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Revision 17

M-091 Transuranic Mixed/Mixed Low-Level Waste Project Management Plan

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

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

P.O. Box 1600
Richland, Washington 99352

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Document Type: PLAN

D. L. Flyckt
CH2M HILL Plateau Remediation Company

Date Published
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Executive Summary

The Hanford Site, managed by the U.S. Department of Energy (DOE), produced about 60 percent of the United States' plutonium from the mid-1940s to the late 1980s in support of national defense efforts. Much of the waste and contaminated materials from the Hanford Site defense mission remains on the Central Plateau of the Hanford Site.

The *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989a),[1] commonly known as the Tri-Party Agreement (TPA), is a legal agreement between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and DOE (hereinafter the Tri-Parties) that identifies cleanup actions and schedules, referred to as milestones, to manage a portion of this remaining waste and contaminated material. The scope of the M-091 Milestone series (Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*)[2] is to complete removal of the retrievably stored waste from the burial grounds and dispose of the mixed low-level waste (MLLW) and transuranic mixed (TRUM) waste in storage by September 30, 2030. When these milestones are complete, DOE will have successfully treated the MLLW and shipped the TRUM waste offsite for disposal.

The Tri-Parties approved a number of changes to the M-091 Milestone series in January 2016. The milestones were adjusted to complete the treatment of Hanford Site *Resource Conservation and Recovery Act of 1976*[3] (RCRA) MLLW and RCRA TRUM waste. These adjustments are needed to develop information about alternatives for retrieval, storage, and treatment of Hanford Site TRUM waste; and to better align with the projected schedule for reopening the Waste Isolation Pilot Plant in Carlsbad, New Mexico.

This project management plan (PMP) contains the status of work completed and outlines the DOE strategy for completing the remaining work in the M-091 Milestones.

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[1] Ecology, EPA, and DOE, 1989a, *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. Available at: http://www.hanford.gov/?page=81.

[2] Ecology, EPA, and DOE, 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=82.

[3] *Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq. Available at: http://epw.senate.gov/rcra.pdf.

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Terms

AMWTP	Advanced Mixed Waste Treatment Project
AR	Administrative Record
CBFO	DOE Carlsbad Field Office
CCP	Central Characterization Project
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CH	contact-handled
CWC	Central Waste Complex
CY	calendar year
DOE	U.S. Department of Energy
DOE-RL	DOE Richland Operations Office
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
FY	fiscal year
HEPA	high efficiency particulate air
ID	inner diameter
LDR	land disposal restriction(s)
LLBG	low-level burial ground(s)
LLW	low-level waste
MLLW	mixed low-level waste
MWT	mixed waste trench
NDE	non-destructive evaluation
OD	outer diameter
OU	operable unit
PFP	Plutonium Finishing Plant
PMP	project management plan
PUREX	Plutonium Uranium Extraction (Plant)
RCRA	*Resource Conservation and Recovery Act of 1976*

RH	remote-handled
ROD	record of decision
ROM	rough order of magnitude
RSW	retrievably stored waste
RTD	removal, treatment (as needed), and disposal
SAP	sampling and analysis plan
SWB	standard waste box
TPA	Tri-Party Agreement
Tri-Parties	DOE, EPA, and Ecology
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TRUM	transuranic mixed
TRUPACT-II	Transuranic Package Transporter Model 2
TSD	treatment, storage, and/or disposal
WBS	work breakdown structure
WIPP	Waste Isolation Pilot Plant
WMA	waste management area
WRAP	Waste Receiving and Processing Facility

1 Project Overview

The Hanford Site, managed by the U.S. Department of Energy (DOE) produced about 60 percent of the United States' plutonium from the mid-1940s to the late 1980s in support of national defense efforts. The 1,518 km^2 (586 mi^2) site is located in southeastern Washington State. The Central Plateau covers approximately 194 km^2 (75 mi^2) in the center of the Hanford Site. Much of the waste and contaminated materials from the Site's defense mission remains on the Central Plateau.

The *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989a), commonly known as the Tri-Party Agreement (TPA), is a legal agreement between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and DOE (hereinafter the Tri-Parties) that identifies cleanup actions and schedules referred to as milestones. The scope of the M-091 Milestone series (Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan*, commonly known as the TPA Action Plan) is to complete retrieval and eliminate the backlog of Hanford Site mixed low-level waste (MLLW) and transuranic mixed (TRUM) waste in storage by September 30, 2030. When these milestones are completed, DOE will have retrieved the retrievably stored waste (RSW) from the burial grounds, treated and disposed of M-091 MLLW, repackaged M-091 TRUM waste into certifiable containers, and shipped M-091 TRUM waste offsite for disposal.

The Tri-Parties approved a number of changes to the M-091 Milestone series in January 2016. The milestones were adjusted to complete the treatment of Hanford Site *Resource Conservation and Recovery Act of 1976*[4] (RCRA) MLLW and RCRA TRUM waste. These adjustments are needed to develop information about alternatives for retrieval, characterization, processing, certification and shipment of Hanford Site TRUM waste; and to better align with the projected schedule for reopening the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. An overview of the changes follows:

DOE developed this Project Management Plan (PMP) in accordance with the TPA (Ecology et al., 1989a), Section 11.5, "Waste Material Stream Project Management Work Plans," prepared under Milestone series M-090-00, M-091-00, and M-092-00 of the TPA Action Plan (Ecology et al., 1989b). This PMP contains the current status of completed work along with the DOE plan to accomplish the remaining work under the M-091 Milestone series.

A goal of the Tri-Parties is to integrate the Hanford Site cleanup activities to the extent possible to enable efficient and effective management of waste. The three agencies agreed to integrate the plan for managing transuranic (TRU) and TRUM waste under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) cleanup actions, with the plan to manage similar waste forms under the M-091 work scope. This PMP also addresses the acquisition of capabilities necessary to prepare TRU and TRUM waste generated under CERCLA cleanup actions.

1.1 Goals and Objectives

The goal of the M-091 Milestones is to complete the treatment to Land Disposal Restrictions (LDR) treatment standards for Hanford Site RCRA MLLW and repackaging of TRUM waste. The focus of the milestones is on treating and repackaging waste that has been retrieved and stored in drums and boxes above ground. The milestones also align with a schedule for developing alternative capabilities required for waste treatment, certification, and disposal.

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[4] *Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq. Available at: http://epw.senate.gov/rcra.pdf.

The M-091 Milestones set a deadline of 2030 to remove TRUM waste from the Hanford Site. When the M-091 Milestones are completed, the RSW will have been retrieved from the burial grounds, MLLW will have been treated, and TRUM waste will have been repackaged, certified, and shipped offsite for disposal.

1.2 Scope

The scope of the M-091 Milestone series includes all MLLW and TRUM waste in aboveground storage as of June 30, 2009, and RSW in the low-level burial grounds (LLBGs). Waste in aboveground storage is defined as the waste stored within the Central Waste Complex (CWC), T Plant, and the Waste Receiving and Processing Facility (WRAP). The RSW is defined as waste that was placed in LLBG 218-W-4B, 218-W-4C, 218-W-3A, and 218-E-12B after May 6, 1970, and was believed to meet TRU waste criteria when it was placed in one of these burial grounds.

Descriptions and maps of the LLBGs are included in Appendix C. An aerial view of the Hanford Site 200 West Area is presented in Figure 1-1.

The M-091 Milestone series scope is as follows:

- Complete TRUM certification and MLLW treatment (M-091-47).
- Development of capabilities for retrieval, characterization, and treatment of TRUM waste prior to disposal (M-091-51, M-091-52, and M-091-53).
- Retrieval of RSW trench and caisson waste (M-091-49).
- Shipment of TRUM waste to WIPP (M-091-48).

A summary of the CERCLA cleanup actions that have the potential to generate waste with TRU constituents greater than 100 nCi/g, along with projected volumes, is provided in Chapter 7. These wastes are not included within the scope of the M-091 milestones. Schedules from the CERCLA cleanup actions authorized in records of decision (RODs) and action memoranda are included.

Milestone schedules for CERCLA cleanup actions still in the investigatory phase are provided in Appendix E.

The currently approved CERCLA cleanup actions generating (or anticipated to generate) TRU/TRUM waste include the following:

- Plutonium Finishing Plant (PFP)
- 100 K Basins
- U Plant
- 618-10 and 618-11 Burial Grounds (300-FF-2)
- 200-PW-1 and 200-PW-6 Operable Units (OUs)

Future CERCLA Operable Units (OUs) decisions and facilities with the potential to generate waste with TRU constituents greater than 100 nCi/g during CERCLA actions are summarized in Section 7.3 and Appendix E. These OUs and facilities include the following:

- 200-BC-1, B/C Cribs and Trenches OU
- 200-CW-5, PFP cooling water ditches

Figure 1-1. Aerial View of Hanford Site 200 West Area (April 2010)

- 200-SW-2, Radioactive Landfills and Dumps Group OU
- 200-WA-1, West Inner Area OU
- 200-DV-1, Deep Vadose Zone OU
- 200-IS-1, Tanks/Lines/Pits/Boxes Waste Group OU
- 200-EA-1, East Inner Area OU
- 200-CP-1, Plutonium Uranium Extraction (PUREX) Plant Canyon and associated past-practice waste site including the PUREX Tunnels 1 and 2
- 224B Plutonium Concentration Facility
- 200-CR-1, Reduction and Oxidation Plant Canyon and associated past-practice waste site

Other RCRA actions with potential to generate waste with TRU constituents greater than 100 nCi/g, and are not within the scope of the M-091 milestones and not covered in this PMP include the Tank Farms Waste Management Areas (WMAs) that are covered under the M-045 Milestone series and 11 single-shell tanks. DOE expects to make a classification as to whether the material is TRU waste and to continue critical decision documentation development that will define the technology and infrastructure needed to retrieve, process, and package the waste for disposal. As more information becomes available, any interfaces or impacts to the M-091 scope will be addressed in future revisions of the PMP. The engineering alternative study to be completed under Milestone M-091-51 will not consider potential waste from the Tank Farms.

1.3 Management Plan Overview

This revision of the PMP describes a revised strategy for the completion of the M-091 Milestone series that was adjusted in January 2016. The strategy reflects the progress on the work scope and the need to prioritize the treatment and processing of MLLW and TRUM waste. The strategy also emphasizes the need to provide the necessary capabilities to complete M-091 work scope. Figure 1-2 is an illustration of the strategy.

Key elements of the DOE strategy for the completion of the M-091 work scope are as follows:

- Prioritize the treatment and processing of MLLW and TRUM waste. Utilization of commercial capabilities to accelerate the treatment and processing of MLLW and TRUM waste.
- Complete an engineering alternatives analysis that identifies the capabilities necessary to complete the retrieval, treatment, and processing of the MLLW and TRUM waste. This study will be completed in fiscal year (FY) 2016 under Milestone M-091-51. In subsequent years, DOE will submit milestones to provide these needed capabilities. The engineering alternatives analysis will allow DOE to submit retrieval milestones by the end of FY 2020.

The organization of this PMP follows the DOE strategy, illustrated in Figure 1-2, to complete the M-091 work scope:

- Chapter 2 addresses the engineering alternatives analysis of capabilities necessary to complete the retrieval, treatment, and processing of the MLLW and TRUM waste.
- Chapter 3 addresses the generation of certifiable TRUM waste and treatment of MLLW.

- Chapter 4 addresses the retrieval of RSW.
- Chapter 5 discusses the certification and shipment of TRUM waste to the WIPP.
- Chapter 6 provides a discussion of the storage capacity necessary for the storage of the M-091 wastes.
- Chapter 7 provides an estimate of the amount of waste generated from CERCLA cleanup activities. This waste is not within the scope of the M-091 milestones. It is described in this PMP to provide an overview of the waste disposition challenges included within the efforts to clean up the Hanford Site.
- Chapter 8 describes the DOE project control elements for the planning, managing, and reporting performance necessary to complete the M-091 work scope.

1.4 Status of Milestones

The status of near term M-091 milestones is provided in Table 1-1.

Table 1-1. Status of Near Term M-091 Milestones

M-091 Milestone	M-091 Milestone Title	Required Completion Date	Status
M-091-03	Submit annual revision of TRUM waste and MLLW PMP to Ecology	6/30/2015	Complete
M-091-47A	Certify or treat 280 cubic meters of TRUM/MLLW waste.	9/30/2015	Complete
M-091-03	Submit annual revision of TRUM waste and MLLW PMP to Ecology	6/30/2016	On Schedule
M-091-47B	Certify or treat 280 cubic meters of TRUM/MLLW waste.	9/30/2016	On Schedule
M-091-51	Submit to Ecology as a secondary document, an engineering alternatives study 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.	9/30/2016	On Schedule

MLLW = mixed low-level waste
PMP = Project Management Plan
RH = remote-handled
TRUM = transuranic mixed

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M-091 TRUM/MLLW (Summary)

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total
TRUM/MLLW Repack																Volume
		M-091-47B														
Offsite/Onsite m³	280	280	280	280	400	400	400	400	400	500	600	700	600	480	0	6,000
Alternate Capability m³									80	400	500	500	500	420	0	2,400
																8,400
Retrieval RSW (Trench and Caissons)					M-091-49A											
					Submit Retrieval Milestones											
m³							500	800	800	712	11					2,823
														M-091-40 Retrieval Complete		
Shipments TRUM to WIPP					M-091-44T											
					Submit Shipment Milestones											
CH-TRUM									92	97	97	97	97	97	98	675
RH-TRUM									82	278	278	278	278	278	278	1,750
															M-091-00	
Provide Needed Capabilities																
		Submit Engineering/Alternative Study (M-091-51)														
			Submit Target Milestones for Needed Capabilities (M-091-52)													
				Submit Milestones for Needed Capabilities (M-091-53)												
					New Treatment Processing Capability (design, construction, startup)											
						Submit Retrieval Milestones										
									Alpha Caisson Retrieval							

Figure 1-2. DOE Strategy to Complete the M-091 Work Scope

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2 Acquisition of Necessary Capabilities

The M-091 Milestone series addresses the retrieval, treatment/processing, shipment, and disposal of MLLW and TRUM wastes. To accomplish the work scope under the milestones, additional capabilities are necessary. The preparation of an engineering alternatives analysis is the first step in the sequence of M-091 milestones to provide needed capabilities. The following milestones will demonstrate progress on completion of the engineering alternatives analysis:

M-091-51, Complete Engineering alternatives analysis – By September 30, 2016, a study will be prepared that identifies the alternatives DOE will evaluate to provide the needed capabilities to complete the M-091 Milestones.

