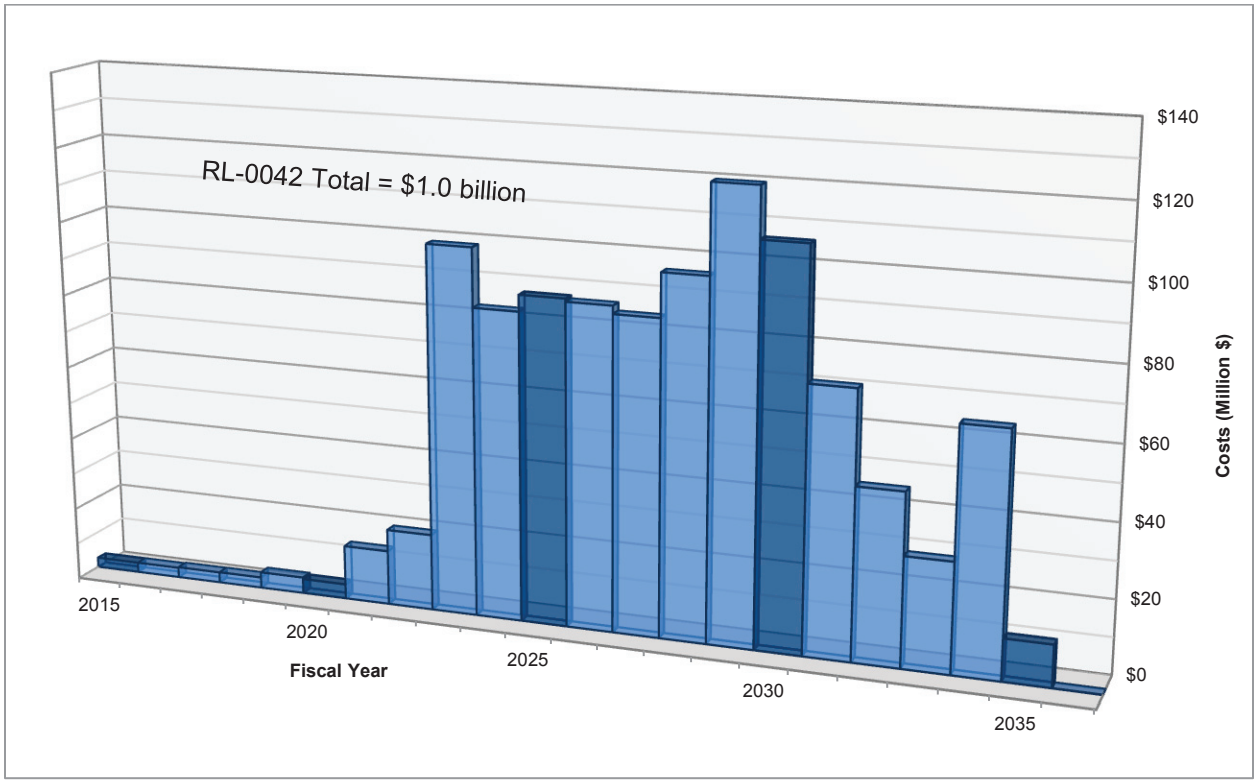

Figure 4-7. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Remaining Estimated Costs by Fiscal Year.

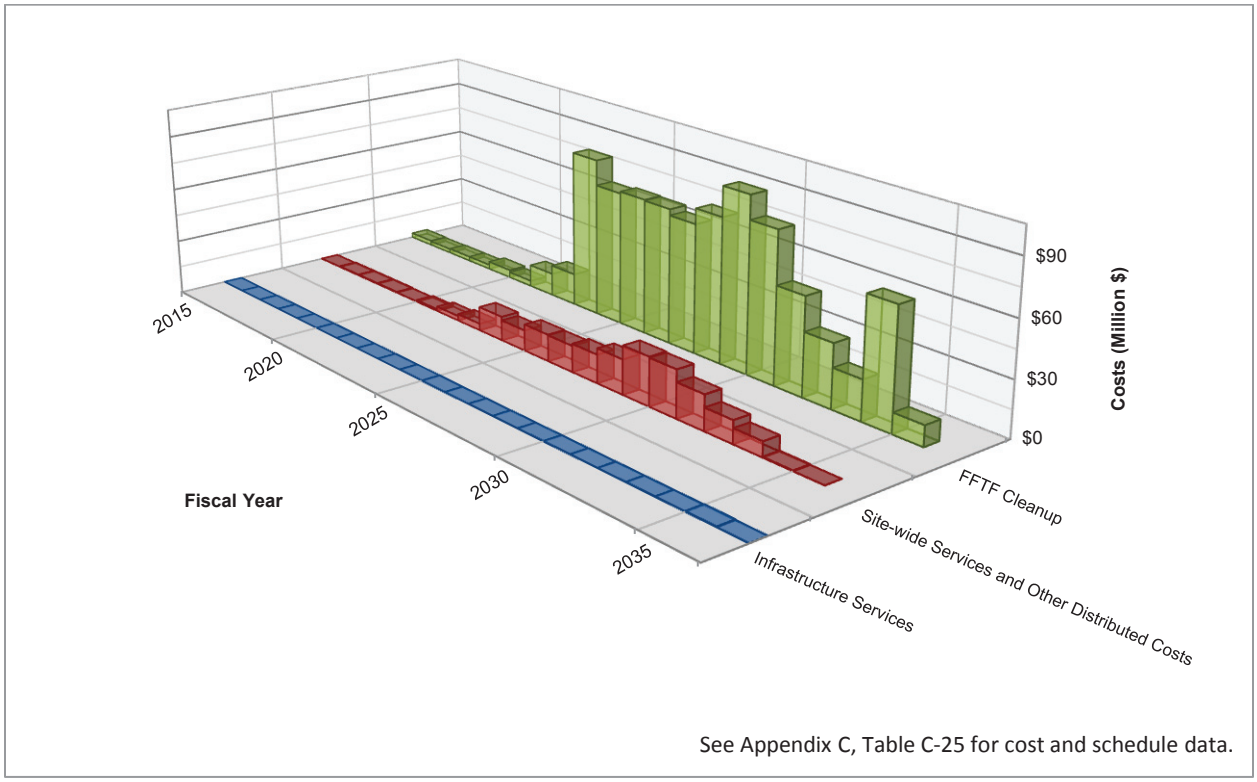

Figure 4-8. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Remaining Estimated Costs by Work Element.

4.5 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 facilities and operations. The major mission objectives are to:

- Operate waste treatment facilities, including T Plant, WRAP Facility, and 200 Area Liquid Effluent Treatment Facility (ETF).
- Provide Base Waste Management Operations at the CSB and 200 Area Interim Storage Area, Integrated Disposal Facility (IDF), 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 or other permitted facility.
- 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 repackage large and remote-handled (RH) 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 waste 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 transferred 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 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.

Table 4-6 summarizes each scope element. As waste management facilities are no longer needed to support Hanford cleanup, they will be transitioned to Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) for final disposition.

Table 4-6. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 2 Scope Summary. (2 pages)

Work Element	Scope Description
Project Management	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	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.
CSB	Includes safe storage of SNF and immobilized high-level waste from the WTP while awaiting final disposition at the geologic repository, repackaging SNF for shipment, and coordination with the offsite repository for evaluations and information.
MLLW Treatment	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	Consists of the retrieval, designation, and transfer to a TSD facility of both CH and RH solid stored underground TRU waste.
TRU Repackaging	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.
WRAP Facility	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	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.
CWC	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 CH TRU waste into shipping containers for shipment to WIPP.
ERDF	Addresses the operation of the ERDF after turnover from the River Corridor Closure Project through the end of Hanford cleanup, including cell expansion and ERDF interim cover construction.
Liquid Effluent Facilities	Includes operation and maintenance of LERF, ETF, and 200 Area TEDF to receive, store, treat, and dispose of liquid effluents from Hanford cleanup activities.
IDF	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	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.
TRU Disposition	Provides funding and resources for the TRU Program's coordination with the Central Characterization Project 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 Central Characterization Project and to establish shipping capabilities for RH TRU waste and additional CH TRU waste shipping capabilities.
SNF Disposition	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.

Table 4-6. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 2 Scope Summary. (2 pages)

Work Element	Scope Description
Mixed Waste Disposal Trenches	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	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 and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.3.2 for details: - Includes administrative and technical support and other activities. Details are provided in Table C-7. - Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Details are provided in Table C-7. - Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.

CH	=	contact-handled.	RH	=	remote-handled.
CSB	=	Canister Storage Building.	RL	=	U.S. Department of Energy, Richland Operations Office.
CWC	=	Central Waste Complex.			
D&D	=	decontamination and decommission.	SNF	=	spent nuclear fuel.
DOE	=	U.S. Department of Energy.	TEDF	=	Treated Effluent Disposal Facility.
ERDF	=	Environmental Restoration Disposal Facility.	TRU	=	transuranic.
ETF	=	Effluent Treatment Facility.	TSD	=	treatment, storage, and disposal.
IDF	=	Integrated Disposal Facility.	WESF	=	Waste Encapsulation and Storage Facility.
LERF	=	Liquid Effluent Retention Facility.	WIPP	=	Waste Isolation Pilot Plant.
MLLW	=	mixed low-level waste.	WRAP	=	Waste Receiving and Processing (Facility).
PBS	=	project baseline summary.	WTP	=	Waste Treatment Plant.

Figure 4-9 shows the remaining estimated cleanup costs for the Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) by fiscal year; Figure 4-10 shows the remaining estimated cleanup costs by work element.

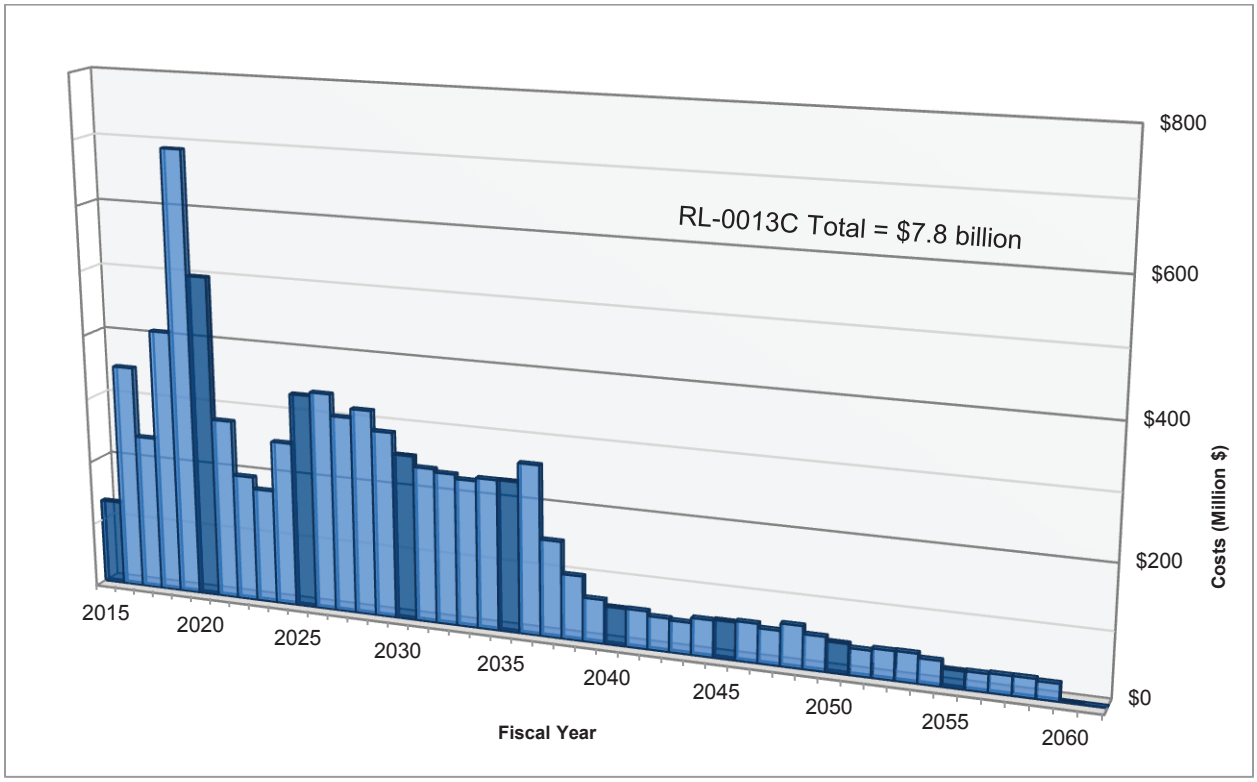

Figure 4-9. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Remaining Estimated Cleanup Costs by Fiscal Year.

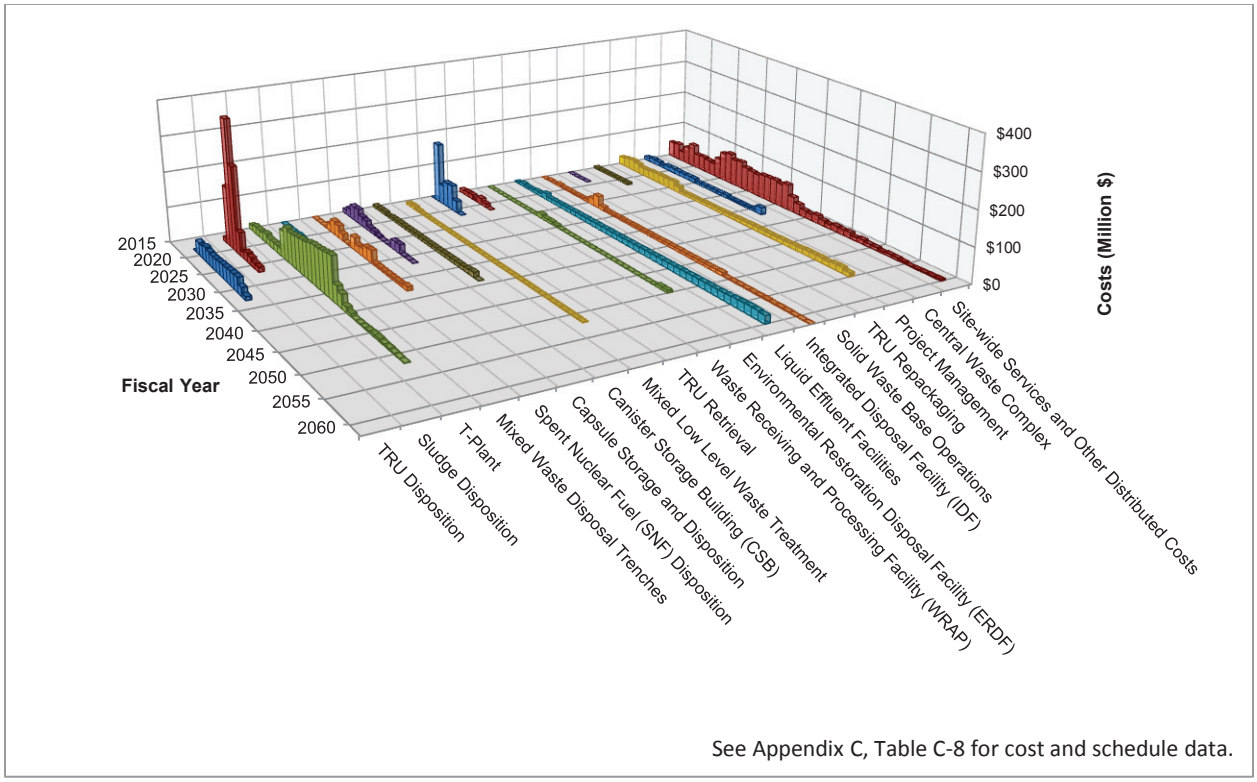

Figure 4-10. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Remaining Estimated Cleanup Costs by Work Element.

4.6 CENTRAL PLATEAU CLEANUP 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.

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

- 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 were identified:

- An industrial worker scenario will be used to define the exposure scenarios and the threshold cleanup levels for waste sites located in the Inner Area. Cleanup levels for waste sites in the Outer Area will support the reasonably anticipated future land use of conservation/mining.
- The Central Plateau area will remain under Federal control for the foreseeable future.
- All low-level legacy waste will be managed and treated on Hanford via remove, treat, and dispose (RTD) to approved onsite disposal facilities.
- Planning assumes that geographic aggregate barriers will be utilized. The aggregate barriers 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 assumption was identified:

- FFTF funding to accomplish the scope can be carried over from year to year. Beginning in FY2019, 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 were identified:

- 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 RCRA transuranic mixed (TRUM) waste as required by TPA M-091-01
- WIPP will remain operational through the end of Hanford cleanup operations that have the potential to generate TRU waste. Current planning has processing and shipping of TRU waste to WIPP until FY2030.

5.0 TANK WASTE CLEANUP

Tank waste cleanup is part of the River Protection Project (RPP) and is being performed under the authority of ORP. ORP manages the RPP 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 tank waste and close the tank farms to protect the Columbia River. As a result, ORP is responsible for the retrieval, treatment, and disposal of approximately 56 million gallons of mixed waste contained in Hanford 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 Hanford'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 5-1 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 comprises 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 are based on Revision 4 of ORP-11242 in order to remain consistent with ORP's last certified baseline and approved baseline change request, which is the current technical baseline for ORP. ORP expects to update the cost and schedule planning case in the LCR when a new baseline is approved and in place.

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). 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 ~55,000 gallons of capacity, while the largest DSTs hold up to ~1,250,000 gallons.

When Hanford was in production mode, 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 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 operations, the underground waste tanks and their contents remain. The radioactive liquid waste was transferred from the separations facilities as slurry (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 supernate.

The ORP planning case in this LCR is the same as that presented in previous LCRs, based on the *River Protection Project System Plan* (ORP-11242, Rev. 4) in order to remain consistent with ORP's last certified baseline and approved baseline change request. ORP expects to update the cost and schedule planning case in the LCR when a new baseline is approved and in place.

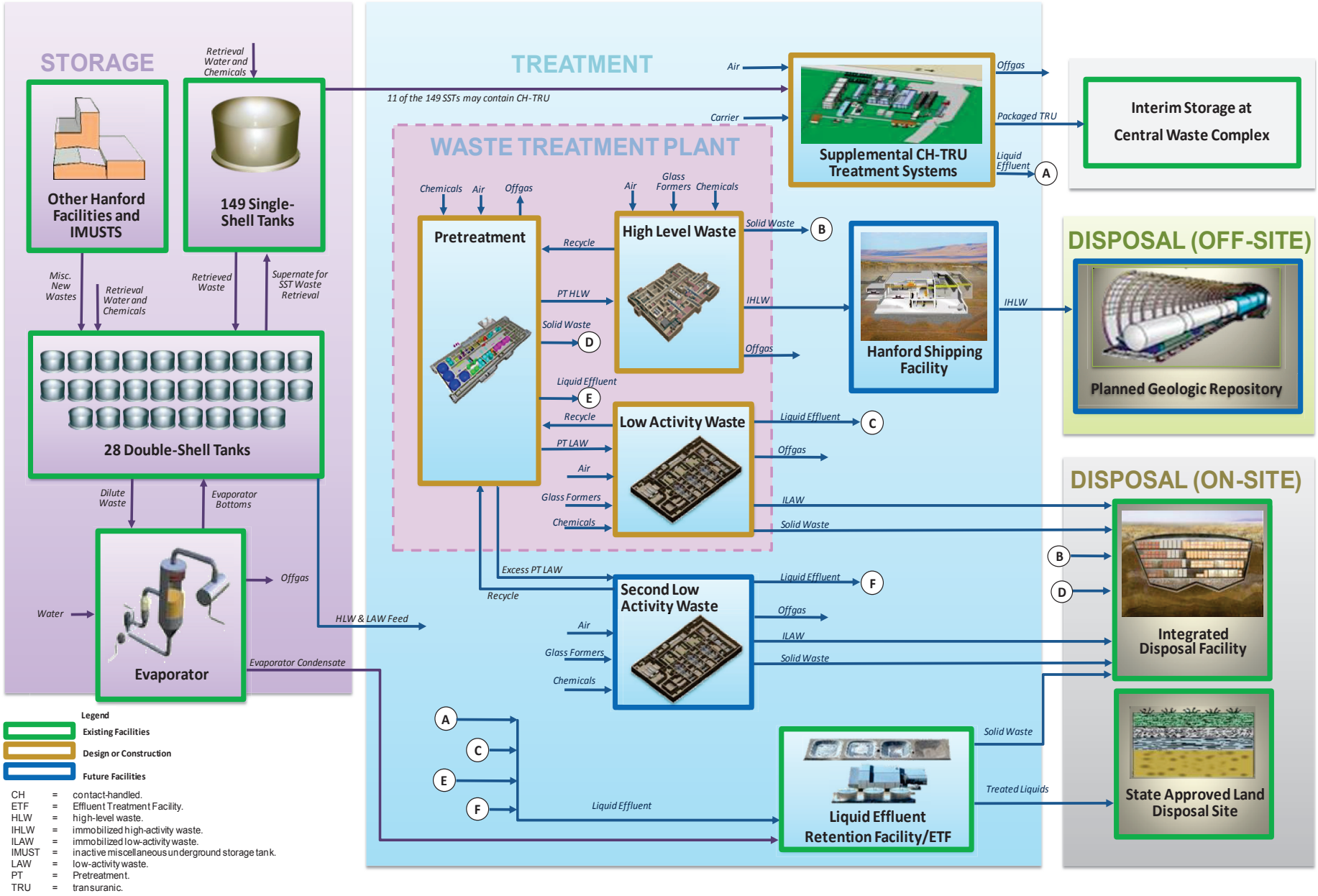

Figure 5-1. Simplified Process Diagram for Tank Waste Retrieval and Treatment.

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 saltcake, a crystalline solid waste form. At one time, most tanks contained supernate, slurry, and saltcake waste forms simultaneously. The current typical content of the tanks is depicted in Figure 5-2.

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 bottom of some tanks. Cesium and strontium capsules, currently stored in the WESF, resulted from efforts to reduce fission products in the tanks. 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 Hanford's tank waste and close the tank farms to protect the Columbia River. 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 high-level waste (IHLW) pending determination of the final disposal pathway (national repository).
- Closing the SST and DST farms, ancillary facilities, and associated waste management and treatment facilities.

The overall schedule objective is to complete retrieval, treatment, and closure activities by the end of FY2050. 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.

ORP is developing and implementing operating strategies to address the actions in applicable regulatory milestones, including those in the Consent Decree in *State of Washington v. Department of Energy*, Case No. 08-5085 (E.D. Wa. October 25, 2010) (DOE and Ecology, 2010) (the "Consent Decree"). The milestones shown in Table 5-1 were selected as key measures for significant progress.

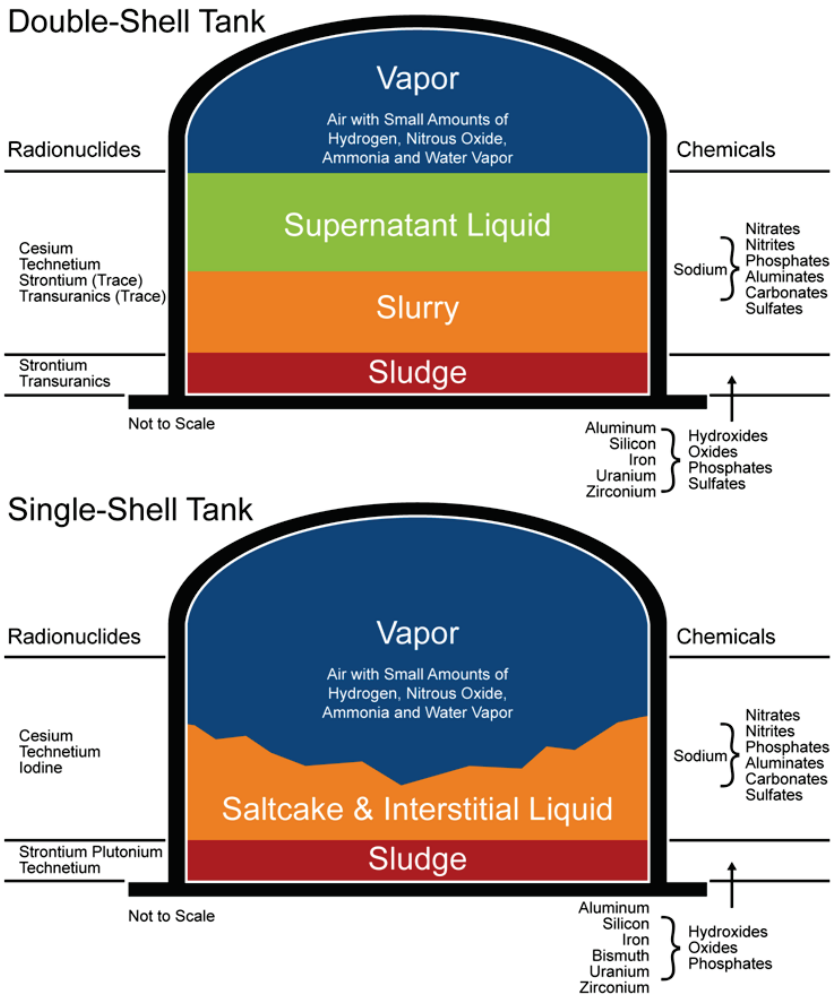

Figure 5-2. Depictions of Typical Tank Contents.

Table 5-1. 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
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
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[1]	Hot start of WTP.	12/31/2019

Table 5-1. Tank Waste Cleanup Key Tri-Party Agreement and Consent Decree Milestones. (2 pages)

Milestone	Description	Compliance Date
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[1]	Complete retrieval of tank wastes from the nine SSTs selected to satisfy D-00B-02[1].	09/30/2022
M-062-34-T01	Complete hot commissioning (startup and readiness prior to full operations) of Supplemental Treatment Vitrification Facility and/or WTP Enhancements.	12/30/2022
D-00A-01[1]	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 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

[1] Milestones from Consent Decree and Tri-Party Agreement Settlement Package (DOE and Ecology, 2010).

DOE = U.S. Department of Energy.
DST = double-shell tank.
Ecology = Washington State Department of Ecology.
HFFACO= *Hanford Federal Facility Agreement and Consent Order*.
RCRA = *Resource Conservation and Recovery Act*.
SST = single-shell tank.
WMA = waste management area.
WTP = Waste Treatment and Immobilization Plant.

5.1 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.

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 anticipated for FY2015 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 and TPA 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. Additional scope information on these work elements is provided in Table 5-2.

Table 5-2. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Level 2 Scope Summary.

Work Element	Scope Description
Base Operations	Provides for safe storage of waste, reduces the volume of waste through evaporation, provides laboratory support, and includes necessary support activities.
Retrieve and Close SSTs	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.
Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure	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	Includes planning and analysis for supplemental low-activity waste treatment and contact-handled TRU handling, up to and including design and construction.
Treat Waste	Includes preparation for hot commissioning, closure planning, and final closure activities.
Facility Closures	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 6.3.2 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 5-3 presents the remaining estimated cleanup costs for Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) by fiscal year; Figure 5-4 presents the remaining estimated cleanup costs by work element.

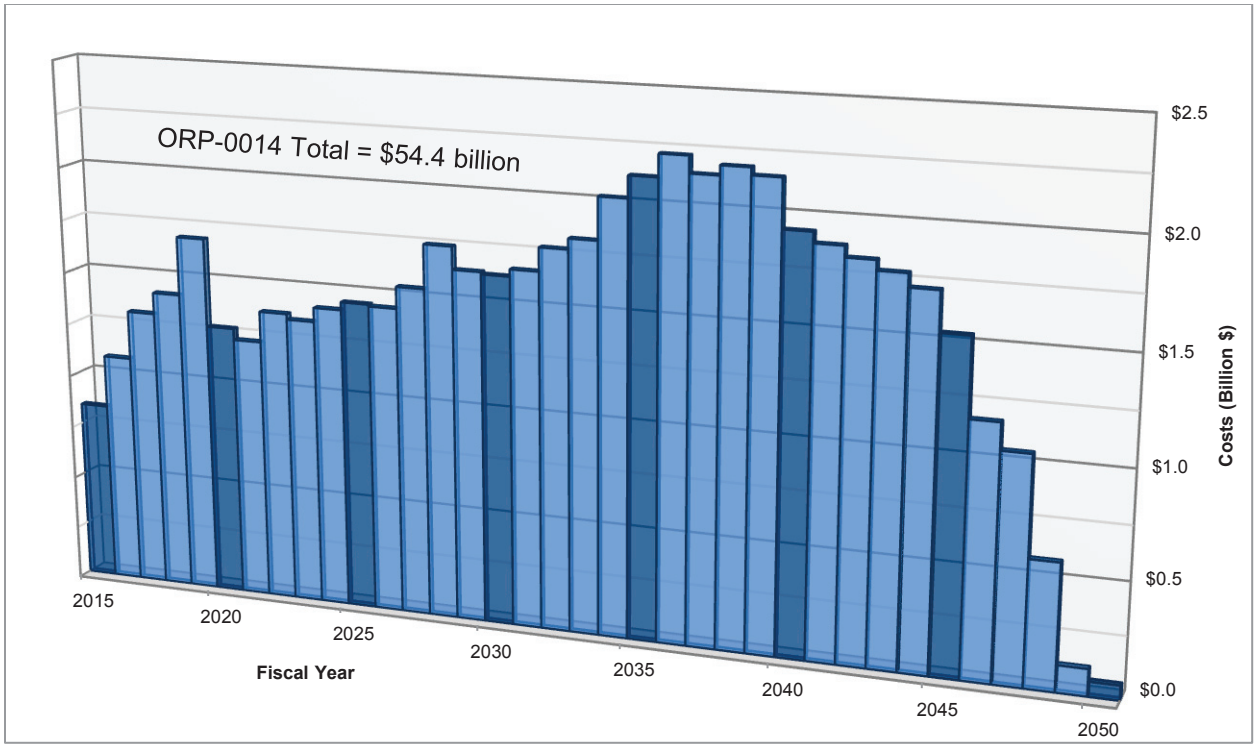

Figure 5-3. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Estimated Cleanup Costs by Fiscal Year.

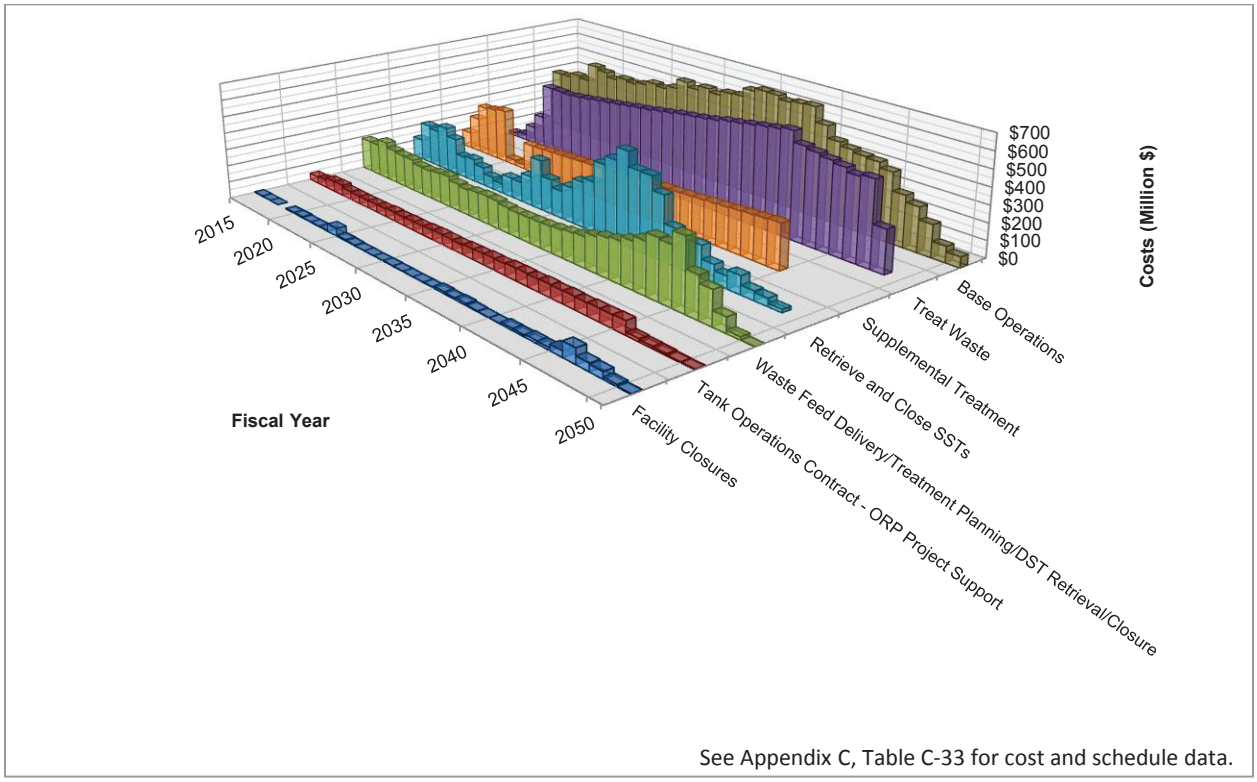

Figure 5-4. Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014) Remaining Estimated Cleanup Costs by Work Element.

5.2 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 for pretreating and immobilizing the mixed wastes currently stored in Hanford's underground storage tanks. Work is complete when WTP construction is complete and the facilities are turned over to ORP's operations contractor. The following five main facilities are being constructed in the WTP:

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

Additional scope information on these work elements is provided in Table 5-3.

Table 5-3. Major Construction–Waste Treatment Plant (PBS ORP-0060) Level 2 Scope Summary.

Work Element	Scope Description
Pretreatment	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)	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)	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	Includes design, construction and commissioning of the Balance of Facilities. When finished, the dedicated facilities and utilities will support the WTP.
Analytical Laboratory	Includes design, construction, and commissioning of the Analytical Laboratory. When finished, samples will be analyzed to ensure the glass product meets requirements.
Shared Services - Plant Wide	Includes crosscutting 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 6.3.2).

HLW = high-level waste. PBS = project baseline summary.
LAW = low-activity waste. WTP = Waste Treatment and Immobilization Plant.

Figure 5-5 presents the remaining estimated costs for Major Construction – Waste Treatment Plant (PBS ORP-0060) by fiscal year; Figure 5-6 presents the remaining estimated costs by work element.