The capabilities necessary to manage the waste and complete the M-091 Milestone include:

- **Retrieval of the remaining RSW**-The remaining RSW in below ground storage is both CH and RH waste. The waste is contained in various types of containers. Experience from previous retrieval operations indicates that the containers may be significantly deteriorated.
- **Characterization of the retrieved waste** – All retrieved waste must be characterized. Characterization of the waste with Non-destructive Examination (NDE) is necessary to identify the presence of prohibited items in the waste. Characterization of the waste with Nondestructive Analysis (NDA) is necessary to determine if the waste is TRUM or MLLW. Acceptable knowledge is used for characterization for those container where NDE/NDA is not possible due to equipment limitations.
- **Process the retrieved waste** – Retrieved waste must be processed if NDE or other inspections determine that it does not meet the acceptance criteria of the disposal site. Processing includes the removal of prohibited items, size reduction and repackaging. The processing capabilities must be capable of handling a variety of containers, both contact-handled and remote-handled.
- **Certification of the waste** – Certification that the waste complies with the disposal site acceptance criteria is necessary prior to shipment for disposal. All the waste currently in below ground and aboveground storage requires certification. Additionally, any newly generated TRU or TRUM waste will require certification. The capabilities must able to handle a variety of containers. Acceptable knowledge is used for certification for those container where NDE/NDA is not possible due to equipment limitations.
- **Shipment to Disposal** – The TRUM waste within the scope of this study will require shipment to WIPP for disposal. The study will consider needed capabilities to prepare this waste for shipment. MLLW is disposed at Hanford.

M-091-52, Propose Target Milestones – Target dates will be proposed and submitted by September 30, 2017 to provide the needed capabilities. The target milestones will consider the technical viability of each alternative along with its rough order of magnitude (ROM) cost and schedule. The target milestones will consider DOE requirements for the acquisition of capital assets DOE safety requirements, and the necessary environmental permitting process.

M-091-53, Submit Alternate Capability Milestones – Proposed milestones to provide the needed capabilities will be submitted for the preferred alternative September 30, 2018. The milestones will support the DOE preferred alternative to provide the necessary capabilities to complete the M-091 Milestones.

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3 Retrieval and Designation of Retrievably Stored Waste (M-091-49)

DOE has made substantial progress in retrieving RSW from the burial grounds that contained approximately 15,200 m^3 (537,000 ft^3) of RSW. Since retrieval operations began, DOE has successfully retrieved over 12,500 m^3 (441,000 ft^3) of RSW, leaving approximately 2,800 m^3 (98,900 ft^3) remaining to be retrieved. The RSW is in designated areas in LLBGs 218-E-12B, 218-W-3A, 218-W-4B, and 218-W-4C. Burial Ground 218-W-4B includes four alpha caissons containing RH-RSW. The retrieval of RSW has been completed in the 218-W-4C LLBG. Descriptions and maps of these LLBGs are included in Appendix C.

Retrieval of the remaining RSW will be addressed in the engineering alternatives analysis being completed under Milestone M-091-51 (see Chapter 2). Under Milestone M-091-49A, a schedule for the retrieving the remaining RSW shall be established. This schedule will represent a refinement of the volume of RSW remaining to be retrieved under the M-091 milestone scope.

3.1 Status and Annual Volume Projections for Retrieval of Retrievably Stored Waste

Retrieval operation has been placed in a layup condition. During CY 2015, retrieval of RSW was not performed.

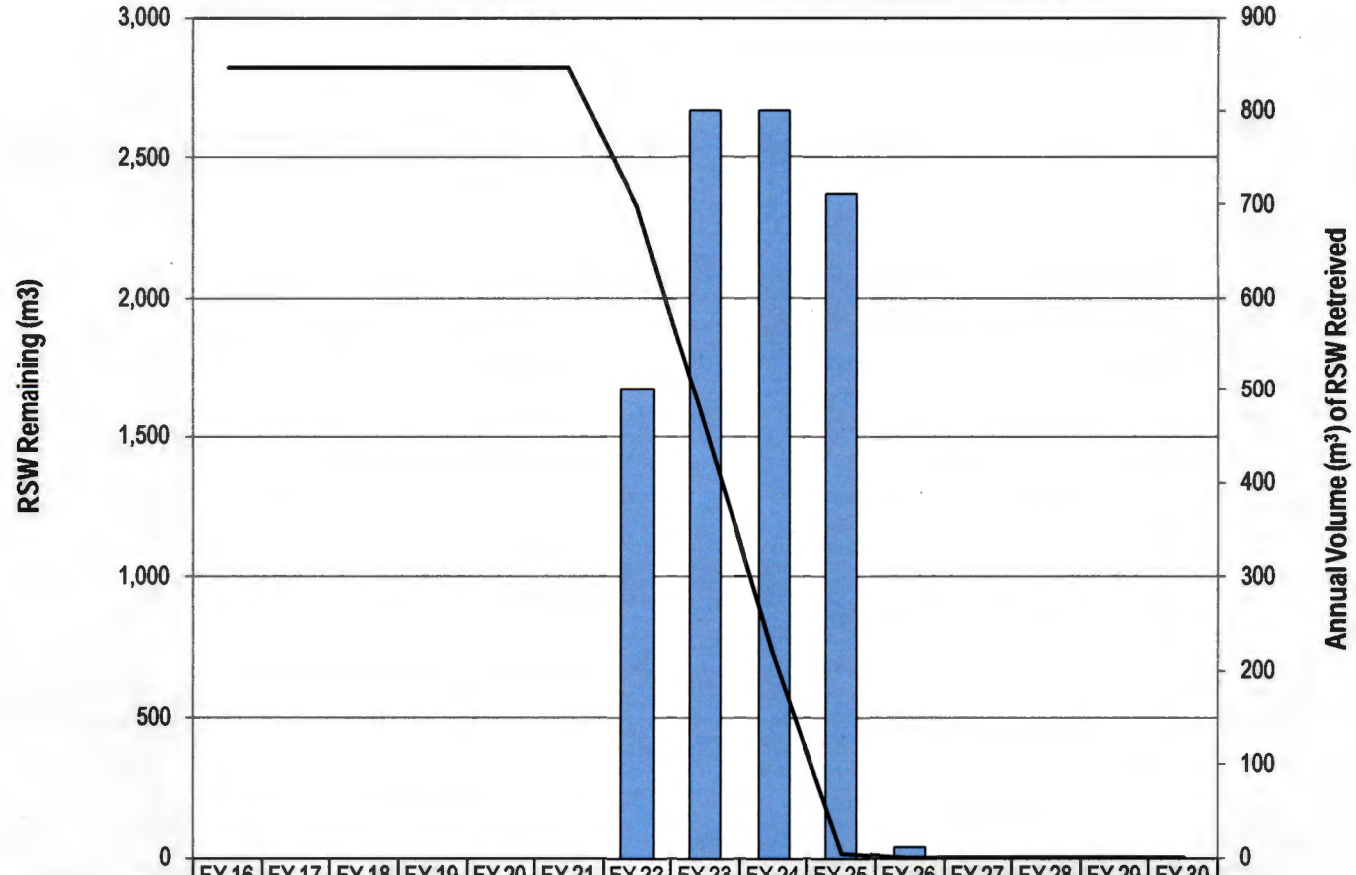
Figure 3-1 presents a summary of the RSW projected to be retrieved from 2016 through 2030. The bars represent the quantity of RSW that is projected to be retrieved during a fiscal year, and the line represents the cumulative volume remaining at the end of a fiscal year.

Under the projected annual funding profile and the implementation of additional capabilities, retrieval of RSW is not anticipated to occur during FY 2016 through FY 2021. Ramp-up of retrieval operation is anticipated to begin in FY 2020, with retrieval of RSW resuming in FY 2022. Retrieval would be completed by the end of FY 2026. Design and construction of the alpha caisson retrieval project is scheduled to be completed in FY 2024, with retrieval of the caisson RH-RSW to be completed by the end of FY 2026.

3.2 Post-retrieval Activities

DOE will sample and analyze trench substrates with the purposes of determining whether or not release of contaminants to the environment have occurred and, if so, the nature and extent of contamination. Sampling that has been performed is documented in the Administrative Record (AR).

Once RSW has been removed from the trenches in the LLBGs, information and photographs regarding as-left trench conditions will be documented, and sampling of the soil will commence per the sampling and analysis plans (SAPs) that have been developed to determine whether contaminants have been released from the burial grounds where RSW has been and will be retrieved.



	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30
RSW Retrieved	0	0	0	0	0	0	500	800	800	712	11	0	0	0	0
RSW Remaining End-of-Year	2,823	2,823	2,823	2,823	2,823	2,823	2,323	1,523	723	11	0	0	0	0	0

*See Appendix D, Table D-1, for the data source and analytical basis used in the development of this chart.

Figure 3-1. Volume Projections for RSW Retrieval

The SAPs for the four LLBGs are as follows:

- DOE/RL-2003-48, *218-W-4C Sampling and Analysis Plan*
- DOE/RL-2004-70, *218-W-4B Burial Ground Sampling and Analysis Plan*
- DOE/RL-2004-32, *218-E-12B Burial Ground Sampling and Analysis Plan*
- DOE/RL-2004-71, *218-W-3A Burial Ground Sampling and Analysis Plan*

For the purposes of this PMP, it is assumed that any soil remediation in the trenches where RSW is removed will be addressed as part of the 200-SW-2 OU CERCLA cleanup actions (M-016 Milestone series). There are opportunities to support the 200-SW-2 investigative process through implementation of the SAPs.

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4 Certifiable TRUM Waste and MLLW Treatment (M-091-47)

This chapter addresses the scope of work under Milestone M-091-47 that initially focuses on repackaging TRUM waste and treating MLLW that has already been retrieved and stored in drums and boxes above ground.

4.1 Certifiable TRUM Waste

This section describes DOE plan to prepare TRUM waste certifiable for offsite shipment by continuing to utilize existing offsite capabilities at Perma-Fix Northwest. WRAP and T Plant are currently in a standby condition. Acquiring new capabilities to treat, repackage, and, where necessary, size reduce the remaining containers will be addressed under Milestone M-091-51 (see Chapter 2). Onsite and offsite transportation of waste is discussed in Section B1.8.

4.1.1 Status of Certifiable TRUM Waste

As of December 31, 2015, there has been 1,520 m3 (53,678 ft^3) of large container TRU/TRUM shipped to Perma-Fix Northwest; however, the quantity completed was 1,406 m3 (49,652 ft^3) (3 of the boxes shipped in CY 2015 were not yet repackaged by December 31, 2015. During CY 2015, 35 containers (11 large and 24 drums) equally 459 m^3 (16,209 ft^3) were processed at Perma-Fix Northwest.

4.1.2 Processing Approach to Certifiable Containers of TRUM Waste

This subsection addresses containers currently in aboveground storage that are being made certifiable at Perma-Fix Northwest, the only available capability today for repackaging TRUM waste. In addition this section addresses the those containers remaining to be retrieved from the LLBGs (RSW) that do not meet the Perma-Fix Northwest acceptance criteria that will be addressed in the engineering alternatives analysis being completed under Milestone M-091-51 (see Chapter 2). Figure 4-1 shows an example of repackaging of TRUM waste at Perma-Fix Northwest

Drums of RSW that have been determined to be TRUM waste, non-destructive evaluation (NDE) is used to determine whether a WIPP-prohibited item(s) is present. If a prohibited item(s) is found, the drum will be repackaged. In the case where a drum is to be shipped offsite for remediation, the drum contents will be characterized onsite before the drum is shipped offsite.

Similarly, if capability is available, boxes of RSW that have been determined to be TRUM waste will be NDE to determine whether a WIPP-prohibited item(s) is present. If a prohibited item(s) is found, and the box is to be shipped offsite for repackaging, additional knowledge obtained from the NDE is recorded in the waste package operating record, and the additional knowledge is sent to the receiving offsite facility prior to shipment. Acceptable knowledge is used for characterization for those container where NDE is not possible due to equipment limitations.

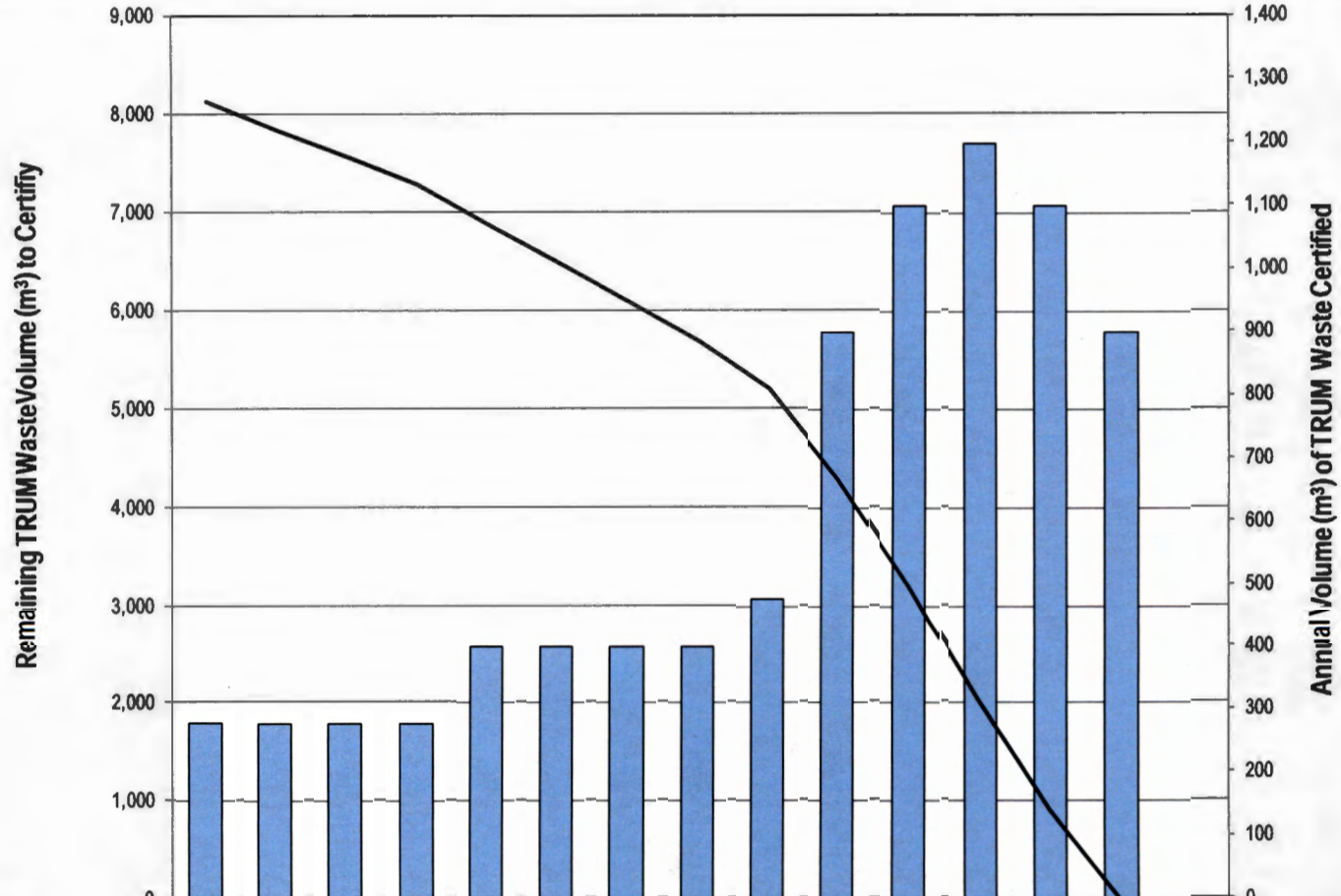
For boxes of RSW determined to be TRUM waste and where the capability to NDE is not available, the waste record of the waste box will be reviewed and investigated to determine the probable contents inventory. This review and investigation will be documented in the operating record. If the box is to be shipped offsite for repackaging, all available process knowledge about the contents will be provided to the offsite facility prior to shipment.