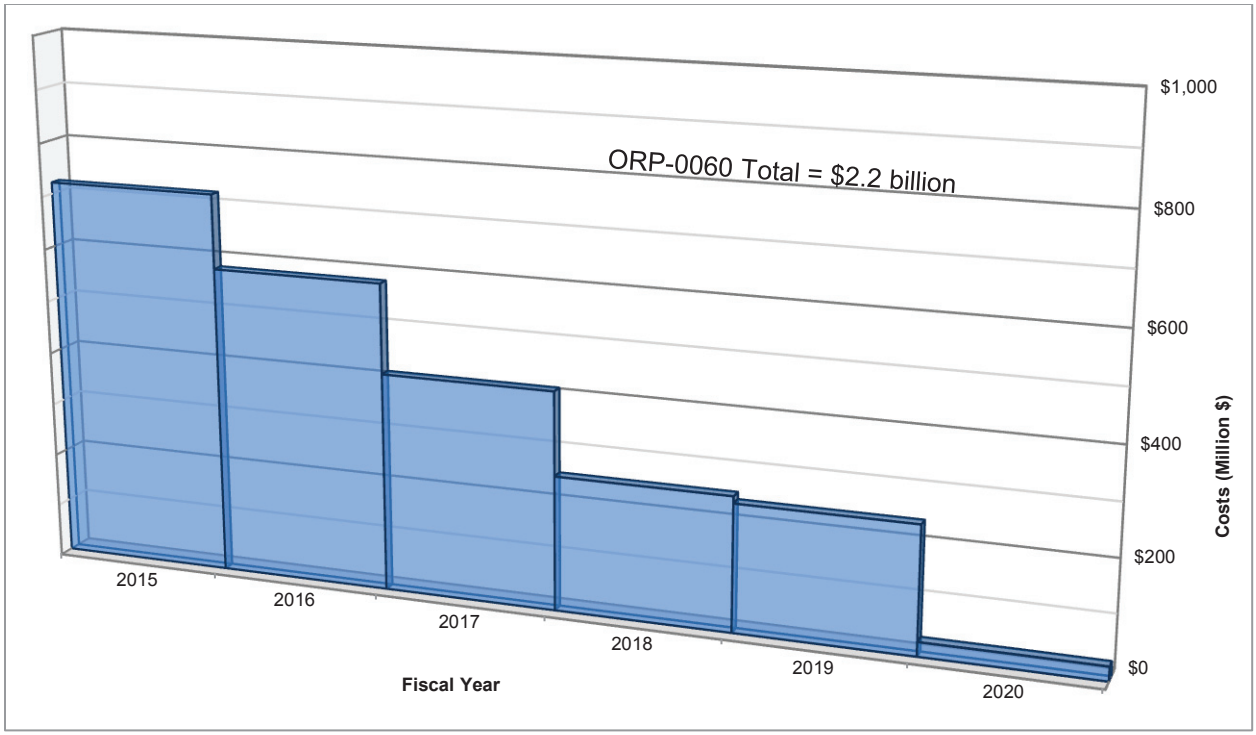

Figure 5-5. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Estimated Costs by Fiscal Year.

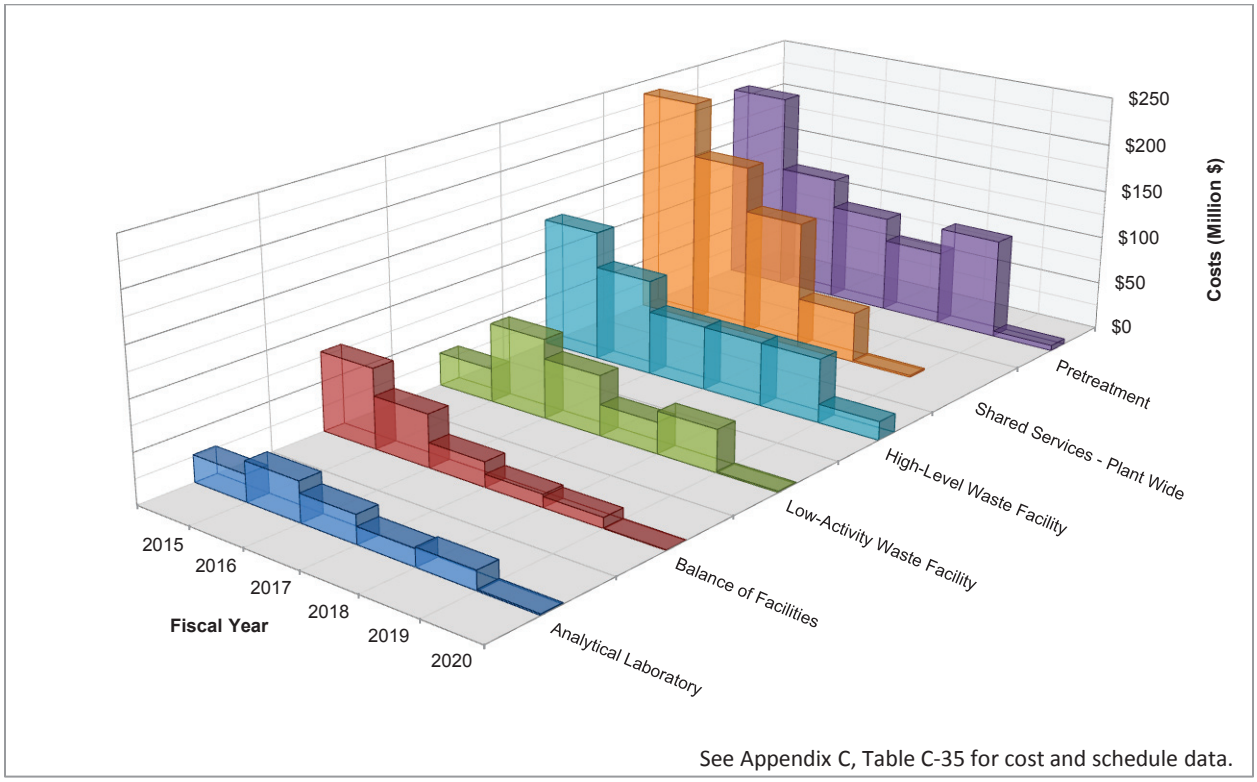

Figure 5-6. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Estimated Costs by Work Element.

5.3 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 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 ROD issuance. ORP-11242, Revision 4, details assumptions and uncertainties for the RPP.

The following is a summary of key assumptions and uncertainties:

- Cesium and strontium capsules will not be processed in the WTP. (The December 13, 2013, ROD [78 FR 75913] states that DOE is not deciding on treatment of the cesium and strontium capsules.)
- The RPP baseline presented in this report includes cost and/or schedule uncertainty to address highly probable risks that an offsite geologic repository will not be available to accept IHLW canisters from the Hanford Site starting in April 2023 and construction of additional interim HLW storage (up to 16,000 canisters) on the Hanford Site if the repository is delayed in opening or does not open.
- 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 could be provided by a second LAW vitrification facility located adjacent to the WTP, under the same technical assumptions as the WTP LAW Vitrification Facility, to complete hot commissioning on September 30, 2021, and 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 RCRA 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 FY2015 to support TRU tank waste retrieval.
- Waste previously assumed to be RH-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 at the IDF and WTP secondary liquid waste will be treated at the ETF and disposed at IDF.
- The IDF is currently in standby mode and will be ready to serve upon completion of a performance assessment, permit modification, operational readiness review, etc. The activation will be completed when the IDF is needed by the WTP. The IDF will provide permanent disposal for the immobilized LAW, 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 wastes.

  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 transfer of slurry in multiple DSTs to provide operational flexibility in managing waste and staging feed to the WTP.
- Fiscal year funding will be available to support the baseline case, including funding required for risk mitigating actions.

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6.0 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 Hanford cleanup through Richland Community and Regulatory Support (PBS RL-0100).

There are a number of infrastructure-related Mission Support activities in place to support cleanup of the Hanford Site. These Mission Support activities are managed under Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040). 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.

6.1 SAFEGUARDS AND SECURITY (PBS RL-0020)

The scope of this PBS includes one primary work element: Safeguards and Security. Table 6-1 describes the work scope. Safeguards and Security will be required until cleanup is complete, then protection of human health and the environment transfers to PBS RL-LTS. The level of effort required to ensure protectiveness may diminish as nuclear material is shipped offsite and as the cleanup progresses.

Table 6-1. 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.	RL = U.S. Department of Energy, Richland Operations Office.

Figure 6-1 provides the remaining estimated costs for Safeguards and Security (PBS RL-0020) by fiscal year.

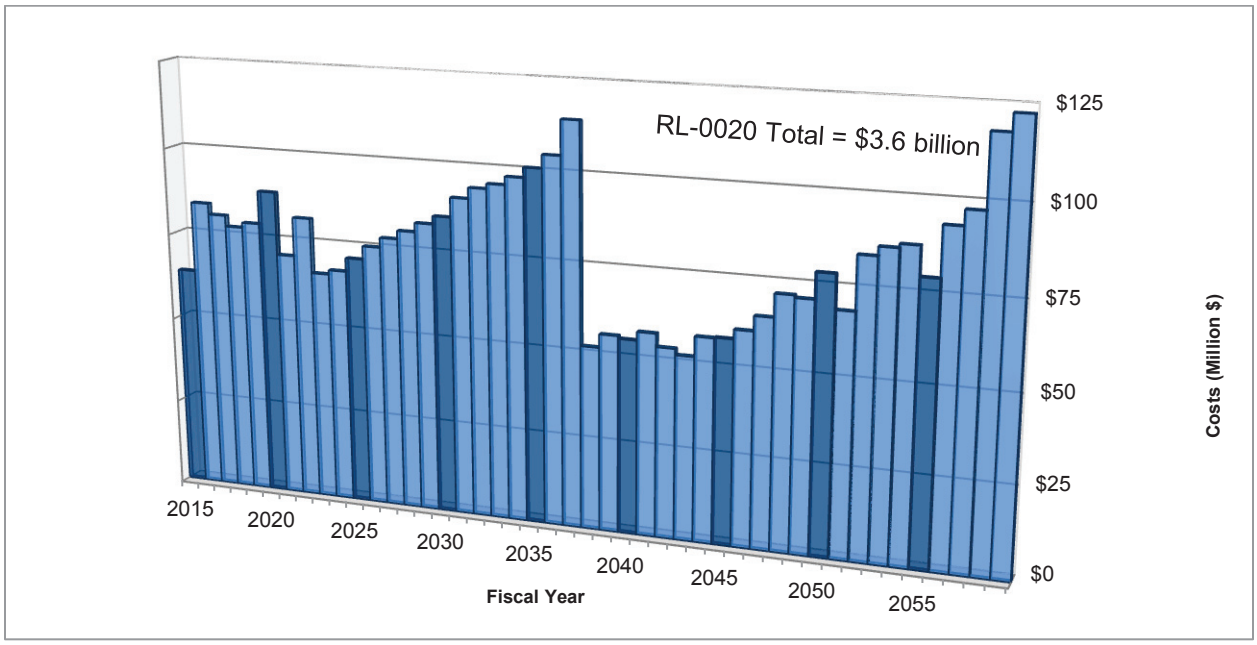

Figure 6-1. Safeguards and Security (PBS RL-0020) Remaining Estimated Costs by Fiscal Year.

6.2 RICHLAND COMMUNITY AND REGULATORY SUPPORT (PBS RL-0100)

This PBS includes support to the communities that are influenced by the Hanford cleanup and the scope of work is summarized in Table 6-2.

Table 6-2. 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 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.
PBS = project baseline summary. RL = U.S. Department of Energy, Richland Operations Office.	

Figure 6-2 provides the remaining estimated costs for Richland Community and Regulatory Support (PBS RL-0100) by fiscal year.

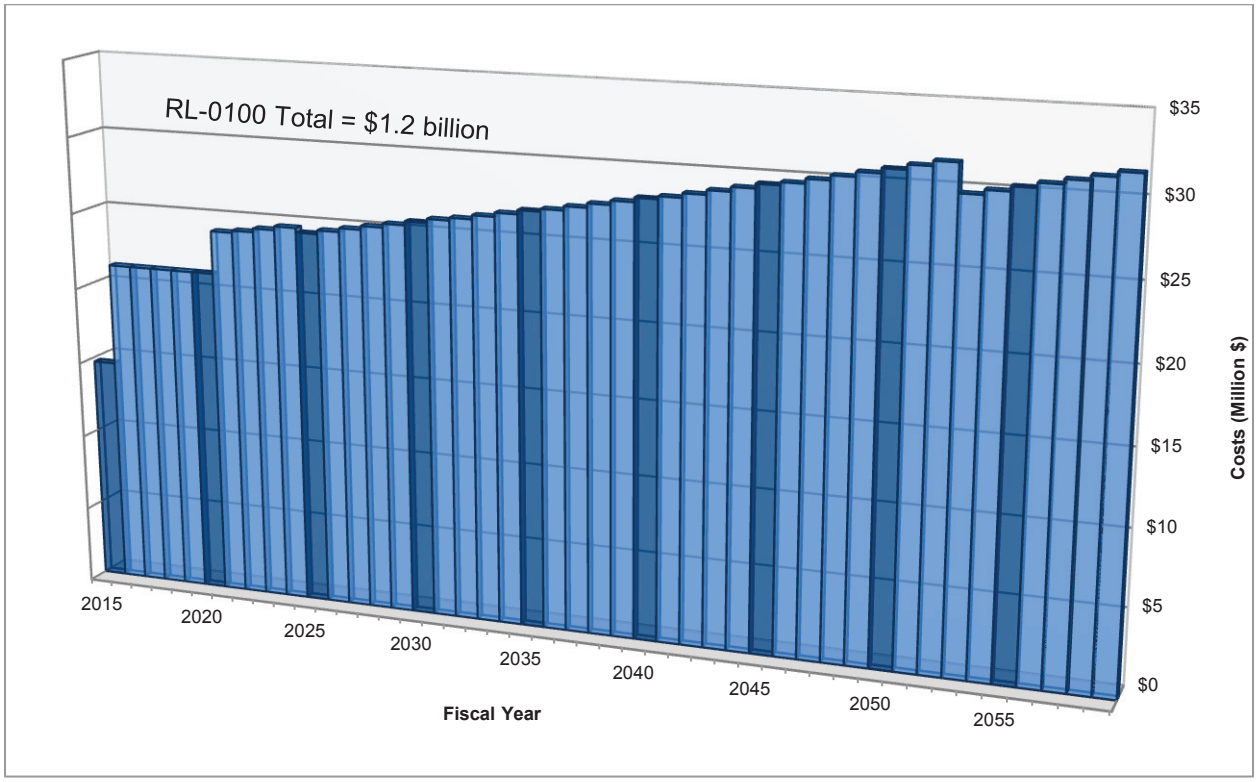

Figure 6-2. Richland Community and Regulatory Support (PBS RL-0100) Remaining Estimated Costs by Fiscal Year.

6.3 INFRASTRUCTURE AND SERVICES (PBS RL-0040)

Infrastructure and Services play a key role in completing the cleanup mission, and as noted in Chapters 2.0 and 4.0, the work scope is included within PBS RL-0040.

6.3.1 Reliability Projects and HAMMER

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 environmental cleanup mission. The scope description for these work elements is provided in Table 6-3.

Table 6-3. Infrastructure and Services (PBS RL-0040) Level 2 Scope Summary.

Work Element	Scope Description
Reliability Projects	Includes repair and replacement of infrastructure systems and provides capital upgrades to the infrastructure, including larger scale expense projects. Also included are construction and capital equipment expenditures associated with replacements for biological control, crane and rigging, electrical system, facilities, Hanford Fire Department, network and telecommunications, studies and estimates, transportation, water and sewer utilities and other infrastructure reliability projects.
HAMMER	Includes operations and maintenance activities at the HAMMER facility in support of the Hanford Site and other training programs.
Site-wide Services and Other Distributed Costs	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 offsite laboratory sample analysis), 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). - Includes contracted technical services in key areas such as audit, regulatory analysis, cost and risk analysis and estimating. Also includes mission critical support services to DOE and its contractors in key areas such as occupational medicine, information and telecommunications, janitorial, radiological laundry, electrical power and facilities rentals; critical independent legal counsel and litigation services in support of DOE and its contractors; and other mission critical support services to DOE and its contractors in key areas such as land transfers, acquisition and contract closeout, acquisition of natural gas utility services, energy conservation and management (including steam), natural resource trusteeship, Tribal Nation support, and other small contracts. - Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.
DOE = U.S. Department of Energy. HAMMER = Hazardous Materials Management and Emergency Response Training and Education Center.	PBS = project baseline summary. RL = U.S. Department of Energy, Richland Operations Office.

Figure 6-3 presents the remaining estimated costs for Infrastructure and Services (PBS RL-0040) by fiscal year and Figure 6-4 presents the remaining estimated costs by work element.

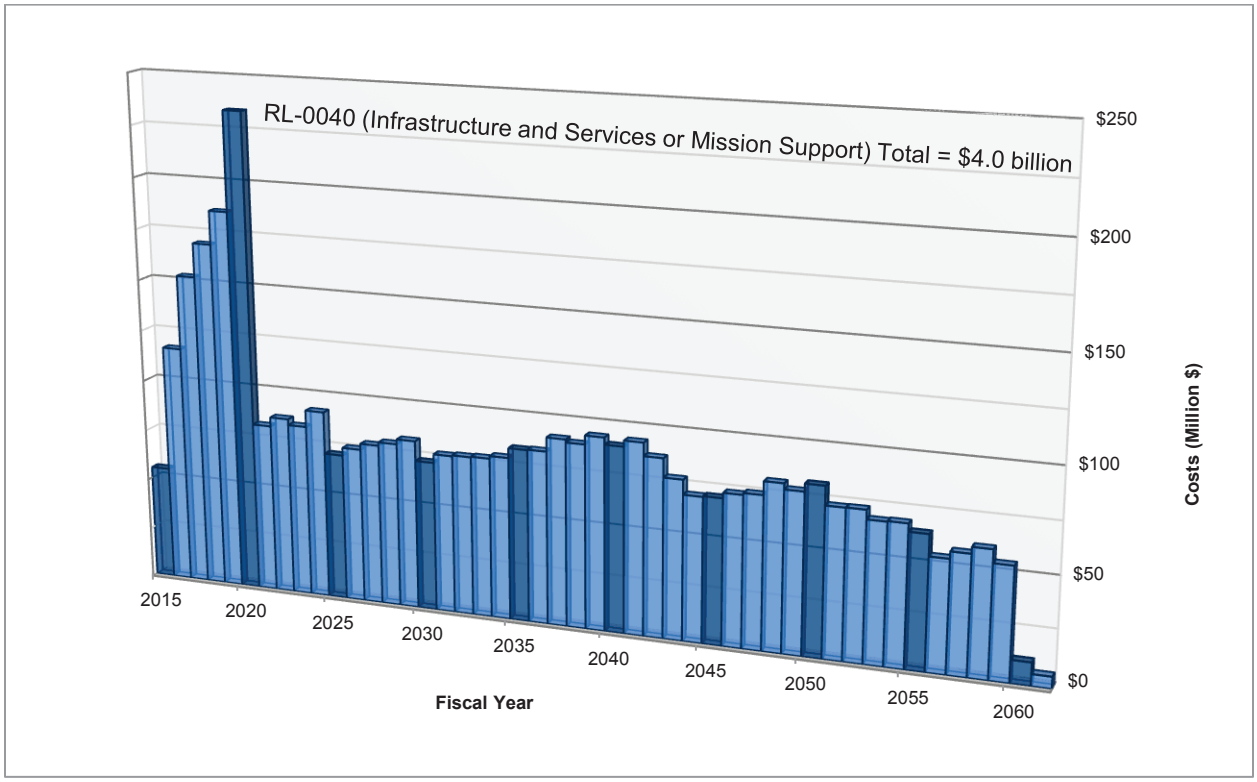

Figure 6-3. Infrastructure and Services (PBS RL-0040) Remaining Estimated Costs by Fiscal Year.

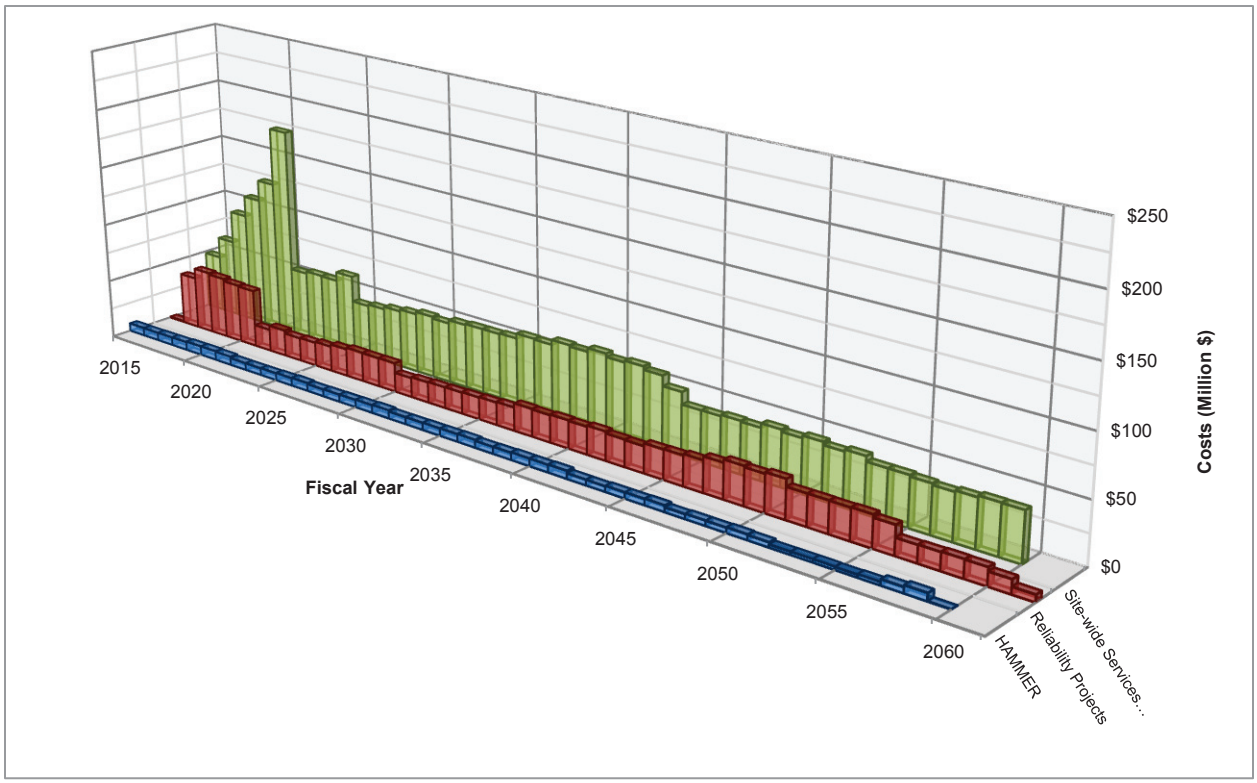

Figure 6-4. Infrastructure and Services (PBS RL-0040) Remaining Estimated Costs by Work Element.

6.3.2 Site-wide Services

The Site-wide Services program provides direct operations support to RL, 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; and portfolio management.

Under the safety, security and environment function, both Safeguards and Security (PBS RL-0020) and HAMMER (PBS RL-0040, Section 6.3.1) 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 and resource protection; and radiological site services.

The work elements under the site infrastructure and utilities function include: Offsite laboratory sample analysis; biological control; facility services; transportation; railroad services; roads and grounds; utilities (water, electricity), sewer systems; and sanitary waste management and disposal.

The work elements under the site business management function include: Real property asset management; property systems/acquisition and materials management; sponsorship, management and administration of employee pension and other benefits plans; Energy Employees Occupational Illness Compensation Program Act/workers compensation; external affairs and other interactions; mail services; and reproduction, correspondence control and multi-media.

As part of real property asset management, 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 6.4.

The work elements under the information resources and content management function include: Strategic planning and program management; telecommunications; information systems; and 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.

6.4 LONG-TERM STEWARDSHIP (PBS RL-LTS)

Following the completion of Hanford 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. 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 activities at Hanford.

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, recordkeeping 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 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 LTS Program manages Hanford's 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 LCR for the period from 2060 to 2090. The Federal Government 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 LCR.

Table 6-4 provides a summary of the scope. Figure 6-5 shows remaining estimated costs for PBS RL-LTS by fiscal year and Figure 6-6 shows the remaining estimated costs by work element.

Table 6-4. Long-Term Stewardship (PBS RL-LTS) Level 2 Scope Summary.

Work Element	Scope Description
Infrastructure and Waste Management	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 Long-Term Stewardship activities. Includes operation and maintenance of 200 Area liquid effluent facilities in support of groundwater treatment and monitoring activities.
Site and Environmental Monitoring	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, and Environmental Compliance	Includes real estate and Hanford Site planning, land management, and surveillance and maintenance activities for the 100 and 200 Areas. Includes activities to ensure environmental compliance and protection.
Payment in Lieu of Taxes	Includes payment in lieu of taxes.
Management and Administration	Provides for management and administration of these Long-Term Stewardship activities.

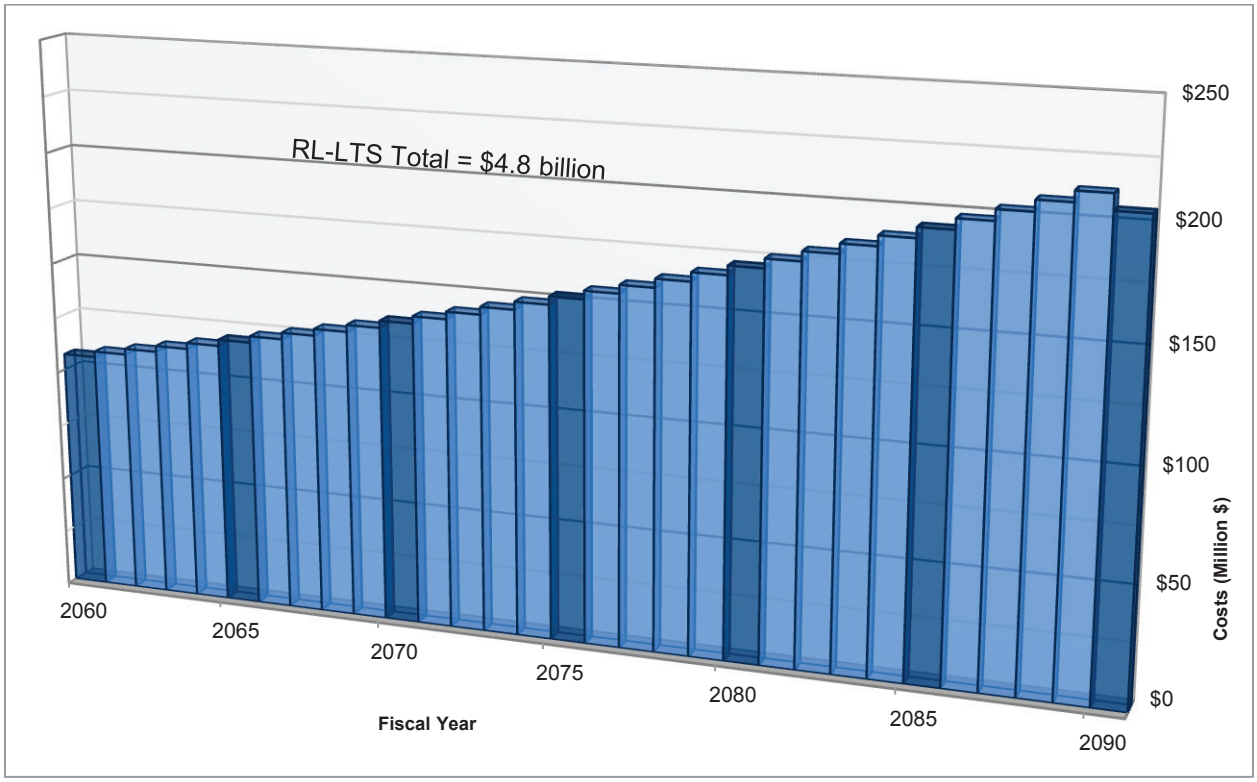

Figure 6-5. Long-Term Stewardship (PBS RL-LTS) Remaining Estimated Costs by Fiscal Year.

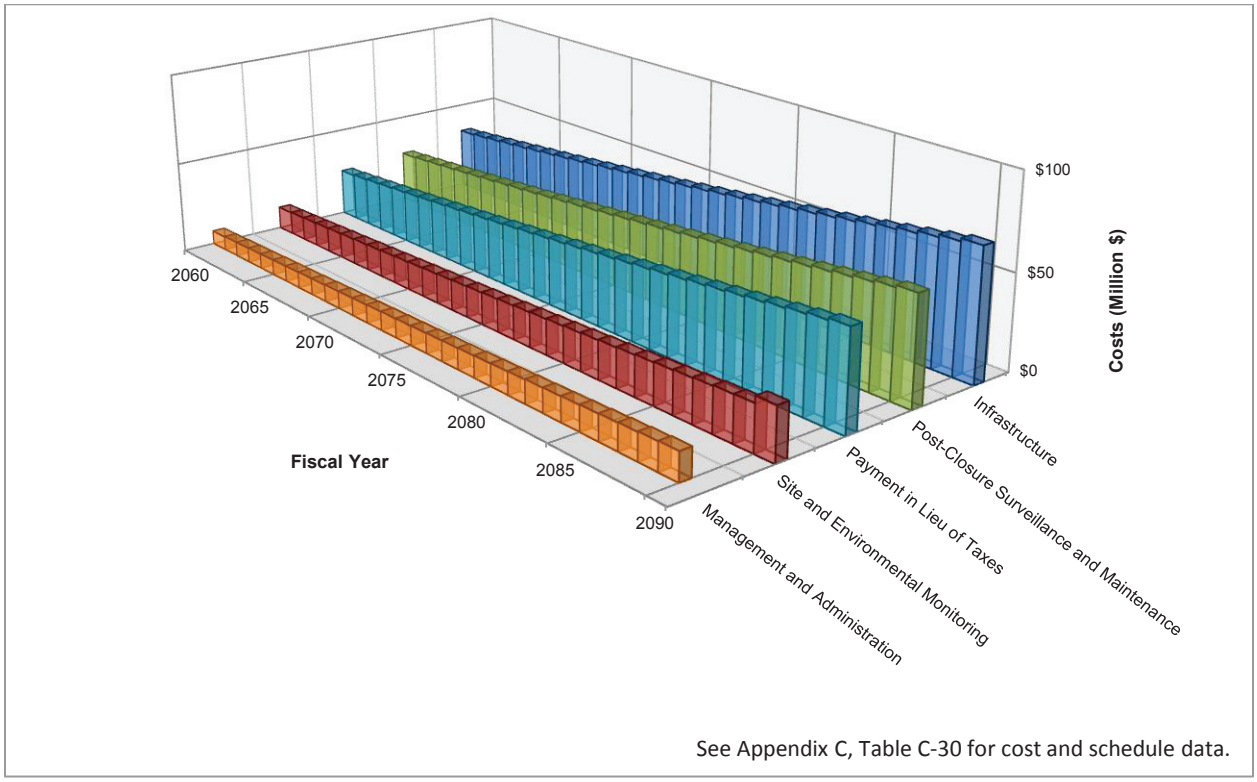

Figure 6-6. Long-Term Stewardship (PBS RL-LTS) Remaining Estimated Costs by Work Element.

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7.0 REPORT LIMITATIONS

7.1 SCHEDULE AND COST LIMITATIONS

The LCR is based on an annual compilation of estimated scope, schedule and cost information. In order to finish preparing the LCR, 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 2015 LCR, August 31, 2014, 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 2015 LCR.

7.2 OTHER LIMITATIONS

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

The LCR 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 LCR.

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APPENDIX A

HANFORD SITE EXISTING CLEANUP DECISIONS

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TERMS

AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CCN	correspondence control number
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
D&D	decontamination and decommission
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
HLW	high-level waste
IC	institutional controls
INL	Idaho National Laboratory
ISRM	in situ redox manipulation
ISS	interim safe storage
LCR	Lifecycle Report
MCL	maximum contaminant level
NPL	National Priorities List
NTCRA	non-time-critical removal action
OU	operable unit
P&T	pump-and-treat
PCB	polychlorinated biphenyl
PFP	Plutonium Finishing Plant
PRG	preliminary remediation goal
RCRA	*Resource Conservation and Recovery Act of 1976*
RD/RAWP	remedial design/remedial action work plan
ROD	record of decision
RTD	remove, treat, and dispose
SNF	Spent Nuclear Fuel
SST	single-shell tank
TCRA	time critical removal action
TPA	Tri-Party Agreement
TRU	transuranic
TSD	treatment, storage, and disposal
WIDS	Waste Information Data System
WIPP	Waste Isolation Pilot Plant
WTP	Waste Treatment and Immobilization Plant

APPENDIX A

HANFORD SITE EXISTING CLEANUP DECISIONS

Pursuant to the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as Tri-Party Agreement (TPA), M-036-01 requires the U.S. Department of Energy (DOE) to prepare an annual *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report [LCR]). The LCR is expected to reflect all actions necessary for DOE to meet all applicable environmental obligations as it completes the Hanford 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) (Tri-Party agencies), and other agencies conduct under Federal and State regulatory programs.

Several decisions affecting the Hanford cleanup mission have been made, and actions to implement these decisions have been completed, or are/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 TPA 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."**

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

- **Section A.1** provides a general overview of the principal processes that are employed at Hanford to reach decisions about future cleanup actions.
- **Section A.2** describes in more detail the Federal and State decisions that can affect Hanford 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 A.3** summarizes current decisions that, for purposes of this LCR, are considered to be cleanup decisions and which 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 LCR.

A.1 PRINCIPAL HANFORD CLEANUP DECISION-MAKING PROCESSES

To implement the cleanup mission, the Tri-Party agencies 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 the Tri-Party agencies use to achieve Hanford cleanup. 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, 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, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*).

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 use(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 regulatory 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 Hanford, and includes several tables that list and summarize the effects of these decisions.

A.2 DECISIONS THAT CAN AFFECT HANFORD CLEANUP

A.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 cleanup 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 the National Contingency Plan and Executive Order 12580, *Superfund Implementation*. EPA is the lead regulatory agency under the 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. A 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. RODs can be final or interim; interim RODs 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.

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

A.2.2 PERMITS, LICENSES, AND OTHER STATUTORY/REGULATORY PROGRAM APPROVALS

RCRA, as modified by the *Hazardous and Solid Waste Amendments of 1984*, gave EPA 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 state, Ecology has lead authority for most elements of RCRA. Principal documents used to implement Hanford 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 Hanford, a single final status permit covers the entire site, but 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 specific activities conducted at each TSD facility.
- **Closure/Post-Closure Plan.** Some 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 required to address residual contamination. Ecology must approve closure/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 cleanup releases from RCRA TSD facilities may be required before a final status permit is issued. Decisions about degree/methods for cleanup will be made and implemented through a corrective action plan approved by Ecology.

In addition to RCRA, several other programs authorized under existing Federal and State statutes and regulations require permits, licenses and other approvals that can affect cleanup at Hanford. These other decision documents establish, among other conditions, limits on emissions of radionuclides and other hazardous constituents to the air, water, and ground. Section A.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 cleanup.

A.2.3 TRI-PARTY AGREEMENT DECISIONS

Among other functions, the TPA helps define how 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 waste sites and facilities at Hanford, but it is that subsequent documentation (not the TPA) where cleanup decisions are formally established. These may include 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 A.3.

A.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 at Hanford. Section A.3 lists various Executive Orders, Presidential Proclamations, Congressional Acts, judicial orders/decrees, and Federal and State decisions that may affect cleanup.

A.3 SUMMARY OF HANFORD CLEANUP DECISIONS – FINAL AND NOT YET FINAL

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

While some decisions more clearly affect Hanford than others, care has been taken to include decisions that have indirect effects on 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 Hanford. As stated earlier, the LCR is required to consider cleanup alternatives “where final cleanup decisions have not yet been made” (TPA M-036-01, third paragraph) at Hanford. Some cleanup decisions may appear to be final but are not:

- They may be “interim” remedies until a final cleanup decision can be made, or
- They may 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 LCR, 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.

Hanford cleanup decisions summarized in Tables A-1, A-3, and A-5 indicate whether the decision is considered to be final by placing the word **FINAL** after the decision title in the first column. In addition to decisions that have been made, whether final or not, many cleanup decisions are yet to be made. By definition, the absence of a decision means there is not a final cleanup decision. It would be very difficult to develop an exhaustive list of all the decisions that still need to be made to complete Hanford cleanup. However, as these decisions are reached, they will be incorporated into this section of the LCR.

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

Record of Decision			
Title: *Record of Decision, USDOE Hanford 1100 Area* (EPA/ROD/R10-93/063) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 1100 **Date Approved:** Sep-93 **Initial Decision:** 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.			
Revision Title	**Type**	**Date**	**Revised Decision**
Explanation of Significant Differences for the Record of Decision for the USDOE Hanford 1100 Area Benton County, Washington (EPA 2010a)	ESD	Sep-10	Documents significant differences to the selected remedies in the ROD. In summary, this ESD clarifies the IC requirements for the Horn Rapids Landfill.
Record of Decision			
Title: *Declaration of the Record of Decision for the Environmental Restoration Disposal Facility* (EPA/ROD/R10-95/100) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 200 West **Date Approved:** Jan-95 **Initial Decision:** Initial construction of two cells; maximum size of 1.6 mi^2; landfill construction in accordance with RCRA; capped at completion.			
Revision Title	**Type**	**Date**	**Revised Decision**
USDOE Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Difference (ESD) (EPA/ESD/R10-96/145)	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/compaction activities at ERDF.
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, (also see proposed plan for amendment) (EPA/AMD/R10-97/101)	Amended ROD	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.
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, (also see proposed plan for amendment) (EPA/AMD/R10-99/038)	Amended ROD	Mar-99	Establishes conditional approval for delisting of the ERDF leachate.
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, (also see	Amended ROD	Jan-02	Authorizes four additional disposal cells and the option of staging waste at ERDF pending treatment and/or disposal.

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

proposed plan for amendment) (EPA/AMD/R10-02/030)			
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)	Amended ROD	May-07	Allows specific waste, such as waste associated with surveillance and maintenance of Hanford facilities, environmental research/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.
Declaration: U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site - 200 Area, Benton County, Washington (EPA 2009a)	Amended ROD and ESD	Aug-09	Allows for ERDF expansion of an area equal to 4 cells or 2 super cells; updates cell design to allow super cell concept and allows for ERDF expansion via EPA approval and fact sheets rather than ROD amendments.
Record of Decision			
Title: *Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit* (EPA/ROD/R10-95/114) **ROD Type:** CERCLA Interim Action ROD **Area:** 200 West; 200-ZP-1 OU **Date Approved:** May-95 **Initial Decision:** P&T 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.			
Record of Decision			
Title: *Record of Decision, Hanford 200 Area, 200-ZP-1 Operable Unit Superfund Site, Benton County, Washington* (EPA 2008) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 200 West; 200-ZP-1 OU **Date Approved:** Sep-08 **Initial Decision:** P&T to address carbon tetrachloride, nitrate, chromium, trichloroethylene, I-129, Tc-99, and tritium; monitored natural attenuation; flow-path control through injection of treated water; and ICs.			
Record of Decision			
Title: *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) **ROD Type:** CERCLA Interim Action ROD **Area:** 100; 100-BC-1, 100-DR-1, and 100-HR-1 OUs **Date Approved:** Sep-95 **Initial Decision:** 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.			
Revision Title	**Type**	**Date**	**Revised Decision**
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 documents preceding this ROD amendment) (EPA/AMD/R10-97/044)	Amended ROD	Apr-97	Incorporates 34 additional waste sites into the ROD; refines remedial cost estimate for original 37 sites and additional 34 sites based on actual data, streamlining, and lessons learned; documents that soil washing is not an effective treatment.
Record of Decision			
Title: *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) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 100; 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 OUs **Date Approved:** Feb-96 **Initial Decision:** No action.			

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

Record of Decision			
Title: *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) **ROD Type:** CERCLA Interim Action ROD **Area:** 100; 100-H, 100-K **Date Approved:** Mar-96 **Initial Decision:** Interim action to remove hexavalent chromium from groundwater; 30 extraction wells; ion exchange treatment; reinject treated effluent; monitor; institute ICs.			
Revision Title	**Type**	**Date**	**Revised Decision**
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)	Amended ROD	Oct-99	Implements In Situ Redox Manipulation barrier for second chromium plume in 100-HR-3 OU; existing P&Ts remain in operation.
Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision (EPA 2002)	ESD	Oct-02	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.
Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision (EPA/ESD/R10-03/606)	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.
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)	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.
Record of Decision			
Title: *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) Note: The ROD is only **FINAL** for the 300-FF-1 OU; it is an interim action for 300-FF-5 OU. **ROD Type:** CERCLA Final ROD **Area:** 300; 300-FF-1 and 300-FF-5 OUs **Date Approved:** Jul-96 **Initial Decision:** 300-FF-1: Remove contaminated soil and debris; dispose at ERDF; backfill and recontouring; ICs. 300-FF-5: Monitoring and ICs for groundwater.			
Revision Title	**Type**	**Date**	**Revised Decision**
USDOE Hanford 300 Area, 300-FF-1 Operable Unit, Hanford Site, Benton County, Washington Explanation of Significant Difference (ESD) (EPA/ESD/R10-00/505)	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.
Explanation of Significant Difference for the 300-FF-5 Record of Decision (EPA/ESD/R10-00/524)	ESD	Jun-00	Expanded scope of 300-FF-5 ROD to include groundwater in 300 Area, including 300-FF-2 sites and any sites plugged into 300-FF-1 ROD.
Record of Decision			
Title: *Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit* (EPA/ROD/R10-01/119) **ROD Type:** CERCLA Interim Action ROD **Area:** 300; 300-FF-2 OU **Date Approved:** Apr-01 **Initial Decision:** Remove contaminated soil, structures, and debris; treat as needed; dispose at ERDF, WIPP, or other; backfill and revegetate; establish ICs; continued groundwater monitoring; and define plug-in approach.			

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

Revision Title	Type	Date	Revised Decision
Explanation of Significant Differences for the 300-FF-2 Operable Unit Record of Decision (EPA 2004b)	ESD	May-04	Modified uranium soil cleanup level from 350 to 267 pCi/g based on engineering study to ensure protectiveness of the groundwater and river; modified land-use assumption for 8 outlying waste sites from industrial to unrestricted, changed cleanup levels for these sites to those consistent with 100 Area cleanup.
Explanation of Significant Differences for the 300-FF-2 Operable Unit Interim Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009e)	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.
Explanation of Significant Differences, Hanford 300 Area, 300-FF-2 Operable Unit, 618-10 Burial Ground (EPA 2011b)	ESD	Aug-11	Modified remedy to allow necessary treatment of liquid waste in bottles, up to 1 gal/bottle, to occur in trays within the excavation area in accordance with an approved work plan.
Record of Decision			
Title: *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1 Hanford Site, Benton County, Washington* (EPA and DOE, 2013) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 300; 300-FF-1, 300-FF-2 and 300-FF-5 **Date Approved:** Nov-13 **Initial Decision:** This ROD selects a remedy for the waste sites in 300-FF-2, a remedy for the groundwater in 300-FF-5 and amends the remedy for three 300-FF-1 waste sites. The interim action remedy for 300-FF-5, selected in 1996 and the interim action remedy for 300-FF-2 selected in 2001 are replaced with this final action remedy. The remedy for 300-FF-1 selected in 1996 is amended for additional remedial action of uranium from three sites. Contaminated buildings are being removed in accordance with CERCLA Action Memoranda and are not part of the OUs addressed by this ROD. The major components of the selected remedy for the 300-FF-2 OU are: • Remove, treat and dispose (RTD) at waste sites • Temporary surface barriers and pipeline void filling • Enhanced attenuation of uranium using sequestration in the vadose zone, PRZ and top of the aquifer • ICs, including the requirement that DOE prevent the development and use of property that does not meet residential cleanup levels at the 300 Area Industrial Complex and 618-11 for other than industrial uses, including use of property for residential housing, elementary and secondary schools, childcare facilities and playgrounds. The major components of the selected remedy for the 300-FF-5 OU are: • Monitored Natural Attenuation • Groundwater monitoring • Enhanced attenuation of uranium at the top of aquifer • ICs. The major component of the amended remedy for 300-FF-1 is: • Enhanced attenuation of uranium using sequestration in the vadose zone, PRZ and top of the aquifer.			
Record of Decision			
Title: *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** **ROD Type:** CERCLA Final ROD **Area:** 200 East and 200 West **Date Approved:** Sep-11 **Initial Decision:** RTD of soil and debris to specified depths cleanup levels for plutonium-contaminated soils and subsurface structures/debris. Soil vapor extraction at three 200-PW-1 waste sites will continue until vadose zone cleanup levels are met. Soil covers will be used to a depth of at least 15 ft over cesium-contaminated soils. Removal of sludge followed by tank stabilization for two tanks. No action for two waste sites. ICs and long-term monitoring for waste sites where contamination is left in place and an unrestricted land use is precluded.			

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

Record of Decision			
Title: *Declaration of the Record of Decision, USDOE Hanford 200 Area, Hanford Site, Benton County, Washington* (EPA/ROD/R10-97/048) **ROD Type:** CERCLA Interim Action ROD **Area:** 200 West; 200-UP-1 OU **Date Approved:** Feb-97 **Initial Decision:** Extract groundwater from high concentration zone of uranium and Tc-99 plumes and treat at Effluent Treatment Facility.			
Revision Title	**Type**	**Date**	**Revised Decision**
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)	ESD	Feb-09	Adds National MCL of 30 µg/L for uranium as ARAR for treating extracted water; replaces 190 gal/min pumping with a pumping requirement from existing and new wells consistent with approved RD/RAWP until uranium and Tc-99 concentrations are less than 10 times the MCL for 4 consecutive quarters; adds sampling requirements and updates cost estimates and IC requirements.
Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site 200-UP-1 Operable Unit (EPA 2012)	Interim Action ROD	Sep-12	Supersedes previous interim action ROD (Feb-97) and ESD (Feb-09). Includes groundwater extraction/treatment (with flow path control through injection of treated water) in combination with monitored natural attenuation for Tc-99, uranium, chromium (total and hexavalent), nitrate, carbon tetrachloride and tritium; hydraulic containment and further treatment technology evaluation for I-129; remedy performance monitoring and ICs.
Record of Decision			
Title: *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) **ROD Type:** CERCLA Interim Action ROD **Area:** 100, 200 North **Date Approved:** Jul-99 **Initial Decision:** 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.			
Revision Title	**Type**	**Date**	**Revised Decision**
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)	ESD	Jun-00	Plugs in 600-23 and JA Jones #1 waste sites to the Remaining Sites ROD.
Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision (EPA 2004a)	ESD	Feb-04	Adds 28 sites to ROD; adds 10 CFR 1022 and 40 CFR 6, Appendix A as ARARs to ROD; revises annual ICs report date to be coincident with the due date for the Sitewide ICs Plan for Hanford CERCLA Response Actions.
Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009d)	ESD	Aug-09	Authorizes adding 200-CW-3 OU wastes sites, 99 newly discovered waste sites, and 87 candidate sites using the plug-in approach in the ROD and any newly discovered waste sites that will be documented in the Administrative Record and in an annual fact sheet.

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

Record of Decision			
Title: *Record of Decision Hanford 100 Area Superfund Site 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units* (EPA 2014) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 100 Area **Date Approved:** Sep-14 **Initial Decision:** RTD at 91 waste sites, ICs at 15 waste sites, no additional action due to interim remedial actions completed at 198 waste sites, monitored natural attenuation to address nitrate, hexavalent chromium, trichloroethene, and strontium-90 in 100-FR-3 groundwater and ICs.			
Record of Decision			
Title: *Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington* (EPA/ROD/R10-99/059) **ROD Type:** CERCLA Interim Action ROD **Area:** 100-K **Date Approved:** Sep-99 **Initial Decision:** 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 ICs.			
Revision Title	**Type**	**Date**	**Revised Decision**
Interim Remedial Action Record of Decision Amendment, U.S. Department of Energy; 100 K Area K Basins, Hanford Site - 100 Area, Benton County, Washington (EPA 2005a)	Amended ROD	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 grouting in place some of the basin debris followed by removal along with the removal of the basins.
Record of Decision			
Title: *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) **ROD Type:** CERCLA Interim Action ROD **Area:** 100-N **Date Approved:** Sep-99 **Initial Decision:** ICs 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&T for 100-NR-2.			
Revision Title	**Type**	**Date**	**Revised Decision**
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)	ESD	May-03	Removes July 31 annual ICs reporting requirements, consolidates reporting with the site-wide IC annual report; eliminates requirement to evaluate applying 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.
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)	Amended ROD	Sep-10	Deploys the apatite sequestration technology for remediating Sr-90 in the 100-NR-2 OU by extending existing apatite permeable reactive barrier to ~2,500 ft, allows for deployment of the apatite sequestration technology elsewhere in 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.
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)	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 A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

Explanation of Significant Difference for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2013)	ESD	Aug-13	Adds 2 additional waste sites in the 100-NR-1 OU for remediation by RTD and increases the total cost by $401,500.
Record of Decision			
Title: *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) **ROD Type:** CERCLA Interim Action ROD for 2 RCRA TSDs and an associated site **Area:** 100-N **Date Approved:** Jan-00 **Initial Decision:** 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.			
Revision Title	**Type**	**Date**	**Revised Decision**
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)	ESD	May-03	Removes July 31 annual ICs requirement and consolidates reporting with the site-wide IC annual report; eliminates requirement to evaluate applying 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.
Record of Decision			
Title: *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) **ROD Type:** CERCLA Interim Action ROD **Area:** 100 **Date Approved:** Sep-00 **Initial Decision:** Remove contaminated soil, structures, and debris; treat as needed; dispose at ERDF; backfill and revegetate. Applies to 45 burial grounds in 100 Area.			
Revision Title	**Type**	**Date**	**Revised Decision**
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)	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 ICs for protection of groundwater and the Columbia River.
Record of Decision			
Title: *Record of Decision 221-U Facility (Canyon Disposition Initiative), Hanford Site, Washington* (EPA 2005b) **FINAL** **ROD Type:** CERCLA Final ROD **Area:** 200 West **Date Approved:** Oct-05 **Initial Decision:** Remove waste from vessels and equipment in the facility with levels of transuranic isotopes greater than 100 nCi/g and eventual disposal 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 dispose at ERDF; demolition and subsequent stabilization of the railroad tunnel, 271-U, 276-U, 291-U, and 292-U structures and 291-U-1 and 296-U-10 stacks and dispose at ERDF; constructing an engineered barrier; planting semiarid-adapted vegetation on the barrier; ICs; post-closure care; and ongoing barrier performance and groundwater monitoring.			

ARAR = applicable or relevant and appropriate requirement.
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act.*
EPA = U.S. Environmental Protection Agency.
ERA = expedited response action.
ERDF = Environmental Restoration Disposal Facility.
OU = operable unit.
P&T = pump-and-treat.
PCB = polychlorinated biphenyl.
PRZ = Periodically Rewetted Zone.
RCRA = *Resource Conservation and Recovery Act of 1976.*
RD/RAWP = remedial design/remedial action work plan.
ROD = record of decision.

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

ESD	=	explanation of significant difference.	RTD	=	remove, treat, and dispose.
IC	=	institutional controls.	TSD	=	treatment, storage, and disposal.
ISRM	=	in situ redox manipulation.	WIPP	=	Waste Isolation Pilot Plant.
MCL	=	maximum contaminant limit.			

Unless otherwise noted in Table A-2, decisions made through Action Memoranda are considered final and are available in the TPA Administrative Record (http://pdw.hanford.gov/arpir/). These decisions focus mainly on the deactivation, decontamination, decommissioning, and demolition (D4) of buildings and generally are considered final actions because buildings are demolished and the waste disposed to approved facilities; or remove, treat, and dispose (RTD) of contaminated soil from waste sites, which are generally considered final actions for individual waste sites. Slabs and contaminated soils underlying the buildings may require 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 A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
"618-9 Burial Ground Expedited Response Action, Phase I Project Plan" (CCN 9100749)	Feb-91	TCRA	Provides for trench excavation and removal of drummed liquid wastes from 618-9 Burial Ground. Treatment and/or disposal of 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, USDOE Hanford Site, Richland, WA" (CCN 9103432)	Jul-91	ERA	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 initially was 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	Identifies installing a soil vapor extraction system with granular activated carbon recovery and offsite granular activated carbon regeneration at 216-Z-1A 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, USDOE Hanford Site, Richland, WA" (CCN 9307470)	Mar-93	ERA	Identifies excavation and disposal of drums and homestead debris from the landfill and sampling 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, USDOE Hanford Site, Richland, WA" (CCN 9305567)	Jun-93	ERA	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, USDOE Hanford Site, Richland, WA" (Ecology and EPA 1994a)	Mar-94	ERA	Provides for mitigation of physical hazards, excavation of the worst-case landfill, characterization of 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 is to provide for the final removal action taken at the 100-IU-3 OU (the Wahluke Slope).

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
"Action Memorandum; N Springs Expedited Response Action Cleanup USDOE Hanford Site, Richland, WA" (Ecology and EPA 1994b)	Sep-94	ERA	Identifies a P&T system combined with a vertical barrier for implementation at N Springs. These systems comprise a component of 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; USDOE Hanford Site; Richland, Washington" (EPA and Ecology 1995)	Jun-95	ERA	Allows contaminated soil from 116-B-4, 116-B-5, and 116-C-1 to be excavated and temporarily stored pending start of ERDF operations; actions under this AM would provide additional information to support remedial design, including cost information, for 100-BC-1 OU. The ERA was not intended as a final decision; 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" (CCN 040739)	Nov-96	ERA	Identifies ERDF as the disposal location for 183-H Solar Evaporation Basin waste generated through cleanup activities.
"Action Memorandum, N Area Waste Expedited Response Action Cleanup Plan" (CCN 038546)	Nov-96	ERA	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.
"Action Memorandum; 100-B/C Area Ancillary Facilities and the 108-F Building Removal Action, USDOE Hanford Site, Richland, WA" (EPA 1997)	Jan-97	NTCRA	Identifies D4 with ERDF disposal for facilities in 100-B and 100-F Areas: 111-B, 115-B, 118-C-4, 119-B, 105-C reactor waste, and 108-F Building. The B Reactor and ISS of 105-C Reactor are not included in the AM. This action is considered final for 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, USDOE Hanford Site, Benton County, WA" (DOE and EPA 1997)	Mar-97	NTCRA	Identifies D&D as the preferred alternative for 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 at ERDF; other waste would be disposed as appropriate.
"Action Memorandum, USDOE Hanford 100 Area NPL, 100-IU-3 Operable Unit (Wahluke Slope), Hanford Site, Adams, Grant, and Franklin Counties, WA" (Ecology and DOE 1997)	Jul-97	TCRA	Addresses contaminated soils/drums at the 2,4-D Burial Ground in 200-IU-3 OU. Removal action includes excavating dioxin-contaminated soil for offsite disposal; bioremediation of 2,4-D contaminated soil; and excavating, cleaning, and disposing drums at ERDF. In the 1994 AM for Wahluke Slope, only 2,4-D Burial Ground was identified for sampling. Subsequently, additional contamination was found, prompting another AM. Completing this AM action allows continuation of the deletion process for the OU from the NPL.
"Action Memorandum: USDOE Hanford 100 Area National Priorities List, 105-F and 105-DR Reactor Buildings and Ancillary Facilities, Hanford Site, Benton County, WA" (CCN 059689)	Jul-98	NTCRA	Identifies ISS for 105-F and 105-DR reactor cores and D&D for reactor components up to the cores and for 116-D, 116-DR, 117-DR, and 119-DR ancillary facilities. Demolition will extend generally to 3 ft bgs; 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 reactors. Additional decisions are expected on the reactor cores in ISS.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
"Action Memorandum: USDOE Hanford 100 Area National Priorities List, 100-N Area Ancillary Facilities; Hanford Site, Benton County, WA" (DOE et al. 1998)	Dec-98	NTCRA	Provides for D&D of the inactive contaminated ancillary facilities in 100-N Area, facilities in the buffer zone, Hanford Generating Plant, and solid waste management units inside 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 100-N Area decision documents for waste sites.
"Action Memorandum: USDOE, Hanford 300 Area National Priorities List (NPL), 331-A Virology Laboratory Building, Hanford Site, Benton County, WA" (DOE and EPA 2000)	Feb-00	NTCRA	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 at ERDF. The concrete slab and underlying soils would remain in place.
"Action Memorandum: USDOE Hanford 100 Area National Priorities List (NPL); 105-D and 105-H Reactor Facilities and Ancillary Facilities; Hanford Site; Benton County, WA" (DOE and Ecology 2000)	Dec-00	NTCRA	Identifies ISS for the 105-F and 105-DR reactor cores and D&D 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 bgs; however, substructures and 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, 105-B Reactor Facility, Hanford Site, Benton County, WA" (DOE and EPA 2001)	Dec-01	NTCRA	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 at ERDF.
"Action Memorandum; 200 West Area, Central Waste Complex, 183-H Solar Evaporation Basin Waste, Hanford Site, Benton County, WA" (DOE et al. 2003)	Jun-03	NTCRA	Allows for the treatment and disposal to ERDF of wastes generated during the RCRA closure of 183-H basin.
"Action Memorandum; USDOE, 200 Area, Burial Ground 218-W-4C Waste Retrieval, Hanford Site, Benton County, WA" (DOE et al. 2004)	Apr-04	TCRA	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	Requires treatment of 105-K East North Loadout Pit waste prior to temporary storage at Hanford and ultimate disposal at WIPP.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
"Action Memorandum for the Non-Time-Critical Removal Action for the 224-B Plutonium Concentration Facility" (DOE/RL-2004-36)	Jun-04	NTCRA	Provides for removing nonradiological and radiological hazardous substances from 224-B Facility, removing equipment and associated piping, decontaminating structure and stabilizing contamination, demolishing structure to slab, disposing waste generated, and stabilizing area. Samples will be used to determine the need for additional cleanup of the remaining slab and any subsurface soils. These cleanup actions are not included in the AM, but deferred to future activities.
"Comprehensive Environmental Response, Compensation and Liability Act 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	NTCRA	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.
"Action Memorandum for the Non-Time-Critical Removal Action for the U Plant Ancillary Facilities" (DOE/RL-2004-67)	Dec-04	NTCRA	Provides for removing nonradiological and radiological hazardous substances from U Plant Ancillary Facilities, removing equipment/associated piping, decontaminating structures and stabilizing contamination, demolishing structures to slab, disposing the waste generated, and stabilizing the area around U Plant. The AM includes the specific facilities. Slabs and underlying soils will be addressed as needed through future CERCLA actions.
"Action Memorandum #1 for the 300 Area Facilities" (DOE and EPA 2005a)	Jan-05	NTCRA	Provides for D4 of 72 buildings/structures in the northern part of 300 Area, disposing D4 waste at ERDF. An additional 10 buildings/structures were included in the EE/CA that supports the AM; however, those buildings/structures were demolished and had no hazardous materials prior to the AM.
"Action Memorandum; USDOE, 100 Area, 105-N Reactor Facility and 109-N Heat Exchanger Building, Hanford Site, Benton County, WA" (DOE and Ecology 2005)	Mar-05	NTCRA	Provides for D&D of portions of 105-N and 109-N facilities and constructing a protective cover over the 105-N Reactor block, 109-N steam generator cells and pipe gallery, placing them into ISS, and waste generally disposed at ERDF. Final D&D of these facilities would be done in the future to allow decay of radionuclides in the reactor block. Identifies ISS as 64 years. This action is considered final for demolished portions of the reactor and heat exchange building. Additional decisions are expected on the reactor core and buildings in ISS.
"Action Memorandum for the Plutonium Finishing Plant, Above-Grade Structures Non-Time-Critical Removal Action" (DOE/RL-2005-13)	May-05	NTCRA	Provides for removing nonradiological and radiological hazardous substances from PFP above-grade structures, removing equipment/associated piping, decontaminating structures and stabilizing contamination, demolishing structures to slab, disposing the waste generated, and stabilizing and covering the area around PFP. Provides a listing of the specific structures. 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	NTCRA	Provides for D4 of 27 buildings/structures in northern part of 100-K Area with D4 waste going to ERDF. In general, slabs and subsurface structures would be removed with about 1 m of surrounding soil; however, on a case-by-case basis, the slabs, below-grade structures and soils can be deferred to CERCLA actions associated with 100-KR-1 and 100-KR-2 source OUs.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
"Action Memorandum for the Non-Time-Critical Removal Action for the 224-T Plutonium Concentration Facility" (DOE/RL-2004-68)	Jun-05	NTCRA	Provides for removing nonradiological and radiological hazardous substances from 224-T Facility, removing equipment/associated piping, decontaminating structure and stabilizing contamination, demolishing structure to slab, disposing the waste generated, and stabilizing the area. Samples will determine the need for additional cleanup of the remaining slab and any subsurface soils. These cleanup actions are not included in the AM, but deferred to future activities.
"Action Memorandum for the Time-Critical Removal Action for Support Activities to 200-UW-1 Operable Unit" (DOE/RL-2005-71)	Sep-05	TCRA	Provides activities to support U Canyon barrier construction, including removing part of the 200-W-42 pipeline, rerouting Treated Effluent Disposal Facility line and stabilizing/removing wastewater line; complete or partial removal of concrete slab; remove and seal 3 vent risers; and relocate various markers/utilities. The TCRA accelerated work consistent with weather conditions and to take advantage of available specialized resources. The action is not considered final; the decision process is ongoing for U Plant waste sites. The U Plant barrier ROD is considered final.
"Action Memorandum #2 for the 300 Area Facilities" (DOE and EPA 2006a)	May-06	NTCRA	Provides for D4 of the 324 and 327 Buildings and ancillary facilities in the 300 Area with D4 waste 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	NTCRA	Provides for D4 of 110 buildings/structures in southern part of the 300 Area with D4 waste going to ERDF. An additional 30 buildings/structures were included in the EE/CA that supports the AM; however, those buildings/structures are not included in the AM because DOE identified alternative uses for them.
"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	NTCRA	Identifies ISS for 105-KE and 105-KW reactor cores, D&D of reactor components up to the cores and for remaining buildings and structures in 100-K Area. Subsurface structures will be removed 3 ft bgs; substructures and soil beneath facilities that exceed cleanup levels will be evaluated through source OU cleanup activities that are considered final for the ancillary facilities and demolished portions of the reactors. Further decisions are expected on reactor cores in ISS.
"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)	May-08	NTCRA	Provides removal, treatment as needed, and disposal, generally to ERDF, of UPR-200-E-83 Zone A soils to a depth of 6 in, or until PRGs are met, and Zone B soils in areas of elevated radioactivity above PRGs. Excavation activities must consider old growth vegetation, avoiding destruction of existing plant life.
"Action Memorandum for the Non-Time-Critical Removal Action for the 212-N, -P and -R Facilities" (DOE/RL-2008-80)	May-09	NTCRA	Provides for removing nonradiological and radiological hazardous substances from 212-N, -P, and -R facilities equipment and associated piping; decontaminating structures, stabilizing contamination, demolishing basins and underlying soils to 1 m depth, disposing waste generated, and stabilizing surrounding area. Samples will be collected from underlying soils to evaluate the need for additional cleanup activities.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
"Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit" (DOE/RL-2009-48)	Jul-09	NTCRA	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 RTD alternative (3 sites). Cleanup levels will be consistent with existing 100 Area cleanup levels. If confirmatory sites do not meet cleanup levels, they will be addressed by the RTD alternative.
"Investigation-Derived Waste Purgewater Management Action Memorandum" (DOE/RL-2009-39)	Aug-09	NTCRA	Provides for additional purge water management capacity by relining an existing unit and installing up to 3 new units, each with leak-detection systems. The purge water management units will be operated according to requirements, monitored during operations, and disassembled and dispositioned to appropriate requirements following the operational period.
"Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit" (DOE/RL-2009-37)	Oct-09	NTCRA	Provides for cleanup of 34 waste sites in the 100-MG-2 OU using a confirmatory sampling/no further action alternative (16 sites) or an RTD alternative (18 sites). If the confirmatory sites do not meet cleanup levels, they will be addressed by the RTD alternative. The remaining 200-MG-2 OU sites are not included because contamination may exceed 15 ft bgs; they will be addressed through the CERCLA remedial process.
"Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit" (DOE/RL-2009-86)	Apr-10	NTCRA	Provides for cleanup of 37 waste sites in 100-MG-1 OU using a confirmatory sampling/no further action alternative (21 sites) or RTD alternative (16 sites). Cleanup levels will be consistent with existing 100 Area cleanup levels. If confirmatory sites do not meet cleanup levels, they will be addressed by the RTD alternative. Remaining 200-MG-1 OU sites are not included because contamination may exceed 15 ft bgs; they will be addressed through the CERCLA remedial process.
"Action Memorandum for General Hanford Site Decommissioning Activities" (DOE/RL-2010-22)	Apr-10	NTCRA	Establishes D4 for excess industrial buildings/structures and cleanup of various debris; provides for removing contaminated soil or evaluating contaminated soils for inclusion as a waste site through WIDS; identifies ERDF as the preferred location for wastes meeting ERDF disposal criteria; allows the possibility of using certain wastes in other remedial actions, such as fill material under barriers; and for incorporating additional, similar buildings and structures in the AM.
"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)	Dec-10	NTCRA	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.
"Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Tier 2 Buildings/Structures" (DOE/RL-2010-102)	Feb-11	NTCRA	Established D4 to slab-on-grade for 57 Tier 2 buildings / structures in 200 East Area; plug or grout below-grade piping and drains; remove equipment; remove and 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 area as needed.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision

AM = Action Memorandum.
bgs = below ground surface.
CCN = correspondence control number.
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*.
D4 = deactivate, decontaminate, decommission, and demolish.
D&D = decontamination and decommission.
EE/CA = engineering evaluation/cost analysis.
ERA = expedited response action.
ERDF = Environmental Restoration Disposal Facility.
ISS = interim safe storage.
NTCRA = non-time-critical removal action.
OU = operable unit.
P&T = pump-and-treat.
PFP = Plutonium Finishing Plant.
PRG = preliminary remediation goal.
RCRA = *Resource Conservation and Recovery Act of 1976.*
ROD = record of decision.
RTD = remove, treat, and dispose.
TCRA = time critical removal action.
TRU = transuranic.
WIDS = Waste Information Data System.
WIPP = Waste Isolation Pilot Plant.

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

Document	Summary
Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste (WA7890008967). **FINAL** Ecology issued a Draft Hanford Facility Dangerous Waste Permit, Rev. 9, for public review and comment from May 1, 2012, through October 22, 2012. Until Ecology reaches a final decision, Rev. 8C Permit remains in effect.	This dangerous waste permit, for the TSD of dangerous waste at Hanford, is the RCRA Permit for the Hanford Facility. The permit allows a step-wise permitting process to ensure the proper implementation of the TPA. In order to accomplish this, the permit consists of six parts: • Part I, Standard Conditions • Part II, General Facility Conditions • Part III, Unit-Specific Conditions for Final Status Operations • Part IV, Unit-Specific Conditions for Corrective Action • Part V, Unit-Specific Conditions for Units Undergoing Closure • Part VI, Unit-Specific Conditions for Units in Post-Closure.
Prevention of Significant Deterioration Permit No. PSD-X80-14, issued to RL by the EPA, Region 10. **FINAL**	Covers emission of NOx to the atmosphere from the Plutonium Uranium Extraction Plant and the Uranium-Trioxide Plant. No expiration date.
Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington (58 FR 48509) **FINAL**	In December 1992, DOE issued the *Final Environmental Impact Statement on Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, WA* (DOE/EIS-0119F). The final EIS analyzed alternatives for decommissioning eight water-cooled, graphite-moderated plutonium-production reactors located along the Columbia River. The eight reactors (B, C, D, DR, F, H, KE and KW) operated between 1944 and 1971 and are retired from service. The alternatives analyzed in the EIS included 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 ROD was signed September 10, 1993 (58 FR 48509). The ROD documented the DOE decision for safe storage followed by deferred one-piece removal of the eight surplus reactors. DOE prepared a supplemental analysis to the EIS in July 2010 (*Supplement Analysis, Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington* [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.