Figure 4-1. Repackaging of TRUM Waste at Perma-Fix Northwest

Figure 4-2 presents a summary of the volume of M-091 TRUM waste projected to be repackaged into WIPP-certifiable containers. The bars represent the TRUM waste projected to be certified during a fiscal year, and the line represents the remaining inventory to be certified at the end of a fiscal year. The projected values are based on existing suspect TRUM waste volumes. The volume of waste currently in aboveground storage that is either certified waste awaiting shipment to WIPP or certifiable waste awaiting certification by CCP is not included in Figure 4-2. Additional information is provided in Appendix D.

Under the anticipated annual funding profile, 280 m^3 (9,888 ft^3) of TRUM waste will be repackaged using commercial capabilities in FY 2016 through FY 2019, and then increasing in FY 2020 through FY 2029 once capacity and alternate capabilities becomes available. These projections will be refined under Milestone M-091-47B, where a change request will be submitted that establishes the next interim milestones for certifiable TRUM waste.

To accomplish this M-091 Milestone work scope, DOE will utilize existing capabilities and acquire the necessary new capabilities as discussed in Chapter 2. Details and a schedule for redeployment of onsite repackaging of TRUM waste have not been established.



	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30
TRUM Waste Certified	280	280	280	280	400	400	400	400	480	900	1,100	1,200	1,100	900	0
Remaining TRUM to be Certified End-of-Year	8,120	7,840	7,560	7,280	6,880	6,480	6,080	5,680	5,200	4,300	3,200	2,000	900	0	0

* See Appendix D, Table D-2, for the data source, analytical basis, and underlying assumptions used in the development of this chart.

Figure 4-2. Certifiable Volume Projections of TRUM Waste (M-091 Scope)

4.2 Treatment of MLLW

Substantial progress has been made in recent years in the treatment and disposal of MLLW. Since 1997, over 14,000 m^3 (494,000 ft^3) of MLLW has been treated and disposed of. The majority of this MLLW has been treated using commercial capabilities and disposed of onsite at either the mixed waste trenches (MWTs) or Environmental Restoration Disposal Facility (ERDF).

Current commercial facilities under contract include the following:

- Perma-Fix Northwest, located in Richland, Washington
- East Tennessee Material and Energy Corporation, Inc., located in Oak Ridge, Tennessee
- Perma-Fix Diversified Scientific Services, Inc., located in Kingston, Tennessee

4.2.1 Status and Annual Volume Projections for Treatment of MLLW

During FY 2015, no processing of M-091 MLLW was performed.

After retrieval and assay, a portion of the RSW will be designated as non-TRU waste based on the change in the definition of TRU waste (to 100 nCi/g from the former definition of 10 nCi/g), which occurred after the waste was placed into retrievable storage in the trenches. RSW that designates as MLLW will be disposed at the MWTs or ERDF. It is anticipated that current capabilities are available to process most of the remaining MLLW. Newly generated MLLW will continue to be treated with in the one year storage prohibitions specified in 40 CFR 268.50, "Land Disposal Restrictions," "Prohibition on Storage of Restricted Wastes."

4.2.2 MLLW Characterization

This section addresses containers currently in storage and those to be retrieved from the LLBGs.

Drums of RSW that have been determined to be MLLW are NDE to determine whether a nonconforming item(s) is present. If a nonconforming item(s) is not found, the drum will be sent offsite for treatment.

Boxes of RSW that have been determined to be MLLW are NDE, if capability is available, to determine whether a nonconforming item(s) is present. If a nonconforming item(s) is not found, the box will be sent offsite for processing. If a nonconforming item(s) is found, the box will be shipped offsite for processing after additional knowledge obtained from the NDE is recorded in the waste package operating record, and the additional knowledge is sent to the receiving offsite facility prior to shipment. Acceptable knowledge is used for characterization for those container where NDE is not possible due to equipment limitations.

For boxes of RSW that have been determined to be MLLW where the capability to NDE is not available, the waste record of the waste box will be reviewed and investigated to determine the probable contents inventory. This review and investigation will be documented in the operating record. If the box is to be shipped offsite for processing, all available process knowledge about the contents will be presented to Ecology before the package is shipped to the offsite facility.

4.2.3 Overview of MLLW Treatability Groups

The MLLW is categorized by the necessary treatment path to ensure that the waste, once treated, will meet LDR requirements for disposal. The following treatability groups are included in DOE/RL-2015-08, *Calendar Year 2014 Hanford Site Mixed Waste Land Disposal Restrictions Full Report*:

- MLLW-01 "LDR Compliant Waste," Treatment Path: Direct disposal without additional LDR treatment

- MLLW-02 "Inorganic Non-Debris," Treatment Path: Nonthermal (stabilization)
- MLLW-03 "Organic Non-Debris," Treatment Path: Thermal
- MLLW-04 "Hazardous Debris," Treatment Path: Nonthermal (macroencapsulation)
- MLLW-05 "Radioactive Lead Solids," Treatment Path: Nonthermal (macroencapsulation)
- MLLW-06 "Mercury Waste," Treatment Path: Mercury stabilization (that is, amalgamation or grout stabilization)
- MLLW-07 "RH and Large Container," Treatment Path: Multiple types of treatment (e.g., stabilization, macroencapsulation, and thermal destruction)
- MLLW-08 "Unique Wastes," Treatment Path: No treatment capability
- MLLW-09 "Radioactive Batteries," Treatment Path: Macroencapsulation
- MLLW-10 "Reactive Metals," Treatment Path: Deactivation of reactive component

Pursuant to the *Hazardous and Solid Waste Amendments of 1984*, LDRs were promulgated beginning in 1986 for nonradioactive waste. The LDRs later became effective for mixed waste. Beginning in 1990, TPA (Ecology et al., 1989a) Milestone M-26-01 required a plan with subsequent yearly reports on the volume of mixed waste in storage at the Hanford Site. The last report submitted (DOE/RL-2015-08) provides total waste volume for both the currently stored inventory and the waste forecast to be generated during the next 5 years by treatability group. This PMP addresses MLLW LDR Treatability Groups MLLW-02 through MLLW-10. Treatability Group MLLW-01, direct disposal of LDR compliant waste, requires no processing and is not included in this PMP.

4.2.4 Treatment Capabilities for MLLW

Commercial capabilities are used to treat/process inorganic nondebris (MLLW-02), organic nondebris (MLLW-03), hazardous debris (MLLW-04), radioactive lead solids (MLLW-05), mercury waste (MLLW-06), radioactive batteries (MLLW-09), and reactive metals (MLLW-10) in small containers.

Commercial capabilities are used to treat/process most CH-MLLW in large containers and RH-MLLW (MLLW-07). Onsite and offsite transportation of waste is discussed in Section B1.8.

4.2.4.1 Stabilization (MLLW-02)

The treatment path for inorganic nondebris MLLW is commercial stabilization and is represented in LDR Treatability Group MLLW-02. Waste within this group consists of many different inorganic solids (e.g., particulates, absorbed liquids, sludges, resins, and soils) and lab packs that are contaminated with regulated metals and other inorganics.

The objective of stabilization is to immobilize the hazardous component through chemical and/or physical fixation into low-solubility materials and by encapsulation to reduce the potential for future releases. Usually, stabilization is accomplished by mixing the waste with Portland cement or pozzolanic materials at a preselected ratio, but stabilization can also include mixing with polymer materials. Pretreatment processes may be employed prior to stabilization (e.g., drying, shredding, screening, and chemical treatments).

Several commercial treatment facilities located in the United States can accept the majority of the Hanford Site's waste in Treatability Group MLLW-02.

4.2.4.2 Thermal Treatment of Organics (MLLW-03)

The treatment path for organic nondebris MLLW is commercial thermal treatment and is represented in LDR Treatability Group MLLW-03. Waste within this group consists of many different inorganic and organic solids (e.g., particulates, absorbed liquids, sludges, resins, and soils) and lab packs that are contaminated with organic regulated dangerous waste constituents. The thermal treatment process destroys organic materials by oxidation, combustion, and/or pyrolysis.

Commercial treatment facilities are located in the United States that can accept the Hanford Site's waste in Treatability Group MLLW-03.

4.2.4.3 Macroencapsulation (MLLW-04, MLLW-05, and MLLW-09)

Waste within Treatability Group MLLW-04 meets the definition of hazardous debris as defined in 40 CFR 268.2, "Definitions Applicable in This Part." The physical characteristics include paper, plastic, wood, rubber, rags, and lesser quantities of metallic and inorganic waste components. This waste may include organic/carbonaceous waste constituents in excess of 10 percent as defined in WAC 173-303-040, "Dangerous Waste Regulations," "Definitions."

Waste within Treatability Group MLLW-05 meets the definition of the radioactive lead solids subcategory as described in 40 CFR 268.40, "Applicability of Treatment Standards." The physical makeup consists of many different forms of radioactive lead solids including bricks, sheets, shot-filled blankets, and lead-lined debris items where the lead comprises more than 50 percent of the waste matrix. The primary treatment path for MLLW debris and radioactive lead solids is commercial macroencapsulation.

Waste within Treatability Group MLLW-09 is, or contains, radioactively contaminated batteries that have the treatment requirements specified in 40 CFR 268.40 (i.e., D006, cadmium batteries; D008, lead acid batteries (drained); D009, mercury batteries; and D011, silver batteries).

The primary treatment path for MLLW debris, radioactive lead solids, and radioactively contaminated batteries is commercial macroencapsulation. Macroencapsulation consists of applying a surface coating of polymeric organics or using a jacket of inert inorganic materials (e.g., cement) to allow substantial reduction of surface exposure to potential leaching media. Portland cement-based grouts have mainly been used to macroencapsulate this waste on the Hanford Site. The waste is typically sent through one or more size-reduction steps (e.g., sorting, cutting/shearing, compaction, and super compaction) prior to macroencapsulation.

Commercial treatment facilities are located in the United States and can accept the Hanford Site's waste in the MLLW-04, MLLW-05, and MLLW-09 treatability groups. Onsite and offsite transportation of waste is discussed in Section B1.8.

4.2.4.4 Mercury Stabilization and Amalgamation (MLLW-06)

Radioactively contaminated mercury waste requires either stabilization or amalgamation. Commercial capability is available. The Hanford Site inventory of mercury-bearing waste is currently zero (represented in LDR Treatability Group MLLW-06). The last report submitted (regulated constituents table, including treatment requirements and underlying hazardous conditions [if applicable] in Section 3.3.1 of DOE/RL-2015-08) does reflect that high inorganic mercury is present in the PUREX tunnels.

4.2.4.5 RH and Large-Container MLLW (MLLW-07)

Waste that falls into the MLLW-07 Treatability Group includes very large packages that, when treated, pose a transportation concern and/or waste packages that have a significant radiological inventory that

pose a worker protection concern. The waste will be limited to hazardous debris. Chemical stabilization and macroencapsulation under 40 CFR 268.45, "Treatment Standards for Hazardous Debris," will be utilized to render the waste LDR compliant. In addition, the mixed waste containers will meet the 90 percent full container requirements following treatment. Treatment would be limited to those technologies that can be employed for containerized mixed waste only.

Commercial facilities will be used to treat most CH-MLLW in large containers and some RH-MLLW. Waste within Treatability Group MLLW-07 consists of: (1) large containers of MLLW, (2) RH-MLLW packages, and (3) RH-MLLW that is shielded down to contact-handling levels for safe handling and storage. DOE has implemented significant commercial capability with firms in Washington and Utah to disposition a significant portion of this LDR treatability group.

4.2.4.6 Disposition Path for MLLW-08

Waste within Treatability Group MLLW-08 is a unique waste, for which no permitted treatment capability exists in the United States, or the capability exists but the capability is very limited.

4.2.4.7 Deactivation (MLLW-10)

Reactive metals containing radioactive contamination require deactivation as the specified treatment technology under RCRA. Waste within Treatability Group MLLW-10 has water reactive materials, including sodium metal.

4.2.5 Disposal of MLLW

On the Hanford Site, MLLW is disposed at the MWTs and ERDF. The MWTs (LLBG 218-W-5, Trenches 31 and 34) are RCRA compliant, meet Subtitle C disposal requirements, and provide permanent disposal of low-level waste (LLW) and MLLW. They have a double-liner system with leachate collection. The combined capacity of the two MWTs is approximately 22,300 m^3 (787,517 ft^3). Approximately half of each disposal unit has been filled with waste.

ERDF is authorized to dispose of waste under CERCLA and meets substantive requirements for RCRA landfills (e.g., double liner and leachate collection). The landfill is used for disposal of environmental restoration waste being generated from cleanup activities. ERDF is designed to provide permanent disposal capacity to accommodate projected Hanford Site LLW and MLLW.

In 2007, an amendment to the ERDF ROD (EPA et al., 2007, *Amendment to the Record of Decision for the USDOE Hanford Environmental Restoration Disposal Facility*) was approved, authorizing treatment and/or disposal at ERDF of specific Hanford Site-only waste that is not covered in other existing Hanford Site CERCLA authorizations or RODs. Examples of Hanford Site-only waste include waste from surveillance and maintenance at Hanford Site facilities, environmental research and development activities, sample analyses, liquid effluent waste treatment, and environmental monitoring programs.

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5 Certification and Shipment of TRUM Waste

DOE has made considerable progress in disposing of TRUM waste by shipping over 4,200 m^3 (148,321 ft^3) directly to WIPP or to the Advanced Mixed Waste Treatment Project (AMWTP) in Idaho for processing prior to disposal. This chapter presents the DOE plan to complete final certification and shipment of TRUM waste by continuing to utilize existing capabilities and, where necessary, acquiring new capabilities to prepare and manage the remaining containers of CH-TRUM and RH-TRUM wastes for offsite disposal (see Chapter 2).

5.1 Status and Annual Volume Projections for Certification and Shipment of TRUM Waste

During CY 2015, final certifications of TRUM waste was not performed by CCP nor were shipments of TRUM waste made to WIPP.

5.2 Certification and Shipment of TRUM Waste to WIPP

WIPP has been unable to receive TRUM waste since the radiological incident that occurred on February 14, 2014. At this time, it is too soon to speculate on when receipt operations will recommence, but it is known that the National TRU Program has prioritized removal of waste from a number other sites within the DOE Complex ahead of the Hanford Site.

It is anticipated certification of TRUM waste will continue to be done by CCP, although details for redeployment of certification/shipping capability at the Hanford Site have not been established. It is anticipated that the TRUM certification program will resume in FY 2024 and shipments to WIPP resuming the same year.