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

Document	Summary
Record of Decision: Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (78 FR 75913) **FINAL**	In December 2013, DOE issued the first in a series of RODs pursuant to the *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (TC&WM EIS, DOE/EIS–0391, December 2012). In this ROD DOE announced several decisions, including: to implement Tank Closure Alternative 2B, ‘‘Expanded WTP Vitrification and Landfill Closure,’’ without supplemental treatment at WTP and without technetium-99 removal in the WTP Pretreatment facility; to implement FFTF Alternative 2 Entombment; and, to implement Waste Management Alternative 2.
Hanford Site Air Operating Permit 00-05-006, Renewal 2 **FINAL**	Covers operations on the Hanford Site having a potential to emit airborne emissions. The permit provides a compilation of applicable *Clean Air Act of 1977* (42 USC 7401) requirements for radioactive and nonradioactive emissions at Hanford. It will be implemented through Federal and State programs. Effective April 1, 2013 through March 31, 2018. Attachment 1 contains Ecology’s permit terms and conditions. Attachment 2 contains the State of Washington Department of Health Radioactive Air Emissions License (FF-01) as permit terms and conditions. Attachment 3 contains the Benton Clean Air Agency 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 **FINAL**	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 **FINAL**	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 **FINAL**	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 **FINAL**	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-0004502, Washington State Department of Ecology – State Wastewater Permit **FINAL**	Allows treated effluent from the 200 East and 200 West Areas to be discharged to the 200 Area Treated Effluent Disposal Facility. This permit revised and replaced Permit ST-4502 and will remain in effect from July 1, 2012 to June 30, 2017.
Permit ST-4511, Washington State Department of Ecology – State Wastewater Permit **FINAL**	Consolidation of permits: ST-4501, 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. This permit will remain in effect until the new permit is issued.
Permit ST0045514, Washington State Department of Ecology – State Wastewater Permit **FINAL**	Allows domestic wastewater to be treated in a non-discharging, lined evaporative lagoon located northeast of the 200 West Area. Effective July 1, 2012 through June 30, 2017.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
Federal Facilities Compliance Act of 1992. **FINAL**	This act 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. Washington State, EPA, and DOE had the TPA, which addressed compliance with the storage prohibition for mixed waste at the time this law was enacted and was not required to develop a new plan. A violation of the TPA may concurrently be a violation of the *Federal Facilities Compliance Act of 1992* (i.e., Washington State may seek judicial enforcement under RCRA (42 USC 6901).
Nuclear Waste Policy Act of 1982 (42 USC 10101). **FINAL**	This act directed DOE to characterize and evaluate the Yucca Mountain site for suitability as a potential repository for disposal of commercial SNF and HLW. The act 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 was that HLW from atomic energy defense activities may be disposed in the proposed repository along with SNF. 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 developing a repository for disposal of HLW and SNF, pursuant to the *Nuclear Waste Policy Act of 1982*. As indicated in the Obama Administration's FY2010 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 dispose of HLW and SNF. The Administration directed establishing 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: 1. A new consent-based approach to siting future nuclear waste management facilities. 2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed. 3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management. 4. Prompt efforts to develop one or more geologic disposal facilities. 5. Prompt efforts to develop one or more consolidated storage facilities. 6. Prompt efforts to prepare for eventual large-scale transport of SNF and HLW to consolidated storage/disposal facilities when such facilities become available. 7. Support continued U.S. innovation in nuclear energy technology and workforce development. 8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns. In January 2013, DOE responded to the Blue Ribbon Commission's final report in the *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*. This policy document proposes a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of SNF and HLW from civilian nuclear power generation, defense, national security and other activities.

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

Document	Summary
Permit WAG-50-5180, Washington State Department of Ecology – State Sand and Gravel General Permit **FINAL**	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 **FINAL**	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 **FINAL**	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 A-4. Tri-Party Agreement Decisions Affecting Hanford Cleanup.

TPA Documentation	Summary of Decision
• M-045-00 • Appendix C Part 1: Required Retrieval Technologies • Appendix H	Closure will follow retrieval of as much tank waste as technically possible, with tank waste residues not to exceed 360 ft^3 in each of the 100-series tanks, 30 ft^3 in each of the 200-series tanks, or the limit of waste retrieval technology capability.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
Executive Order 11514, *Protection and Enhancement of Environmental Quality*, as amended by Executive Order 11991	This order requires Federal agencies to continually monitor and control their activities to protect and enhance the quality of the environment and develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs that may have potential environmental impacts so that interested parties can submit their views. DOE issued regulations 10 CFR 1021, "National Environmental Policy Act Implementing Procedures" and DOE O 451.1B, *National Environmental Policy Act Compliance Program* for compliance with this order.
Executive Order 12088, *Federal Compliance with Pollution Control Standards*	This order directs Federal agencies to comply with applicable administrative and procedural pollution control standards established by, but not limited to: *Clean Air Act of 1977* (42 USC 7401); *Noise Control Act of 1972* (42 USC 4901); *Clean Water Act of 1977* (33 USC 1251); *Safe Drinking Water Act of 1974* (42 USC 300); *Toxic Substances Control Act of 1976* (15 USC 2601); and RCRA (42 USC 6901).
Executive Order 12580, *Superfund Implementation*	This order delegates a number of Federal departments and agencies the authority and responsibility to implement certain provisions of CERCLA. Policies and procedures for implementing these provisions (e.g., response actions and fulfilling natural resource trusteeship responsibilities) are provided in the National Contingency Plan.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
Waste Isolation Pilot Plant Land Withdrawal Act (Public Law 102-579). **FINAL**	The act withdrew land from the public domain for purposes of creating and operating WIPP, the geologic repository in New Mexico designated as the national disposal site for defense TRU waste. In addition to establishing the location for the facility, the WIPP Land Withdrawal Act defines the characteristics and amount of waste that will be disposed at the facility. Amendments to the WIPP 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 TRU waste from other RCRA requirements. WIPP does have a RCRA permit and can accept mixed TRU waste. On May 15, 2003, EPA Region 6 approved DOE's request to dispose TRU and mixed TRU waste containing PCBs at WIPP subject to certain "conditions of approval."
Spent Fuel Settlement Agreement (No. CV-91-0035-S-EJL and No. CV-91-0054-S-EJL), October 17, 1995 Consent Decree for Stabilization of SSTs at Hanford Site between U.S. Department of Energy and Washington State Department of Ecology (No. CT-99-5076-EFS) September 29, 1999. **FINAL**	This agreement allows INL to receive SNF and mixed waste from offsite and establishes schedules for the treatment of existing HLW, TRU waste, mixed waste, and removal of SNF from the State. 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: • Pumping the tanks that pose the greatest environmental risk first, thus providing additional protection for the Columbia River and public health. • Accelerating the schedule for pumping so that 98% of approximately 6.2 million gallons of remaining pumpable liquid is removed by September 30, 2003, with the final 2% scheduled to be removed by September 30, 2004 (this was completed). • Increasing DOE funding to a level that supports successful execution of the new schedule for tank stabilization. • Work under the consent decree has been completed and the court has terminated the consent decree.
Presidential Proclamation 7319, *Establishment of the Hanford Reach National Monument* (June 9, 2000). **FINAL**	This proclamation set apart and reserved the Hanford Reach National Monument to protect all lands and interests in lands owned or controlled by the U.S. 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.
Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000). **FINAL**	This 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.
U.S. Department of Interior Announcement, National Historic Landmark, August 19, 2008.	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.
2015 National Defense Authorization Act	President Obama signed the 2015 National Defense Authorization Act into law on December 19, 2014, authorizing the Manhattan Project National Historical Park. B Reactor as the world's first production reactor is a signature facility of the Manhattan Project National Historical Park.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
Consent Decree in *State of Washington v. Department of Energy*, Case No. CV-08-5085-FVS (E.D. Wa. October 25, 2010)	The Consent Decree imposes milestones for the construction, commissioning, and startup of the 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.
Settlement Agreement between the State of Washington and the U.S. Department of Energy (No. 2: 03CV-05018-AAM January 6, 2006). **FINAL**	Prior to the issuance of the *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington* (HSW EIS) (DOE/EIS-0286F) and record of decision (69 FR 39449, "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 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 TRU waste to Hanford for processing and storage pending shipment to WIPP located 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 (DOE/EIS-0286F) groundwater and other analyses. The agreement specifies that when the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391) is complete, it will supersede the HSW EIS. Until that time, DOE will not rely on HSW EIS groundwater analyses for decision-making and will not import offsite waste to Hanford with certain limited exemptions as specified in the agreement.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980.*
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HLW = high-level waste.
HSW EIS = *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington.*
INL = Idaho National Laboratory.
PCB = polychlorinated biphenyl.
RCRA = *Resource Conservation and Recovery Act of 1976.*
SNF = spent nuclear fuel.
SST = single-shell tank.
TPA = Tri-Party Agreement.
TRU = transuranic.
WIPP = Waste Isolation Pilot Plant.
WTP = Waste Treatment Plant.

A.4 REFERENCES

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EPA/ESD/R10-00/524, 2000, *Explanation of Significant Difference for the 300-FF-5 Record of Decision*, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ESD/R10-03/605, 2003, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ESD/R10-03/606, 2003, *Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-93/063, 1993, *Record of Decision, USDOE Hanford 1100 Area*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-95/100, 1995, *Declaration of the Record of Decision for the Environmental Restoration Disposal Facility*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-95/114, 1995, *Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-95/126, 1995, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-96/134, 1996, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units*, *Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-96/143, 1996, *Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-96/151, 1996, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-97/048, 1997, *Declaration of the Record of Decision, USDOE Hanford 200 Area, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-99/039, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-99/059, 1999, *Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-99/112, 1999, *Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-00/120, 2000, *Interim Remedial Action Record of Decision Declaration, U.S. Department of Energy 100 Area, 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-00/121, 2000, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

EPA/ROD/R10-01/119, 2001, *Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

Executive Order 11514, 1970, *Protection and Enhancement of Environmental Quality*, Richard M. Nixon, March 5. Sec. 2 amended by Executive Order 11991 of May 24, 1977, 42 FR 26967, 3 CFR, 1977 Comp., p. 123.

Executive Order 11991, 1977, *Relating to Protection and Enhancement of Environmental Quality*, Jimmy Carter, May 24, 1977, 42 FR 26967.

Executive Order 12088, 1978, *Federal Compliance with Pollution Control Standards*, James E. Carter, October 13. Sec. 1-8 amended by Executive Order 12580 of Jan. 23, 1987, 52 FR 2923, 3 CFR, 1987 Comp., p. 193.

Executive Order 12580, 1987, *Superfund Implementation*, 52 FR 2923, 3 CFR, 1987 Comp., p. 193.

Executive Order 13175, 2000, *Consultation and Coordination with Indian Tribal Governments*, William J. Clinton, November 6.

Federal Facilities Compliance Act of 1992, Public Law 102-386, October 6, 1992, 106 Stat. 1505.

Hazardous and Solid Waste Amendments of 1984, Public Law 98-616, November 8, 1984, 98 Stat. 3221.

Noise Control Act of 1972, 42 USC 4901, et seq.

Nuclear Waste Policy Act of 1982, 42 USC 10101, 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.

Safe Drinking Water Act of 1974, 42 USC 300, et seq.

Spent Fuel Settlement Agreement between the State of Idaho and U.S. Department of Energy, order signed October 16, 1995, in *Public Service Co. of Colorado v. Batt* (CV-91-0035-S-EJL) and *United States V. Batt* (CV-91-0054-S-EJL).

Superfund Amendments and Reauthorization Act of 1986, 42 USC 103, et seq.

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

WA7890008967, 2013, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*, Washington State Department of Ecology, Nuclear Waste Program, Richland, Washington, September 30.

Waste Isolation Pilot Plant Land Withdrawal Act, 1992, Public Law 102-579, October 30, 106 Stat.4777.

APPENDIX B

FUTURE CLEANUP ACTIONS AND ALTERNATIVE ANALYSES

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TERMS

ABAR	aggregate barrier
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CSNA	confirmatory sampling to support no further cleanup action
D&D	decontamination and decommission
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
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
ESD	explanation of significant differences
ETF	Effluent Treatment Facility
FBSR	fluidized bed steam reforming
FFTF	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
LCR	Lifecycle Report
LERF	Liquid Effluent Retention Facility
LTS	long-term stewardship
MESC	maintain existing soil cover
MNA	monitored natural attenuation
N/A	not applicable
NEPA	*National Environmental Policy Act of 1969*
NRDWL	Nonradioactive Dangerous Waste Landfill
OU	operable unit
P&T	pump-and-treat
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction (Plant)
RAO	remedial action objective
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction-Oxidation Facility (S Plant)
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RTD	remove, treat, and dispose
SALDS	State-Approved Land Disposal Site
S&M	surveillance and maintenance
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	*Washington Administrative Code*
WESF	Waste Encapsulation and Storage Facility
WRAP	Waste Receiving and Processing Plant
WTP	Waste Treatment and Immobilization Plant

APPENDIX B

FUTURE CLEANUP ACTIONS AND ALTERNATIVE ANALYSES

In accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as the Tri-Party Agreement (TPA) M-036-01 requires that where final cleanup decisions have not yet been made, the *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report [LCR]) may 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 implement future cleanup actions at the Hanford Site. As discussed in Section B.1, the LCR has grouped remaining Hanford Site cleanup work into approximately 36 separate cleanup actions.

Because final cleanup decisions have not yet been made for many of the remaining Hanford cleanup work, the LCR may 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 LCR. 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 B.2 includes information about the range of plausible alternatives for each future 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 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 B.3 proposes a rationale and schedule for when different cleanup actions may undergo in-depth alternatives analyses in the LCR.

Information provided in this appendix has been developed for the sole purpose of preparing the LCR and fulfilling the requirements of TPA M-036-01; the LCR 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 procedures established in the TPA and applicable Federal and State requirements. Information in this appendix does not presume nor is it intended to prejudice the outcome of the requirements that must be followed by the Tri-Party 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.

B.1 IDENTIFYING FUTURE CLEANUP ACTIONS FOR THE HANFORD SITE

The term "cleanup action" is used to conceptually describe 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 cleanup action concept is consistent with the operable unit (OU) cleanup approach taken in the TPA and enables future cleanup actions and alternatives to be addressed in a manner consistent with the way cleanup decisions are being made for Hanford. This approach also provides a reasonable middle ground for looking at cleanup work that is performed onsite.

The Tri-Party agencies developed a set of cleanup actions for the LCR. Table B-1 lists the future cleanup actions for which final cleanup decisions do not yet exist.

Table B-1. Future Cleanup Actions for which Final Decisions Have Not Been Made.

River Corridor Cleanup Actions
• Disposition N Reactor • Disposition 100 Area K West Basin • Remediate 100 Area Contaminated Soil Sites • Restore 100-BC-5 Groundwater OU to Beneficial Use • Restore 100-KR-4 Groundwater OU to Beneficial Use • Restore 100-NR-2 Groundwater OU to Beneficial Use • Restore 100-HR-3 Groundwater OU to Beneficial Use • Disposition 300 Area Facilities Retained by Pacific Northwest National Laboratory • Disposition of 100 Area former Orchard Contaminated Soil Sites (100-OL-1 OU)
Central Plateau Cleanup Actions
• Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU) • Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 OUs) • Disposition Below-Grade Portions of Plutonium Finishing Plant • Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU) • Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU) • Disposition PUREX Storage Tunnels (200-CP-1 OU) • Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU) • Disposition T Plant Canyon Building/Associated Waste Sites • Disposition Cesium/Strontium Capsules • Remediate 200-SW-1 OU • Disposition Remaining Liquid Waste Disposal Facilities • Disposition Remaining Waste Treatment, Storage, and Disposal Facilities • Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks (200-IS-1 OU) • Remediate Land Disposal Units (200-SW-2 OU) • Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU) • Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU) • Disposition Fast Flux Test Facility Complex • Disposition Remaining Buildings and Facilities Within Fast Flux Test Facility Complex • Disposition Remaining Inner Area Buildings and Facilities • Remediate Contaminated Deep Vadose Zone (200-DV-1 OU) • Restore 200 West Groundwater to Beneficial Use (200-UP-1 OU) • Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 OUs)
Tank Waste Cleanup Actions
• Tank Retrieval and Single-Shell Tank Farm Closure • Tank Waste Treatment • Secondary Waste Treatment • Double-Shell Tank Closure • Waste Treatment and Immobilization Plant Closure
OU = operable unit. REDOX = Reduction-Oxidation Facility (S Plant). PUREX = Plutonium Uranium Extraction (Plant).

Cleanup work at Hanford 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 LCR will evolve over time and may have a different scope in future reports as progress is made in completing Hanford cleanup.

B.2 IDENTIFYING RANGES OF PLAUSIBLE ALTERNATIVES AND ANALYZING ALTERNATIVES FOR FUTURE CLEANUP ACTIONS

The LCR provides information about ranges of plausible alternatives for future cleanup actions. Alternatives are included based on current understandings among the Tri-Party agencies, the status of existing and forthcoming cleanup decisions, and whether current planning adequately encompasses the range of plausible alternatives. The Tri-Party agencies developed and maintain the range of plausible alternatives presented in Section B.2.1.

As discussed further in Section B.2.2, a more in-depth analyses of the alternatives for individual future cleanup actions will be performed in order to describe a reasonable upper bound for the scope and costs of a specific cleanup action. The Tri-Party 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 future cleanup actions in each annual LCR. The main reasons for this approach include the following:

- Developing and analyzing alternatives for every separate cleanup action in every annual edition of the LCR 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 are underway, the results of which will improve the ability to analyze alternatives in future LCRs.

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

B.2.1 RANGE OF PLAUSIBLE ALTERNATIVES

The range of plausible alternatives for each future cleanup action was originally developed through a series of working sessions involving the Tri-Party 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). Determining 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 was intended to encompass the most current planning assumptions with respect to that cleanup action. This list is updated by the Tri-Party agencies annually.

Tables B-2, B-3, and B-4 list and are organized by the identified future cleanup actions for River Corridor, Central Plateau, and Tank Waste. These tables include the following:

- 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 B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

CLEANUP ACTION:	RC-1a[1] River Corridor – Disposition N Reactor
Cleanup Decision Summary and Relevant Decision Documents In September 1993, DOE issued 58 FR 48509, "Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, WA," 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 ISS was approved through the CERCLA process. Final disposition of N Reactor will be determined by a subsequent NEPA or CERCLA decision process. • 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, October.	
Range of Plausible Alternatives • Demolition of the reactor block in ISS and transport the reactor block intact on a tractor transporter from the present 100 Area location to the 200 West Area for disposal. • 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. • 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. 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.	
CLEANUP ACTION:	RC-2 River Corridor – Disposition 100 Area K West Basin
Cleanup Decision Summary and Relevant Decision Documents 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. • EPA/ROD/R10-99/059, 1999, *Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • DOE and EPA, 2004, *Action Memorandum: Request for Time Critical Response for Treatment and Disposal of Sludge from the 105-K East North Loadout Pit, USDOE Hanford Site*, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, June 4. • EPA, 2005, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.	
Range of Plausible Alternatives • 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.* * May require removing K Reactors to access below-grade contaminated soils. K East Basin was demolished in 2009.	
CLEANUP ACTION:	RC-3 River Corridor – Remediate 100 Area Contaminated Soil Sites
Cleanup Decision Summary and Relevant Decision Documents Interim RODs, ROD amendments, ESDs, and Annual Fact Sheets (100 Area "Plug-In" and Candidate Waste Sites for FY2010) are in place to remove contaminated soil, structures, debris, and burial grounds using the observational and plug-in approaches with onsite disposal at ERDF. • EPA, 2004, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision,* U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.	

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

- EPA, 2007, *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),* U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2009a, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2011, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-95/126, 1995, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/AMD/R10-97/044, 1997, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-99/039, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ESD/R10-00/045, 2000, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-00/120, 2000, *Interim Remedial Action Record of Decision for the 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ESD/R10-03/605, 2003, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-00/121, 2000, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- *Resource Conservation and Recovery Act of 1976*, (42 USC 6901), et seq.

Range of Plausible Alternatives

- 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.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

* In accordance with applicable interim action RODs.

** Closure of several 100-N facilities will be according to approved RCRA closure plans.

CLEANUP ACTION:	RC-4.1 River Corridor – Restore 100-BC-5 Groundwater OU to Beneficial Use

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for this OU; however, a proposed plan went through public review and the ROD is expected to be completed in late 2014. Groundwater monitoring and annual reporting continue to track groundwater contamination in this OU.

- WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code,* Olympia, Washington.
  - WAC 173-340-720, "Groundwater Cleanup Standards."

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

Range of Plausible Alternatives

- Install P&T system in 100-BC-5; transition to S&M for post-treatment groundwater monitoring.
- Incorporate bioremediation for chromium.
- Allow monitored natural attenuation to proceed under LTS with institutional controls.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

CLEANUP ACTION:	RC-4.2 River Corridor – Restore 100-KR-4 Groundwater OU to Beneficial Use

Cleanup Decision Summary and Relevant Decision Documents

An interim ROD is in place to clean up hexavalent chromium in the groundwater using P&T.

- EPA, 2009d, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-96/134, 1996, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units*, *Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code*, Olympia, Washington.
  - WAC 173-340-720, "Groundwater Cleanup Standards."

Range of Plausible Alternatives

- Expand the P&T system in 100-KR-4; transition to S&M for post-treatment groundwater monitoring.
- Continue operation of P&T system with incorporation of bioremediation for chromium.
- Allow monitored natural attenuation to proceed under LTS with institutional controls.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

CLEANUP ACTION:	RC-4.3 River Corridor – Restore 100-NR-2 Groundwater OU to Beneficial Use

Cleanup Decision Summary and Relevant Decision Documents

An action memorandum, interim ROD, and ESD are in place to clean up strontium-90 in the groundwater using P&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.

- EPA, 2011, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2010, *Amended Record of Decision, Decision Summary and Responsiveness Summary U.S. Department of Energy 100-NR-1 and NR-2 Operable Units, Hanford Site – 100 Area, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- Ecology and EPA, 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.
- EPA/ESD/R10-03/605, 2003, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-99/112, 1999, *Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code*, Olympia, Washington.
  - WAC 173-340-720, "Groundwater Cleanup Standards."

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

Range of Plausible Alternatives

- Resume operation of existing P&T system; operate and expand system as necessary until cleanup objectives are achieved; transition to S&M for post-treatment groundwater monitoring.
- Construct an impermeable barrier along the shoreline to re-direct groundwater flow and increase travel times for radioactive decay to achieve cleanup objectives.
- Expand the apatite permeable reactive barrier to promote sequestration of strontium-90.
- Incorporate phytotechnology.
- Use sequestration and immobilization technologies for inner portion of strontium-90 plume.
- Allow monitored natural attenuation to proceed under LTS with institutional controls.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

CLEANUP ACTION:	RC-4.4 River Corridor – Restore 100-HR-3 Groundwater OU to Beneficial Use

Cleanup Decision Summary and Relevant Decision Documents

An interim ROD, ROD amendment, and ESDs are in place to clean up hexavalent chromium in the groundwater using P&T and an in situ reduction/oxidation ("redox") manipulation barrier.

- EPA/ROD/R10-96/134, 1996, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units*, *Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/AMD/R10-00/122, 1999, *Interim Remedial Action Record of Decision Amendment: 100-HR-3 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2002, *Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ESD/R10-03/606, 2003, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2009b, *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*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code*, Olympia, Washington.
  - WAC 173-340-720, "Groundwater Cleanup Standards."

Range of Plausible Alternatives

- Expand P&T system in 100-HR-3; transition to S&M for post-treatment groundwater monitoring.
- Maintain and repair in situ redox manipulation barrier.
- Incorporate bioremediation.
- Allow monitored natural attenuation to proceed under LTS with institutional controls.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

CLEANUP ACTION:	RC-5 River Corridor – Disposition 300 Area Facilities Retained By PNNL

Cleanup Decision Summary and Relevant Decision Documents

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&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&D has been completed. Decision documents for D&D of 300 Area buildings and facilities that may have future application for the PNNL-retained facilities are listed here.

- DOE and EPA, 2005, *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.
- DOE and EPA, 2006a, *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.
- DOE and EPA, 2006b, *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.

Range of Plausible Alternatives

- 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.

D4 = deactivate, decontaminate, decommission, and demolish.
D&D = decontamination and decommission.
DOE = U.S. Department of Energy.
EIS = environmental impact statement.
ERDF = Environmental Restoration Disposal Facility.
ESD = explanation of significant differences.
FFTF = Fast Flux Test Facility.
ISS = interim safe storage.
LTS = long-term stewardship.
NEPA = *National Environmental Policy Act of 1969*.
OU = operable unit.
P&T = pump-and-treat.
PNNL = Pacific Northwest National Laboratory.
RAO = remedial action objective.
RCRA = *Resource Conservation and Recovery Act*.
RI/FS = remedial investigation/feasibility study.
ROD = record of decision.
RTD = remove, treat, and dispose.
S&M = surveillance and maintenance.
SSE = safe storage enclosure.
WAC = *Washington Administrative Code*.

[1] RC-1 River Corridor – Disposition 100 Area Reactors (Except B Reactor) was removed from the LCR in response to comments that the 1993 National Environmental Policy Act ROD is considered a final action (see Appendix A, Table A-3)

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-1 Central Plateau – Disposition Remaining Outer Area Buildings and Facilities

Cleanup Decision Summary and Relevant Decision Documents

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&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&D has been completed.

- DOE/RL-2008-80-ADD1, 2010, *Action Memorandum for the Non-Time Critical Removal Action for the 212-N, 212-P, and 212-R Facilities*, *Addendum 1: Disposition of Railcars*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2010-22, 2010, *Action Memorandum for General Hanford Site Decommissioning Activities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Range of Plausible Alternatives

- 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.

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-2 Central Plateau – Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 OUs)
Cleanup Decision Summary and Relevant Decision Documents An interim ROD, ESD, and action memoranda are in place to remove contaminated soil, structures, and debris with disposal at ERDF. Future cleanup decisions for remaining soil sites will be included in decision documents (e.g., action memoranda, RODs). • EPA/ROD/R10-99/039, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • EPA, 2009a, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • 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. • 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. • 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.	
Range of Plausible Alternatives • RTD contaminated soil sites to achieve RAOs comparable to 100 Areas; backfill, contour, and revegetate excavations. • RTD all sites except ponds; allow monitored natural attenuation for large pond sites with presence of existing vegetated soil covers. • Allow monitored natural attenuation to proceed for all sites with appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-3 Central Plateau – Disposition Below-Grade Portions of Plutonium Finishing Plant
Cleanup Decision Summary and Relevant Decision Documents A non-time critical action memorandum is in place, associated TPA milestone decision documents are approved, and D4 activities are being completed for above-grade structures of PFP. Final decisions and cleanup actions have not been made for below-grade structures/contaminated areas and are not identified in the action memorandum. • DOE/RL-2005-13, 2005, *Action Memorandum for the Plutonium Finishing Plant, Above-Grade Structures Non-Time Critical Removal Action*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.	
Range of Plausible Alternatives • Evaluate below-grade portions for residual contamination; leave remaining below-grade structures and contaminated areas in-place and transition to LTS with appropriate institutional controls. • RTD all PFP below-grade structures and contaminated areas; backfill and revegetate. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-4 Central Plateau – Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU)
Cleanup Decision Summary and Relevant Decision Documents Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs). • 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.	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

- 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.
- 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.

Range of Plausible Alternatives

- 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 waste and debris at approved facility.
- 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.
- 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.
- Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

CLEANUP ACTION:	**CP-5 Central Plateau – Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU)**

Cleanup Decision Summary and Relevant Decision Documents

Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs).

- 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.
- 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.
- 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.

Range of Plausible Alternatives

- Remove all contents and D4 PUREX Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soils to achieve RAOs; dispose all waste and debris at approved facility.
- Condition contents to place 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.
- 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.
- Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

Note: Cleanup decisions affecting disposition of the PUREX Canyon Building/associated waste sites and disposition of PUREX Storage Tunnels should be aligned and cleanup actions should be coordinated and integrated as much as practical.

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-6 Central Plateau – Disposition PUREX Storage Tunnels (200-CP-1 OU)
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made for the PUREX Storage Tunnels. • TBD – No decision documents currently available.	
Range of Plausible Alternatives • Maintain safe storage, perform hazardous waste facility closure consistent with RCRA Permit, remediate radionuclides consistent with CERCLA, and conduct post-closure monitoring. • Stabilize waste and prepare tunnels for in-place disposal, install barrier, perform post-closure care and transition to LTS. • Remove and dispose waste and contaminated equipment from tunnels, evaluate tunnels for residual contamination; if needed, remediate tunnels consistent with 200 East Inner Area contaminated soil sites. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness. **Note**: Cleanup decisions affecting disposition of PUREX Storage Tunnels and disposition of PUREX Canyon Building/associated waste sites should be aligned and cleanup actions should be coordinated and integrated as much as practical.	
CLEANUP ACTION:	CP-7 Central Plateau – Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU)
Cleanup Decision Summary and Relevant Decision Documents Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs). • 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. • 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. • 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.	
Range of Plausible Alternatives • Remove all contents and D4 REDOX Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soil to achieve RAOs; dispose all waste and debris at approved facility. • Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated waste and soil 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. • Condition contents, retrieve associated waste site contaminated soil 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. • Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-8 Central Plateau – Disposition T Plant Canyon Building/Associated Waste Sites
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made for the T Plant Canyon Building and Associated Waste Sites. Current expectations are that T Plant will continue to be used to support other remediation and waste management work. • TBD – No decision documents currently available.	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

Range of Plausible Alternatives

- Continue ongoing operations until 2036; transition to D4 in 2038; fulfill hazardous waste facility closure obligations consistent with RCRA Permit.
- Remove all contents and D4 T Plant Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soil to achieve RAOs; dispose all waste and debris at approved facility.
- 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.
- Condition contents, retrieve associated waste site contaminated soil 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.
- Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of waste from cleanup activities.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

CLEANUP ACTION:	CP-9 Central Plateau – Disposition Cesium/Strontium Capsules

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for final disposition of the cesium/strontium capsules. Decisions have been deferred to future decision-making processes.

- TBD – No decision documents currently available.

Range of Plausible Alternatives

- Package and transport capsules from WESF to dry storage; store capsules pending final disposition; direct dispose of capsules at a geologic repository.
- Incorporate capsules into immobilized high-level waste glass at WTP.
- Store capsules at Hanford for 300 years (approximately 10 half-lives); after natural decay, direct dispose of capsules as mixed low-level radioactive waste.

CLEANUP ACTION:	CP-10 Central Plateau – Remediate 200-SW-1 OU*

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for the 200-SW-1 OU.

- TBD – No decision documents currently available.

Range of Plausible Alternatives

The following alternatives are being considered as part of DOE/EA-1707D, *Environmental Assessment Closure of Nonradioactive Dangerous Waste Landfill (NRDWL) and Solid Waste Landfill (SWL)*; these alternatives are not intended to presume the outcome of the ongoing environmental assessment process:

- Install an evapotranspiration barrier over both landfills; upgrade monitoring and infrastructure systems; perform post-closure monitoring and caretaking.
- Partial RTD with removal of waste material from both landfills and impacted soil 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.
- Remove all waste material from both landfills; excavate and RTD all contaminated soil to groundwater, if necessary; backfill and revegetate.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

* Includes NRDWL and SWL.

CLEANUP ACTION:	CP-11 Central Plateau – Disposition Remaining Liquid Waste Disposal Facilities*

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for the Remaining Liquid Waste Disposal Facilities.

TBD – No decision documents currently available.

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

Range of Plausible Alternatives

- Closure of facilities will be according to approved operating plans and closure plans.
- If needed, may remediate contaminated soil under zone closure; may include partial RTD with various capping alternatives; monitoring and institutional controls after closure may be required.
- RTD all contaminated soil; backfill and revegetate.
- Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

* Includes State-Approved Land Disposal Site; State Waste Discharge Permit Sites; 100-N Sewage Lagoon; onsite Sewage Systems; National Pollutant Discharge Elimination System Outfalls; and Underground Injection Control Well Sites.

CLEANUP ACTION:	CP-12 Central Plateau – Disposition Remaining Waste Treatment, Storage and Disposal Facilities*

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for the Remaining Waste Treatment, Storage and Disposal Facilities.

- TBD – No decision documents currently available.

Range of Plausible Alternatives

- 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.

* Includes LERF/ETF, WESF, WRAP, 222-S Laboratory, IDF, and Inert Waste Landfill/Pit 9.

CLEANUP ACTION:	CP-13 Central Plateau – Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks 200-IS-1 OU

Cleanup Decision Summary and Relevant Decision Documents

The 200-IS-1 OU waste sites include tanks (except 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.

- TBD – No decision documents currently available.

Range of Plausible Alternatives

- RTD all contaminated equipment, materials, debris and soil to a depth that is determined by the Tri-Party agencies to be protective of human health and ecological resources (depth TBD); backfill and revegetate.
- RTD all contaminated equipment, materials, debris and soil; backfill and revegetate.
- Stabilize select equipment in place using technologies yet to be determined.
- Leave everything in place; maintain under LTS with appropriate institutional controls.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

CLEANUP ACTION:	CP-14 Central Plateau – Remediate Land Disposal Units (200-SW-2 OU)

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made to remediate the 200-SW-2 OU. (Note that this OU is not a single contaminated site, but comprises a large number of land disposal units.)

- TBD – No decision documents currently available.

Range of Plausible Alternatives

- Excavation, treatment (as necessary), and disposal of all waste from within individual landfills.
- 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.
- Capping of individual landfills; includes continued cap maintenance and monitoring.
- In situ treatment/stabilization (e.g., vitrification or grouting) of portions of individual landfills followed by capping; includes continued cap maintenance and monitoring.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-15 Central Plateau – Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU)
Cleanup Decision Summary and Relevant Decision Documents 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). • 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. • 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.	
Range of Plausible Alternatives • RTD approximately half of waste sites and cap remainder. • RTD all waste sites; backfill and revegetate. • Cap and maintain under LTS with monitoring and appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-16 Central Plateau – Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU)
Cleanup Decision Summary and Relevant Decision Documents 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). • 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. • 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.	
Range of Plausible Alternatives • RTD approximately half of waste sites and cap remainder. • RTD all waste sites; backfill and revegetate. • Cap and maintain under LTS with monitoring and appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-17 Central Plateau – Disposition Fast Flux Test Facility (FFTF) Complex
Cleanup Decision Summary and Relevant Decision Documents In 1995, DOE determined FFTF would be deactivated. Other decisions have been deferred to future decision-making processes. • TBD – No decision documents currently available.	
Range of Plausible Alternatives The following reflect alternatives considered as part of DOE/EIS-0391, *Final Tank Closure and Waste Management Environmental Impact Statement* (TC&WM EIS); these alternatives are not intended to presume the outcome of the environmental impact decision process: • Entombment – Consolidate buildings and waste, compact, and fill void spaces in 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. • 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. • Remove and treat remote-handled special components onsite or at INL; dispose treated components at IDF or Nevada Test Site.	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

- Store sodium; convert to caustic sodium hydroxide solution onsite or at INL; reuse caustic sodium hydroxide solution for tank corrosion control or processing tank waste at WTP.
- Leave structures in place with inert gas blanket for sodium residuals; transition to LTS with appropriate institutional controls.

CLEANUP ACTION:	CP-18 Central Plateau – Disposition Remaining Buildings and Facilities in FFTF Complex

Cleanup Decision Summary and Relevant Decision Documents

In 1995, DOE determined FFTF would be deactivated. Other decisions have been deferred to future decision-making processes.

- TBD – No decision documents currently available.

Range of Plausible Alternatives

- D4 all buildings per appropriate removal action work plan; if needed, remediate below-grade portions.
- Leave structures in place and transition to LTS with appropriate institutional controls.

CLEANUP ACTION:	CP-19 Central Plateau –Disposition Remaining Inner Area Buildings and Facilities

Cleanup Decision Summary and Relevant Decision Documents

Cleanup decisions have been made for D&D of some of the Remaining Inner Area Buildings and Facilities, and the applicable action memorandum is expected to cover future D&D activities. DOE considers D&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&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.)

- DOE/RL-2010-22, 2010, *Action Memorandum for General Hanford Site Decommissioning Activities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Range of Plausible Alternatives

- 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.
- Leave structures in place and transition to LTS with appropriate institutional controls.

CLEANUP ACTION:	CP-20 Central Plateau – Remediate Contaminated Deep Vadose Zone (200-DV-1 OU)

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for the Deep Vadose Zone.

- TBD – No decision documents currently available.

Range of Plausible Alternatives

- Implement results of treatability testing in accordance with CERCLA and/or RCRA final decisions.
- RTD all contaminated soils to groundwater if necessary and technically practical; backfill and revegetate.
- In place treatment to destroy, immobilize, or capture, treat and dispose contaminants.
- Soil flushing with P&T or pore water removal.
- Install surface barriers.
- Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls.

CLEANUP ACTION:	CP-21 Central Plateau – Restore 200 West Groundwater To Beneficial Use (200-UP-1 OU)

Cleanup Decision Summary and Relevant Decision Documents

An interim ROD for 200-UP-1 OU was issued in September 2012 that superseded the previous remedy decisions for this OU and a final ROD is in place for the 200-ZP-1 OU to address all contaminants.

- EPA, 2012, *Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site, 200-UP-1 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-95/114, 1995, *Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-97/048, 1997, *Declaration of the Record of Decision, USDOE Hanford 200-UP-1 Operable Unit, 200 Area, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

- EPA, 2009c, *Explanation of Significant Differences for the Interim Action Record of Decision for the 200-UP-1 Groundwater Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2008, *Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code*, Olympia, Washington.
  - WAC 173-340-720, "Groundwater Cleanup Standards."

Range of Plausible Alternatives

- Expand 200-ZP-1 extraction, treatment and injection capacity; install extraction and transfer system for 200-UP-1; operate P&T system to achieve RAOs; continue monitoring.
- Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls.
- Hydraulic containment of the iodine-129 groundwater plume.
- Groundwater monitoring and institutional controls.

CLEANUP ACTION:	**CP-22 Central Plateau – Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 OUs)**

Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for 200 East Groundwater.

- WAC 173-340, "Model Toxics Control Act -- Cleanup," *Washington Administrative Code*, Olympia, Washington.
  - WAC 173-340-720, "Groundwater Cleanup Standards."

Range of Plausible Alternatives

- Install P&T system for 200-BP-5 OU; implement monitored natural attenuation for 200-PO-1 OU; perform well support and maintenance activities.
- Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls.
- Install P&T system for 200-BP-5 and selective P&T for 200-PO-1 hot spots.

Note: 400 Area groundwater cleanup actions are included as part of 200-PO-1 OU.

CERCLA= *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*.
D&D = decontamination and decommission.
D4 = deactivation, decontamination, decommissioning, and demolition.
DOE = U.S. Department of Energy.
ERDF = Environmental Restoration Disposal Facility.
ESD = explanation of significant difference.
ETF = Effluent Treatment Facility.
FFTF = Fast Flux Test Facility.
IDF = Integrated Disposal Facility.
INL = Idaho National Laboratory.
LERF = Liquid Effluent Retention Facility.
LTS = long-term stewardship.
NRDWL = Nonradioactive Dangerous Waste Landfill.
OU = operable unit.
P&T = pump-and-treat.
PFP = Plutonium Finishing Plant.
PUREX = Plutonium-Uranium Extraction (Plant).
RAO = remedial action objective.
RCRA = *Resource Conservation and Recovery Act of 1976*.
REDOX = reduction-oxidation.
ROD = record of decision.
RTD = remove, treat, and dispose.
SWL = solid waste landfill.
TBD = to be determined.
TPA = Tri-Party Agreement.
TSD = treatment, storage, and disposal.
WAC = *Washington Administrative Code*.
WESF = Waste Encapsulation and Storage Facility.
WRAP = Waste Receiving and Processing Plant.
WTP = Waste Treatment and Immobilization Plant.

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

CLEANUP ACTION:	TW-1 Tank Waste – Tank Retrieval and Single-Shell Tank Farm Closure
Cleanup Decision Summary and Relevant Decision Documents In the February 26, 1997 *Federal Register*, DOE decided to retrieve and treat tank waste (62 FR 8693). Further decisions have been deferred to future decision-making processes.	
Range of Plausible Alternatives • Retrieve SST wastes (assumes two retrieval technologies) to meet milestones in the Consent Decree (DOE and Ecology, 2010); achieve designated retrieval objectives or limits of technology; remediate structures and soil and install cover/cap to meet closure performance standards; maintain post-closure care and monitoring consistent with RCRA Permit. The following reflect alternatives considered as part of the TC&WM EIS (DOE/EIS-0391); these alternatives are not intended to presume the outcome of the environmental impact decision process: • Grout, cap and close SSTs with residual waste in place; monitor and implement institutional controls after closure; eventual transition to LTS. • Construct new DST capacity sufficient to complete SST retrieval; close SSTs and implement post-closure care, monitoring, and institutional controls; eventual transition to LTS. • RTD some SSTs and ancillary facilities, residual waste, and contaminated soils; backfill and revegetate. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	TW-2 Tank Waste – Tank Waste Treatment
Cleanup Decision Summary and Relevant Decision Documents In the February 26, 1997 *Federal Register*, DOE decided to retrieve, separate, vitrify, and dispose the tank waste (62 FR 8693). The ILAW 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.	
Range of Plausible Alternatives • 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 or Interim Hanford Storage Facility (new) until a final repository is available. • Perform blending and waste characterization at a new Enhanced Waste Receiving Facility.	
CLEANUP ACTION:	TW-3 Tank Waste – Secondary Waste Treatment
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made. Decisions have been deferred to future decision-making processes. • TBD – No decision documents currently available.	
Range of Plausible Alternatives • Recycle liquid waste streams in WTP; manage residual liquid waste at LERF/ETF/SALDS; treat solid waste from WTP and ETF and dispose at IDF; manage and disposition other secondary waste (e.g., failed melters). Other plausible alternatives will be determined at a later date. **Note**: Any radioactive HLW will be stored and eventually shipped to a geologic repository.	
CLEANUP ACTION:	TW-4 Tank Waste – Double-Shell Tank Closure
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made. Decisions have been deferred to future decision-making processes.	
Range of Plausible Alternatives • Retrieve DST wastes consistent with TPA; achieve designated retrieval objectives or limits of technology; remediate structures and soil and install cover/cap to meet closure performance standards; maintain post-closure care and monitoring consistent with RCRA Permit. • RTD DSTs and ancillary facilities, residual waste, and contaminated soil; backfill and revegetate. • Stabilize, cap and close DSTs with residual waste in place; monitor and implement institutional controls after closure; eventual transition to LTS. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	

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

CLEANUP ACTION:	TW-5 Tank Waste – WTP Closure
Cleanup Decision Summary and Relevant Decision Documents 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 also may 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. • WA7890008967, 2013, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*, Washington State Department of Ecology, Nuclear Waste Program, Richland, Washington, September 30.	
Range of Plausible Alternatives • 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. • D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions. • Perform clean closure of WTP and all ancillary facilities/structures. • Leave structures in place and transition to LTS with appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
D4 = deactivation, decontamination, decommissioning, and demolition. DOE = U.S. Department of Energy. DST = double-shell tank. ETF = Effluent Treatment Facility. HLW = high-level waste. IDF = Integrated Disposal Facility. ILAW = immobilized low-activity waste. LAW = low-activity waste. LERF = Liquid Effluent Retention Facility.	LTS = long-term stewardship. RCRA = *Resource Conservation and Recovery Act of 1976*. RTD = remove, treat, and dispose. SALDS = State-Approved Land Disposal Site. SST = single-shell tank. TBD = to be determined. TC&WM EIS = Tank Closure and Waste Management Environmental Impact Statement. TPA = Tri-Party Agreement. WTP = Waste Treatment and Immobilization Plant.

B.2.2 DOE'S APPROACH FOR ANALYZING ALTERNATIVES AND DESCRIBING THE REASONABLE UPPER BOUND

TPA 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 LCR provides information that meets the requirement and intent of the milestone, DOE has relied on a conceptual framework as described in the 2013 LCR (Appendix A, Section A.2.2).

B.3 RATIONALE FOR ANNUAL SELECTION OF FUTURE CLEANUP ACTIONS TO BE ANALYZED

DOE will 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 LCRs selecting the future cleanup actions to be analyzed in the LCR. Additional details regarding the rationale used to select the future cleanup actions to be analyzed in the LCR are described in the 2013 LCR (Appendix A, Section A.3).

B.4 COMPLETED CLEANUP ACTION ALTERNATIVES

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

Table B-5. Summary of Completed Cleanup Action Alternatives.

2011 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2010-25)		
Cleanup Action	**Cost Estimate Alternative Analysis (Million $)**	**Final Decision Reference**
River Corridor–Disposition 100 Area Reactors	Reactors Remain in Place - $0 Remove Reactors - $676	Record of Decision; Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, WA (58 FR 48509)
Central Plateau–Remediate 200-SW-2 OU	Barriers - $823 Remove, Treat, Dispose of Waste - $16,614	TBD
2012 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2011-93)		
Cleanup Action	**Cost Estimate Alternative Analysis (Million $)**	**Final Decision Reference**
Tank Waste Cleanup Action–Tank Retrieval and Single-Shell Tank Farm Closure	1 – Baseline Case - $59,900 2 – TRU Waste to WTP - $61,600 3 – FBSR for supplemental treatment - $58,100 4 – WTP delay with +10% vitrification capacity - $66,000 5 – 2020 Vision One System - $58,000 6 – WTP delay with new DST farm - $68,700 7 – Enhanced tank waste strategy - $57,300 8 – Accelerated SST retrievals - $62,800 9 – Early U Farm closure - $59,600 10 – Slow SST retrievals - $60,800	TBD
Tank Waste Cleanup Action–Tank Waste Treatment		TBD
Tank Waste Cleanup Action–Secondary Waste Treatment		TBD
2013 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2012-13)		
Cleanup Action	**Cost Estimate Alternative Analysis (Million $)**	**Final Decision Reference**
Central Plateau-Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 OUs)	The DOE planning case cleanup remedies for the 190 waste sites evaluated includes: RTD - $98.3 CSNA - $4.9 MESC/MNA/IC - $3.2 IBAR - $19.2 ABAR - $19.8 **Total** - $145.4	TBD
Central Plateau-Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU)		TBD
2014 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2013-02)		
Cleanup Action	**Cost Estimate Alternative Analysis (Million $)**	**Final Decision Reference**
None selected for 2014	N/A	N/A
2015 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2014-11)		
Cleanup Action	**Cost Estimate Alternative Analysis (Million $)**	**Final Decision Reference**
None selected for 2015	N/A	N/A

ABAR = aggregate barrier.
CSNA = confirmatory sampling to support no further cleanup action.
DOE = U.S. Department of Energy.
DST = double-shell tank.
FBSR = fluidized bed steam reformer.
IBAR = individual barrier.
IC = institutional controls.
MESC = maintain existing soil cover.
MNA = monitored natural attenuation.
N/A = not applicable.
OU = operable unit.
RTD = remove, treat and dispose.
SST = single-shell tank.
TBD = to be determined.
TRU = transuranic.
WTP = Waste Treatment and Immobilization Plant.

Considering the criteria described above and cleanup actions analyzed in previous LCRs, DOE developed an anticipated schedule for performing in-depth analyses of plausible alternatives for each future cleanup action remaining at Hanford. Table B-6 presents this schedule and includes an explanation of the rationale for analyzing alternatives in the recommended LCR year.

Table B-6. Anticipated Schedule for Detailed Analyses of Future Cleanup Action Alternatives. (3 pages)

Cleanup Action	Alternative
• Central Plateau–Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU) • Central Plateau–Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU) • Central Plateau–Remediate Contaminated Deep Vadose Zone (200-DV-1 OU)	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 after 2015 that could benefit future planning and budget requests.
• Central Plateau–Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 OUs)	TPA M-015-21A requires FS/proposed plan submittal by June 30, 2015. May be reasonable to develop alternatives in the 2016 LCR to benefit future planning and budget requests.
• Central Plateau– Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks (200-IS-1 OU) • Central Plateau–Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU)	CERCLA/RCRA decision document submittals are scheduled by December 31, 2016 (TPA M-015-92B). Analyzing potential alternatives in the 2016 LCR could provide information to help inform the decision process.
• Central Plateau–Disposition Below-Grade Portions of PFP • Central Plateau–Remediate 200-SW-1 OU	Cleanup is proceeding with existing decisions (e.g., interim ROD, action memorandum, RCRA interim status/final permit) and reflected in current planning documents. Final decisions could be made within 1-2 years of 2015 timeframe and are expected to be compatible with interim decisions. Prior to developing the 2016 LCR, decide whether alternatives should be analyzed based on status of final cleanup decision making.
• River Corridor–Disposition 100 Area former orchard contaminated soil sites (100-OL-1 OU)	TPA M-015-95 required RI/FS work plan submittal by April 30, 2013. May be reasonable to develop alternatives in the 2016 LCR or later that could benefit future planning and budget requests.
• Central Plateau–Disposition FFTF Complex	It is expected that the TC&WM EIS (DOE/EIS-0391) and final ROD will address decisions related to this cleanup action before cleanup must begin. If, instead, cleanup decisions have not been made, it may be timely to reassess whether the FFTF cleanup action could be analyzed.
• Central Plateau–Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU)	May be reasonable to develop alternatives after 2016 that may benefit future planning/budget requests.
• Central Plateau–Disposition Cesium/Strontium Capsules	TPA 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 in safe storage; no immediate action is required. Other activities will provide data and potential problem resolutions that will enhance considering alternatives for management/disposition of the cesium/strontium capsules. Prior to the 2017 LCR, decide if alternatives would benefit future planning/budget requests.
• Central Plateau–Restore 200 West Groundwater to Beneficial Use (200-UP-1 OU)	An interim action ROD was issued in September 2012 that superseded the previous 200-UP-1 OU decisions. Deferral to after 2015 would allow final decisions to be made and coincide with subsequent CERCLA 5-year review.
• River Corridor–Disposition 300 Area Facilities Retained by PNNL	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.

Table B-6. Anticipated Schedule for Detailed Analyses of Future Cleanup Action Alternatives. (3 pages)

Cleanup Action	Alternative
• Central Plateau (Outer Area)–Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU)	The few remaining structures in the Outer Area do not present imminent or significant threats to health or environment. Cleanup actions are likely to be non-controversial and focused on RTD, with scope, schedule and cost accounted for in planning documents. Analysis of alternatives before 2016 is not likely to contribute useful information for out-year budget planning.
• Central Plateau–Disposition PUREX Storage Tunnels (200-CP-1 OU)	Prior to development of the 2017 LCR, decide whether development of alternatives would benefit future planning and budget requests.
• Central Plateau–Disposition T Plant Canyon Building/Associated Waste Sites • Central Plateau–Disposition Remaining Liquid Waste Disposal Facilities • Central Plateau–Disposition Remaining Waste Treatment, Storage and Disposal Facilities	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.
• Central Plateau–Disposition Remaining Buildings and Facilities Within FFTF Complex • Central Plateau–Disposition Any Remaining Inner Area Buildings and Facilities	Continuing with the current planning bases and uncertainties is sufficient for health and environmental protection and scope and budget planning before 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 cleanup actions before the 2018 LCR.
• Tank Waste–Double-Shell Tank Closure • Tank Waste–WTP Closure	DST closure is not expected to begin before 2034 and WTP closure before 2050. No imminent or significant health/environmental concerns were identified that need to be addressed. Earlier planning and budget development would be unnecessary and not account credibly for future decisions and conditions.
CLEANUP ACTIONS FOR WHICH ALTERNATIVES WOULD NOT BE ANALYZED	
River Corridor–B Reactor Preservation - B Reactor is designated a National Historic Landmark and is a signature facility of the newly established Manhattan Project National Historical Park so no cleanup actions are anticipated. Minor conditioning/maintenance activities will be performed consistent with National Park Service decision making under the *National Environmental Policy Act* (42 USC 4321) and/or *National Historic Preservation Act* (16 USC 470).	
River Corridor-Disposition Remaining 100 Area Buildings/Facilities and Disposition Remaining 300 Area Buildings/Facilities (except facilities retained for use by PNNL) - Although cleanup actions are ongoing for these buildings/facilities, excess buildings/facilities in the 100 and 300 Areas are expected to undergo D&D according to applicable action memoranda. DOE considers D&D of buildings/structures to be final cleanup decisions if all regulated contaminants are removed in accordance with an action memorandum so alternatives do not need to be analyzed.	
River Corridor–Remediate Remaining Contaminated Sites Within Hanford Reach National Monument - National Monument remediation is being implemented to fulfill obligations under a Presidential Proclamation that establishes a *de facto* final decision. RTD and decontamination in the Monument areas were substantially completed in 2012 (some residual cleanup in the 100 Area portions of the Monument is expected to be complete within the next few years as part of the River Corridor or Central Plateau cleanup projects).	
River Corridor - Disposition 100 Area K West Basin **River Corridor - Remediate 100 Area Contaminated Soil Sites** **River Corridor - Restore 100-BC-5 Groundwater OU to Beneficial Use** **River Corridor - Restore 100-KR-4 Groundwater OU to Beneficial Use** **River Corridor - Restore 100-NR-2 Groundwater OU to Beneficial Use** **River Corridor - Restore 100-HR-3 Groundwater OU to Beneficial Use** The Tri-Party agencies agreed that for cleanup actions close to having final decisions there would be little value in presenting a cost estimate alternatives analysis in the LCR. Because K West Basin cleanup action was limited to only one alternative (see Table B-2) the agencies agreed to remove it from the alternatives analysis in the LCR.	
Central Plateau–Disposition U Plant (Canyon Building/Associated Waste Sites) - U Plant remediation was approved according to 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.	

Table B-6. Anticipated Schedule for Detailed Analyses of Future Cleanup Action Alternatives. (3 pages)

Cleanup Action	Alternative
Central Plateau–Manage ERDF - ERDF was approved according to a CERCLA Final ROD and closure and post-closure care are part of the operating documentation. Alternatives need not be analyzed, unless future decisions are made that modify the current final ERDF decisions.	
CERCLA= *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*. D&D = decontamination and decommission. DOE = U.S. Department of Energy. DST = double-shell tank. ERDF = Environmental Restoration Disposal Facility. FFTF = Fast Flux Test Facility. FS = feasibility study. LCR = Lifecycle Report. OU = operable unit.	PFP = Plutonium Finishing Plant. PNNL = Pacific Northwest National Laboratory. PUREX = Plutonium-Uranium Extraction (Plant). RCRA = *Resource Conservation and Recovery Act of 1976*. REDOX = Reduction-Oxidation (Facility). RI/FS = remedial investigation/feasibility study. ROD = record of decision. RTD = remove, treat, and dispose. TPA = Tri-Party Agreement. WTP = Waste Treatment and Immobilization Plant.

B.5 REFERENCES

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APPENDIX C

HANFORD ESTIMATED SCHEDULE AND COST STATUS

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TERMS

BOF	Balance of Facilities
CCP	Central Characterization Project
CENRTC	capital equipment not related to construction
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CH	contact-handled
CSB	Canister Storage Building
CWC	Central Waste Complex
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
ESH&Q	environmental safety, health and quality
ETF	Effluent Treatment Facility
FFTF	Fast Flux Test Facility
FY	fiscal year
GRP	Groundwater Remediation Project
HAMMER	Hazardous Materials Management and Emergency Response (Facility); also known as the Volpentest HAMMER Training and Education Center
HLW	high-level waste
IDF	Integrated Disposal Facility
IFW	Integrated Field Work
KE	K East Basin
KW	K West Basin
LAW	low-activity waste
LCR	Lifecycle Report
LDR	land disposal restriction
LERF	Liquid Effluent Retention Facility
LLBG	low-level burial ground
LOE	level of effort
LTS	Long-Term Stewardship
MLLW	mixed low-level waste
MS/GS	Mission Support/General Support
NEPA	*National Environmental Policy Act*
NM	nuclear material
O&M	operations and maintenance
OHC	Other Hanford Contractor
ORP	U.S. Department of Energy, Office of River Protection
OU	operable unit
PBS	project baseline summary
PFP	Plutonium Finishing Plant
PRC	Plateau Remediation Contract
PT	pretreatment
PUREX	Plutonium Uranium Extraction (Plant)
RH	remote-handled
RCRA	*Resource Conservation and Recovery Act of 1976*

REDOX	Reduction-Oxidation Facility (S Plant)
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
RTD	remove, treat, and dispose
S&M	surveillance and maintenance
SNF	spent nuclear fuel
SST	single-shell tank
STSC	Sludge Transfer Storage Container
SWOC	Solid Waste Operations Complex
TEDF	Treated Effluent Disposal Facility
TOC	Tank Operations Contract
TPA	Tri-Party Agreement
TRU	transuranic
TSD	treatment, storage, and disposal
WAC	*Washington Administrative Code*
WIPP	Waste Isolation Pilot Plant
WESF	Waste Encapsulation and Storage Facility
WRAP	Waste Receiving and Processing (Facility)
WTP	Waste Treatment and Immobilization Plant

APPENDIX C

HANFORD ESTIMATED SCHEDULE AND COST STATUS

As directed in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), also referred to as the Tri-Party Agreement (TPA)[1], M-036-01, additional schedule and cost details are provided in this appendix. The schedules and costs are provided by project baseline summary (PBS) and reflect the scope discussed in Chapters 3.0 through 6.0 of this *Hanford Lifecycle Scope, Schedule and Cost Report* (LCR), 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] 2015) 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 PBS 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 FY2015 through the final year of the lifecycle for all PBSs. PBS RL-LTS extends from FY2060 through FY2090.
- A near-term cost and schedule table at Level 3 by fiscal year that extends for about 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. Information provided in this LCR 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 1.7.2.

C.1 RICHLAND OPERATIONS OFFICE PROJECT BASELINE SUMMARY INFORMATION

The 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-0040.01.1
- Infrastructure and Services, PBS RL-0040.01.2
- Nuclear Facility D&D–River Corridor Cleanup Project, PBS RL-0041
- Nuclear Facility D&D–Fast Flux Test Facility Project, PBS RL-0042

[1] 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.

- Richland Community and Regulatory Support, PBS RL-0100
- Long-Term Stewardship, PBS RL-LTS
- Final Reactor Disposition.

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

Table C-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	Provide safety, emergency management, Occupational Safety and Health Administration programs, 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.
Project Management and Support	Project Management and Support	Provide management functions, including management and technical/engineering support to the project mission.
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee.

NOTE: See Tables C-2 and C-3 for schedule and budget information.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act*.
D&D = decontamination and decommissioning.
NEPA = *National Environmental Policy Act.*
OHC = Other Hanford Contractors.
NM = nuclear materials.
PFP = Plutonium Finishing Plant.
RL = U.S. Department of Energy, Richland Operations Office.

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

Fiscal Year	2015	2016	2017	2018	2019	Total
Maintain Safe and Compliant PFP	31,685	33,476	450	0	0	**65,611**
Disposition PFP Facility	85,591	106,889	137,004	59,782	43,477	**432,743**
Project Management and Support	9,191	4,257	244	35	0	**13,727**
Site-wide Services and Other Distributed Costs	22,604	40,450	17,312	1	3	**80,370**
Total	**149,071**	**185,072**	**155,010**	**59,818**	**43,480**	**592,451**

PBS = project baseline summary.
PFP = Plutonium Finishing Plant.

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

Schedule Level	Scope	2015	2016	2017	2018	2019	Total
1	**NM Stabilization and Disposition – PFP**						
2	**Maintain Safe and Compliant PFP**	**31,685**	**33,476**	**450**	**0**	**0**	**65,611**
3	Maintain Safe and Compliant PFP	30,512	32,990	0	0	0	**63,502**
3	Cost and/or Schedule Uncertainty	1,173	486	450	0	0	**2,109**
2	**Disposition PFP Facility**	**85,591**	**106,889**	**137,004**	**59,782**	**43,477**	**432,743**
3	Disposition PFP Facility	67,813	67,506	1,404	0	0	**136,723**
3	Cost and/or Schedule Uncertainty	17,778	39,383	135,600	59,782	43,477	**296,020**
2	**Project Management and Support**	**9,191**	**4,257**	**244**	**35**	**0**	**13,727**
3	Project Management & Support	8,731	4,013	0	0	0	**12,744**
3	Cost and/or Schedule Uncertainty	460	244	244	35	0	**983**
2	**Site-wide Services and Other Distributed Costs**	**22,604**	**40,450**	**17,312**	**1**	**3**	**80,370**
3	Site-wide Services and Other Distributed Costs	22,604	40,450	17,312	1	3	**80,370**
Total		**149,071**	**185,072**	**155,010**	**59,818**	**43,480**	**592,451**

PBS = project baseline summary. PFP = Plutonium Finishing Plant.

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

Table C-4. SNF Stabilization and Disposition (PBS RL-0012) Level 3 Scope Summary.

Level 2 Work Element	Level 3 Work Element	Scope Summary
Program Management	100-K Area Project Management	Provide overarching project management for 100-K Area work activities.
K Basins Operations and Maintenance	KW Basin	Provide operations support to keep KW Basin in a safe and compliant mode until finish of dewatering and turnover to 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	Provide 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 KW Basin safe and compliant, including operation of water plant and all potable water services; 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 the Cold Vacuum Drying Facility; 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	Management and Support	Provide project management; engineering; training; safety and health support activities; dose data gathering and analysis, sampling, and characterization of radioactive and hazardous waste; baseline management; and updating waste volume projections.
	Process Containerized Sludge	Includes designing/testing a system to retrieve, package, and transport sludge stored in engineered containers in KW Basin to an interim storage facility on the Central Plateau; procuring Containerized Sludge Retrieval and transportation system; modifications to existing 105-KW Facility and construction of a new facility, including installing all equipment necessary in the KW Facility and the new Annex; readiness and startup activities; retrieving sludge from the engineered containers in KW Basin, loading sludge into STSC, transporting the STSCs to T Plant, receiving the STSCs at T Plant and placing 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 cleanout cells, modify additional cells, and update safety documentation.
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee. - Also includes technical support services (e.g., audit, regulatory analysis, cost and risk analysis, estimating), Tribal Nation support and other small contracts.

NOTE: See Tables C-5 and C-6 for schedule and budget information.

D&D = decontamination and decommissioning.
KE = K East.
KW = K West.
OHC = Other Hanford Contractor.
PBS = project baseline summary.
STSC = Sludge Transfer Storage Container.

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

Fiscal Year	2015	2016	2017	2018	Total
Program Management	1,605	2,773	2,978	3,011	**10,367**
K Basins Operations and Maintenance	8,360	5,159	6,789	350	**20,658**
Facility Operations	9,052	11,056	12,485	10,502	**43,095**
Sludge Treatment Project	54,995	132,527	124,906	23,902	**336,330**
Site-wide Services and Other Distributed Costs	29,693	33,798	30,686	6,958	**101,135**
Total	**103,705**	**185,313**	**177,844**	**44,723**	**511,585**

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

Schedule Level	Scope	2015	2016	2017	2018	Total
1	**NF Stabilization and Disposition**					
2	**Program Management**	**1,605**	**2,773**	**2,978**	**3,011**	**10,367**
3	100K Area Project Management	1,510	2,671	2,872	2,903	**9,956**
3	Cost and/or Schedule Uncertainty	95	102	106	108	**411**
2	**K Basins Operations and Maintenance**	**8,360**	**5,159**	**6,789**	**350**	**20,658**
3	KW Basin	8,048	4,833	6,467	0	**19,348**
3	Cost and/or Schedule Uncertainty	312	326	322	350	**1,310**
2	**Facility Operations**	**9,052**	**11,056**	**12,485**	**10,502**	**43,095**
3	100-K Facility Operations & Support	8,721	10,648	12,001	10,140	**41,510**
3	Cost and/or Schedule Uncertainty	331	408	484	362	**1,585**
2	**Sludge Treatment Project**	**54,995**	**132,527**	**124,906**	**23,902**	**336,330**
3	Management and Support	5,395	11,772	12,727	0	**29,894**
3	Process Containerized Sludge	49,600	120,755	112,179	23,902	**306,436**
2	**Site-wide Services and Other Distributed Costs**	**29,693**	**33,798**	**30,686**	**6,958**	**101,135**
3	Site-wide Services and Other Distributed Costs	29,693	33,798	30,686	6,958	**101,135**
Total		**103,705**	**185,313**	**177,844**	**44,723**	**511,585**

KW = K West. PBS = project baseline summary.

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

Table C-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary. (4 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
Project Management	Project Management	Provide overall management function in support of the waste management mission.
Capsule Storage and Disposition	WESF Base Operations	Includes activities to safely store cesium/strontium capsules in the WESF pool cells, operate and maintain 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, dispose as appropriate, and maintain systems necessary for environmental compliance, radiological control, personnel safety and capsule integrity.
	Cesium/ Strontium Capsule Disposition	Includes retrieval of cesium/strontium capsules from WESF pool cells and packaging, transportation, and placement of capsules into dry storage. Provides for construction, including contracting/construction management oversight, 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 immobilized high-level waste from WTP, while awaiting final disposition at a national repository. Includes operation and maintenance of CSB facilities and associated structures, operating systems and equipment, and monitoring systems. Also includes various corrective maintenance tasks, facility modifications, or capital projects necessary to continue safe, cost-effective, and compliant operations throughout the operating life of the facility.
Mixed Low-Level Waste (MLLW) Treatment	TPA M-091-42 (MLLW)	Prepare MLLW packages in aboveground storage at SWOC facilities (including Waste Retrieval Project) for treatment, as required to meet regulatory requirements. Includes management of offsite commercial MLLW treatment/ disposal contracts and receipt of MLLW packages into the onsite Mixed Waste Disposal Trenches for disposal once treatment has been completed and the packages have been determined to be LDR compliant. Development of alternative methods for treatment and disposal of orphan waste may include LDR variance approvals, expanding commercial treatment facilities permit limits and construction and operation of additional onsite treatment capabilities.
	TPA M-091-43 (MLLW)	Prepare large MLLW containers and RH packages in aboveground storage at SWOC facilities or retrieved from the LLBGs for treatment, as required to meet regulatory requirements. Includes 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 LDR compliant.
	Other Treatment Activities	Includes the identification and disposition of LLW packages in aboveground storage at SWOC 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 management of offsite commercial contracts. Includes final disposition of the processed containers (e.g., management of receipt into appropriate disposal facility).
	MLLW Project Management	Includes management 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 LDR compliant.

Table C-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary. (4 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
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 WIPP 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.
Waste Receiving and Processing Facility (WRAP)	WRAP Base Operations	Provides operations and maintenance of the WRAP facility to support shipping and receiving activities associated with WIPP shipments.
	WRAP Transition	Following operations, WRAP will be transitioned to a condition ready for D&D.
	WRAP Min Safe Operations	Provides 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 TRU package transporter only operational period.
T Plant	T Plant Base Operations	Provides services necessary to maintain the T Plant Complex in a ready-to-serve status (base operations) for waste processing operations.
	T Plant Upgrades	Provides upgrades to waste processing equipment, systems components, and computer interface equipment, including physical upgrades to T Plant Facility.
Central Waste Complex (CWC)	CWC	Provides services necessary to maintain CWC in a ready-to-serve status (base operations) for interim storage of LLW, MLLW, TRU waste and waste receipts from RL approved generators.
	Low-Level Waste Burial Grounds (LLBG)	Provides 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	Provide expansion of ERDF as needed to support site cleanup efforts.
	ERDF Interim Cover	Provide 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 each PBS generating waste.
Liquid Effluent Facilities (LEF)	200 Area LEF Base Operations	Provides 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 cleanup activities.
	200 Area LEF Upgrades	Provides modifications to ETF, TEDF and LERF to improve operations, extend useful life, ensure regulatory compliance, and/or correct identified deficiencies.
Integrated Disposal Facility (IDF)	IDF Operations	Provides operation of IDF in a safe, compliant and cost-effective manner, including 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 assist in review of documents for safety impacts, perform safety surveillances, inspections and support, assist in maintenance of the Health and Safety Plan, and update 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.

Table C-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary. (4 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
Solid Waste Base Operations	Solid Waste Ready to Serve	Provides the minimum staffing to maintain a viable waste management program and to capture those waste support activities that are essentially fixed cost in nature.
TRU Disposition	Central Characterization Project (CCP) Support	Provides resources to develop and maintain an interface with Hanford Site generators and CCP to perform TRU Certification activities. Includes support for generators of TRU waste to define CH and RH waste volumes and packaging requirements and resources to perform WIPP closeout activities to the current Hanford WIPP Program.
	Establish Shipping Capability	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 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/Offsite SNF Disposition	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. Also includes activities to facilitate final disposition of Hanford SNF inventories at a National Repository including compliance document review, technical and programmatic interface with the National SNF 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 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 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-0040.01.1 for final cleanup and closure.
Sludge Disposition	Sludge Disposition	Includes activities to stabilize and package sludge from 105-KW Basin for final disposition to WIPP or other disposal facility, including Phase 2 treatment and packaging, shutdown and deactivation of needed equipment, and management and support.
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee. - Also includes technical support services (e.g., audit, regulatory analysis, cost and risk analysis, estimating), Tribal Nation support and other small contracts.

Table C-7. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 3 Scope Summary. (4 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary

NOTE: See Tables C-8 and C-9 for schedule and budget information.

CCP	=	Central Characterization Project.	MLLW	=	mixed low-level waste.
CENRTC	=	capital equipment not related to construction.	OHC	=	Other Hanford Contractors.
CH	=	contact-handled.	PBS	=	project baseline summary.
CSB	=	Canister Storage Building.	RH	=	remote-handled.
CWC	=	Central Waste Complex.	SNF	=	spent nuclear fuel.
D&D	=	decontamination and decommissioning.	SWOC	=	Solid Waste Operations Complex.
ERDF	=	Environmental Restoration Disposal Facility.	TEDF	=	Treated Effluent Disposal Facility.
ETF	=	Effluent Treatment Facility.	TRU	=	transuranic.
IDF	=	Integrated Disposal Facility.	TSD	=	treatment, storage, and disposal.
LDR	=	land disposal restriction.	WESF	=	Waste Encapsulation Storage Facility.
LERF	=	Liquid Effluent Retention Facility.	WIPP	=	Waste Isolation Pilot Plant.
LLBG	=	Low-Level Burial Grounds.	WRAP	=	Waste Receiving and Processing (Facility).
LLW	=	low-level waste.	WTP	=	Waste Treatment and Immobilization Plant.