Figure 5-1 presents a summary of the volume and number of shipments of M-091 TRUM waste projected to be shipped to WIPP. The bars represent the CH-TRUM and RH-TRUM waste projected number of shipments to WIPP during a fiscal year, and the line represents the remaining inventory to be shipped to WIPP at the end of a fiscal year. Shipments of TRUM waste to WIPP or AMWTP are expected to be completed by September 30, 2030.

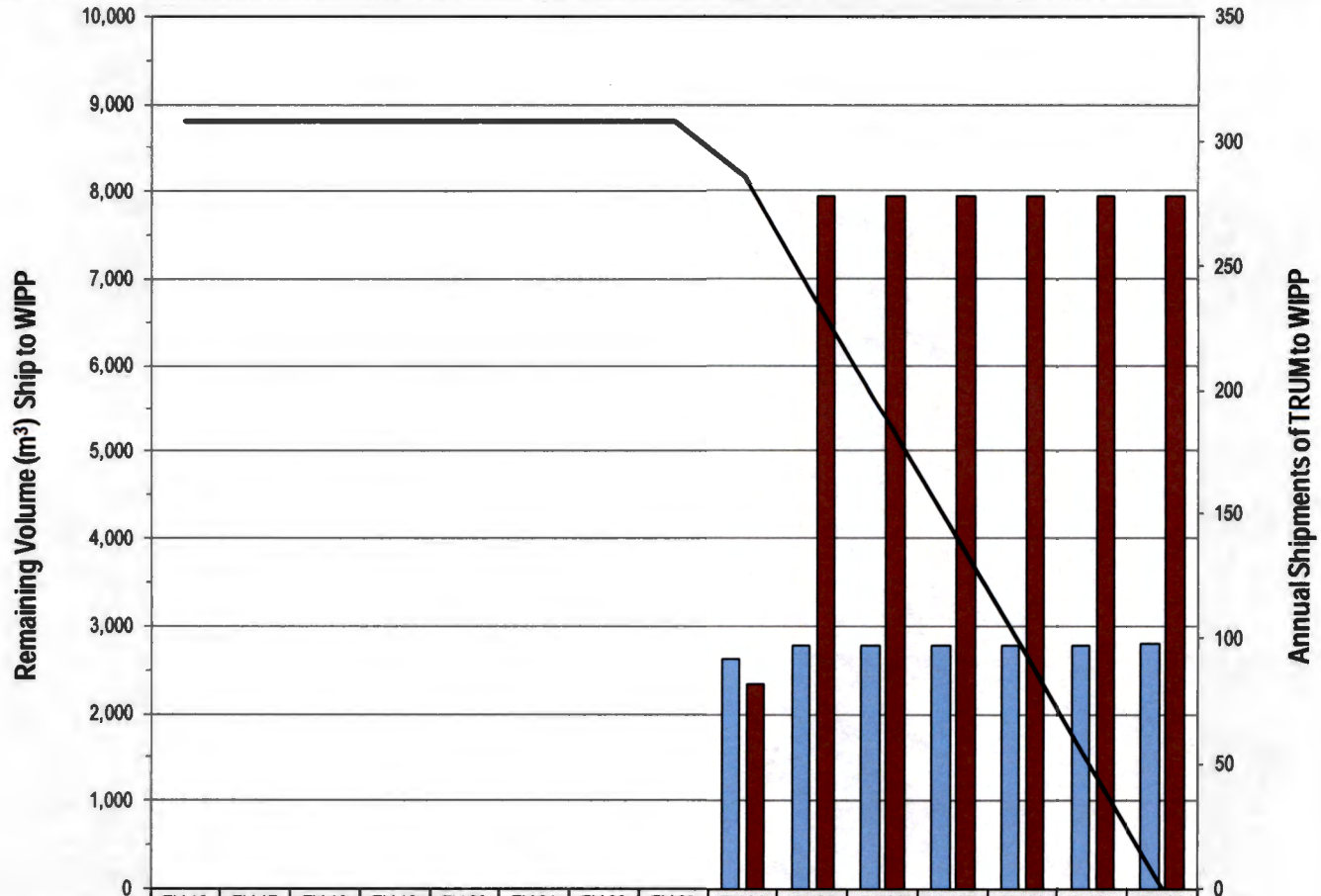
The following subsections describe the certification program for shipment of TRUM waste to WIPP for disposal.

5.2.1 CCP Certification Program

The DOE Carlsbad Field Office (CBFO) is responsible for characterization, certification, and shipment of the TRU waste to WIPP for disposal or to AMWTP through CCP. These activities at the Hanford Site have been suspended until 2024, when funding is expected to become available.

To support DOE in the packaging and disposal of TRU wastes, CCP provides characterization services in accordance with NM4890139088-TSDF, *Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Attachment C, Waste Analysis Plan*, and DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*. CCP also provides intersite certification and transportation for containers to be transported to AMWTP.

The waste acceptance criteria applicable to the TSD of CH-TRU and RH-TRU waste at WIPP are defined in DOE/WIPP-02-3122. These criteria serve as DOE instructions for ensuring that CH-TRU and RH-TRU waste are managed and disposed of in a manner that protects human health and safety and the environment.



	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30
M-091 CH-TRUM Shipments	0	0	0	0	0	0	0	0	92	97	97	97	97	97	98
M-091 RH-TRUM Shipments	0	0	0	0	0	0	0	0	82	278	278	278	278	278	278
Remaining Volume to be Shipped	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,166	6,805	5,444	4,083	2,722	1,361	0

*See Appendix D, Table D-2 for the data source, analytical basis, and underlying assumptions used in the development of this chart.

Figure 5-1. Projection of TRUM Waste Shipments to WIPP

5.2.2 CH-TRUM Waste Shipments to WIPP

At WRAP, DOE has the capability to load drums and SWBs of CH-TRUM waste into TRUPACT-II containers that are shipped to WIPP. Each stainless steel TRUPACT-II (Figure 5-2) is approximately 2.4 m (8 ft) in diameter, 3 m (10 ft) high and constructed with leak-tight inner and outer containment vessels. TRUPACT-II can hold up to fourteen 208 L (55 gal) waste drums or two SWBs. The TRUPACT-II containers are typically shipped three at a time to WIPP (Figure 5-3).

5.2.3 RH-TRU Waste Shipments to WIPP

DOE currently does not have the onsite capability necessary to load and ship the RH-TRUM waste to WIPP (see Chapter 2). Alternatives to provide the needed capabilities to ship RH-TRUM waste will be identified under Milestone M-091-51 (see Chapter 2).

Figure 5-2. Loading a TRUPACT-II with TRUM Waste Drums at WRAP

Figure 5-3. TRUPACT-II Shipment of TRUM Waste to WIPP

6 Storage Capacity

CWC, T Plant, WRAP, and LLBGs provide storage of containers managed under the M-091 Milestone series. Table 6-1 lists the permitted storage capacities as stated in the approved Part A permit. The design storage capacities are much larger. The maximum volume of waste that would require storage at one time is projected to be 14,000 m^3 (494,000 ft^3) with potentially an additional 3,000 m^3 (106,000 ft^3) from CERCLA cleanup activities (Chapter 7). With a permitted storage capacity of 33,729 m^3 (1,191,128 ft^3), the need for additional storage capacity is not expected. As the out-year schedule for the management of waste containers is refined, the impact on storage capacity will be reevaluated.

Table 6-1. Facility Permitted Storage Capacity

Facility	OU	Permitted Capacity (m^3[ft^3])*
CWC	WA 89000 8967, Part III, OU 6, Revision 8, October 1, 2008	20,796 (734,404)
T Plant	WA 89000 8967, Part III, OU 9, Revision 12, October 1, 2008	946 (33,408)
WRAP	WA 89000 8967, Part III, OU 7, Revision 6, October 1, 2008	1,987 (70,170)
LLBG	WA 89000 8967, Part III, OU 17, Revision 14, October 1, 2008	10,000 (353,147)
		Total 33,729 (1,191,128)

* The permitted storage capacity is based on the latest Ecology-approved Part A capacity for the OU. It is recognized that DOE and regulator agreements may change this in the future.

CWC = Central Waste Complex
DOE = U.S. Department of Energy
Ecology = Washington State Department of Ecology
LLBG = low-level burial ground
OU = operable unit
WRAP = Waste Receiving and Processing Facility

The following assumptions were used to determine the adequacy of the current storage capacity:

- TRUM waste will remain in aboveground storage until the waste is treated/processed and shipped to WIPP.
- RSW will be designated and stored at CWC awaiting treatment/processing.
- After treatment/processing, TRUM waste will be stored at CWC and WRAP awaiting final certification, and shipment to WIPP.

6.1 CWC Storage

CWC, located in the 200 West Area, provides storage for mixed waste. The following waste management activities are associated with storage:

- Loading and unloading of containers for shipments
- Transferring containers from one building or storage area to another area
- Relocating a container from storage for treatment
- Performing required facility, equipment, and container inspections and maintenance

The storage areas provide space for various sizes of waste containers. Storage structures with physical features that provide for segregated storage areas are operated to maintain appropriate separation between containers of incompatible waste (incompatibility is defined in WAC 173-303-040).

Secondary containment has been incorporated into the design of the Flammable and Alkali Waste Storage Modules, the 2401-W Building, the 2404-WA Building, and the 2402-Series and 2403-Series Buildings. Any waste containers that are to be stored outside of the storage buildings and modules requiring secondary containment will be stored over spill containment pallets or equivalent devices meeting the requirements of WAC 173-303-630(7), "Use and Management of Containers." Liquid incompatible wastes will be segregated within these outside storage areas by separating the containers of incompatible waste on portable spill containment pallets or equivalent devices meeting the requirements of WAC 173-303-630(9).

6.2 T Plant Storage

T Plant storage structures and areas use a variety of engineered and administrative controls to provide segregation of and maintain appropriate separation between incompatible wastes. Storage of dangerous and/or mixed waste in various-sized containers could take place in the 221-T Canyon, 221-T Railroad Tunnel, 2706-T, 214-T Storage Building, other support structures and storage areas, or outdoor storage areas located within the boundaries of T Plant.

The storage and storage/treatment areas provide space for the management and storage of various sizes of waste containers. Storage structures with physical features that provide for segregated storage areas are operated and maintain appropriate separation between containers of incompatible waste (incompatibility is defined in WAC 173-303-040). Liquid incompatible wastes will be segregated within outside storage areas by separating the containers of incompatible waste on portable spill containment pallets or equivalent devices meeting the requirements of WAC 173-303-630(7)-(9). The management of the containers is consistent with and performed in accordance with T Plant procedures and controls.

6.3 WRAP Storage

The 2336W Building is the main WRAP building and is divided into administrative, shipping and receiving, waste characterization, and processing areas. Storage of mixed waste occurs in the shipping and receiving area, characterization area, Room 152 of the administrative area, and the process area. Two large container storage buildings are part of WRAP (2404-WB and 2404-WC). The storage capacity at WRAP also includes outdoor storage that is intended to facilitate the WRAP waste management activities such as the loading and unloading of containers for shipment, transferring containers from one building to another area or TSD unit, or relocating a container for storage awaiting treatment or characterization.

These storage/treatment areas provide space for the management and storage of various sizes of waste containers. Storage structures and areas are operated to maintain appropriate separation between containers of incompatible waste (incompatibility is defined in WAC 173-303-040). Waste containers holding a dangerous waste that is incompatible with any waste or other materials stored nearby will be separated from the other materials or protected from them by means of portable spill containment pallets or equivalent devices meeting the requirements of WAC 173-303-630 (7)-(9).

6.4 LLBG Storage

The current MWTs (218-W-5 LLBG, Trenches 31 and 34) included in the Part A (dated October 1, 2008) provide storage for various-sized containers of mixed waste.

7 TRU and TRUM Waste Generated from CERCLA Cleanup Actions

A goal of the Tri-Parties is to integrate the Hanford Site cleanup activities to the extent possible to enable efficient, effective management of waste. The Tri-Parties have agreed to integrate the plan for managing TRU and TRUM waste under the CERCLA cleanup actions, with the plan to manage similar waste forms under the M-091 Milestone work scope. As a result, this M-091 PMP addresses the acquisition of capabilities necessary to prepare TRU and TRUM waste within the scope of the M-016 Milestone series for disposal at WIPP. This PMP reflects retrieval decisions, projected waste volumes, and schedules for CERCLA cleanup actions authorized in RODs and action memoranda at the Hanford Site. The remedial actions for all non-tank farm and non-canyon OUs are to be completed by September 30, 2024 per Milestone M-016-00.

At this time, it is expected that other TRU and TRUM waste generated during Hanford Site cleanup activities (e.g., 618-10/11 and PFP) will be compliantly packaged at the point of generation. If, at the time of conceptual design, this is not the case (e.g., K Basin sludge), the scope of the new capability or the time to use the new capability may be expanded to accommodate the repackaging of other TRU or TRUM waste beyond M-091 scope. Similarly, conceptual design of the alpha caisson processing capability will explore treatment of non-caisson RH-TRUM waste and incorporate the necessary accommodations if this is deemed appropriate.

Schedules for CERCLA cleanup actions are established through the following CERCLA decision documentation:

1. **Prepare Remedial Investigation and Feasibility Study.** The remedial investigation presents data collected during the investigation and other characterization activities (analogous to the RCRA facility investigation). The feasibility study develops and evaluates alternatives for remediation comparable to the RCRA corrective measures study.

2. **Prepare Proposed Plan.** This plan is based on the detailed information contained in the RI/FS reports.

3. **Receive Public Input.** The Tri-Parties will solicit input from the Tribal Nations and the public regarding the preferred remedial alternatives, which are described in the proposed plan.

4. **Select Preferred Alternative.** Comments received from the Tribal Nations and the public regarding the preferred alternatives will assist the Tri-Parties in selecting a final decision on the preferred alternatives that will be taken to clean up the contamination associated with the OUs described in the proposed plan.

5. **Prepare ROD.** After the Tri-Parties consider the comments received, a ROD will be issued identifying the final cleanup remedies selected for implementation, including a summary of the responses to comments.

6. **Post-ROD Activities.** The selected remedial alternative is implemented after the final ROD is approved. This stage may involve remedial design and design verification studies, construction, remediation process optimization, and operation and maintenance of the implemented processes (comparable to the RCRA corrective measure implementation stage).

The OUs and facilities that may generate TRU waste are at different stages in the CERCLA decision process.

Table 7-1 summarizes the OUs and/or facilities that will or will not be addressed in this PMP. Those to be included have the potential to generate waste with TRU constituents greater than 100 nCi/g during

CERCLA cleanup actions and are within the scope of the M-016, M-083, and M-085 Milestone series. The groundwater OUs and the tank farm WMAs are not addressed in this PMP.