Table C-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000 Escalated). (3 pages)

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Project Management	23,695	27,863	30,739	27,290	21,195	21,721	24,456	24,956	24,925	25,440
Capsule Storage and Disposition	11,319	23,806	38,987	39,408	25,572	22,488	9,931	8,545	3,792	252
Canister Storage Building	6,884	7,423	7,791	3,079	6,624	6,758	6,976	7,107	7,114	7,258
MLLW Treatment	0	6,520	7,862	3,758	1,758	1,206	464	439	435	444
TRU Retrieval	191	172,078	55,753	71,262	71,712	33,250	481	0	0	0
TRU Repackaging	5,500	5,500	5,500	5,500	5,500	5,500	5,500	0	0	0
WRAP	10,120	11,965	12,460	3,717	17,702	9,875	6	0	0	0
T Plant	13,739	19,841	19,737	19,590	25,451	18,976	19,483	19,872	19,934	77,397
Central Waste Complex	10,005	13,425	11,806	6,964	13,129	13,169	12,202	11,940	11,862	12,124
ERDF	192	102	102	58	71	6	129	133	132	135
Liquid Effluent Facilities	3,720	8,790	6,256	6,411	8,882	8,809	16,561	9,504	9,930	10,490
Integrated Disposal Facility	481	2,667	1,510	6,149	3,644	3,548	3,661	3,728	3,725	6,828
Solid Waste Base Operations	94	97	104	106	0	0	0	0	0	0
TRU Disposition	0	0	0	79	35,405	33,293	39,616	35,790	33,434	34,124
Spent Nuclear Fuel Disposition	333	341	367	371	20,297	37,349	34,105	18,125	898	1,158
Mixed Waste Disposal Trenches	591	625	648	263	4,162	2,160	0	0	0	0
Sludge Disposition	0	0	11,594	166,183	364,041	240,514	64,071	16,329	25,115	21,518
Site-wide Services and Other Distributed Costs	44,511	47,712	29,445	49,671	65,649	41,582	42,664	39,517	36,403	58,451
Total	**131,375**	**348,755**	**240,661**	**409,859**	**690,794**	**500,204**	**280,306**	**195,985**	**177,699**	**255,619**
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Project Management	26,720	16,384	6,967	7,216	7,359	7,603	8,088	8,387	8,507	8,681
Capsule Storage and Disposition	206	217	24,280	25,040	1,269	164	79	0	0	0
Canister Storage Building	7,572	7,200	7,485	7,708	7,933	8,184	8,683	9,001	9,074	9,298
MLLW Treatment	470	492	514	532	545	566	601	622	625	633
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
TRU Repackaging	0	0	0	0	0	0	0	0	0	0
WRAP	0	0	0	0	0	0	0	0	0	0
T Plant	93,635	88,600	91,549	94,525	97,520	100,297	106,563	110,574	111,868	114,363
Central Waste Complex	6,429	7,149	7,038	7,250	7,486	7,648	5,150	4,813	4,852	4,959
ERDF	143	12,085	7,339	7,124	4,913	870	181	184	187	191
Liquid Effluent Facilities	10,594	10,980	11,256	11,637	11,775	12,088	12,395	12,687	13,042	13,365
Integrated Disposal Facility	19,204	34,412	10,139	4,467	4,511	4,630	4,904	5,062	5,182	5,262
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0

Table C-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000 Escalated). (3 pages)

TRU Disposition	35,929	37,797	39,201	40,431	41,659	42,891	24,963	9,733	0	0
Spent Nuclear Fuel Disposition	34,753	19,605	21,888	32,981	35,037	5,482	4,966	5,118	5,354	5,516
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Sludge Disposition	14,668	13,533	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	82,445	89,969	77,452	80,178	68,764	65,632	63,420	69,000	69,786	71,284
Total	**332,768**	**338,423**	**305,108**	**319,089**	**288,771**	**256,055**	**239,993**	**235,181**	**228,477**	**233,552**
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Project Management	8,945	9,329	10,105	10,387	11,138	10,982	11,471	10,709	10,551	11,726
Capsule Storage and Disposition	0	0	0	0	0	0	0	0	0	0
Canister Storage Building	9,559	11,703	13,743	40	0	0	0	0	0	0
MLLW Treatment	654	691	740	770	824	811	839	797	776	864
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
TRU Repackaging	0	0	0	0	0	0	0	0	0	0
WRAP	0	0	0	0	0	0	0	0	0	0
T Plant	117,527	121,226	50,912	38,136	14,462	7,223	960	1,725	2,360	3,763
Central Waste Complex	5,694	20,094	0	0	0	0	0	0	0	0
ERDF	199	205	220	230	246	243	253	237	238	256
Liquid Effluent Facilities	13,487	13,976	14,329	14,587	14,756	15,471	15,607	16,159	16,481	16,701
Integrated Disposal Facility	5,396	5,695	6,092	6,286	6,773	6,655	6,971	6,532	6,477	7,103
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0
TRU Disposition	0	0	0	0	0	0	0	0	0	0
Spent Nuclear Fuel Disposition	5,857	6,066	10,507	0	0	0	0	0	0	0
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Sludge Disposition	0	0	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	66,530	74,115	43,838	30,587	20,032	17,136	22,809	15,638	12,468	16,906
Total	**233,848**	**263,100**	**150,486**	**101,023**	**68,231**	**58,521**	**58,910**	**51,797**	**49,351**	**57,319**
Fiscal Year	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Project Management	11,741	12,253	13,137	14,441	14,315	14,823	13,080	15,800	16,273	10,906
Capsule Storage and Disposition	0	0	0	0	0	0	0	0	0	0
Canister Storage Building	0	0	0	0	0	0	0	0	0	0
MLLW Treatment	870	913	971	1,061	1,068	1,175	1,023			
TRU Retrieval	0	0	0	0	0	0	0	0	0	0
TRU Repackaging	0	0	0	0	0	0	0	0	0	0
WRAP	0	0	0	0	0	0	0	0	0	0
T Plant	5,954	6,089	3,896	3,520	2,473	1,178	445			
Central Waste Complex	0	0	0	0	0	0	0	0	0	0

Table C-8. Solid Waste Stabilization and Disposition –200 Area (PBS RL-0013C) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000 Escalated). (3 pages)

ERDF	257	271	285	6,376	6,188	0	0	0	0	0
Liquid Effluent Facilities	17,221	17,541	17,879	18,257	18,826	19,136	19,501	19,759	20,423	21,071
Integrated Disposal Facility	7,123	7,464	8,046	8,788	1,507	1,902	2,051	2,078	1,954	2,001
Solid Waste Base Operations	0	0	0	0	0	0	0	0	0	0
TRU Disposition	0	0	0	0	0	0	0	0	0	0
Spent Nuclear Fuel Disposition	0	0	0	0	0	0	0	0	0	0
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	0	0	0
Sludge Disposition	0	0	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	15,384	16,134	9,796	13,095	8,964	8,455	4,860	7,071	6,555	4,605
Total	**58,550**	**60,665**	**54,010**	**65,538**	**53,341**	**46,669**	**40,960**	**44,708**	**45,205**	**38,583**
Fiscal Year	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**	**2061**	**Total**		
Project Management	0	0	0	0	0	0	0	**600,304**		
Capsule Storage and Disposition	0	0	0	0	0	0	0	**235,355**		
Canister Storage Building	0	0	0	0	0	0	0	**184,197**		
MLLW Treatment	0	0	0	0	0	0	0	**43,333**		
TRU Retrieval	0	0	0	0	0	0	0	**404,727**		
TRU Repackaging	0	0	0	0	0	0	0	**38,500**		
WRAP	0	0	0	0	0	0	0	**65,845**		
T Plant	0	0	0	0	0	0	0	**1,645,363**		
Central Waste Complex	0	0	0	0	0	0	0	**205,188**		
ERDF	0	0	0	0	0	0	0	**49,981**		
Liquid Effluent Facilities	22,835	23,671	24,704	24,237	22,043	0	0	**667,830**		
Integrated Disposal Facility	2,613	1,827	1,972	1,646	695	458	284	**250,103**		
Solid Waste Base Operations	0	0	0	0	0	0	0	**401**		
TRU Disposition	0	0	0	0	0	0	0	**484,345**		
Spent Nuclear Fuel Disposition	0	0	0	0	0	0	0	**306,474**		
Mixed Waste Disposal Trenches	0	0	0	0	0	0	0	**8,449**		
Sludge Disposition	0	0	0	0	0	0	0	**937,566**		
Site-wide Services and Other Distributed Costs	1,718	2,442	2,635	3,636	3,858	0	0	**1,622,802**		
Total	**27,166**	**27,940**	**29,311**	**29,519**	**26,596**	**458**	**284**	**7,750,763**		

ERDF = Environmental Restoration Disposal Facility. MLLW = mixed low-level waste. TRU = transuranic.
PBS = project baseline summary. WRAP = Waste Receiving and Processing Facility.

Table C-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	2015	2016	2017	2018	2019	2020	Total
1	**Solid Waste Stabilization and Disposition–200 Area**							
2	**Project Management**	**23,695**	**27,863**	**30,739**	**27,290**	**21,195**	**21,721**	**152,503**
3	Project Management	23,695	27,863	30,739	27,290	21,195	21,721	**152,503**
2	**Capsule Storage and Disposition**	**11,319**	**23,806**	**38,987**	**39,408**	**25,572**	**22,488**	**161,580**
3	WESF Base Operations	6,922	7,443	7,628	7,566	6,747	6,797	**43,103**
3	Cesium/Strontium Capsule Disposition	4,148	13,543	31,130	31,596	17,819	14,598	**112,834**
3	Cost and/or Schedule Uncertainty	249	2,820	229	246	1,006	1,093	**5,643**
2	**Canister Storage Building (CSB)**	**6,884**	**7,423**	**7,791**	**3,079**	**6,624**	**6,758**	**38,559**
3	Canister Storage Building	6,645	7,185	7,349	2,812	6,376	6,424	**36,791**
3	Cost and/or Schedule Uncertainty	239	238	442	267	248	334	**1,768**
2	**Mixed Low Level Waste (MLLW) Treatment**	**0**	**6,520**	**7,862**	**3,758**	**1,758**	**1,206**	**21,104**
3	M-091-42 (MLLW)	0	5,063	7,038	3,051	0	0	**15,152**
3	M-091-43 (MLLW)	0	811	338	0	0	0	**1,149**
3	MLLW Project Management	0	541	162	0	402	405	**1,510**
3	Other Treatment Activities	0	105	44	0	0	0	**149**
3	Cost and/or Schedule Uncertainty	0	0	280	707	1,356	801	**3,144**
2	**TRU Retrieval**	**191**	**172,078**	**55,753**	**71,262**	**71,712**	**33,250**	**404,246**
3	CH Waste Retrieval Operations	0	149,170	30,205	25,141	17,015	14,034	**235,565**
3	RH Waste Retrieval Operations	0	22,424	24,454	4,399	0	0	**51,277**
3	Cost and/or Schedule Uncertainty	191	484	1,094	41,722	54,697	19,216	**117,404**
2	**TRU Repackaging**	**5,500**	**5,500**	**5,500**	**5,500**	**5,500**	**5,500**	**33,000**
3	TRU Repackaging	5,000	5,000	5,000	5,000	5,000	5,000	**30,000**
3	Cost and/or Schedule Uncertainty	500	500	500	500	500	500	**3,000**
2	**Waste Receiving and Processing Facility (WRAP)**	**10,120**	**11,965**	**12,460**	**3,717**	**17,702**	**9,875**	**65,839**
3	WRAP Base Operations	4,971	6,756	6,871	0	0	0	**18,598**
3	WRAP Transition	0	0	0	0	17,021	9,165	**26,186**
3	Min-Safe Operation	4,658	4,774	5,133	3,558	0	0	**18,123**
3	Cost and/or Schedule Uncertainty	491	435	456	159	681	710	**2,932**
2	**T-Plant**	**13,739**	**19,841**	**19,737**	**19,590**	**25,451**	**18,976**	**117,334**
3	T-Plant Base Operations	12,012	14,649	15,373	9,262	23,485	18,293	**93,074**
3	T-Plant Upgrades	998	3,772	3,493	8,577	0	0	**16,840**
3	Cost and/or Schedule Uncertainty	729	1,420	871	1,751	1,966	683	**7,420**

Table C-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	2015	2016	2017	2018	2019	2020	Total
2	**Central Waste Complex**	**10,005**	**13,425**	**11,806**	**6,964**	**13,129**	**13,169**	**68,498**
3	Central Waste Complex	8,962	9,982	10,841	4,875	10,896	10,977	**56,533**
3	Low-Level Waste Burial Grounds	717	1,130	679	210	0	0	**2,736**
3	Cost and/or Schedule Uncertainty	326	2,313	286	1,879	2,233	2,192	**9,229**
2	**Environmental Restoration Disposal Facility (ERDF)**	**192**	**102**	**102**	**58**	**71**	**6**	**531**
3	Cost and/or Schedule Uncertainty	192	102	102	58	71	6	**531**
2	**Liquid Effluent Facilities (LEF)**	**3,720**	**8,790**	**6,256**	**6,411**	**8,882**	**8,809**	**42,868**
3	200 Area LEF Base Operations	3,720	8,164	2,667	0	4,288	4,441	23,280
3	200 Area LEF Upgrades	0	626	3,104	5,911	3,569	3,596	16,806
3	Cost and/or Schedule Uncertainty	0	0	485	500	1,025	772	2,782
2	**Integrated Disposal Facility (IDF)**	**481**	**2,667**	**1,510**	**6,149**	**3,644**	**3,548**	**17,999**
3	IDF Operations	331	2,425	1,301	5,862	1,944	1,959	**13,822**
3	IDF Regulatory and Safety	133	222	184	168	1,528	1,377	**3,612**
3	Cost and/or Schedule Uncertainty	17	20	25	119	172	212	**565**
2	**Solid Waste Base Operations**	**94**	**97**	**104**	**106**	**0**	**0**	**401**
3	Cost and/or Schedule Uncertainty	94	97	104	106	0	0	**401**
2	**TRU Disposition**	**0**	**0**	**0**	**79**	**35,405**	**33,293**	**68,777**
3	Central Characterization Project Support	0	0	0	0	963	970	**1,933**
3	Establish Shipping Capability	0	0	0	0	1,046	570	**1,616**
3	TRU Shipping	0	0	0	0	31,787	30,329	**62,116**
3	Cost and/or Schedule Uncertainty	0	0	0	79	1,609	1,424	**3,112**
2	**Spent Nuclear Fuel (SNF) Disposition**	**333**	**341**	**367**	**371**	**20,297**	**37,349**	**59,058**
3	Fuel Prep Facility/ Offsite SNF Disposition	323	331	356	360	20,197	37,246	**58,813**
3	Cost and/or Schedule Uncertainty	10	10	11	11	100	103	**245**
2	**Mixed Waste Disposal Trenches**	**591**	**625**	**648**	**263**	**4,162**	**2,160**	**8,449**
3	Mixed Waste Disposal Trenches Base Operations	574	607	629	243	0	0	**2,053**
3	Mixed Waste Disposal Trenches Upgrades	0	0	0	0	4,051	2,103	**6,154**
3	Cost and/or Schedule Uncertainty	17	18	19	20	111	57	**242**
2	**Sludge Disposition**	**0**	**0**	**11,594**	**166,183**	**364,041**	**240,514**	**782,332**
3	Sludge Disposition	0	0	11,594	143,940	348,042	225,758	**729,334**
3	Cost and/or Schedule Uncertainty	0	0	0	22,243	15,999	14,756	**52,998**
2	**Site-wide Services and Other Distributed Costs**	**44,511**	**47,712**	**29,445**	**49,671**	**65,649**	**41,582**	**278,570**
3	Site-wide Services and Other Distributed Costs	44,511	47,712	29,445	49,671	65,649	41,582	**278,570**
Total		**131,375**	**348,755**	**240,661**	**409,859**	**690,794**	**500,204**	**2,321,648**

Table C-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	2015	2016	2017	2018	2019	2020	Total

CH = contact-handled.
CSB = Canister Storage Building.
CWC = Central Waste Complex.
ERDF = Environmental Restoration Disposal Facility.
IDF = Integrated Disposal Facility.
LEF = Liquid Effluent Facility.
MLLW = mixed low-level waste.
PBS = project baseline summary.
RH = remote-handled.
SNF = spent nuclear fuel.
TRU = transuranic.
WESF = Waste Encapsulation Storage Facility.
WRAP = Waste Receiving and Processing (Facility).

C.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 C-10. This PBS is not broken down to Level 3 details, so no additional scope is presented; however, both near-term and remaining estimated cost information is provided.

Table C-10. Safeguards and Securities (PBS RL-0020) Level 2 Scope Summary.

Work Element	Scope Description
Safeguards and Security	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.

NOTE: See Table C-11 for schedule and budget information.
PBS = project baseline summary.
RL = U.S. Department of Energy, Richland Operations Office.

Table C-11. Safeguards and Security (PBS RL-0020) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000 Escalated).

Fiscal Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Safeguards and Security	63,700	83,986	80,864	77,756	79,226	88,722	70,715	81,917	66,260	67,537
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Safeguards and Security	71,459	75,318	78,155	80,574	83,180	85,514	91,099	94,215	95,675	98,014
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Safeguards and Security	100,899	104,721	114,613	52,570	56,390	55,631	58,086	54,362	52,613	58,324
Fiscal Year	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Safeguards and Security	58,546	61,227	65,468	72,008	71,295	78,675	69,022	84,188	86,747	87,840
Fiscal Year	**2055**	**2056**	**2057**	**2058**	**2059**					
Safeguards and Security	79,639	93,631	97,977	118,111	122,993					
Total	**3,569,462**									

C.1.5 SOIL AND WATER REMEDIATION–GROUNDWATER / VADOSE ZONE (PBS RL-0030) SCHEDULE AND COST DETAILS

Table C-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (3 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	
	Systematic Planning Integration	
Drilling	100-KR-4 Drilling	Planning, coordinating, and implementing well drilling and well decommissioning for Hanford Site wells according to project-specific requirements.
	100-NR-2 Drilling	
	100-HR-3 Drilling	
	200-BP-5 Drilling	
	200-PO-1 Drilling	
	200-UP-1 Drilling	
	200-ZP-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.
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.
	IFW – GRP Field Work Projects	
	IFW – Field Equipment Purchases (CENRTC)	
	Spare Parts	
Groundwater Monitoring and Performance Assessments	Modutanks	Includes operation, maintenance, sampling, and dismantling the Modutanks used for disposing groundwater from onsite well sampling and maintenance; geophysical borehole logging and reporting, groundwater sampling, water level monitoring, evaluating 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 Data Evaluation and Reporting	
	Groundwater Sample Collection	
	Hanford Geotechnical Library	
	Groundwater Lab Analysis and Data Management	
	Well Maintenance, Monitoring and Reporting	
100-BC-5 Operable Unit	100-BC-5 OU Project Management	Includes project management, CERCLA process implementation for final remedy, remedial actions, and monitoring and reporting.
	100-BC-5 CERCLA Process Implementation	
	100-BC-5 Remedial Actions-Interim and Final	
	100-BC-5 Monitoring and Reporting	

Table C-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
100-KR-4 Operable Unit	100-KR-4 OU Project Management	Includes project management, CERCLA process implementation for final remedy, remedial actions, well support, monitoring and reporting, modifications and expansions, and final D&D of remedy components.
	100-KR-4 CERCLA Process Implementation	
	100-KR-4 Remedial Actions-Interim and Final	
	100-KR-4 Monitoring and Reporting	
	100-KR-4 Modifications and Expansions	
	100-KR-4 D&D	
	100-KR-4 Well Support	
100-NR-2 Operable Unit	100-NR-2 OU Project Management	Includes project management, CERCLA process implementation for final remedy, remedial actions, monitoring and reporting, well support, and final D&D of remedy components.
	100-NR-2 CERCLA Process Implementation	
	100-NR-2 Remedial Actions-Interim and Final	
	100-NR-2 Monitoring and Reporting	
	100-NR-2 Well Support	
	100-NR-2 D&D	
100-HR-3 Operable Unit	100-HR-3 Project Management	Includes project management, decision documents for final remedy, remedial actions, well support, monitoring and reporting, modifications and expansions, and final D&D 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	Includes project management, CERCLA process implementation for final remedy, and monitoring and reporting.
	100-FR-3 CERCLA Process Implementation	
	100-FR-3 Monitoring and Reporting	
200-BP-5 Operable Unit	200-BP-5 Project Management	Includes project management, decision documents for final remedy, remedial actions, monitoring and reporting, and field studies and deployment.
	200-BP-5 Decision Documentation	
	200-BP-5 Remedial Actions – Interim and Final	
	200-BP-5 Monitoring and Reporting	
	200-BP-5 Field Studies and Deployment	
200-PO-1 Operable Unit	200-PO-1 OU Project Management	Includes project management, decision documents for final remedy, remedial actions, and monitoring and reporting.
	200-PO-1 Decision Documentation	
	200-PO-1 Remedial Actions-Interim and Final	
	200-PO-1 Monitoring and Reporting	
200-UP-1 Operable Unit	200-UP-1 OU Project Management	Includes project management, remedial actions, monitoring and reporting, well support, and final D&D of remedy components.
	200-UP-1 Remedial Actions-Interim and Final	
	200-UP-1 Monitoring and Reporting	
	200-UP-1 Well Support	
	200-UP-1 D&D	
200-ZP-1 Operable Unit	200-ZP-1 OU Project Management	Includes project management, decision documentation, remedial actions, and monitoring and reporting.
	200-ZP-1 Decision Documentation	
	200-ZP-1 Remedial Actions-Interim and Final	
	200-ZP-1 Monitoring and Reporting	
200-PW-1 Operable Unit	200-PW-1 OU Project Management	Includes project management, remedial actions, and monitoring and reporting.
	200-PW-1 Remedial Actions-Interim and Final	
	200-PW-1 Monitoring and Reporting	
300-FF-5 Operable Unit	300-FF-5 OU Project Management	Includes project management, decision documents for final remedy, remedial actions, well support, and monitoring and reporting.
	300-FF-5 Decision Documentation	
	300-FF-5 Remedial Actions – Interim and Final	
	300-FF-5 Monitoring and Reporting	
	300-FF-5 Well Support	

Table C-12. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 3 Scope Summary. (3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
Regulatory Decisions and Closure Integration	Closure Zones	Includes CERCLA and RCRA assessment activities for the Central Plateau source OUs, including project management, planning, documentation, and field and other activities necessary to complete the final remedy decision process.
Deep Vadose Zone Treatability Tests	Deep Vadose Zone Treatability Tests	Includes planning for and conducting 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 OU	The Deep Vadose Zone OU will address mitigation of the contamination present in the deep vadose zone at Hanford. The initial actions planned for this OU are the development of the decision documents, field studies, and deployment activities. 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 D&D of the OU remediation activities at the conclusion of the project, will be further developed following the decision process.
	Deep Vadose Zone Decision Documentation	
	Deep Vadose Zone Field Studies and Deployment	
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee. - Includes technical support services (e.g., audit, regulatory analysis, cost and risk analysis, estimating), Tribal Nation support and other small contracts.

NOTE: See Tables C-13 and C-14 for schedule and budget information.

CENRTC = capital equipment not related to construction.
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act.*
D&D = deactivation and decommissioning.
GRP = Groundwater Remediation Project.
IFW = Integrated Field Work.
OHC = Other Hanford Contractor.
OU = operable unit.
PBS = project baseline summary.
RCRA = *Resource Conservation and Recovery Act.*
TPA = Tri-Party Agreement.

Table C-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated). (4 pages)

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Integration and Assessments	7,504	18,079	13,653	13,204	21,750	19,594	20,116	18,655	18,174	18,591
Drilling	5,223	30,192	17,938	26,835	8,255	5,942	4,063	9,606	8,944	8,720
Project Management	7,761	8,105	8,680	11,685	16,761	15,813	14,396	10,086	9,829	10,026
Integrated Field Work	7,080	7,601	7,321	7,342	16,646	16,146	15,588	15,477	15,358	15,676
GW Monitoring/Performance Assessment	24,341	26,565	28,218	30,089	34,323	30,710	33,258	33,924	34,186	34,866
100-BC-5 Operable Unit	1,844	978	8,760	106,484	39,049	3,730	4,836	3,136	4,252	6,103
100-KR-4 Operable Unit	14,475	137,440	21,542	10,431	11,070	6,970	6,844	6,903	19,279	4,553
100-NR-2 Operable Unit	4,816	18,568	3,057	1,045	3,861	5,887	3,467	159	89	85
100-HR-3 Operable Unit	25,624	29,439	11,677	17,096	38,369	32,222	11,715	7,074	6,358	5,004
100-FR-3 Operable Unit	5,111	6,840	4,125	3,978	3,370	4,550	4,677	3,805	3,988	4,101
200-BP-5 Operable Unit	625	18,518	35,812	13,292	9,933	6,925	5,858	5,130	4,311	3,836
200-PO-1 Operable Unit	508	1,105	3,813	1,700	457	438	8	0	0	0
200-UP-1 Operable Unit	5,863	17,882	16,329	21,256	7,539	7,263	1,249	1,280	1,271	1,305
200-ZP-1 Operable Unit	19,453	29,683	42,175	35,882	32,556	25,244	16,965	17,288	17,236	17,646
200-PW-1 Operable Unit	1,025	1,024	1,098	1,361	265	0	0	0	0	0
300-FF-5 Operable Unit	4,276	28,114	5,065	5,405	1,687	1,580	400	382	399	402
Regulatory Decisions/Closure Integration	101,268	54,993	12,235	16,116	14,120	7,939	1,633	184	22	0
Deep Vadose Zone Treatability Tests	876	9,823	3,205	3,024	1,290	634	11	0	0	0
Deep Vadose Zone Operable Unit	1,373	19,056	42,582	57,208	49,974	47,818	35,685	29,086	14,481	3,918
Site-wide Services and Other Distributed Costs	57,759	100,621	87,565	82,678	76,754	89,072	31,005	30,239	30,207	27,746
Total	**296,805**	**564,662**	**374,850**	**466,111**	**388,029**	**328,477**	**211,774**	**192,414**	**188,384**	**162,578**
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Integration and Assessments	19,576	20,575	21,678	21,998	22,653	23,347	24,804	26,071	26,009	26,604
Drilling	10,827	13,106	7,594	7,380	7,596	10,783	8,325	7,265	7,483	7,549
Project Management	10,539	11,087	11,421	8,489	8,284	8,556	4,818	4,236	4,274	4,325
Integrated Field Work	16,525	15,009	15,000	13,455	13,519	13,835	9,067	8,282	8,377	8,564
GW Monitoring/Performance Assessment	35,826	38,251	39,521	40,879	42,892	43,397	48,675	47,203	47,898	48,828
100-BC-5 Operable Unit	5,740	6,580	6,195	6,165	6,554	5,334	5,249	6,270	6,030	4,904
100-KR-4 Operable Unit	3,846	3,884	3,983	4,160	4,375	4,357	4,593	4,671	4,610	4,806
100-NR-2 Operable Unit	90	94	98	105	109	113	121	125	127	129
100-HR-3 Operable Unit	4,070	3,494	3,328	3,438	3,628	3,630	3,718	3,758	4,077	4,095
100-FR-3 Operable Unit	2,948	3,145	2,377	939	1,004	1,206	220	228	230	235
200-BP-5 Operable Unit	2,529	1,973	1,901	1,132	516	238	0	0	0	0
200-PO-1 Operable Unit	340	7	0	0	0	404	7	0	0	0
200-UP-1 Operable Unit	1,300	1,276	1,327	1,361	1,395	1,447	1,536	1,588	1,612	1,640
200-ZP-1 Operable Unit	23,948	19,726	20,183	20,830	21,475	28,544	23,746	24,352	24,837	25,235

Table C-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated). (4 pages)

200-PW-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
300-FF-5 Operable Unit	367	386	413	448	430	464	460	397	410	494
Regulatory Decisions/Closure Integration	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
Deep Vadose Zone Operable Unit	2,221	0	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	23,768	24,458	28,498	29,546	33,498	39,391	41,678	41,684	39,831	37,952
Total	**164,460**	**163,051**	**163,517**	**160,325**	**167,928**	**185,046**	**177,017**	**176,130**	**175,805**	**175,360**
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Integration and Assessments	27,333	28,209	30,577	31,427	33,703	33,231	34,721	32,374	30,908	33,833
Drilling	11,314	1,340	0	0	0	4,277	91	0	0	0
Project Management	4,478	4,665	5,072	5,232	5,592	5,552	8,226	7,675	7,573	8,401
Integrated Field Work	8,832	7,847	8,159	8,393	9,038	8,896	11,721	10,833	10,696	11,881
GW Monitoring/Performance Assessment	48,357	50,739	54,139	55,599	60,160	55,896	57,589	55,303	55,298	59,774
100-BC-5 Operable Unit	6,085	4,613	3,716	5,401	4,204	3,809	4,704	3,705	3,338	1,994
100-KR-4 Operable Unit	4,755	2,755	593	297	318	313	328	310	305	334
100-NR-2 Operable Unit	130	135	148	154	164	162	169	158	156	173
100-HR-3 Operable Unit	4,212	2,621	613	370	397	391	409	378	376	418
100-FR-3 Operable Unit	242	252	273	282	303	307	321	300	296	328
200-BP-5 Operable Unit	0	0	0	0	0	0	0	0	0	0
200-PO-1 Operable Unit	478	7	0	0	0	587	8	0	0	0
200-UP-1 Operable Unit	1,695	1,765	1,907	1,972	2,096	2,079	2,137	1,939	10,191	304
200-ZP-1 Operable Unit	33,534	27,177	29,438	30,272	32,407	33,149	33,549	30,992	10,848	14,790
200-PW-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
300-FF-5 Operable Unit	482	512	396	568	521	543	595	446	542	495
Regulatory Decisions/Closure Integration	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
Deep Vadose Zone Operable Unit	0	0	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	45,976	39,673	53,884	44,347	53,005	45,460	46,265	30,818	19,183	23,868
Total	**197,903**	**172,310**	**188,915**	**184,314**	**201,908**	**194,652**	**200,833**	**175,231**	**149,710**	**156,593**
Fiscal Year	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Integration and Assessments	33,521	33,365	34,352	37,482	36,925	40,610	35,734	43,363	44,704	45,119
Drilling	0	0	0	0	0	0	0	0	0	0
Project Management	8,429	8,823	9,442	10,464	10,377	11,367	9,985	12,085	12,469	12,618
Integrated Field Work	11,987	12,616	13,467	14,798	14,682	16,186	14,220	17,163	17,717	17,949
GW Monitoring/Performance Assessment	59,057	61,938	65,373	70,544	72,157	75,742	74,596	80,023	82,054	83,163
100-BC-5 Operable Unit	2,222	3,978	2,517	2,418	3,920	2,321	2,128	1,498	1,713	2,974
100-KR-4 Operable Unit	322	346	373	322	259	252	218	266	273	277
100-NR-2 Operable Unit	174	181	193	212	211	232	204	247	254	255

Table C-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated). (4 pages)

100-HR-3 Operable Unit	424	443	318	254	235	0	56	0	0	0
100-FR-3 Operable Unit	328	344	366	403	398	438	387	468	483	488
200-BP-5 Operable Unit	0	0	0	0	0	0	0	0	0	0
200-PO-1 Operable Unit	612	0	0	0	0	0	0	0	0	0
200-UP-1 Operable Unit	699	1,146	976	660	394	412	361	445	466	461
200-ZP-1 Operable Unit	17,521	19,182	13,520	3,285	0	0	0	0	0	0
200-PW-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
300-FF-5 Operable Unit	462	630	654	579	808	683	572	715	687	599
Regulatory Decisions/Closure Integration	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
Deep Vadose Zone Operable Unit	0	0	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	21,450	22,014	24,518	29,833	25,189	29,531	15,948	25,693	23,809	19,924
Total	**157,208**	**165,006**	**166,069**	**171,254**	**165,555**	**177,774**	**154,409**	**181,966**	**184,629**	**183,827**
Fiscal Year	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**	**2061**	**2062**	**2063**	**2064**
Integration and Assessments	40,794	19,584	15,866	13,483	13,079	13,404	2,119	1,655	457	189
Drilling	0	0	0	0	0	0	0	0	0	0
Project Management	11,534	3,736	932	0	0	0	0	0	0	0
Integrated Field Work	16,373	5,211	1,179	42	0	0	0	0	0	0
GW Monitoring/Performance Assessment	78,743	42,787	33,316	21,912	27,077	10,730	8,994	2,565	421	0
100-BC-5 Operable Unit	506	3,155	245	1,329	1,458	3,095	1,086	1,952	569	661
100-KR-4 Operable Unit	251	118	23	0	0	0	0	0	0	0
100-NR-2 Operable Unit	225	41	57	29	0	0	0	0	0	0
100-HR-3 Operable Unit	0	0	0	0	0	0	0	0	0	0
100-FR-3 Operable Unit	475	81	75	23	6	0	0	0	0	0
200-BP-5 Operable Unit	0	0	0	0	0	0	0	0	0	0
200-PO-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
200-UP-1 Operable Unit	429	37	75	26	0	0	0	0	0	0
200-ZP-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
200-PW-1 Operable Unit	0	0	0	0	0	0	0	0	0	0
300-FF-5 Operable Unit	572	247	278	229	230	381	384	266	202	209
Regulatory Decisions/Closure Integration	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
Deep Vadose Zone Operable Unit	0	0	0	0	0	0	0	0	0	0
Site-wide Services and Other Distributed Costs	11,248	1,986	2,190	3,548	4,399	48,959	0	0	0	0
Total	**161,150**	**76,983**	**54,236**	**40,621**	**46,249**	**76,569**	**12,583**	**6,438**	**1,649**	**1,059**

Table C-13. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated). (4 pages)

Fiscal Year	2065	Total
Integration and Assessments	0	**1,224,756**
Drilling	0	**230,648**
Project Management	0	**373,898**
Integrated Field Work	0	**515,754**
GW Monitoring/Performance Assessment	0	**2,247,896**
100-BC-5 Operable Unit	0	**319,507**
100-KR-4 Operable Unit	0	**296,400**
100-NR-2 Operable Unit	0	**46,209**
100-HR-3 Operable Unit	0	**233,729**
100-FR-3 Operable Unit	0	**64,744**
200-BP-5 Operable Unit	0	**112,529**
200-PO-1 Operable Unit	0	**10,479**
200-UP-1 Operable Unit	0	**128,391**
200-ZP-1 Operable Unit	0	**816,668**
200-PW-1 Operable Unit	0	**4,773**
300-FF-5 Operable Unit	493	**66,959**
Regulatory Decisions/Closure Integration	0	**208,510**
Deep Vadose Zone Treatability Tests	0	**18,863**
Deep Vadose Zone Operable Unit	0	**303,402**
Site-wide Services and Other Distributed Costs	0	**1,666,668**
Total	**493**	**8,890,783**