Table 7-1. Summary of OUs and Facilities

OU or Facility	Comment
300-FF-2, PFP, 221-U Facility, 100 K Basins, 209E, 200-PW-1, and 200-PW-6	• Potential waste with TRU constituents greater than 100 nCi/g is generated during cleanup/closure actions at these OUs and facilities. • Approved CERCLA cleanup actions under RODs or action memoranda. • Addressed in this PMP (Sections 7.1 and 7.2).
200-BC-1, 200-SW-2, 200-WA-1, 200-DV-1, 200-IS-1, 200-EA-1, 200-CP-1 (including the PUREX Tunnels 1 and 2), 224B, and 200-CR-1	• Potential waste with TRU constituents greater than 100 nCi/g is generated during cleanup/closure actions at these OUs and facilities. • Future CERCLA cleanup actions. • Only summary presented in this PMP (Sections 7.3 and 7.4, and Appendix E).
100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-NR-1, 100-IU-2, 100-IU-6, 100-KR-1, 100-KR-2, 100-HR-1, 100-HR-2, 200-CW-1, 200-CW-3, 200-CW-5, 200-PW-3, and 200-CB-1	• No waste with TRU constituents greater than 100 nCi/g is expected to be generated during CERCLA cleanup actions at these OUs. • Not addressed in this PMP.
200-BP-5, 200-PO-1, 100-NR-2, 100-FR-3, 100-KR-4, 100-HR-3, and 100-FF-5, 200-UP-1, and 200-ZP-1	• No waste with TRU constituents greater than 100 nCi/g is expected to be generated during CERCLA cleanup actions at these groundwater OUs. • Not addressed in this PMP.
WMA Series	• Tank farm WMAs are covered under the M-045 Milestone series. • Not addressed in this PMP.

CERCLA= *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
OU = operable unit
PMP = project management plan
PUREX = Plutonium Uranium Extraction (Plant)
ROD = record of decision
TRU = transuranic
WMA = waste management area

7.1 Status of Approved CERCLA Cleanup Actions Generating TRU and TRUM Waste

DOE is currently implementing several major CERCLA cleanup actions on the Hanford Site in accordance with approved RODs and action memoranda that have or are projected to generate TRU or TRUM waste. Table 7-2 presents the forecast volumes of these cleanup actions that were provided from the projects in HNF-EP-0918, *Solid Waste Integrated Forecast Technical (SWIFT) Report FY2015 - FY2050, 2015.0*, and represents a forecast subject to time changes. The following subsections discuss these cleanup actions.

Table 7-2. TRU and TRUM Waste Forecast from CERCLA Cleanup Actions

Generator	FY 2016		FY 2017		FY 2018 – FY 2037		Total	
	CH	RH	CH	RH	CH	RH	CH	RH
PFP[a]	1,040		408				1,448	0
100 K[a]		29					0	29
618-10/11[a]	108			208			108	208
200-PW-1, 200-PW-6 OUs[a]					6,581		6,581	0

a. Projected volumes (m^3) are from the Solid Waste Information and Tracking System.

CH = contact-handled
FY = fiscal year
OU = operable unit
PFP = Plutonium Finishing Plant
RH = remote-handled

7.1.1 Plutonium Finishing Plant

PFP represented the end of the process associated with plutonium production at the Hanford Site. PFP is a complex consisting of multiple buildings. Ultimately, DOE will decontaminate and demolish all of these structures as Hanford Site cleanup continues. The long-term goal for PFP is to bring it down to slab-on-grade, which means that the buildings are all to be decontaminated and demolished, debris will removed, and only concrete floors of the various structures will be left. DOE is performing PFP decontamination and decommissioning in accordance with DOE/RL-2005-13, *Action Memorandum for the Plutonium Finishing Plant Above-Grade Structures Non-Time Critical Removal Action.*

Removal of plutonium-contaminated process equipment continued as a top priority in readying the PFP Complex for demolition, with a particular focus on removal of glove boxes and associated piping and ductwork. TRU waste continues to be transferred from PFP to WRAP/CWC for future certification and shipment to WIPP. DOE is utilizing existing capabilities to disposition the TRU waste generated during the slab-on-grade activities. DOE continues with the use of standard large box-2 containers; these reduce the amount of in situ size reduction of large items such as glove boxes, piping, and ductwork to be able to be placed directly into a WIPP-compliant container. It is expected that the remaining waste will be packaged in WIPP-certifiable containers at the point of generation, and no new capabilities will be required.

7.1.2 100 K Basin

According to the 100-K ROD Amendment (EPA, 2005, *Amendment to the Interim Remedial Action Record of Decision for the 100 K Area K Basins*), the sludge will be treated, packaged for disposal, interim stored pending shipment, and shipped to a national repository for disposal. Sludge from the 105-KW Basin originated primarily from the 105-KE Basin floor and pits, fuel canisters, and fuel washing. DOE plans to package the sludge into transport casks, transfer them to T Plant, and place them into interim storage until a new treatment and packaging facility is available. K Basin remediation is being performed in accordance with the 100-K ROD Amendment (EPA, 2005).

DOE has completed the technology evaluation report and has selected warm water oxidation as the technical baseline for sludge treatment with size reduction and Fenton's Reagent processes as potential enhancements. When funding allows, DOE will pursue a treatment and packaging siting study. One of

the first activities will be establishment of the siting criteria to be utilized for the overall siting study. The technical approach being taken by the project (e.g., the scope of the siting study), and the decision process being used, will be reviewed. The design of the treatment and packaging system is not mature enough to determine whether the solidification and packaging system could be used for packaging of other RH-TRU/TRUM sludge (e.g., U Plant Tank D-10 contents).

During K Basin cleanup, an estimated 10 m^3 (353 ft^3) filter media (sand, garnet) with TRU constituents greater than 100 nCi/g may also be generated.

7.1.3 U Plant

TRUM waste generated during the CERCLA cleanup actions at U Plant is a tank heel. During FY 2011, DOE removed Tank D-10, located in Cell 30 of the 221-U Facility, from the canyon and transferred it to CWC for interim storage until capability is available to repackage the waste in a WIPP-certifiable container, as described in DOE/RL-2010-106, *90% Design Remedial Design Report Addendum for the Disposition of Tank D-10 from Cell 30 within the 221-U Plant Canyon Facility*. The tank heel contains approximately 1,893 L (500 gal) of solid and liquid that has been designated as RH-TRUM waste. U Plant decontamination and decommissioning is being performed in accordance with Ecology et al., 2005, *Record of Decision 221-U Facility (Canyon Disposition Initiative) Hanford Site, Washington.*

DOE will disposition the Tank D-10 heel with the future large-package/RH capability. There is a possibility that the tank heel could be dispositioned at the same future facility used to disposition the K Basin sludge; however, design of this treatment and packaging system is not mature enough to determine whether the solidification and packaging system could be used for packaging of other RH-TRUM sludge.

7.1.4 618-10 and 618-11 Burial Grounds (300-FF-2)

Two of the most challenging CERCLA cleanup actions at the Hanford Site will be the 618-10 and 618-11 Burial Grounds, which are part of the 300-FF-2 OU. Incomplete operational records and history associated with past waste disposal practices of the 300 Area waste streams complicate these actions. The burial grounds contain waste that was generated by the 300 Area of the Hanford Site which was used for developing and manufacturing reactor fuel and conducting laboratory research during the Hanford Site's plutonium production mission.

TRU wastes were disposed in trenches, as well as vertical pipe units and caissons. The vertical pipe units were constructed by welding three to five bottomless drums together and were buried vertically about 3 m (10 ft) apart. The caissons were constructed of galvanized corrugated metal pipe (3 m [10 ft] high, 2.4 m [8 ft] diameter) and buried approximately 4.6 m (15 ft) underground. DOE is performing the 618-10 and 618-11 Burial Ground remediation in accordance with EPA/ROD/R10-01/119, *EPA Superfund Record of Decision: Hanford 300-Area, Benton County, Washington.*

DOE has begun remediation of the 618-10 Burial Ground. Equipment at WRAP will be utilized for the characterization of the waste containers removed from the 618-10 Burial Ground. Initially, the WRAP high-energy NDE equipment can be used to penetrate the approximately 100 concrete-lined drums being removed to determine whether liquids are present. Existing WRAP procedures will be used to manage the drums at WRAP compliantly. DOE has also begun the vertical pipe unit remediation and is exploring options for removing the caissons, which will present more of a challenge. The TRU/TRUM waste will be sent to CWC for interim storage prior to disposition at WIPP. The expectation is that the waste coming out of the caissons will be RH-TRU/TRUM waste. DOE will continue to explore integration of TRU/TRUM waste disposition activities.

7.1.5 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 OUs

The ROD for the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 OUs (EPA et al., 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*) was signed by the Tri-Parties in October 2011. The selected remedy of these OUs addresses soils and subsurface disposal structures, two settling tanks, and associated pipelines contaminated primarily with plutonium and cesium. The amount of waste disposed of is a limiting factor because the plutonium waste generated at the 200-PW-1 and 200-PW-6 OU waste sites are expected to include TRU waste that will be disposed of at WIPP, which has limited capacity.

From 1943 to 1990, the primary mission of the Hanford Site was the production of nuclear materials for national defense. Operations at the Hanford Site included nuclear fuel manufacturing, reactor operations, fuel reprocessing, chemical separation, plutonium and uranium recovery, processing of fission products, and waste partitioning. Large volumes of liquid wastes were generated from the processing of plutonium at various facilities in the 200 Area. This process wastewater was discharged to waste sites in the 200-PW-1, 200-PW-3, and 200-PW-6 OUs. The processes were intended to recover as much plutonium as possible prior to discharge of the waste liquids, but the waste streams still contained low levels of plutonium and other contaminants. Cooling water and steam condensate were discharged to the 200-CW-5 OU waste sites. The cooling waste and steam condensate systems were designed to isolate those systems from potential contamination sources but, occasionally, became contaminated because of minor leaks due to corrosion pinholes or cracks and process upsets. The liquid waste that contained low levels of plutonium and other contaminants discharged to the waste sites in these OUs infiltrated into the ground and contaminated the underlying soil. Over time, this facilitated the accumulation of contaminants to form localized areas of concentrated contaminants.

Removal, treatment (as needed), and disposal (RTD) of soil and debris to the specified depths or specified cleanup levels will be used to address plutonium-contaminated soils and subsurface structures and debris. This consists of: (1) removing a portion of the contaminated soil, structures, and debris; (2) treating these removed wastes as required to meet disposal requirements at ERDF or waste acceptance criteria for offsite disposal at WIPP, and (3) disposal at ERDF or WIPP. The selected pipelines associated with these OUs will also be excavated and disposed at ERDF. Cleanup levels have been selected that are protective of groundwater and the current and reasonably expected future industrial land use.

- Three 200-PW-1 OU waste sites (216-Z-1A, 216-Z-9, and 216-Z-18), also known as the High-Salt Waste Group, will use the RTD approach to excavate contaminated soils and debris located to a minimum of 0.6 m (2 ft) below the bottom of the disposal structure, with disposal at ERDF or WIPP, as appropriate. After the excavations are filled, an evapotranspiration barrier will be constructed over the remaining waste in these waste sites.

- The 200-PW-6 OU and four 200-PW-1 OU waste sites (216-Z-5, 216-Z-1&2, 216-Z-3, and 216-Z-12), also known as the Low-Salt Waste Group, will use the RTD approach to excavate contaminated soils and debris to a depth of 6.7 to 10 m (22 to 33 ft) below ground surface, with disposal at ERDF or WIPP, as appropriate. After excavations are filled, an evapotranspiration barrier will be constructed over the remaining waste in these waste sites.

Conceptually, the RTD approach consists of the following steps: (1) remove and stockpile clean overburden for use in backfilling; (2) remove contaminated soils and debris using conventional excavation technology, and place in waste containers; (3) dispose waste at ERDF or WIPP; (4) backfill excavation with clean fill and compact; and (5) construct an evapotranspiration barrier as necessary, and replant surface with native vegetation.

The 241-Z-361 Settling Tank is an underground, reinforced-concrete structure with a 0.95 cm (3/8 in.) steel liner. The tank has inside dimensions of 7.9 m (26 ft) long and 4 m (13 ft) wide. The bottom slopes, resulting in an internal height variation between 5.2 and 5.5 m (17 and 18 ft). The top of the tank is 0.6 m (2 ft) below grade. The tank served as the primary solids settling tank for low-salt liquid from PFP from 1949 to 1973, and then was taken out of service in May 1973, when discharge of contaminated waste streams to the ground from PFP was discontinued as a matter of policy. All available information indicates that the settling tank has not leaked.

The 241-Z-8 Settling Tank is a cylindrical tank that is 12.1 m (40 ft) long and 2.4 m (8 ft) in diameter. It is constructed of steel or wrought iron plate and oriented horizontally at about 1.8 m (6 ft) below grade. The tank was in service from 1955 to 1962, receiving pH neutral effluent waste from back flushes of the PFP feed filters.

The sludge removal and tank stabilization of the two settling tanks require the following:

- Removal of sludge from the tanks to the extent necessary to facilitate removal of the tanks.
- Packaging of the sludge to meet waste disposal criteria for disposal at WIPP.
- Screening of waste in container to confirm it meets the requirements for disposal at WIPP. Waste in containers that do not meet WIPP disposal criteria will be treated if necessary and sent to ERDF for disposal.
- It is expected that the tanks will be removed, and the excavation areas will be sampled in accordance with the SAP, backfilled, and revegetated. The sludge and tank debris are expected to be TRU waste.

Associated pipelines covered under the 200-PW-1 and 200-PW-6 OUs are expected to be TRUM and will be shipped to WIPP for disposal. The pipelines are constructed of various materials, primarily stainless steel or vitrified clay.

An estimated 6,581 m^3 (232,405 ft^3) of TRU/TRUM soil/rock/gravel waste is anticipated to be generated during the RTD of these OUs, and an estimated 140 m^3 (4,944 ft^3) of TRU/TRUM sludge is anticipated to be generated from the two settling tanks. It is expected that any TRU/TRUM waste generated during the remediation of the 200-CW-5, 200-PW-1, and 200-PW-6 OUs will be packaged in WIPP-certifiable containers at the point of generation, and no new capabilities will be required.

7.2 CERCLA TRU and TRUM Shipments to WIPP

WIPP has been unable to receive TRUM waste since the radiological incident that occurred on February 14, 2014. At this time, it is too soon to speculate on when receipt operations will recommence, but it is known that the National TRU Program has prioritized removal of waste from a number other sites within the DOE Complex ahead of the Hanford Site. It is projected that shipments of CERCLA TRU and TRUM waste to WIPP will not begin until after FY 2030.

7.3 Status of Future CERCLA Cleanup Decisions with the Potential to Generate TRU and TRUM Waste

Table E-1 in Appendix E describes the OUs and facilities with the potential to generate waste with TRU constituents greater than 100 nCi/g during CERCLA cleanup actions. To date, no regulatory cleanup decisions have been made for these OUs. A range of plausible alternatives and reasonable

upper-bound cleanup volumes have been estimated. Completion schedules will be established with the CERCLA remedial action work plans. Table E-1 in Appendix E gives the waste unit name, waste type, estimated volume, and schedule. The volume projections are based on currently available information and will be updated as the CERCLA process for a given OU progresses. The sources of the estimated volumes are referenced in the table.

Although a significant volume of material with TRU constituents greater than 100 nCi/g has been identified, the majority of the CERCLA decisions have not been made regarding cleanup. This results in a significant level of uncertainty regarding the remedy selection and potential volumes and time of TRU/TRUM waste generation.

7.4 Summary of Disposition Approaches per Waste Form

The form of waste with the potential for TRU constituents greater than 100 nCi/g generated during CERCLA cleanup actions fall into three general categories: (1) soil/gravel/rock, (2) debris, and (3) sludge. The following subsections outline the waste disposition approach of each of these categories.

7.4.1 Soil, Gravel, and Rock

During the CERCLA cleanup actions of contaminated cribs, trenches, and tile fields, an upper-bound estimate of 4,170 m^3 (147,262 ft^3) of soil/gravel/rock waste could be generated that has a potential to have TRU constituents greater than 100 nCi/g. This estimated volume is based on current available data and is dependent on the area and depth of soil excavated in accordance with the CERCLA RODs. It is expected that this waste would be packaged in WIPP-certifiable containers at the point of generation.

Cleanup actions could include: (1) removal and stockpiling of clean overburden for use in backfilling once the contaminated area has been removed; (2) removal of contaminated soil/gravel/rock using conventional excavation technology and placement into WIPP-certifiable containers (SWB or drums); and (3) assay of containers to determine whether they are TRUM waste or LLW/MLLW. The TRUM waste containers will be certified by CCP and shipped to WIPP, and the LLW/MLLW containers will be shipped to ERDF. Specific cleanup actions are as follows:

1. Remove and stockpile clean overburden for use in backfilling.
2. Remove contaminated solids and debris, and place in waste containers.
3. Haul waste containers to assay/screening station and then to ERDF or WIPP for disposal.
4. Backfill excavation with clean fill, and compact.
5. Construct ET barrier as necessary, and replant surface with native vegetation.

7.4.2 Debris

During the CERCLA cleanup actions of facilities and burial grounds, an upper-bound estimate of 36,500 m^3 (1,288,985 ft^3) of contaminated debris waste could be generated that has the potential to have TRU constituents greater than 100 nCi/g. The majority of debris waste generated during the cleanup actions at facilities would be packaged into WIPP-certifiable containers at the point of generation.

There may be occasions that waste cannot be repackaged into WIPP-certifiable containers. Waste in this category could include a portion of the 34,510 m^3 (1,218,709 ft^3) of debris waste potentially removed from the 200-SW-2 Landfills.

7.4.3 Sludge

During the CERCLA cleanup actions of facilities, an estimated 280 m^3 (9,888 ft^3) of sludge waste could be generated that has a potential to have TRU constituents greater than 100 nCi/g. Typically, sludge

removal from tanks would employ a power fluidics system to loosen and homogenize the sludge and transfer to WIPP certifiable drums or SWBs at the point of generation. Material (e.g., cement or absorbents) would be added to the SWB to absorb residual liquid and stabilize the sludge. These waste containers would be certified by CCP and shipped to WIPP.

8 Project Control Elements

The sections in this chapter identify DOE project control elements for the planning, managing, and performance reporting necessary to complete the M-091 Milestone work scope. These project control elements are consistent with DOE O 413.3B and related project management activities.

8.1 Funding Profile and Project Work Breakdown Structure

The funding profile to support activities necessary to complete the M-091 Milestone series is given in Figure 8-1. This funding profile is based on the FY 2016 through FY 2018 Plateau Remediation Contract baseline. Funding for FY 2019 through FY 2030 is based on the Hanford Lifecycle Scope, Schedule, and Cost Report, under M-036-01, which reflects all of those actions necessary for DOE to meet all applicable environmental obligations including those under the TPA (Ecology et al., 1989a). The funding profile has also been adjusted to accommodate the recent change package (M-91-15-01) for the M-091 series milestones. The funding profile does not include the funding necessary to support the CERCLA cleanup actions discussed in Chapter 7.

Work that is part of this PMP is broken down into discrete, defined units of scope. DOE uses this breakdown for planning, estimating, and scheduling the performance of work. This breakdown, known as the work breakdown structure (WBS), is developed to organize, define, and display work required to complete a project. The specific WBS element numbers and descriptions are as follows.

WBS 013.01 Project Management—This scope includes overall project management, safety, health, and quality technical support, and oversight to support implementation of key programs such as the Integrated Safety Management System, Corrective Action Management, Occurrence Reporting, and Quality Assurance Program. This scope also includes preparing the necessary deliverables under M-091-51, M-091-52-and M-091-53 in managing the projects necessary to implement the capabilities to accomplish the M-091 work scope. In addition, this WBS provides support staff for the overall project including waste support services to Hanford Site generators, human relations, buyer/procurement staff, and project controls (e.g., schedulers/cost analysts). Technical support includes environmental and nuclear/criticality safety engineering to support development and implementation of regulatory permits, safety bases, procedure reviews, hazard analysis generation, and criticality safety evaluation report development.

Strategic planning and integration is another critical scope element that provides onsite interface between DOE contractors and subcontractors to ensure that mission needs are met. Also included in this scope is the maintenance of the transportation and packaging program, in accordance with applicable requirements for onsite and offsite shipments of regulated waste and materials and nonregulated materials.

WBS 013.04 MLLW Treatment—This scope provides for MLLW treatment under Milestone M-091-47. Processing includes thermal and nonthermal treatment. Activities consist of managing offsite commercial MLLW treatment/disposal contracts, shipping MLLW packages that have been determined to be LDR compliant to the MWTs or ERDF for disposal, and treatment of selected waste containers.

WBS 013.05 TRU Retrieval—This scope provides for retrieval of suspect TRU waste from the LLBGs (218-W-3A, 218-W-4C, 218-W-4B, and 218-E-12B) under Milestone M-091-49. Included is potential redeployment of the trench face retrieval and characterization system, and any new capabilities necessary for the retrieval of the remaining RSW including the caisson RH-RSW. Any new capabilities will be identified under Milestones M-091-51, M-091-52, and M-091-53. Retrieval consists of the following activities:

- Removing soil over RSW containers within the trenches

WBS - Scope	Lifecycle Cost	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
013.01 - Project Management - PBS RL-13	300,553	16,938	16,435	17,036	24,886	26,102	27,284	28,863	29,446	30,612	32,914	20,776	9,136	9,631	9,998	10,494
013.04 - Mixed Low Level Waste Treatment	5,304	-	-	-	-	-	-	483	491	511	549	589	623	653	686	719
013.05 - TRU Retrieval	264,289	-	-	-	-	-	-	-	-	31,968	60,350	61,500	98,987	11,484	-	-
013.06 - TRU Repackaging	647,296	20,000	20,460	20,920	21,380	28,392	28,990	29,588	30,186	30,784	31,382	75,030	76,433	77,836	79,239	76,676
013.07 - Waste Receiving and Processing Facility (WRAP)	98,321	4,831	4,948	3,472	3,473	3,630	2,753	5,690	8,127	8,288	8,449	8,610	8,771	8,932	9,093	9,254
013.08 - T-Plant	799,311	16,691	18,373	16,189	18,173	37,128	44,600	45,520	142,803	146,816	161,738	68,880	20,048	20,416	20,784	21,152
013.09 - Central Waste Complex	167,164	12,695	10,729	11,298	12,701	12,535	13,412	13,410	13,495	14,065	7,511	8,552	8,525	8,945	9,420	9,871
013.10 - Environmental Restoration Disposal Facility (ERDF)	37,439	-	-	-	3	1	1	145	145	152	163	13,921	8,191	8,584	5,920	213
013.12 - Integrated Disposal Facility	103,672	1,111	352	360	464	503	526	4,022	4,098	7,244	22,368	38,867	7,197	5,408	5,699	5,917
013.15 - TRU Disposition	218,184	-	-	-	-	-	-	-	-	11,840	12,070	31,980	37,590	40,832	41,568	42,304
013.21 - Mixed Waste Disposal Trenches	5,337	594	607	620	574	603	597	569	581	592	-	-	-	-	-	-
Total	2,646,870	72,860	71,904	69,895	81,190	108,894	118,163	128,290	229,372	282,872	337,494	328,705	275,501	192,721	172,409	176,600

dollars in $000s
*See Appendix D, Table D-4, for the basis of this figure.

Figure 8-1. RL-0013 Annual Funding Profile

- Removing the RSW containers from the trenches
- Assaying containers and venting containers as required
- Designating waste
- Shipping containers to the appropriate TSD facility
- Sampling of the LLBG trench substrate

WBS 013.06 TRU Repackaging—This scope provides repackaging of TRU/TRUM waste at WRAP, T Plant, commercial facility (i.e., Perma-Fix Northwest) and new onsite capability for TRU/TRUM waste such that it can be processed to meet the WIPP waste acceptance criteria. Any new capabilities necessary for repackaging TRUM waste will be identified under Milestones M-091-51, M-091-52, and M-091-53.

WBS 013.07 WRAP—This scope provides activities for the safe operation of WRAP and maintaining WRAP in a dormant condition until it is required to support TRU waste repackaging.

WBS 013.08 T Plant—This scope provides activities for the safe operation of T Plant and maintaining T Plant in a minimum safe condition until it is required to support TRU waste repackaging.

WBS 013.09 CWC/LLBGs—This scope provides for the safe operation of CWC and maintaining CWC in a ready-to-serve condition and the safe operation of LLBGs.

The LLBGs contain two lined MWTs (218-W-5 LLBG, Trenches 31 and 34) that are within the boundaries of the LLBGs. Operations and maintenance of these trenches is included in WBS 013.21.

WBS 013.10 ERDF—This scope provides activities for the safe operation of ERDF and to support ERDF expansion, construction of interim covers, and long-term stewardship (leachate management and monitoring).

WBS 013.12 IDF—This scope provides for a minimum level of required maintenance of the facility prior to initiation of operations and operational startup activities.

WBS 013.15 TRU Disposition—This scope includes support to CCP certification activities and shipment of TRU waste to WIPP. It is expected that CCP will provide the capability to load/ship M-091 waste to WIPP.

WBS 013.21 Mixed Waste Trenches—This scope provides activities for the safe operation of the MWTs and maintaining the MWTs in a ready-to-serve condition.

8.2 Project Schedule and Critical Path Analysis

Appendix F presents the M-091 Milestone series logic-tied lifecycle schedule. The following tasks are included on the schedule:

- Acquisition of new capabilities to retrieve the remaining RSW including the alpha caisson RH-RSW, treat/process the remaining waste, and load RH casks for shipment to WIPP (Milestones M-091-51, M-091-52, M-091-53). Within DOE, capital asset projects are required to follow the requirements of DOE O 413.3B. The phases of a typical project include: initiation definition, design construction and operations. A Critical Decision (CD) review and approval is required by DOE before proceeding to the next phase of the project.

- Retrieval of RSW (Milestone M-091-49) will generate CH and RH wastes in a variety of packages, which feed into the treatment and processing of MLLW and TRUM waste. Delay in retrieval of RSW will cause a delay in subsequent milestones.
- Generation of certifiable TRUM waste and treatment/processing of MLLW is covered under Milestone M-091-47. Waste for treatment and processing is from the RSW retrieval operations and waste in storage.
- The certification and shipment of TRUM waste (Milestones M-091-48). Waste for processing is from the RSW retrieval operations and waste in above ground storage.

8.3 Project Constraints

The following subsections identify constraints and uncertainties associated with the ability to accomplish the M-091 Milestone work scope.

8.3.1 Budget

The schedule of activities presented in this PMP is based on the assumption that funding levels are available as given in Figure 8-1 and that the ROM values are adequate for the identified scope. To accomplish the work scope under the M-091 Milestones additional capabilities are necessary (see Chapter 2). Funding for new capabilities must be authorized and appropriated by Congress. An acquisition strategy will be developed under Milestones M-091-51, M-091-52 and M-091-53. As the strategy matures, there is a risk that the current budget profile will not meet the budget levels or schedule necessary to implement the new capabilities required to accomplish the M-091 Milestone work scope by the end of FY 2030.

8.3.2 Delay in Retrieval Operations

Retrieval of RSW supplies the inventory to the MLLW treatment and TRUM waste repackage/shipment milestones. Failure to meet the schedule for these milestones is likely if retrieval is delayed. Once funding is available, a recovery schedule will be established.

8.3.3 New Capabilities under M-091-51, M-091-52, and M-091-53

Current technologies and processing methods are not adequate to retrieve and process the alpha caisson RH-RSW, process all of the CH-TRUM and RH-TRUM wastes, or load waste into the RH-72B cask for shipment of RH-TRUM waste to WIPP. An engineering alternative analysis is underway in FY 2016 to identify capabilities necessary to complete the M-091 Milestone series (see Chapter 2).

8.3.4 Higher Contamination Levels than Expected

There is a risk that RSW retrieval operations will be impacted by higher-than-expected contamination levels, container degradation, or container location. RSW retrieval is moving into the higher-risk trenches where waste records may be less complete, and waste packaging may be more degraded than encountered to date. Although retrieval planning considers the most likely waste contamination/exposure scenario in developing the retrieval approach, there is a possibility that contamination levels (radiological or chemical) may be greater than expected, or that container degradation may be more significant than expected, requiring in-trench overpacking prior to retrieval. There is also a risk that some containers will be buried at depths that require trench shoring during retrieval. These retrieval complexities would result in schedule impacts.

8.3.5 Increase in RSW Volume

There is a risk that RSW retrieval operations encountering waste that is either not identified in records or is comingled with non-RSW due to inaccurate records or soil contamination. Based on inspections of

previously excavated waste containers in the trenches and handling the waste at the point of generation, the volume of waste to be retrieved is uncertain. Inability to identify the specific containers may result in the retrieval of increased volumes of waste before determining that the RSW waste sought has been retrieved. The volumes and characteristics of RSW waste to be processed are based upon existing records.

8.3.6 Increase in Volume of TRUM Waste to Be Shipped to WIPP

There is a risk that volumes could increase if smaller quantities of waste must be placed into the waste packages to meet WIPP requirements. Additional size reduction, as an example, increases the amount of processing time and increases the number of shipments to WIPP. The WIPP acceptance criteria allows for a limited number of waste packages that exceed a surface contact radiological activity of 100 R/hr. Much of the RH-RSW waste that will be generated as part of the alpha caisson retrieval could exceed the 100 R/hr activity limit. This would result in the need for additional size reduction and separation into separate waste containers or incorporation of shielding into the waste package, thus increasing the total number of RH-TRUM packages and, consequently increasing the number and duration of shipments to WIPP. An increase in the number of shipments would result in the inability to ship all of the M-091 RH-TRUM waste to WIPP by the end of FY 2030.

8.3.7 Final Certification and Shipment

Final certification and shipment of TRUM waste to WIPP is dependent on support from CCP and WIPP. CCP has been contracted by CBFO to characterize and certify TRU waste packaged at the Hanford Site. Shipments to WIPP are dependent upon a number of factors, including the restart of WIPP to accept waste, the availability of shipping casks, overall shipping priorities established by CBFO, timely WIPP approvals of new waste forms, and the availability of CCP resources to certify wastes. These factors could impact the ability to meet planned shipping schedules and cause prolonged storage at CWC.