Table C-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated). (4 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
1	**Soil and Water Remediation-Groundwater/Vadose Zone, PBS RL-0030**							
2	**Integration and Assessments**	**7,504**	**18,079**	**13,653**	**13,204**	**21,750**	**19,594**	**93,784**
3	Strategic Integration	743	762	819	828	2,116	1,859	**7,127**
3	Technical Integration	1,535	5,908	4,478	2,657	3,470	3,496	**21,544**
3	Remediation Decision Support	313	642	490	495	1,753	1,767	**5,460**
3	Remediation Science and Technology	0	5,086	1,872	2,791	5,884	5,928	**21,561**
3	Sample Management and Reporting	1,360	1,394	1,499	1,515	1,537	1,549	**8,854**
3	Environmental Databases	2,423	2,886	3,371	3,407	4,240	4,271	**20,598**
3	Value Engineering Studies	0	405	0	440	0	0	**845**
3	Systematic Planning Integration	719	550	671	678	0	0	**2,618**
3	Cost and/or Schedule Uncertainty	411	446	453	393	2,750	724	**5,177**
2	**Drilling**	**5,223**	**30,192**	**17,938**	**26,835**	**8,255**	**5,942**	**94,385**
3	100-KR-4 Drilling	0	5,130	1,428	1,443	54	412	**8,467**
3	100-NR-2 Drilling	0	1,092	1,458	4,394	0	0	**6,944**
3	100-HR-3 Drilling	0	653	702	710	2,022	1,945	**6,032**
3	200-UP-1 Drilling	0	9,842	0	0	1,414	1,422	**12,678**
3	200-ZP-1 Drilling	205	2,680	2,859	2,024	0	1,080	**8,848**
3	200-PW-1 Drilling	0	0	0	0	1,830	78	**1,908**
3	M-24-00 Well Drilling	1,853	1,470	1,162	1,175	780	783	**7,223**
3	Miscellaneous Well Drilling	742	761	818	827	0	0	**3,148**
3	Decommission Non-Tank Farm Wells	0	2,772	5,262	6,640	0	0	**14,674**
3	100-BC-5 Well Drilling	0	0	0	2,153	0	0	**2,153**
3	100-FR-3 Well Drilling	0	513	0	554	0	0	**1,067**
3	300-FF-5 Well Drilling	0	3,864	3,268	3,727	117	0	**10,976**
3	Deep Vadose Zone	844	0	0	0	492	0	**1,336**
3	Cost and/or Schedule Uncertainty	1,579	1,415	981	3,188	1,546	222	**8,931**
2	**Project Management**	**7,761**	**8,105**	**8,680**	**11,685**	**16,761**	**15,813**	**68,805**
3	Project Management and Support	7,460	7,800	8,402	11,332	15,244	15,350	**65,588**
3	Cost and/or Schedule Uncertainty	301	305	278	353	1,517	463	**3,217**
2	**Integrated Field Work (IFW)**	**7,080**	**7,601**	**7,321**	**7,342**	**16,646**	**16,146**	**62,136**
3	IFW – Operations and Maintenance	6,297	6,454	6,605	6,675	9,874	9,927	**45,832**
3	IFW – GRP Field Work Projects	0	0	0	0	2,539	2,558	**5,097**
3	IFW – Field Equipment Purchases (CENRTC)	0	228	0	0	1,590	1,602	**3,420**
3	Spare Parts	386	395	425	430	0	0	**1,636**
3	Cost and/or Schedule Uncertainty	397	524	291	237	2,643	2,059	**6,151**
2	**Groundwater Monitoring and Performance Assessments**	**24,341**	**26,565**	**28,218**	**30,089**	**34,323**	**30,710**	**174,246**
3	Modutanks	407	414	421	428	1,229	1,242	**4,141**
3	Geophysical Sciences and Logging	2,171	2,208	2,246	3,465	150	752	**10,992**
3	GW Lab Analysis & Data Management	8,919	9,143	9,830	9,934	11,675	11,797	**61,298**
3	GW Sample Collection	5,996	6,146	6,608	6,678	3,326	3,351	**32,105**

Table C-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated). (4 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
3	Hanford Geotechnical	78	80	85	86	92	92	**513**
3	Groundwater Data Evaluation and Reporting	3,432	3,517	3,782	3,822	286	288	**15,127**
3	Efficiency Challenge	(2,136)	0	0	0	0	0	**(2,136)**
3	Well Maintenance, Monitoring and Reporting	1,480	1,518	1,632	1,623	2,932	2,641	**11,826**
3	Cost and/or Schedule Uncertainty	3,994	3,539	3,614	4,053	14,633	10,547	**40,380**
2	**100-BC-5 Operable Unit**	**1,844**	**978**	**8,760**	**106,484**	**39,049**	**3,730**	**160,845**
3	100-BC-5 Operable Unit Project Management	179	152	155	158	68	69	**781**
3	100-BC-5 CERCLA Process Implementation	647	603	369	514	0	0	**2,133**
3	100-BC-5 Monitoring and Reporting	384	195	222	212	69	70	**1,152**
3	Cost and/or Schedule Uncertainty	634	28	8,014	105,600	38,912	3,591	**156,779**
2	**100-KR-4 Operable Unit**	**14,475**	**137,440**	**21,542**	**10,431**	**11,070**	**6,970**	**201,928**
3	100-KR-4 Project Management	343	351	378	382	0	0	**1,454**
3	100-KR-4 CERCLA Process Implementation	260	584	0	0	0	0	**844**
3	100-KR-4 Remedial Actions (Interim and Final)	4,056	4,286	4,367	4,610	0	0	**17,319**
3	100-KR-4 Well Support	0	0	0	0	154	155	**309**
3	100-KR-4 Monitoring and Reporting	603	502	540	546	306	308	**2,805**
3	100-KR-4 Modifications and Expansions	0	3,443	2,165	1,897	0	0	**7,505**
3	100-KR-4 D&D	0	0	0	164	0	0	**164**
3	Cost and/or Schedule Uncertainty	9,213	128,274	14,092	2,832	10,610	6,507	**171,528**
2	**100-NR-2 Operable Unit**	**4,816**	**18,568**	**3,057**	**1,045**	**3,861**	**5,887**	**37,234**
3	100-NR-2 Project Management	269	276	297	300	462	466	**2,070**
3	100-NR-2 CERCLA Process Implementation	542	0	0	0	0	0	**542**
3	100-NR-2 Remedial Actions (Interim and Final)	849	13,691	1,574	542	401	676	**17,733**
3	100-NR-2 Well Support	0	0	0	0	79	80	**159**
3	100-NR-2 Monitoring and Reporting	46	45	44	45	210	212	**602**
3	100-NR-2 D&D	0	0	338	0	0	0	**338**
3	Cost and/or Schedule Uncertainty	3,110	4,556	804	158	2,709	4,453	**15,790**
2	**100-HR-3 Operable Unit**	**25,624**	**29,439**	**11,677**	**17,096**	**38,369**	**32,222**	**154,427**
3	100-HR-3 Project Management	343	351	378	382	0	0	**1,454**
3	100-HR-3 Decision Documentation	341	224	147	0	0	0	**712**
3	100-HR-3 Remedial Actions (Interim and Final)	5,534	5,634	5,896	6,314	2,684	456	**26,518**
3	100-HR-3 Well Support	0	0	0	0	193	195	**388**
3	100-HR-3 Monitoring and Reporting	453	465	500	505	565	569	**3,057**
3	100-HR-3 Modifications and Expansions	0	0	0	0	641	0	**641**
3	100-HR-3 D&D	0	988	0	1,884	0	9,435	**12,307**
3	Cost and/or Schedule Uncertainty	18,953	21,777	4,756	8,011	34,286	21,567	**109,350**
2	**100-FR-3 Operable Unit**	**5,111**	**6,840**	**4,125**	**3,978**	**3,370**	**4,550**	**27,974**
3	100-FR-3 Operable Unit Project Management	179	152	155	158	70	71	**785**
3	100-FR-3 CERCLA Process Implementation	277	0	0	0	0	0	**277**
3	100-FR-3 Monitoring and Reporting	380	412	419	448	79	80	**1,818**
3	Cost and/or Schedule Uncertainty	4,275	6,276	3,551	3,372	3,221	4,399	**25,094**

Table C-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated). (4 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
2	**200-BP-5 Operable Unit**	**625**	**18,518**	**35,812**	**13,292**	**9,933**	**6,925**	**85,105**
3	200-BP-5 Project Management	365	251	212	215	686	281	**2,010**
3	200-BP-5 Decision Documentation	0	875	677	0	0	0	**1,552**
3	200-BP-5 Remedial Actions (Interim and Final)	0	13,446	12,756	5,881	359	0	**32,442**
3	200-BP-5 Monitoring and Reporting	218	223	240	243	0	0	**924**
3	200-BP-5 Field Studies and Deployment	0	359	25	0	0	0	**384**
3	Cost and/or Schedule Uncertainty	42	3,364	21,902	6,953	8,888	6,644	**47,793**
2	**200-PO-1 Operable Unit**	**508**	**1,105**	**3,813**	**1,700**	**457**	**438**	**8,021**
3	200-PO-1 Project Management	366	251	269	215	0	0	**1,101**
3	200-PO-1 Decision Documentation	0	354	280	0	0	292	**926**
3	200-PO-1 Remedial Actions (Interim and Final)	0	290	161	81	7	0	**539**
3	200-PO-1 Monitoring and Reporting	120	123	133	134	0	0	**510**
3	Cost and/or Schedule Uncertainty	22	87	2,970	1,270	450	146	**4,945**
2	**200-UP-1 Operable Unit**	**5,863**	**17,882**	**16,329**	**21,256**	**7,539**	**7,263**	**76,132**
3	200-UP-1 Project Management	82	111	113	115	53	54	**528**
3	200-UP-1 Remedial Actions (Interim and Final)	5,605	17,142	12,888	20,718	6,831	6,846	**70,030**
3	200-UP-1 Well Support	0	0	0	0	146	147	**293**
3	200-UP-1 Monitoring and Reporting	167	171	184	186	131	132	**971**
3	Cost and/or Schedule Uncertainty	9	458	3,144	237	378	84	**4,310**
2	**200-ZP-1 Operable Unit**	**19,453**	**29,683**	**42,175**	**35,882**	**32,556**	**25,244**	**184,993**
3	200-ZP-1 Project Management	591	605	651	658	938	945	**4,388**
3	200-ZP-1 Decision Documentation	489	472	508	495	0	219	**2,183**
3	200-ZP-1 Remedial Actions (Interim and Final)	17,381	27,613	39,328	32,082	18,304	22,704	**157,412**
3	200-ZP-1 Monitoring and Reporting	162	166	179	181	216	217	**1,121**
3	Cost and/or Schedule Uncertainty	830	827	1,509	2,466	13,098	1,159	**19,889**
2	**200-PW-1 Operable Unit**	**1,025**	**1,024**	**1,098**	**1,361**	**265**	**0**	**4,773**
3	200-PW-1 Project Management	67	69	74	75	0	0	**285**
3	200-PW-1 Remedial Actions (Interim and Final)	844	840	903	1,156	0	0	**3,743**
3	200-PW-1 Monitoring and Reporting	75	77	83	84	0	0	**319**
3	Cost and/or Schedule Uncertainty	39	38	38	46	265	0	**426**
2	**300-FF-5 Operable Unit**	**4,276**	**28,114**	**5,065**	**5,405**	**1,687**	**1,580**	**46,127**
3	300-FF-5 Project Management	173	148	150	153	330	332	**1,286**
3	300-FF-5 Decision Documentation	24	0	0	0	0	0	**24**
3	300-FF-5 Remedial Actions (Interim and Final)	0	24,641	3,226	4,285	0	0	**32,152**
3	300-FF-5 Well Support	0	0	0	0	118	119	**237**
3	300-FF-5 Monitoring and Reporting	40	41	41	42	828	834	**1,826**
3	Cost and/or Schedule Uncertainty	4,039	3,284	1,648	925	411	295	**10,602**
2	**Regulatory Decisions and Closure Integration**	**101,268**	**54,993**	**12,235**	**16,116**	**14,120**	**7,939**	**206,671**
3	Closure Zones	27	16,760	10,296	9,013	4,024	140	**40,260**
3	Cost and/or Schedule Uncertainty	101,241	38,233	1,939	7,103	10,096	7,799	**166,411**

Table C-14. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated). (4 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
2	**Deep Vadose Zone Treatability Tests**	**876**	**9,823**	**3,205**	**3,024**	**1,290**	**634**	**18,852**
3	Deep Vadose Zone Treatability Tests	0	9,345	2,894	2,975	503	0	**15,717**
3	Cost and/or Schedule Uncertainty	876	478	311	49	787	634	**3,135**
2	**Deep Vadose Zone Operable Unit**	**1,373**	**19,056**	**42,582**	**57,208**	**49,974**	**47,818**	**218,011**
3	Deep Vadose Zone OU	89	462	297	251	68	69	**1,236**
3	Deep Vadose Zone Decision Documentation	61	121	2,882	802	344	135	**4,345**
3	Deep Vadose Zone Field Studies and Deployment	0	6,106	6,125	823	945	961	**14,960**
3	Cost and/or Schedule Uncertainty	1,223	12,367	33,278	55,332	48,617	46,653	**197,470**
2	**Site-wide Services and Other Distributed Costs**	**57,759**	**100,621**	**87,565**	**82,678**	**76,754**	**89,072**	**494,449**
3	Site-wide Services and Other Distributed Costs	57,759	100,621	87,565	82,678	76,754	89,072	**494,449**
Total		**296,805**	**564,626**	**374,850**	**466,111**	**388,029**	**328,477**	**2,418,898**

CENRTC = capital equipment not related to construction.
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act*
D&D = decontamination and decommissioning.
GRP = Groundwater Remediation Project.
IFW = Integrated Field Work.
OU = operable unit.
PBS = performance baseline summary.

C.1.6 NUCLEAR FACILITY D&D–REMAINDER OF HANFORD (PBS RL-0040.01.1) SCHEDULE AND COST DETAILS

Table C-15. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040.01.1) Level 3 Scope Summary. (3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
Regulatory Decisions and Closure Integration	Central Plateau Project Management	Provides overall management function in support of the nuclear facility D&D mission on the Central Plateau.
	Central Plateau Engineering Studies	Provides crosscutting 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 below slab of the non-canyon facilities.
	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, provide 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.	
	Balance of East IA	This area contains waste sites, buildings and structures, and pipelines that will be addressed through zone closure.
	Balance of West IA	This area contains waste sites, buildings and structures, and pipelines that will be addressed through zone closure.
	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.
	B Plant Zone	This zone contains a canyon (B Plant), waste sites, buildings and structures, and pipelines that will be addressed through zone closure.
	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.
	ERDF Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure.
	PFP Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.

Table C-15. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040.01.1) Level 3 Scope Summary. (3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
	PUREX Zone	This zone contains a canyon (PUREX), waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	REDOX Zone	This zone contains a canyon (REDOX), waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	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.
	Solid Waste Zone	This zone contains waste sites and buildings and structures that will be addressed through zone closure.
	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.
	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.
	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.
	Waste Management Zone	This zone contains waste sites, buildings and structures, pipelines, and utility relocations that will be addressed through zone closure.
	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.
	100 Area	This area contains buildings and structures that will be addressed through zone closure.
	600 Area	This zone contains buildings and structures that will be addressed through zone closure.
	300 Area	This area contains buildings and structures that will be addressed through zone closure.
	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. 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	S&M and Min-Safe for Facilities and Waste Sites	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
	200 Area S&M	

Table C-15. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040.01.1) Level 3 Scope Summary. (3 pages)

Level 2 Work Element	Level 3 Work Element	Scope Summary
	300 Area S&M	and health, quality assurance, emergency preparedness, radiation protection, safeguards and security, baseline controls, and training.
	400 Area S&M	
	600 Area S&M	
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee.

NOTE: See Tables C-16 and C-17 for schedule and budget information.

CERCLA= *Comprehensive Environmental Response, Compensation, and Liability Act of 1980.*
D&D = decontamination and decommissioning.
D4 = deactivation, decommissioning, decontamination, and demolition.
ERDF = Environmental Restoration Disposal Facility.
ESH&Q = Environment, Safety, Health, and Quality.
IA = implementation area.
ISMS = Integrated Safety Management System.
O&M = operation and maintenance.
OHC = Other Hanford Contractor.
PBS = project baseline summary.
PFP = Plutonium Finishing Plant.
PUREX = Plutonium Uranium Extraction (Plant).
REDOX = Reduction-Oxidation (Plant).
RL = U.S. Department of Energy, Richland Operations Office.
ROD = record of decision.
RTD = remove, treat, dispose.
S&M = surveillance and maintenance.
WTP = Waste Treatment and Immobilization Plant.

Table C-16. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040.01.1) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated).

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Regulatory Decisions & Closure Integration	1,231	1,715	19,220	33,387	44,219	20,998	21,082	21,505	21,024	20,940
Zone Environmental Remediation	0	128,068	72,730	193,222	571,376	626,827	467,605	511,027	636,947	655,987
S&M & Min-Safe for Facilities and Waste Sites	11,188	8,067	8,279	8,524	13,360	13,394	13,821	13,997	14,812	14,314
Site-wide Services and Other Distributed Costs	1,718	4,859	6,963	14,968	7,354	30	99,649	101,194	98,714	78,228
Total	**14,137**	**142,709**	**107,192**	**250,101**	**636,309**	**661,249**	**602,157**	**647,723**	**771,497**	**769,469**
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Regulatory Decisions & Closure Integration	21,911	23,070	23,976	24,741	25,445	26,212	27,812	28,781	29,250	29,883
Zone Environmental Remediation	332,990	199,450	160,665	142,296	106,346	87,233	61,659	55,808	69,400	82,990
S&M & Min-Safe for Facilities and Waste Sites	15,028	15,281	15,303	14,811	14,910	15,329	16,364	17,977	17,195	17,497
Site-wide Services and Other Distributed Costs	42,559	32,987	37,677	28,329	25,745	24,273	26,943	26,068	29,313	35,445
Total	**412,488**	**270,788**	**237,621**	**210,177**	**172,446**	**153,047**	**132,778**	**128,634**	**145,158**	**165,815**
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Regulatory Decisions & Closure Integration	30,776	31,932	34,731	35,694	38,283	37,747	39,400	36,931	36,357	40,249
Zone Environmental Remediation	102,017	166,868	182,228	257,976	234,281	224,780	239,863	533,574	875,184	556,714
S&M & Min-Safe for Facilities and Waste Sites	18,052	18,804	20,419	20,879	22,447	22,157	23,139	21,957	22,180	25,742
Site-wide Services and Other Distributed Costs	28,963	24,463	34,553	56,389	52,821	61,550	50,764	73,261	85,080	69,051
Total	**179,808**	**242,067**	**271,931**	**370,938**	**347,832**	**346,234**	**353,166**	**665,723**	**1,018,801**	**691,756**
Fiscal Year	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Regulatory Decisions & Closure Integration	40,351	42,186	45,054	49,557	49,031	54,008	47,543	57,635	59,429	60,138
Zone Environmental Remediation	403,412	286,219	248,372	162,380	235,006	184,549	380,554	183,473	172,385	153,261
S&M & Min-Safe for Facilities and Waste Sites	25,837	26,948	28,915	31,182	30,020	32,789	29,048	35,053	35,863	35,635
Site-wide Services and Other Distributed Costs	68,630	61,603	61,340	45,493	49,192	37,566	51,207	29,898	25,003	23,495
Total	**538,230**	**416,956**	**383,681**	**288,612**	**363,249**	**308,912**	**508,352**	**306,059**	**292,680**	**272,529**
Fiscal Year	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**	**2061**	**2062**	**2063**	**2064**
Regulatory Decisions & Closure Integration	54,722	64,051	67,011	79,930	84,187	29,057	31,378	30,650	27,316	9,110
Zone Environmental Remediation	286,123	235,255	313,738	253,539	283,152	240,973	277,939	231,000	137,595	25,675
S&M & Min-Safe for Facilities and Waste Sites	31,988	36,975	38,605	46,261	49,107	14,316	16,209	15,216	12,687	4,042
Site-wide Services and Other Distributed Costs	28,319	39,929	40,259	38,453	39,597	0	0	0	0	0
Total	**401,152**	**376,210**	**459,613**	**418,183**	**456,043**	**284,346**	**325,526**	**276,866**	**177,598**	**38,827**
Fiscal Year	**2065**	**Total**								
Regulatory Decisions & Closure Integration	51	**1,810,897**								
Zone Environmental Remediation	737	**13,231,448**								
S&M and Min-Safe for Facilities and Waste Sites	43	**1,071,966**								
Site-wide Services and Other Distributed Costs	0	**1,899,895**								
Total	**831**	**18,014,206**								

PBS = project baseline summary.

S&M = surveillance and maintenance.

Table C-17. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040.01.1) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated). (2 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
1	**Nuclear Facility D&D-Remainder of Hanford, PBS RL-0040.01.1**							
2	**Regulatory Decisions & Closure Integration**	**1,231**	**1,715**	**19,220**	**33,387**	**44,219**	**20,998**	**120,770**
3	Central Plateau Project Management	1,186	131	13,023	20,162	27,903	11,777	**74,182**
3	Central Plateau Engineering Studies	0	0	0	0	823	830	**1,653**
3	Emergency Response for Facility/Waste Site ESH&Q or Remediation - FY2015 - FY2048	0	1,555	3,134	8,177	7,340	7,395	**27,601**
3	Below Slab Remediation ROD Non-Canyon Facilities	0	0	0	0	1,083	0	**1,083**
3	Hazard Reduction	0	0	2,514	4,141	5,079	0	**11,734**
3	Cost and/or Schedule Uncertainty	45	29	549	907	1,991	996	**4,517**
2	**Zone Environmental Remediation**	**0**	**128,068**	**72,730**	**193,222**	**571,376**	**626,827**	**1,592,223**
3	B Plant Zone	0	0	0	0	806	809	**1,615**
3	C Farm Zone	0	0	0	0	302	1,783	**2,085**
3	ERDF Zone	0	0	0	0	41	41	**82**
3	PFP Zone	0	2	5,390	41,080	61,771	72,458	**180,701**
3	PUREX Zone	0	0	0	0	7,409	7,144	**14,553**
3	REDOX Zone	0	0	0	0	10,343	10,379	**20,722**
3	S/U Farm Zone	0	0	0	0	81	0	**81**
3	Solid Waste Zone	0	0	0	0	26,085	28,389	**54,474**
3	T Plant Zone	0	0	0	0	7,170	7,195	**14,365**
3	U Plant Zone	0	40,891	41,129	63,670	103,108	79,206	**328,004**
3	Waste Management Zone	0	0	0	0	37,289	58,063	**95,352**
3	600 Area (and Misc.)	0	0	73	0	17,483	17,544	**35,100**
3	400 Area	0	0	0	0	540	542	**1,082**
3	Outer Area	0	41,380	14,606	68,553	92,990	226,880	**444,409**
3	Balance of West IA	0	0	1,213	1,015	39,169	16,864	**58,261**
3	Balance of East IA	0	45,795	338	2	58,353	43,086	**147,574**
3	Cost and/or Schedule Uncertainty	0	0	9,981	18,902	108,436	56,444	**193,763**
2	**S&M and Min-Safe for Facilities and Waste Sites**	**11,188**	**8,067**	**8,279**	**8,524**	**13,360**	**13,394**	**62,812**
3	S&M and Min-Safe for Facilities and Waste Sites	8,018	7,729	7,898	8,044	608	581	**32,878**
3	200 Area S&M	0	0	0	0	11,772	11,860	**23,632**
3	400 Area S&M	0	0	0	0	130	131	**261**
3	600 Area S&M	0	0	0	0	130	131	**261**
3	300 Area S&M	0	0	0	0	264	266	**530**
3	Cost and/or Schedule Uncertainty	3,170	338	381	480	456	425	**5,250**
2	**Site-wide Services and Other Distributed Costs**	**1,718**	**4,859**	**6,963**	**14,968**	**7,354**	**30**	**35,892**
3	Site-wide Services and Other Distributed Costs	1,718	4,859	6,963	14,968	7,354	30	**35,892**
Total		**14,137**	**142,709**	**107,192**	**250,101**	**636,309**	**661,249**	**1,811,697**

Table C-17. Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040.01.1) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated). (2 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total

ERDF = Environmental Restoration Disposal Facility.
ESH&Q = environment, safety, health, and quality.
FY = fiscal year.
IA = implementation area.
PBS = Project Baseline Summary.
PFP = Plutonium Finishing Plant.
PUREX = Plutonium Uranium Extraction (Plant).
REDOX = Reduction-Oxidation (Plant).
ROD = record of decision.
S&M = surveillance and maintenance.

C.1.7 INFRASTRUCTURE AND SERVICES (PBS RL-0040.01.2) SCHEDULE AND COST DETAILS

Table C-18. Infrastructure and Services (PBS RL-0040.01.2) Level 3 Scope Summary.

Level 2 Work Element	Level 3 Work Element	Scope Summary
Reliability Projects	Reliability Projects	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.
HAMMER Ready to Serve	HAMMER Ready to Serve	Includes operations and maintenance activities at the HAMMER facility in support of Hanford Site and other training.
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee. - Also includes technical support services (e.g., audit, regulatory analysis, cost and risk analysis, estimating), Tribal Nation support and other small contracts.
NOTE: See Tables C-19 and C-20 for schedule and budget information. CENTRC = capital equipment not related to construction. HAMMER = Hazardous Materials Management and Emergency Response. OHC = Other Hanford Contractor.		

Table C-19. Infrastructure and Services (PBS RL-0040.01.2) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated).

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Reliability Projects	589	44,088	52,833	51,614	49,645	48,957	18,467	22,106	19,597	20,024
HAMMER Ready to Serve	6,549	6,509	6,657	6,821	7,354	7,483	7,018	5,853	5,847	5,982
Site-wide Services and Other Distributed Costs	48,131	65,988	93,365	110,960	128,755	177,660	57,070	59,052	58,656	66,229
Total	**55,269**	**116,585**	**152,855**	**169,395**	**185,754**	**234,100**	**82,555**	**87,011**	**84,100**	**92,235**
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Reliability Projects	21,000	23,055	24,575	24,359	24,468	16,156	17,083	17,577	17,792	18,263
HAMMER Ready to Serve	6,329	6,684	5,846	5,982	6,191	6,395	6,789	5,865	5,921	6,094
Site-wide Services and Other Distributed Costs	44,488	45,923	48,206	49,951	52,052	50,537	53,447	54,343	54,398	55,039
Total	**71,817**	**75,662**	**78,627**	**80,292**	**82,711**	**73,088**	**77,319**	**77,785**	**78,111**	**79,396**
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Reliability Projects	18,752	19,389	22,954	22,533	23,192	22,763	23,853	22,236	21,848	24,341
HAMMER Ready to Serve	6,250	6,511	5,699	5,844	6,310	6,181	6,480	4,573	4,477	4,956
Site-wide Services	59,192	58,530	62,580	61,417	64,566	61,708	63,229	60,335	51,673	41,575
Total	**84,194**	**84,430**	**91,233**	**89,794**	**94,068**	**90,652**	**93,562**	**87,144**	**77,998**	**70,872**
Fiscal Year	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Reliability Projects	24,603	25,787	28,943	31,531	30,528	31,855	25,761	25,837	25,628	25,935
HAMMER Ready to Serve	4,989	5,235	3,740	4,144	4,102	4,491	3,941	2,398	2,498	2,520
Site-wide Services and Other Distributed Costs	41,658	42,833	42,108	45,670	43,882	45,933	43,396	44,989	40,627	40,586
Total	**71,250**	**73,855**	**74,791**	**81,345**	**78,512**	**82,279**	**73,098**	**73,224**	**68,753**	**69,041**
Fiscal Year	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**	**2061**			
Reliability Projects	23,460	13,911	14,175	14,559	14,347	11,195	5,743			
HAMMER Ready to Serve	2,268	2,652	4,686	6,128	103	0	0			
Site-wide Services and Other Distributed Costs	39,459	38,243	39,416	40,806	40,578	0	0			
Total	**65,187**	**54,806**	**58,277**	**61,493**	**55,028**	**11,195**	**5,743**			
Fiscal Year	**Total**									
Reliability Projects	**1,127,907**									
HAMMER Ready to Serve	**239,345**									
Site-wide Services and Other Distributed Costs	**2,589,239**									
Total	**3,956,491**									

HAMMER = Hazardous Materials Management and Emergency Response (Facility).
PBS = project baseline summary.
RL = U.S. Department of Energy, Richland Operations Office.

Table C-20. Infrastructure and Services (PBS RL-0040.01.2) Near-Term Schedule and Costs, Level 3, by Fiscal Year ($1,000, Escalated).

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
1	**Infrastructure and Services, PBS RL-0040.01.2**							
2	**Reliability Projects**	**589**	**44,088**	**52,833**	**51,614**	**49,645**	**48,957**	**247,726**
3	Reliability Projects	0	41,782	50,548	49,753	45,499	46,273	**233,855**
3	Cost and/or Schedule Uncertainty	589	2,306	2,285	1,861	4,146	2,684	**13,871**
2	**HAMMER Ready to Serve**	**6,549**	**6,509**	**6,657**	**6,821**	**7,354**	**7,483**	**41,373**
3	HAMMER Ready to Serve	6,549	6,509	6,657	6,821	6,985	7,104	**40,625**
3	Cost and/or Schedule Uncertainty	0	0	0	0	369	379	**748**
2	**Site-wide Services and Other Distributed Costs**	**48,131**	**65,988**	**93,365**	**110,960**	**128,755**	**177,660**	**624,859**
3	Site-wide Services and Other Distributed Costs	48,131	65,988	93,365	110,960	128,755	177,660	**624,859**
Total		**55,269**	**116,585**	**152,855**	**169,395**	**185,754**	**234,100**	**913,958**

HAMMER = Hazardous Materials Management and Emergency Response.
PBS = project baseline summary.
RL = U.S. Department of Energy, Richland Operations Office.

C.1.8 NUCLEAR FACILITY D&D-RIVER CORRIDOR CLOSURE PROJECT (PBS RL-0041) SCHEDULE AND COST DETAILS

Table C-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	324/327 Area (does not include 300-296 remediation)	Includes D4 of approximately 500 facilities, provision of utility and S&M 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 and 300 Areas. 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). The D4 process includes obtaining regulatory approvals; characterizing 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 track hoe, processor, loader, cranes; explosives, cutting equipment, or other methods and the demolition debris are disposed, generally to ERDF. Following demolition, samples are collected to verify that cleanup criteria are met, and the sites are backfilled and revegetated.
	300 Area Sites	
	S&M	Periodic surveillance and maintenance activities to maintain safe access to facilities undergoing deactivation, to prevent or correct biological vectors at waste sites and to maintain compliance with closure conditions or post-closure care requirements.
Field Remediation Closure	100-B/C Area	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) in 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 A). In addition to RTD, confirmatory sites were identified that require sampling to determine the need for RTD. Following sampling, these sites become RTD sites or are closed as no-action sites. 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 backfill, grading, and revegetation.
	100-D Area	
	100-H Area	
	100-N Area	
	100 Area Remaining Sites	
	300 Area Sites	
	600 Area	
	Misc. Restoration	Includes field remediation of abandoned aboveground utilities and structures, railroads, surplus fencing, and debris, associated restoration of landscape through backfilling and grading to match natural contours of the area, restore positive drainage, and reestablish native vegetation.
	Management & Support	Provides support of the field remediation mission.

Table C-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
Waste Operations	200 Area Waste Operations	Includes the transportation, disposal, and treatment (if required) of waste from the River Corridor cleanup activities and other 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 & Support	Provides for management function in support of the waste operations mission.
End State/Final Closure	End State/Final Closure	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 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 Hanford Long-Term Stewardship Program.
	Management & Support	Provides for management function in support of the final closure mission.
Mission Support/ General Support	Project Integration	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	
	SH&Q	
	Engineering	
	Regulatory and Environmental Management	
	Office of the Project General Manager	
PRC River Zone Environmental	100-K Regulatory Closure Documents	Final remediation of waste sites and D4 of buildings and structures in the 100-K Area will be completed when all spent nuclear fuel is removed from the K Basins. Includes the interim safe storage of the KE and KW reactors consistent with the other 100 Area reactors and project management.
	100-K Group 1 Remediation	
	100-K Group 2 Remediation	
	100-K Group 3 Remediation	
	KW Deactivation	
	105-KE & 105-KW Reactor Disposition	
	100-K Project Management	
Site Infrastructure & Utility/ Logistics & Transportation	B Reactor	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.

Table C-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
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) pension and contractor's fee. - Also includes technical support services (e.g., audit, regulatory analysis, cost and risk analysis, estimating), Tribal Nation support and other small contracts.

NOTE: See Tables C-22 and C-23 for schedule and budget information.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act.*
D&D = decontamination and decommissioning.
D4 = deactivation, decontamination, decommissioning, and demolition.
ERDF = Environmental Restoration Disposal Facility.
KE = K East.
KW = K West.
OHC = Other Hanford Contractor.
PBS = project baseline summary.
PRC = Plateau Remediation Contract.
ROD = record of decision.
RTD = remove, treat, and dispose.
S&M = surveillance and maintenance.
SH&Q = Safety, Health & Quality.

Table C-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).

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022
D4 Closure	7,033	11,209	48,604	40,336	0	0	0	0
Field Remediation Closure	95,448	80,407	63,792	63,415	0	0	0	0
Waste Operations	15,108	32,141	27,379	55,835	0	0	0	0
End State/Final Closure	4,019	1,691	1,186	1,207	0	0	0	0
Mission Support/General Support	21,477	39,158	24,164	17,495	0	0	0	0
PRC River Zone Environment	57,123	117,305	69,021	58,552	52,221	6,845	7,693	11,655
Site Infrastructure & Utility/Logistics & Transportation	2,108	2,094	2,141	2,192	2,143	2,179	0	0
Site-wide Services and Other Distributed Costs	96,811	75,944	73,610	68,915	7,052	6,754	7,703	6,522
Total	**299,127**	**359,949**	**309,897**	**307,947**	**61,416**	**15,778**	**15,396**	**18,177**
Fiscal Year	**2023**	**2024**	**Total**					
D4 Closure	0	0	**107,182**					
Field Remediation Closure	0	0	**303,062**					
Waste Operations	0	0	**130,463**					
End State/Final Closure	0	0	**8,103**					
Mission Support/General Support	0	0	**102,294**					
PRC River Zone Environment	7	0	**380,422**					
Site Infrastructure & Utility/ Logistics & Transportation	0	0	**12,857**					
Site-wide Services and Other Distributed Costs	1,066	115	**344,492**					
Total	**1,073**	**115**	**1,388,875**					

D4 = deactivation, decontamination, decommission, and demolition.
PBS = project baseline summary.
PRC = Plateau Remediation Contract.