8.4 Key Deliverables/Products

Key deliverables/products that will be developed in support of the M-091 work scope include the submittal of annual revisions of this PMP on June 30 each year until the M-091 Milestones are completed. The PMP will include the funding profile, which includes a lifecycle projection of annual funding required to accomplish project scope in accordance with the top-level WBS and schedule (Figure 8-1). The PMP will detail project objectives, work schedules, expected outputs, integration with other programs and projects, and project management alternatives consistent with established agreements and other project constraints.

8.5 Performance Measurement

DOE conducts a performance measurement of the M-091 Milestones to provide an objective assessment of work accomplishments and progress against the baseline plan (scope, schedule, and budget) to manage the baseline effectively and to provide data for management decision making and reporting. The project performance is measured by comparing the amount of work planned with actual accomplishments and costs to determine whether cost and schedule performance is consistent with the baseline plan. DOE monitors the project performance monthly by comparing the budgeted cost of work schedule to actual work performed and the cost of that work.

8.6 Project Interface Control

DOE controls project interfaces through contract requirements, statements of work, interface control documents, and/or memoranda of agreement/understanding. These documents define the interface and/or service, roles and responsibilities, accountabilities, and authorities.

Interface among the M-091-00 Milestone TRUM waste and MLLW activities and other projects, including waste generating programs for inventory tracking and capacity configuration purposes, is essential for successful project execution. The following waste activities, projects, facilities, and organizations require integration for successful project execution:

- CH2M HILL Plateau Remediation Company
- Mission Support Alliance, LLC
- Hanford Site waste generators of TRU/TRUM waste
- CCP and WIPP
- MWTs 31 and 34
- WRAP
- T Plant
- CWC
- RSW retrieval
- ERDF
- Commercial processing facilities

All Hanford Site generators of TRU solid waste that is destined for disposal at WIPP are required to meet the requirements of HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*. The requirements include the responsibility of the generator to provide TRU waste that is WIPP certifiable and acceptable knowledge to support waste certification at the point of generation.

For TRU waste that cannot be packaged into WIPP-certifiable containers at the point of generation, the future large-container CH-TRUM and RH-TRUM capability being acquired under the M-091 scope could be used to repackage this waste, along with WRAP, T Plant, or commercial facilities. At this time, it is assumed that TRU waste generated during Hanford Site cleanup activities (e.g., 618-10/11 and PFP) will be compliantly packaged at the point of generation. If, at the time of conceptual design for the future capability under M-091, this is not the case, the scope of the new capability may be expanded to accommodate the repackaging of other TRU waste beyond M-091 scope.

The annual site wide solid waste forecast includes Hanford Site generator TRU/TRUM waste projections. At this time, no impacts to the M-091 work scope are anticipated as a result of the additional volume of CERCLA TRU/TRUM waste to be certified and shipped to WIPP. Potential impacts are evaluated as waste volume projections are updated.

8.7 Reporting

TPA reporting requirements are described in Chapter 4, "Agreement Management," of the TPA (Ecology et al., 1989a). The primary interface for reporting and notification is from DOE Project Managers to their regulatory counterparts or through the Interagency Management and Integration Team. DOE typically provides a status on the M-091 Milestones to the Ecology Project Manager on a monthly basis, which is documented in the AR. In addition, monthly M-091 Milestone Project Manager Meetings are held. The roles and responsibilities for the Project Manager and the Integration Team are contained in TPA Sections 4.1 and 4.2, respectively (Ecology et al., 1989a).

8.8 Change Management

TPA (Ecology et al., 1989a) and baseline change management are discussed in the following subsections.

8.8.1 TPA Change Management

TPA (Ecology et al., 1989a) change management is described in the TPA Action Plan, Section 12.0, "Changes to the Agreement" (Ecology et al., 1989b). The appropriate authority level for approval of a change is based on the content of the change. All changes will be processed using the change control form provided in Section 12.3.1, "Change Control Form," of the TPA Action Plan (Ecology et al., 1989b).

Changes to the M-091 Milestone PMP will be in accordance with the TPA Action Plan, Section 9.0, "Documentation and Records," and Section 9.3, "Document Revision" (Ecology et al., 1989b). Changes will be documented in the AR. Changes or revisions to the PMP may also result in the need to modify TPA milestones. Such changes are subject to the requirements of Section 12.0, "Changes to the Agreement," of the TPA Action Plan (Ecology et al., 1989b).

DOE will submit revisions to this PMP as required by the M-091 Milestones. The PMP revision will include DOE plans and schedules for addressing all requirements set forth in the M-091 Milestone series. Each revision of the M-091-03 Milestone PMP will, after approval by Ecology, supersede previous M-091-03 Milestone PMPs.

DOE will submit the PMP revision to Ecology for review and approval as primary documents pursuant to the TPA Action Plan, Section 9.2.1 (Ecology et al., 1989b). DOE will implement the PMP, as approved.

8.8.2 Baseline Change Management

DOE maintains a contract budget log under configuration control and management that reconciles to the current contract target costs. Changes are controlled and formally reviewed and approved. DOE requires the contractor to maintain a baseline change process that is approved by DOE.

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9 References

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Appendix A

Glossary

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Terms

DOT	U.S. Department of Transportation
LLW	low-level waste
MLLW	mixed low-level waste
RSW	retrievably stored waste
SLB2	standard large box 2
SWB	standard waste box
SWIFT	Solid Waste Integrated Forecast
SWITS	Solid Waste Information and Tracking System
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TRUM	transuranic mixed
WIPP	Waste Isolation Pilot Plant

A1 Glossary

Specialized words used in the waste management plan are defined in this appendix.

Caissons, as used within the M-091 Milestone series (Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order Action Plan*), are the four caissons containing retrievably stored waste (RSW) in the 218-W-4B Burial Ground.

Certification, as used within the M-091 Milestone series, is defined as follows:

- All activities necessary for waste to be packaged, in order to meet the Waste Isolation Pilot Plant (WIPP) acceptance criteria, are completed. The volume of waste certified is the volume of waste given to the Central Characterization Project for certification verification. If subsequent WIPP certification reveals that the waste cannot be shipped to WIPP, this waste will not count toward meeting the milestone volume requirements (and will be subtracted from meeting such requirements) until such time as it has been determined to meet the WIPP waste acceptance criteria.
- The transuranic mixed (TRUM) waste has been shipped to Idaho, which may also count toward certification based upon actual shipment to Idaho and contingent upon the waste not returning to Hanford Site.
- The waste has been treated to meet land disposal restriction treatment standards.

Contact-Handled waste is a waste container with a surface dose rate less than or equal to 200 mrem/h.

Designation is the process of determining whether a waste is regulated under the dangerous waste lists (WAC 173-303-080, "Dangerous Waste Regulations," "Dangerous Waste Lists," through 173-303-082, "Dangerous Waste Sources"), characteristics (WAC 173-303-090, "Dangerous Waste Characteristics"), or criteria (WAC 173-303-100, "Dangerous Waste Criteria"). The process for designating wastes is described in WAC 173-303-070, "Designation of Dangerous Waste." Waste that has been designated as dangerous may be either dangerous waste or extremely hazardous waste. These regulations allow the use of acceptable knowledge, surrogate sampling, and other measures for designation to minimize radiation exposure to workers and to reduce costs.

Low-Level Waste (LLW) is defined as radioactive waste that is not spent fuel, high-level waste, transuranic (TRU) waste, byproduct material, or naturally occurring radioactive material.

Mixed Waste is a waste that contains a nonradioactive hazardous component and, as defined by 10 CFR 20.1003, "Standards for Protection Against Radiation," "Definitions," source, special nuclear material, or byproduct material subject to the *Atomic Energy Act of 1954*.

Retrievably Stored Waste (RSW), as used within the M-091 Milestone series, is or was believed to meet the TRU waste criteria when it was placed in the 218-W-4B, 218-W-4C, 218-W-3A, and 218-E-12B Burial Ground trenches after May 6, 1970. RSW does not include waste in containers that have deteriorated to the point that they cannot be retrieved and stabilized (e.g., placed in overpacks) in a manner that would allow them to be transported and designated without posing significant risks to workers, the public, or the environment. With respect to any such containers, and with respect to any release of RSW, how to move forward will be determined through the cleanup process set forth in the *Resource Conservation and Recovery Act of 1976*; RCW 70.105, "Hazardous Waste Management;" and/or the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, as appropriate. Those processes may result in additional requirements for the remediation of such wastes.

The Atomic Energy Commission (U.S. Department of Energy predecessor agency) initially defined TRU waste as "waste with known or detectable contamination of transuranium nuclides." In March 1970, the Atomic Energy Commission directed field sites to segregate TRU waste and place it in retrievable storage that would allow the waste to be retrieved within 20 years. Before this date, this waste was disposed as LLW.

In 1973, the TRU waste segregation limit was established at 10 nCi/g of TRU isotopes. In 1982, the limit was changed to 100 nCi/g. This limit was enacted by Congress in 1992. Because of the changing definition of TRU waste, waste generated and stored between 1970 and 1982 could contain less than the current threshold of 100 nCi/g for defining TRU waste. This waste has been termed suspect TRU waste because some of it will be designated as LLW following radiological characterization.

Remote-Handled (RH) waste is a waste container with a surface dose rate greater than 200 mrem/h. The RH waste volumes are based on the sum of all containers listed in Solid Waste Information and Tracking System (SWITS) with a cumulative contact dose rate greater than 200 mrem/h, and/or have a SWITS shielding code of lead, steel, or concrete, and/or coded in SWITS as RH.

Small and Large Containers have different meanings, depending on whether they are used in reference to mixed low-level waste (MLLW) or TRUM waste. When referring to MLLW, small containers are less than 10 m^3 (353.2 ft^2), including 208.2 L (55 gal) drums. When referring to TRUM waste, small containers are 208.2 L (55 gal) drums or small containers, even if overpacked in 321.75 L (85 gal) drums and WIPP standard waste boxes (SWBs). A large container is anything that is not defined as a small container, and vice versa.

Standard Large Box 2 (SLB2) is a steel rectangular container with an external width of 2.5 m (8.2 ft) and an external length of 4.3 m (14 ft). The internal cavity dimensions are 1.8 m (6 ft) wide, 2 m (6.6 ft) tall, and 2.8 m (9.2 ft) long. The SLB2 was qualified in 2004 as meeting the U.S. Department of Transportation (DOT) requirements for specification 7A Type A packaging.

Standard Waste Box (SWB) is a 1.8 m^3 (63.57 ft^3) steel container that is approximately 0.94 m (3.1 ft) in height, 1.8 m (5.9 ft) in length, and 1.4 m (4.6 ft) in width. The SWB was qualified in 1988 as meeting DOT requirements for specification 7A Type A packaging.

Solid Waste Integrated Forecast (SWIFT) database contains estimates of future waste volumes and characteristics forecast by waste-generating units. The waste generating units provide basic information that is incorporated into the SWIFT database. This forecast is updated annually and published in the SWIFT report.

Solid Waste Information and Tracking System (SWITS) is a Hanford Site database containing records of waste containers stored at Hanford and contains data (e.g., volume; container information; and radiological, physical, and dangerous waste characteristics) about each container of stored waste considered within the scope of the M-091 Milestone series. SWITS is a dynamic database that is updated frequently to reflect waste receipts, processing, and shipment volumes; as a result, data presented in this revision of the Project Management Plan may differ from previous versions.

Transuranic (TRU) waste meets the definition, in the *Waste Isolation Pilot Plant Land Withdrawal Act*, Pub. L. 102-579 (Section 2.18), of radioactive waste containing more than 100 nCi of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years.

A2 References

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Appendix B

Applicable Regulatory Requirements

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B1.3 *National Environmental Policy Act of 1969* (42 USC 4321, et seq.) B-2

B1.4 *Resource Conservation and Recovery Act of 1976* (42 USC 6901, et seq.), as Amended by the *Hazardous and Solid Waste Amendments of 1984* B-2

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B1.6 *Washington State Hazardous Waste Management Act of 1976* (RCW 70.105) B-2

B1.7 "Washington Clean Air Act" (RCW 70.94) B-3

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B2 References **B-3**

Terms

CAA	*Clean Air Act of 1990*
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	record of decision
TRU	transuranic
WDOH	Washington State Department of Health

B1 Applicable Regulatory Requirements

Mixed waste management activities will consider the requirements described in the following sections, as well as any other applicable regulations or U.S. Department of Energy (DOE) requirements.

B1.1 *National Environmental Policy Act of 1969* (42 USC 4321, et seq.)

DOE/EIS-0391, *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*, was issued in December 2012. A record of decision (ROD) has been issued (78 FR 75913, "Record of Decision for the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington").

B1.2 *Resource Conservation and Recovery Act of 1976* (42 USC 6901, et seq.), as Amended by the *Hazardous and Solid Waste Amendments of 1984*

Federal regulations, implementing the *Resource Conservation and Recovery Act of 1976* (RCRA) and RCRA corrective action, address the requirements for hazardous wastes, including treatment, storage, disposal, and transportation (40 CFR 260, "Hazardous Waste Management System: General" through 40 CFR 271, "Requirements for Authorization of State Hazardous Waste Programs").

On August 19, 1987, the U.S. Environmental Protection Agency (EPA) has authorized the Washington State Department of Ecology (Ecology) to administer the State's statute and regulations (RCW 70.105, "Hazardous Waste Management;" WAC 173-303, "Dangerous Waste Regulations"), in lieu of federal RCRA regulations.

B1.3 *Clean Air Act of 1990* (42 USC 7401, et seq.)

The Hanford Site air operating permit has been issued in accordance with Title V of the *Clean Air Act of 1990* (CAA) and is implemented through federal and state programs under 40 CFR 70, "State Operating Permit Programs," and WAC 173-401, "Operating Permit Regulation." The permit is intended to provide a compilation of applicable (CAA) requirements for both radioactive emissions and criteria/toxic emissions at the Hanford Site. Current air permitting documentation is expected to address existing mixed waste management activities. New air permitting documentation will be needed for alpha caissons retrieval, retrievably stored waste retrieval, and future large container and remote handling capabilities. Activities addressed by the Project Management Plan will be reviewed against the permitting documentation, as necessary, to ensure that mixed waste management activities are addressed.

B1.4 *Hazardous Materials Transportation Act of 1975* (49 USC 5101, et seq.)

Hazardous material transportation requirements include employee training programs; performance standards; and preparation of shipping papers to identify and track hazardous materials, design of packaging and containers, marking, and labeling. Specific requirements will be followed that relate to mixed waste management activities and the shipment mode used (i.e., rail, aircraft, vessel, and public highway). Offsite shipments of hazardous materials must comply with the implementing regulations of 49 CFR 105, "Transportation," "Hazardous Materials Program Definitions and General Procedures;" 49 CFR 106, "Rulemaking Procedures;" 49 CFR 107, "Hazardous Materials Program Procedures;" and 49 CFR 171, "General Information, Regulations, and Definitions," through 49 CFR 180, "Continuing Qualification and Maintenance of Packaging," administered by the U.S. Department of Transportation (DOT). Onsite waste movements must comply with DOE requirements, including DOE/RL-2001-36, *Hanford Sitewide Transportation Safety Document*.