Table C-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). (2 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
1	**Nuclear Facility D&D-River Corridor Closure Project, PBS RL-0041**							
2	**D4 Closure**	**7,033**	**11,209**	**48,604**	**40,336**	**0**	**0**	**107,182**
3	D4-324/327 Area (does not include 300-296 remediation)	0	6,066	43,426	40,018	0	0	**89,510**
3	D4-300 Area Sites	174	0	0	318	0	0	**492**
3	D4-S&M	6,859	5,143	5,178	0	0	0	**17,180**
2	**Field Remediation Closure**	**95,448**	**80,407**	**63,792**	**63,415**	**0**	**0**	**303,062**
3	Field Remediation - 100 B/C Area	210	0	0	0	0	0	**210**
3	Field Remediation.- 100 D Area	4,844	0	0	0	0	0	**4,844**
3	Field Remediation - 100 H Area	1,370	0	0	0	0	0	**1,370**
3	Field Remediation - 100 N Area	1,715	5	0	0	0	0	**1,720**
3	Field Remediation - 100 Area Remaining Sites	2,963	6	0	0	0	0	**2,969**
3	Field Remediation - 300 Area Sites	31,982	24,095	16,817	0	0	0	**72,894**
3	Field Remediation - 600 Area	49,827	44,297	42,522	63,278	0	0	**199,924**
3	Field Remediation - Misc Restoration	24	5,000	4,000	0	0	0	**9,024**
3	Field Remediation - Management and Support	2,513	7,004	453	137	0	0	**10,107**
2	**Waste Operations**	**15,108**	**32,141**	**27,379**	**55,835**	**0**	**0**	**130,463**
3	200 Area Waste Operations	12,868	29,834	25,002	53,387	0	0	**121,091**
3	Waste Ops-Management and Support	2,240	2,307	2,377	2,448	0	0	**9,372**
2	**End State/Final Closure**	**4,019**	**1,691**	**1,186**	**1,207**	**0**	**0**	**8,103**
3	End State/Final Closure	3,616	1,370	855	866	0	0	**6,707**
3	Management and Support	403	321	331	341	0	0	**1,396**
2	**Mission Support/General Support (MS/GS)**	**21,477**	**39,158**	**24,164**	**17,495**	**0**	**0**	**102,294**
3	MS/GS-Project Integration	3,426	11,200	10,180	9,148	0	0	**33,954**
3	MS/GS-Project Services	9,785	20,906	9,204	5,871	0	0	**45,766**
3	MS/GS-Safety, Health and Quality	3,482	3,709	2,511	1,306	0	0	**11,008**
3	MS/GS-Engineering	144	470	317	166	0	0	**1,097**
3	MS/GS-Regulatory and Environmental Management	1,391	981	661	349	0	0	**3,382**
3	MS/GS-Office of the Project Gen. Manager	3,249	1,892	1,291	655	0	0	**7,087**
2	**PRC River Zone Environment**	**57,123**	**117,305**	**69,021**	**58,552**	**52,221**	**6,845**	**361,067**
3	100-K Area Regulatory Closure Documents	0	259	71	71	65	290	**756**
3	100-K Group 1 Remediation	6,800	90,360	42,729	3,714	13,008	961	**157,572**
3	100-K Group 2 Remediation	0	216	1,206	153	2,298	0	**3,873**
3	100-K Group 3 Remediation	1,998	3,127	5,264	10,619	2,393	239	**23,640**

Table C-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). (2 pages)

Schedule Level	Scope	2015	2016	2017	2018	2019	2020	Total
3	KW Deactivation	0	3,103	3,156	31,055	24,325	0	**61,639**
3	105-KE & 105-KW Reactor Disposition	0	4,735	7,197	3,678	2,555	2,927	**21,092**
3	100-K Project Management	48,325	15,505	9,398	9,262	7,577	2,428	**92,495**
2	**Site Infrastructure & Utility/Logistics & Transportation**	**2,108**	**2,094**	**2,141**	**2,192**	**2,143**	**2,179**	**12,857**
3	B Reactor	2,108	2,094	2,141	2,192	2,143	2,179	**12,857**
2	**Site-wide Services and Other Distributed Costs**	**96,811**	**75,944**	**73,610**	**68,915**	**7,052**	**6,754**	**329,086**
3	Site-wide Services and Other Distributed Costs	96,811	75,944	73,610	68,915	7,052	6,754	**329,086**
Total		**299,127**	**359,949**	**309,897**	**307,947**	**61,416**	**15,778**	**1,354,114**

D&D = decontamination and decommission.
D4 = deactivation, decontamination, decommissioning, and demolition.
KE = K East.
KW = K West.
MS/GS = mission support/general support.
PRC = Plateau Remediation Contractor.

C.1.9 NUCLEAR FACILITY D&D–FAST FLUX TEST FACILITY PROJECT (PBS RL-0042) SCHEDULE AND COST DETAILS

Table C-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	Provide monitoring, surveillance, and maintenance of the FFTF while the facility is in a cold and dark state pending future D&D activities.
	Transition FFTF	Provides the progressive shutdown of facility support systems, including sodium, electrical substations, and cooling systems.
	Disposition FFTF Sodium	Includes removing sodium residuals throughout the life of the project, sodium shipment and conversion, and operating the Sodium Storage Facility.
	Decommission FFTF Complex	Final closure of the FFTF was published in December 2013 (see Appendix A). The scope includes: - Demolition of all structures within the 400 Area Protected Area, except for reactor containment, to at least 3 feet below grade followed by backfill and revegetation; decommissioning waste would be disposed to appropriate disposal facilities. - Removal and disposition of the above grade containment dome. - Grouting of the below grade portion of the reactor containment building and the reactor vessel. - Installing a RCRA-compliant engineered barrier over the grouted area. - Post-closure care would include long-term monitoring of air, groundwater and the vadose zone.
	FFTF Project Management	Provides management in support of the project mission.
	Sodium Reaction Facility	Provide 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	Other	Includes legal support.
Site-wide Services and Other Distributed Costs	Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure and services that are charged based on predetermined rates and services directly charged to OHCs: - Examples charged to OHCs include janitorial, facility services, and motor carrier services. - Examples with predetermined rates include training, reproduction, offsite laboratory sample analysis, crane and rigging, fleet maintenance, desktop and user services, and telecommunications. - Also includes management reserve (an amount of the total contract budget withheld for management control purposes by the contractor) and contractor's fee.

NOTE: See Tables C-25 and C-26 for schedule and budget information.

D&D = decontamination and decommission.
FFTF = Fast Flux Test Facility.
OHC = Other Hanford Contractors.
PBS = project baseline summary.
RCRA = *Resource Conservation and Recovery Act*.
RL = U.S. Department of Energy, Richland Operations Office.

Table C-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).

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
FFTF Cleanup	2,520	2,181	2,356	2,379	4,258	2,974	12,323	17,194	86,375	72,543
Infrastructure Services	37	37	37	37	39	39	41	16	17	22
Site-wide Services and Other Distributed Costs	120	461	455	476	100	958	2,503	3,641	13,132	11,118
Total	**2,677**	**2,679**	**2,848**	**2,892**	**4,397**	**3,971**	**14,867**	**20,851**	**99,524**	**83,683**
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
FFTF Cleanup	73,596	73,110	69,788	78,196	94,478	81,453	52,744	34,280	21,647	64,754
Infrastructure Services	69	51	53	56	60	61	62	64	65	76
Site-wide Services and Other Distributed Costs	14,459	14,144	15,286	18,626	25,952	25,420	18,864	12,201	8,139	358
Total	**88,124**	**87,305**	**85,127**	**96,878**	**120,490**	**106,934**	**71,670**	**46,545**	**29,851**	**65,188**
Fiscal Year	**2035**	**2036**	**Total**							
FFTF Cleanup	11,111	0	**860,260**							
Infrastructure Services	308	17	**1,264**							
Site-wide Services and Other Distributed Costs	1	0	**186,414**							
Total	**11,420**	**17**	**1,047,938**							

FFTF = Fast Flux Test Facility. PBS = project baseline summary.

Table C-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	2015	2016	2017	2018	2019	2020	Total
1	**Nuclear Facility D&D-Fast Flux Test Facility Project, PBS RL-0042**							
2	**FFTF Cleanup**	**2,520**	**2,181**	**2,356**	**2,379**	**4,258**	**2,974**	**16,668**
3	Maintain Safe and Compliant FFTF Complex	2,317	1,978	2,127	2,150	2,571	1,758	**12,901**
3	Cost and/or Schedule Uncertainty	203	203	229	229	1,687	1,216	**3,767**
2	**Infrastructure Services**	**37**	**37**	**37**	**37**	**39**	**39**	**226**
3	Other	25	25	25	25	25	25	**150**
3	Cost and/or Schedule Uncertainty	12	12	12	12	14	14	**76**
2	**Site-wide Services and Other Distributed Costs**	**120**	**461**	**455**	**476**	**100**	**958**	**2,570**
3	Site-wide Services and Other Distributed Costs	120	461	455	476	100	958	**2,570**
	Total	**2,677**	**2,679**	**2,848**	**2,892**	**4,397**	**3,971**	**19,464**

D&D = decontamination and decommission. PBS = project baseline summary.
FFTF = Fast Flux Test Facility. RL = U.S. Department of Energy, Richland Operations Office.

C.1.10 RICHLAND COMMUNITY AND REGULATORY SUPPORT (PBS RL-0100) SCHEDULE AND COST DETAILS

Table C-27. Richland Community and Regulatory Support (PBS RL-0100) Level 3 Scope Summary.

Level 2 Work Element	Level 3 Work Element	Scope Summary
Regulatory Federal and State Grant Support	Regulatory Federal and State Grant Support	Includes 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.

NOTE: See Table C-28 for schedule and budget information.

PBS = project baseline summary.
RL = U.S. Department of Energy, Richland Operations Office.

Table C-28. Richland Community and Regulatory Support (PBS RL-0100), Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated).

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Richland Community and Regulatory Support	14,701	21,347	21,347	21,347	21,347	21,347	24,158	24,304	24,547	24,793
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Richland Community and Regulatory Support	24,504	24,749	24,996	25,246	25,499	25,754	26,011	26,192	26,454	26,719
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Richland Community and Regulatory Support	26,986	27,160	27,432	27,706	27,983	28,263	28,445	28,729	29,017	29,307
Fiscal Year	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Richland Community and Regulatory Support	29,600	29,790	30,088	30,389	30,693	30,999	31,309	31,623	29,822	30,120
Fiscal Year	**2055**	**2056**	**2057**	**2058**	**2059**	**Total**				
Richland Community and Regulatory Support	30,421	30,726	31,033	31,343	31,657	**1,216,003**				

PBS = project baseline summary.
RL = U.S. Department of Energy, Richland Operations Office.

C.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 C-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 C-29. Long-Term Stewardship (PBS RL-LTS) Level 2 Scope Summary.

Work Element	Scope Description
Infrastructure and Waste Management	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 Long-Term Stewardship activities. Includes operation and maintenance of 200 Area liquid effluent facilities in support of groundwater treatment and monitoring activities.
Site and Environmental Monitoring	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, and Environmental Compliance	Includes real estate and Hanford Site planning, land management, and surveillance and maintenance activities for the 100 and 200 Areas. Includes activities to ensure environmental compliance and protection.
Payment in Lieu of Taxes	Includes payment in lieu of taxes.
Management and Administration	Provides for management and administration of these Long-Term Stewardship activities.
NOTE: See Table C-30 for schedule and budget information.	

Table C-30. Long-Term Stewardship (PBS RL-LTS) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated).

Fiscal Year	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069
Infrastructure	33,957	34,773	35,607	36,460	37,336	38,232	39,150	40,090	41,052	42,036
Site and Environmental Monitoring	12,192	12,483	12,784	13,089	13,403	13,726	14,056	14,393	14,738	15,092
Post-Closure Surveillance & Maintenance	27,877	28,547	29,232	29,934	30,652	31,388	32,141	32,913	33,702	34,511
Payment in Lieu of Taxes	25,571	26,184	26,813	27,456	28,115	28,790	29,481	30,188	30,913	31,655
Management and Administration	7,403	7,580	7,762	7,949	8,139	8,335	8,535	8,739	8,949	9,164
Total	**107,000**	**109,567**	**112,198**	**114,888**	**117,645**	**120,471**	**123,363**	**126,323**	**129,354**	**132,458**
Fiscal Year	**2070**	**2071**	**2072**	**2073**	**2074**	**2075**	**2076**	**2077**	**2078**	**2079**
Infrastructure	43,046	44,079	45,137	46,221	47,329	48,466	49,628	50,819	52,038	53,288
Site and Environmental Monitoring	15,453	15,825	16,205	16,593	16,993	17,399	17,818	18,246	18,684	19,131
Post-Closure Surveillance & Maintenance	35,339	36,188	37,056	37,947	38,857	39,788	40,743	41,720	42,722	43,748
Payment in Lieu of Taxes	32,415	33,193	33,989	34,805	35,640	36,496	37,371	38,268	39,187	40,127
Management and Administration	9,384	9,609	9,840	10,076	10,318	10,565	10,819	11,079	11,345	11,617
Total	**135,637**	**138,894**	**142,227**	**145,642**	**149,137**	**152,714**	**156,379**	**160,132**	**163,976**	**167,911**
Fiscal Year	**2080**	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**	**2088**	**2089**
Infrastructure	54,567	55,877	57,217	58,591	59,998	61,437	62,911	64,422	65,968	67,551
Site and Environmental Monitoring	19,590	20,061	20,542	21,036	21,540	22,057	22,586	23,129	23,683	23,937
Post-Closure Surveillance & Maintenance	44,799	45,873	46,974	48,100	49,256	50,439	51,649	52,888	54,157	55,458
Payment in Lieu of Taxes	41,090	42,077	43,086	44,120	45,179	46,264	47,374	48,511	49,675	50,867
Management and Administration	11,896	12,181	12,473	12,773	13,079	13,393	13,715	14,044	14,381	14,695
Total	**171,942**	**176,069**	**180,292**	**184,620**	**189,052**	**193,590**	**198,235**	**202,994**	**207,864**	**212,508**
Fiscal Year	**2090**	**Total**								
Infrastructure	69,171	**1,536,454**								
Site and Environmental Monitoring	27,533	**553,997**								
Post-Closure Surveillance & Maintenance	56,788	**1,261,386**								
Payment in Lieu of Taxes	52,088	**1,156,988**								
Management and Administration	0	**319,837**								
Total	**205,580**	**4,828,662**								

C.1.12 FINAL REACTOR DISPOSITION SCHEDULE AND COST DETAILS

Scope information for Final Reactor Disposition is presented in Table C-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 C-31. Final Reactor Disposition Level 2 Scope Summary.

Work Element	Scope Description
Final Reactor Disposition	Includes final reactor disposition of the 100 Area surplus production reactors (except for B Reactor which is part of the newly established Manhattan Project National Historical 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.
NOTE: See Table C-32 for schedule and budget information.	

Table C-32. Final Reactor Disposition Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated).

Fiscal Year	2054	2055	2056	2057	2058	2059	2060
Final Reactor Disposition	18,811	37,623	37,623	56,434	94,057	94,057	131,679
Fiscal Year	**2061**	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**
Final Reactor Disposition	282,170	282,170	282,170	188,113	188,113	94,057	56,434
Fiscal Year	**2068**						
Final Reactor Disposition	37,623						
Total	**1,881,134**						

C.2 OFFICE OF RIVER PROTECTION PROJECT BASELINE SUMMARY INFORMATION

The DOE, Office of River Protection (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 5.0 of the LCR. No additional scope is presented here. Near-term and estimated costs are presented below.

Table C-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)

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Base Operations	366,504	367,606	393,976	380,201	491,668	472,975	445,198	466,042	455,014	470,787
Retrieve and Close SSTs	124,749	238,683	225,082	268,002	218,965	126,326	136,402	108,807	71,703	54,898
Waste Feed Delivery/Treatment Planning/ DST Retrieval/Closure	189,059	188,453	226,247	197,348	189,059	187,686	168,954	166,352	175,094	182,991
Supplemental Treatment	97,424	213,596	304,519	314,010	328,815	30,074	23,061	169,656	171,626	176,101
Treat Waste	20,310	33,995	105,413	195,452	411,621	410,079	406,116	413,095	420,508	431,471
Facility Closure	3,484	1,923	912	0	4,604	6,400	2,579	2,893	5,985	45,140
TOC-ORP Project Support	39,498	43,420	59,917	62,353	48,354	45,702	45,055	45,931	47,175	52,460
Total	**841,028**	**1,087,676**	**1,316,066**	**1,417,366**	**1,693,086**	**1,279,242**	**1,227,365**	**1,372,776**	**1,347,105**	**1,413,848**
Fiscal Year	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Base Operations	496,481	485,865	508,862	567,468	539,961	567,671	548,171	576,551	582,061	632,972
Retrieve and Close SSTs	115,761	115,140	174,473	297,347	206,817	163,133	208,752	266,323	294,811	418,714
Waste Feed Delivery/Treatment Planning/ DST Retrieval/Closure	161,213	151,474	160,483	166,190	163,648	151,104	145,679	146,633	148,179	150,839
Supplemental Treatment	179,975	183,935	187,981	192,117	195,564	200,663	205,078	210,421	214,200	218,044
Treat Waste	440,964	450,665	460,580	470,712	479,159	491,651	502,468	515,560	524,820	534,237
Facility Closure	7,779	4,728	1,394	1,729	1,336	3,214	2,319	1,882	1,844	2,596
TOC-ORP Project Support	49,210	51,056	51,332	54,637	58,005	56,796	55,192	59,837	60,673	65,146
Total	**1,451,383**	**1,442,863**	**1,545,105**	**1,750,200**	**1,644,490**	**1,634,232**	**1,667,659**	**1,777,207**	**1,826,588**	**2,022,548**
Fiscal Year	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
Base Operations	652,033	648,967	628,512	640,207	646,168	557,149	484,418	462,563	447,632	439,637
Retrieve and Close SSTs	470,008	544,391	458,892	456,143	376,012	216,360	175,960	181,185	104,816	69,823
Waste Feed Delivery/Treatment Planning/ DST Retrieval/Closure	157,589	168,247	177,267	204,991	225,125	238,573	265,977	295,916	343,050	335,495
Supplemental Treatment	222,841	225,396	229,445	234,492	239,651	243,952	250,312	255,819	260,935	267,210
Treat Waste	545,990	562,448	572,550	585,146	598,020	608,751	624,622	559,604	544,302	528,167
Facility Closure	11,213	7,983	11,725	4,113	1,326	747	11,530	10,195	15,046	13,392
TOC-ORP Project Support	64,184	69,834	71,263	68,816	73,029	70,324	72,943	69,655	73,186	73,232
Total	**2,123,858**	**2,227,266**	**2,149,654**	**2,193,908**	**2,159,331**	**1,935,856**	**1,885,762**	**1,834,937**	**1,788,967**	**1,726,956**

Table C-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)

Fiscal Year	2045	2046	2047	2048	2049	2050	Total
Base Operations	407,393	300,834	261,134	187,889	93,459	62,484	**16,736,513**
Retrieve and Close SSTs	104,364	52,641	45,307	18,166	0	0	**7,108,956**
Waste Feed Delivery/Treatment Planning/ DST Retrieval/Closure	409,323	238,259	194,255	85,757	17,388	757	**6,774,654**
Supplemental Treatment	0	0	0	0	0	0	**6,246,913**
Treat Waste	513,673	488,927	500,693	253,327	0	0	**15,205,096**
Facility Closure	33,132	83,973	43,314	38,195	11,774	3,253	**403,652**
TOC-ORP Project Support	75,827	16,622	12,602	10,295	4,272	2,850	**1,880,683**
Total	**1,543,712**	**1,181,256**	**1,057,305**	**593,629**	**126,893**	**69,344**	**54,356,467**

DST = double-shell tank.
ORP = U.S. Department of Energy, Office of River Protection.
PBS = project baseline summary.
SST = single-shell tank.
TOC = Tank Operations Contract

Table C-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	2015	2016	2017	2018	2019	2020	Total
1	**Radioactive Liquid Tank Waste Stabilization and Disposition, PBS ORP-0014**							
2	**Base Operations**	**366,504**	**367,606**	**393,976**	**380,201**	**491,668**	**472,975**	**2,472,930**
3	Base Operations	88,836	79,520	77,720	83,444	85,499	87,886	**502,905**
3	DST Space Management	13,627	10,798	18,442	12,382	9,063	10,755	**75,067**
3	TOC Facility Operations	41,214	43,054	57,124	35,537	28,555	27,198	**232,682**
3	Tank Farm Upgrades	10,927	21,278	22,186	12,434	10,851	41,150	**118,826**
3	Project Support	211,900	212,956	218,504	236,404	357,700	305,986	**1,543,450**
2	**Retrieve and Close SSTs**	**124,749**	**238,683**	**225,082**	**268,002**	**218,965**	**126,326**	**1,201,807**
3	Retrieval/Closure Program	28,756	38,954	101,760	82,909	25,217	9,887	**287,483**
3	SST Retrieval East Area	51,314	108,421	90,129	81,952	60,813	8,352	**400,981**
3	SST Retrieval West Area	0	10,018	6,151	77,784	80,339	21,620	**195,912**
3	Closure Program	806	456	627	437	481	472	**3,279**
3	SST Closure	43,873	80,834	26,415	24,920	52,115	85,995	**314,152**

Table C-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	2015	2016	2017	2018	2019	2020	Total
2	**Waste Feed Delivery/Treatment Planning/DST Retrieval/Closure**	**189,059**	**188,453**	**226,247**	**197,348**	**189,059**	**187,686**	**1,177,852**
3	WTP Feed Delivery Program	22,203	23,467	24,669	24,879	26,169	26,858	**148,245**
3	Construct DST Systems	53,872	41,408	40,057	44,232	57,929	59,175	**296,673**
3	Immobilization Program	51,315	32,497	54,628	33,770	18,446	15,537	**206,193**
3	WTP Operational Readiness	4,122	4,221	4,322	4,426	344	353	**17,788**
3	Tank Waste Pretreatment Project	31,145	39,387	52,772	45,406	45,036	43,750	**257,496**
3	Secondary Waste Treatment/ETF	26,402	47,473	49,799	44,635	41,135	42,013	**251,457**
2	**Supplemental Treatment**	**97,424**	**213,596**	**304,519**	**314,010**	**328,815**	**30,074**	**1,288,438**
3	Supplemental Treatment	97,424	213,596	304,519	314,010	328,815	30,074	**1,288,438**
2	**Treat Waste**	**20,310**	**33,995**	**105,413**	**195,452**	**411,621**	**410,079**	**1,176,870**
3	Waste Treatment Facility	20,310	33,995	105,413	195,452	411,621	410,079	**1,176,870**
2	**Facility Closures**	**3,484**	**1,923**	**912**	**0**	**4,604**	**6,400**	**17,323**
3	TFC Facility and Other Closure	3,484	1,923	912	0	4,604	6,400	**17,323**
2	**Tank Operations Contract - ORP Project Support**	**39,498**	**43,420**	**59,917**	**62,353**	**48,354**	**45,702**	**299,244**
3	Tank Operations Contract - ORP Project Support	39,498	43,420	59,917	62,353	48,354	45,702	**299,244**
Total		**841,028**	**1,087,676**	**1,316,066**	**1,417,366**	**1,693,086**	**1,279,242**	**7,634,464**

DST = double-shell tank.
ETF = Effluent Treatment Facility.
ORP = U.S. Department of Energy, Office of River Protection.
PBS = project baseline summary.
SST = single-shell tank.
TFC = Tank Farm Contractor.
TOC = Tank Operations Contract.
WTP = Waste Treatment and Immobilization Plant.

Table C-35. Major Construction – Waste Treatment Plant (PBS ORP-0060) Remaining Lifecycle Schedule and Costs, Level 2, by Fiscal Year ($1,000, Escalated).

Fiscal Year	2015	2016	2017	2018	2019	2020	Total
Pretreatment	210,179	131,306	100,888	76,461	103,515	5,436	**627,785**
Low-Activity Waste	33,682	80,325	60,474	31,348	42,382	1,208	**249,419**
High-Level Waste	134,006	97,297	64,996	64,624	64,501	18,718	**444,142**
Balance of Facilities	80,098	52,759	24,728	12,691	10,507	484	**181,267**
Analytical Laboratory	26,726	39,691	28,184	17,030	18,590	1,345	**131,566**
Shared Services – Plant Wide	236,250	179,672	132,785	52,156	1,660	0	**602,523**
Total	**720,941**	**581,050**	**412,055**	**254,310**	**241,155**	**27,191**	**2,236,702**

PBS = project baseline summary.

Table C-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	2015	2016	2017	2018	2019	2020	Total
1	**Major Construction - Waste Treatment Plant, PBS ORP-0060**							
2	**Pretreatment Facility (PT)**	**210,179**	**131,306**	**100,888**	**76,461**	**103,515**	**5,436**	**627,785**
3	Engineering Design - PT	1,425	480	0	0	0	0	**1,905**
3	Plant Equipment - PT	13,722	8,976	0	0	0	0	**22,698**
3	Environmental and Nuclear Safety - PT	2,544	3,444	2,963	2,214	128	0	**11,293**
3	Startup - PT	10,982	15,768	0	0	0	0	**26,750**
3	Construction Field Non Manual - PT	13,079	3,427	0	0	0	0	**16,506**
3	Crafts (Construction) - PT - Civil	12,360	3,625	0	0	0	0	**15,985**
3	Crafts (Construction) - PT - Distribs	2,680	656	77	0	0	0	**3,413**
3	Crafts (Construction) - PT - Electrical	18,336	4,395	0	0	0	0	**22,731**
3	Crafts (Construction) - PT - Mechanical	9,517	396	0	0	0	0	**9,913**
3	Crafts (Construction) - PT - Piping and Instrumentation	31,501	7,464	0	0	0	0	**38,965**
3	Construction Subcontracts - PT	19,368	3,249	0	0	0	0	**22,617**
3	Liner Plate and Vessel Const Subcontract - PT	1,341	0	0	0	0	0	**1,341**
3	Special Protective Coating Const Subcontract - PT	599	3	0	0	0	0	**602**
3	Intermech Construction Subcontract - PT	2,358	0	0	0	0	0	**2,358**
3	Commissioning - PT	18,664	32,688	57,052	33,196	0	0	**141,600**
-	Fee	17,279	9,343	18,955	29,886	50,137	1,457	**127,057**
-	Cost and/or Schedule Uncertainty	34,424	37,392	21,841	11,165	53,250	3,979	**162,051**
2	**Low-Activity Waste Facility (LAW)**	**33,682**	**80,325**	**60,474**	**31,348**	**42,382**	**1,208**	**249,419**
3	Engineering Design - LAW	194	19	0	0	0	0	**213**
3	Plant Equipment - LAW	0	20,780	95	(23,362)	0	0	**(2,487)**
3	Equipment Engineering - LAW	14	15	0	0	0	0	**29**
3	Environmental and Nuclear Safety - LAW	1,043	2,386	2,219	1,642	33	0	**7,323**
3	Research and Technology - LAW	239	247	0	0	0	0	**486**
3	Startup - LAW	8,345	2,136	0	0	0	0	**10,481**
3	Construction Field Non Manual - LAW	1,318	115	0	0	0	0	**1,433**
3	Crafts (Construction) - LAW - Distribs	1,082	339	40	0	0	0	**1,461**
3	Commissioning - LAW	11,330	29,573	38,461	41,717	0	0	**121,081**

Table C-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	2015	2016	2017	2018	2019	2020	Total
-	Fee	914	3,191	10,114	18,304	23,613	1,257	**57,393**
-	Cost and/or Schedule Uncertainty	9,203	21,524	9,545	(6,953)	18,736	(49)	**52,006**
2	**High-Level Waste Facility (HLW)**	**134,006**	**97,297**	**64,996**	**64,624**	**64,501**	**18,718**	**444,142**
3	Engineering Design - HLW	1,235	563	20	0	0	0	**1,818**
3	Plant Equipment - HLW	12,277	725	4,857	(13,880)	0	0	**3,979**
3	Equipment Engineering - HLW	34	177	89	0	0	0	**300**
3	Environmental and Nuclear Safety - HLW	2,209	3,337	2,523	1,969	95	0	**10,133**
3	Research and Technology - HLW	370	252	261	135	0	0	**1,018**
3	Startup - HLW	255	11,151	5,560	0	0	0	**16,966**
3	Construction Field Non Manual - HLW	8,868	3,504	0	0	0	0	**12,372**
3	Crafts (Construction) - HLW - Civil	10,700	3,154	0	0	0	0	**13,854**
3	Crafts (Construction) - HLW - Distribs	1,679	549	60	0	0	0	**2,288**
3	Crafts (Construction) - HLW - Electrical	10,714	7,527	0	0	0	0	**18,241**
3	Crafts (Construction) - HLW - Mechanical	7,449	2,275	0	0	0	0	**9,724**
3	Crafts (Construction) - HLW - Piping and Instrumentation	18,588	6,387	0	0	0	0	**24,975**
3	Construction Subcontracts - HLW	15,671	4,835	0	0	0	0	**20,506**
3	Liner Plate and Vessel Const Subcontract - HLW	14	0	0	0	0	0	**14**
3	Special Protective Coating Const Subcontract - HLW	1,082	0	0	0	0	0	**1,082**
3	Intermech Construction Subcontract - HLW	4,306	2,878	0	0	0	0	**7,184**
3	Commissioning - HLW	8,368	15,456	27,350	41,118	0	0	**92,292**
-	Fee	6,189	6,177	12,324	26,596	21,091	14,816	**87,193**
-	Cost and/or Schedule Uncertainty	23,998	28,350	11,952	8,686	43,315	3,902	**120,203**
2	**Balance of Facilities (BOF)**	**80,098**	**52,759**	**24,728**	**12,691**	**10,507**	**484**	**181,267**
3	Engineering Design - BOF	466	22	25	0	0	0	**513**
3	Plant Equipment - BOF	18,633	0	0	0	0	0	**18,633**
3	Environmental and Nuclear Safety - BOF	484	502	432	280	16	0	**1,714**
3	Startup - BOF	9,153	5,497	0	0	0	0	**14,650**
3	Construction Field Non Manual - BOF	5,236	3,000	0	0	0	0	**8,236**
3	Crafts (Construction) - BOF	12,070	5,265	62	0	0	0	**17,397**
3	Crafts (Construction) - BOF - Distribs	834	301	26	0	0	0	**1,161**
3	Construction Subcontracts - BOF	4,184	2,709	144	0	0	0	**7,037**

Table C-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	2015	2016	2017	2018	2019	2020	Total
3	Commissioning - BOF	13,258	22,122	20,996	16,768	0	0	**73,144**
-	Fee	3,935	1,902	3,510	2,195	1,059	529	**13,130**
-	Cost and/or Schedule Uncertainty	11,845	11,439	(467)	(6,552)	9,432	(45)	**25,652**
2	**Analytical Laboratory (Lab)**	**26,726**	**39,691**	**28,184**	**17,030**	**18,590**	**1,345**	**131,566**
3	Engineering Design - Lab	50	0	0	0	0	0	**50**
3	Plant Equipment - Lab	1,671	1,398	0	0	0	0	**3,069**
3	Environmental and Nuclear Safety - Lab	792	773	689	561	32	0	**2,847**
3	Startup - Lab	643	0	0	0	0	0	**643**
3	Crafts (Construction) - Lab - Distribs	195	66	7	0	0	0	**268**
3	Commissioning - Lab	19,546	28,499	27,408	22,960	0	0	**98,413**
-	Fee	1,089	1,508	4,678	2,997	5,679	1,332	**17,283**
-	Cost and/or Schedule Uncertainty	2,740	7,447	(4,598)	(9,488)	12,879	13	**8,993**
2	**Plant Wide**	**236,250**	**179,672**	**132,785**	**52,156**	**1,660**	**0**	**602,523**
3	Safety Assurance - General	2,678	2,941	2,916	3,011	41	0	**11,587**
3	Procurement & Subcontracts Freight - Plant Wide	403	215	115	12	0	0	**745**
3	Project Controls - General	8,145	7,038	5,082	3,015	121	0	**23,401**
3	Engineering Design - Plant Wide	3,105	1,001	409	36	14	0	**4,565**
3	Engineering Design LOE - Plant Wide	5,300	3,729	3,368	2,394	306	0	**15,097**
3	Engineering Management - Plant Wide	3,893	297	260	0	0	0	**4,450**
3	Equipment Engineering - Plant Wide	2,464	228	175	176	11	0	**3,054**
3	Environmental & Nuclear Safety - Plant Wide	6,202	4,970	4,318	5,738	448	0	**21,676**
3	Environmental & Nuclear Safety LOE - Plant Wide	3,358	3,426	2,581	2,546	220	0	**12,131**
3	Material Craft Services - Plant Wide	1,108	120	0	0	0	0	**1,228**
3	Procurement & Subcontracts - Procurement - Shared Services	6,555	3,810	1,516	770	0	0	**12,651**
3	Quality Assurance - General	7,521	6,534	6,464	3,488	55	0	**24,062**
3	Process Engineering and Flowsheet Modeling - Plant Wide	701	302	33	913	93	0	**2,042**
3	Startup - Plant Wide	4,642	3,268	605	0	0	0	**8,515**
3	Shared Services - General	43,266	40,787	33,747	25,670	766	0	**144,236**
3	Construction Field Non Manual – Shared Services	33,797	26,366	12,316	4,923	0	0	**77,402**

Table C-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	2015	2016	2017	2018	2019	2020	Total
3	Crafts (Construction) - Shared Services - Distribs	17,783	(7,386)	(6,961)	0	0	0	**3,436**
3	Construction Subcontracts - Plant Wide	4,412	3,494	0	0	0	0	**7,906**
3	Construction Subcontracts - Shared Services - Distribs	3,689	1,230	0	0	0	0	**4,919**
3	Intermech Construction Subcontract - Plant Wide	111	0	0	0	0	0	**111**
3	Bulk Material (Civil) - Plant Wide	135	461	0	0	0	0	**596**
3	Bulk Material (Electrical) - Plant Wide	4,608	2	0	0	0	0	**4,610**
3	Bulk Material (Piping & Instrumentation) - Plant Wide	19	0	0	0	0	0	**19**
3	Commissioning - General	68,644	72,948	63,420	(2,146)	(520)	0	**202,346**
3	Project Operations - General	3,711	3,891	2,421	1,610	105	0	**11,738**
Total		**720,941**	**581,050**	**412,055**	**254,310**	**241,155**	**27,191**	**2,236,702**

[1] 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).

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