B1.5 *National Environmental Policy Act of 1969* (42 USC 4321, et seq.)

DOE/EIS-0391, *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*, was issued in December 2012. A record of decision (ROD) has been issued (78 FR 75913, "Record of Decision for the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington").

B1.6 *Resource Conservation and Recovery Act of 1976* (42 USC 6901, et seq.), as Amended by the *Hazardous and Solid Waste Amendments of 1984*

Federal regulations, implementing the *Resource Conservation and Recovery Act of 1976* (RCRA) and RCRA corrective action, address the requirements for hazardous wastes, including treatment, storage, disposal, and transportation (40 CFR 260, "Hazardous Waste Management System: General" through 40 CFR 271, "Requirements for Authorization of State Hazardous Waste Programs").

On August 19, 1987, the U.S. Environmental Protection Agency (EPA) has authorized the Washington State Department of Ecology (Ecology) to administer the State's statute and regulations (RCW 70.105, "Hazardous Waste Management;" WAC 173-303, "Dangerous Waste Regulations"), in lieu of federal RCRA regulations.

B1.7 *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (42 USC 9601, et seq.)

The *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) addresses spill cleanups and hazardous substances left at past practice waste sites. DOE performs investigation and response actions for release of hazardous substances at the Hanford Site as the lead agency delegated authority under CERCLA Section 104, "Response Authorities," by Executive Order 12580, *Superfund Implementation*. In 1989, pursuant to CERCLA Section 120, "Federal Facilities," DOE executed an agreement with EPA and Ecology governing execution of CERCLA response actions and measures to bring Hanford into compliance with RCRA treatment, storage, and disposal unit and corrective action requirements. The agreement is called the Tri-Party Agreement (Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order*). Either EPA or Ecology will assume responsibility as lead regulatory agency for various response actions at the Hanford Site.

In September 2012, DOE submitted an M-016-93 implementation work plan to EPA proposing the acquisition of capabilities necessary to prepare transuranic (TRU) mixed waste generated by CERCLA cleanup actions at the Hanford Site for disposal at the Waste Isolation Pilot Plant. This work plan reflected retrieval decisions, projected waste volumes, and schedules from all CERCLA cleanup actions authorized in RODs and action memoranda at the Hanford Site. As part of the approval process for RODs and action memoranda, EPA and the DOE Richland Operations Office will obtain Ecology concurrence to ensure that wastes from CERCLA operable units for which Ecology is the lead regulatory agency, are properly planned.

B1.8 *Washington State Hazardous Waste Management Act of 1976* (RCW 70.105)

The *Washington State Hazardous Waste Management Act of 1976* authorizes Ecology to regulate the treatment, storage, disposal, and transportation of dangerous waste in Washington State. Mixed waste is dangerous waste that is mixed with radioactive elements. Chemical characteristics of mixed waste are regulated under RCRA and WAC 173-303, while radioactive characteristics are regulated by DOE under the *Atomic Energy Act of 1954*. Ecology has promulgated dangerous waste regulations in WAC 173-303. Mixed waste generation activities are subject to generator requirements. Mixed waste management

activities that cannot utilize generator provisions must be conducted according to dangerous waste permits under WAC 173-303 in order to operate.

B1.9 "Washington Clean Air Act" (RCW 70.94)

Ecology's Nuclear Waste Program regulates air toxicity and criteria pollutant emissions from the Hanford Site. Ecology promulgates and enforces the regulations under RCW 70.94, "Washington Clean Air Act." Ecology's implementing requirements (e.g., WAC 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants") specify review of new source emissions, permitting, applicable controls, reporting, notifications, and compliance with general standards for applicable sources of Hanford Site emissions.

The Washington State Department of Health (WDOH) Radiation Protection Division regulates radioactive air emissions statewide, as authorized by EPA and Washington State legislative and regulatory authority. WDOH implements the state requirements, adopts and implements the federal requirements under WAC 246-247, "Radiation Protection—Air Emissions," and enforces the federal requirements under authority delegated by EPA. Before beginning any work that would result in creating a new or modified source of radioactive airborne emissions, a notice of construction application must be submitted for review and approval by WDOH, resulting in issuance of an operating license. Typical license requirements for radioactive air emission sources include ensuring adequate emission controls, emissions monitoring/sampling, and annual reporting of emissions.

B1.10 Department of Transportation

Onsite transportation of waste is managed by DOE in accordance with DOE/RL-2001-36. Transportation of waste offsite is regulated by DOT. A Memorandum of Understanding between the Western Governors' Association and DOE requires that DOE conduct TRU waste shipments through the western states in accordance with the protocols contained in WGA and DOE-CBFO, 2003, *WIPP Transportation Safety Program Implementation Guide*. Shipments within the same DOE site, or other TRU waste shipments as agreed to between DOE and the states, are not included. Shipments of TRU waste to commercial firms using road closures are acceptable.

The type of packaging required to transport the waste depends, in part, on the total quantity of radioactivity, form of the materials, and concentration of radioactivity. DOE is responsible for determining the appropriate container for the material it is transporting. DOE ensures that each waste package being transported offsite meets DOT regulations for design, material, manufacturing methods, and testing.

B2 References

40 CFR 70, "State Operating Permit Programs," *Code of Federal Regulations*. Available at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=b9f71e37c7ac95548244e7c19bfa1665&tpl=/ecfrbrowse/Title40/40cfr70_main_02.tpl.

40 CFR 260, "Hazardous Waste Management System: General," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol25/xml/CFR-2010-title40-vol25-part260.xml.

40 CFR 271, "Requirements for Authorization of State Hazardous Waste Programs," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol28/pdf/CFR-2012-title40-vol28-part271.pdf.

49 CFR, "Transportation," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2009-title49-vol2/xml/CFR-2009-title49-vol2.xml.

49 CFR 105, "Hazardous Materials Program Definitions and General Procedures."

49 CFR 106, "Rulemaking Procedures;"

49 CFR 107, "Hazardous Materials Program Procedures,"

49 CFR 171, "General Information, Regulations, and Definitions."

49 CFR 180, "Continuing Qualification and Maintenance of Packaging."

78 FR 240, "Record of Decision for the Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington," *Federal Register*, Vol. 79, No. 240, pp. 75913-75919, December 13, 2013. Available at: http://www.hanford.gov/files.cfm/TCWM_ROD_FR_pub_12_13_13.pdf.

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DOE/RL-2001-36, 2010, *Hanford Sitewide Transportation Safety Document*, Rev. 1-E, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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Executive Order 12580, 1987, *Superfund Implementation*, Ronald W. Reagan, January 23. Available at: http://www.archives.gov/federal-register/codification/executive-order/12580.html.

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

Hazardous Materials Transportation Act of 1975, 49 USC 5101, et seq., Available at: http://www.epa.gov/oem/content/lawsregs/hmtaover.htm.

National Environmental Policy Act of 1969, 42 USC 4321, et seq. Available at: http://www.fhwa.dot.gov/environment/nepatxt.htm.

RCW 70.94, "Washington Clean Air Act," *Revised Code of Washington*, Olympia, Washington. Available at: http://apps.leg.wa.gov/RCW/default.aspx?cite=70.94.

RCW 70.105, "Hazardous Waste Management," *Revised Code of Washington*, Olympia, Washington. Available at: http://apps.leg.wa.gov/RCW/default.aspx?cite=70.105.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. Available at: http://epw.senate.gov/rcra.pdf.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-400.

WAC 173-401, "Operating Permit Regulation," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-401.

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460.

WAC 246-247, "Radiation Protection—Air Emissions," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=246-247.

WGA and DOE-CBFO, 2003, *WIPP Transportation Safety Program Implementation Guide*, Western Governors' Association and U.S. Department of Energy, Carlsbad Field Office, Carlsbad, New Mexico. Available at: http://www.westgov.org/wga/initiatives/wipp/wipp-pig03.pdf.

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Appendix C

Descriptions of Low-Level Burial Grounds with Retrievably Stored Waste

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Terms

LLBG	low-level burial ground
RSW	retrievably stored waste

C1 Descriptions of Low-Level Burial Grounds with Retrievable Stored Waste

Retrievably stored waste (RSW) is/was in designated areas of low-level burial grounds (LLBGs) 218-E-12B, 218-W-3A, 218-W-4B, and 218-W-4C (Figure C-1). These LLBGs are located in the LLBG *Resource Conservation and Recovery Act of 1976* treatment, storage, and/or disposal unit. These LLBGs are also included in the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* 200-SW-2 Radioactive Landfills and Dump Group Operable Unit.

The following sections provide background information on each LLBG.

C1.1 218-W-4B

The 218-W-4B LLBG is located in the central portion of the 200 West Area of the Hanford Site. The trenches are 175 m (575 ft) long and 3.7 m (12 ft) deep. Figure C-2 shows the trenches in the 218-W-4B LLBG.

The LLBG received miscellaneous radioactive solid waste from the 100, 200, and 300 Areas and offsite shipments from 1967 to 1990. Solid waste at the site consists of rags, paper, cardboard, plastic, pumps, tanks, process equipment, and other miscellaneous high dose rate transuranic waste.

The site contains RSW in Trenches T07 and T11 and four alpha caissons. Trench T07 is divided into two sections that were designed to receive RSW. The east end of the trench is referred to as TV7, a diamond shaped structure made up of a concrete lined "V" bottom and metal cover. The cement floor of T07 is a barrier to waste constituent migration, similar to the asphalt pad used in the remainder of Trench T07, with the exception of a known preferred direction of migration along the cement surface.

In the fall of 1972, the first asphalt pad was built in the remainder of Trench T07. Drums were arranged in modules, typically 12 drums wide by 12 drums deep by 4 drums high. Flame retardant plywood sheets were placed to separate the layers of drums and other packages. When modules were completed, they were covered with tarps and plywood sheets.

From 1970 to 1972, Trench T11 received waste drums and boxes that were stacked horizontally and "direct buried" in the ground without tarps or plywood to separate the soil overlying the waste. Other containers, such as concrete or steel burial boxes, ductwork, stainless steel tanks, and a culvert, were placed in this trench.

C1.2 218-W-4C

The 218-W-4C LLBG is located inside the 200 West Area of the Hanford Site. The trenches ranging from 91 to 219 m (300 to 719 ft) long. Figure C-3 shows the trenches in the 218-W-4C LLBG.

In the 218-W-4C LLBG, Trenches T01, T04, T07, T24, T20, and T29 contain RSW. This waste is placed in modules on asphalt pads that contain drums and other packages, including boxes and steel and concrete casks. Drums were arranged in modules, typically 12 drums wide, by 12 drums deep, by 4 drums high. Flame retardant plywood sheets were placed to separate the layers of drums and other packages. When modules were completed, they were covered with tarps and plywood sheets. The contact-handled RSW has been removed from this LLBG.

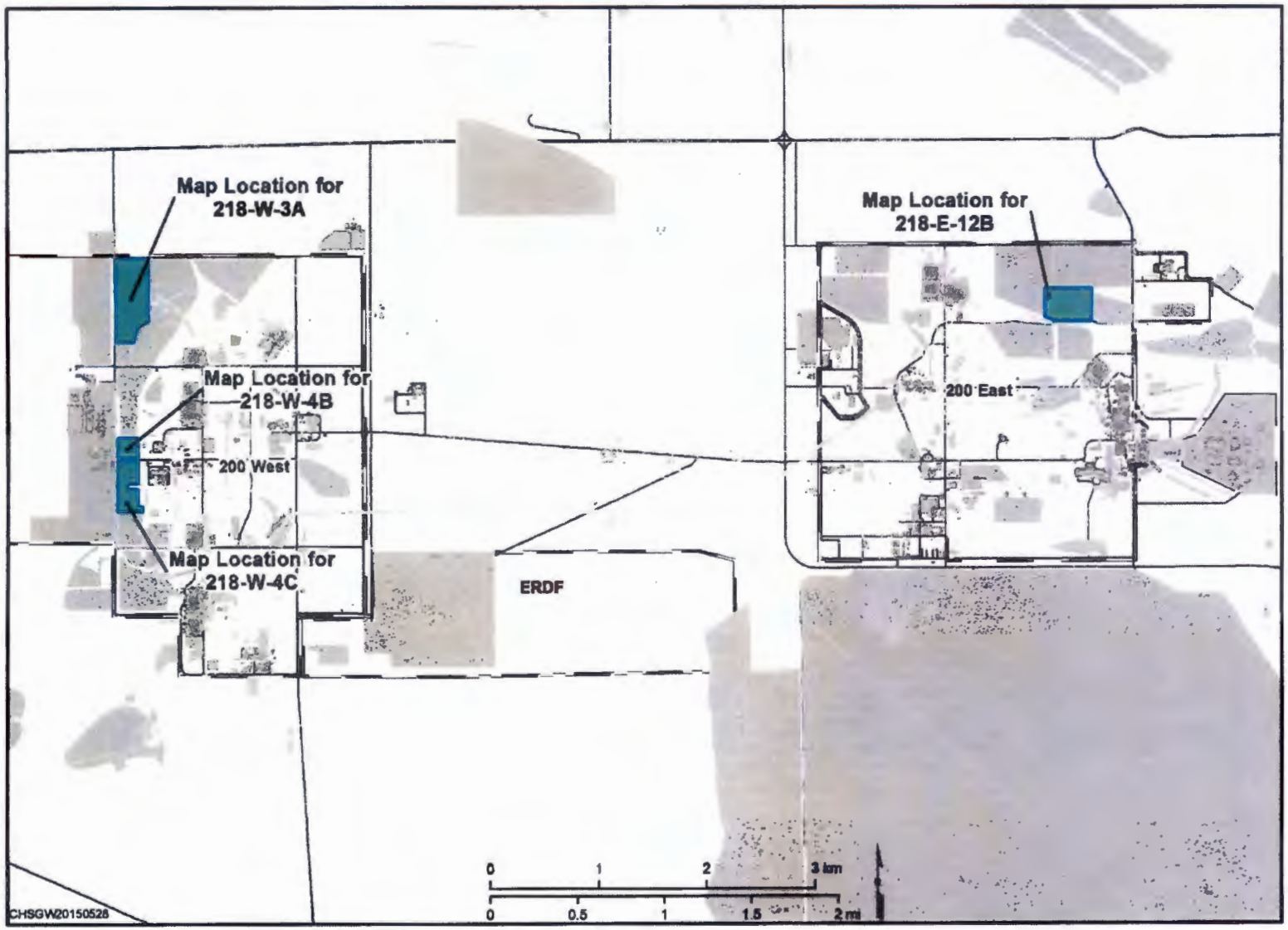

Figure C-1. Map Locations for Low-Level Burial Grounds 218-W-3A, 218-W-4B, and 218-W-4C, and 218-E-12B

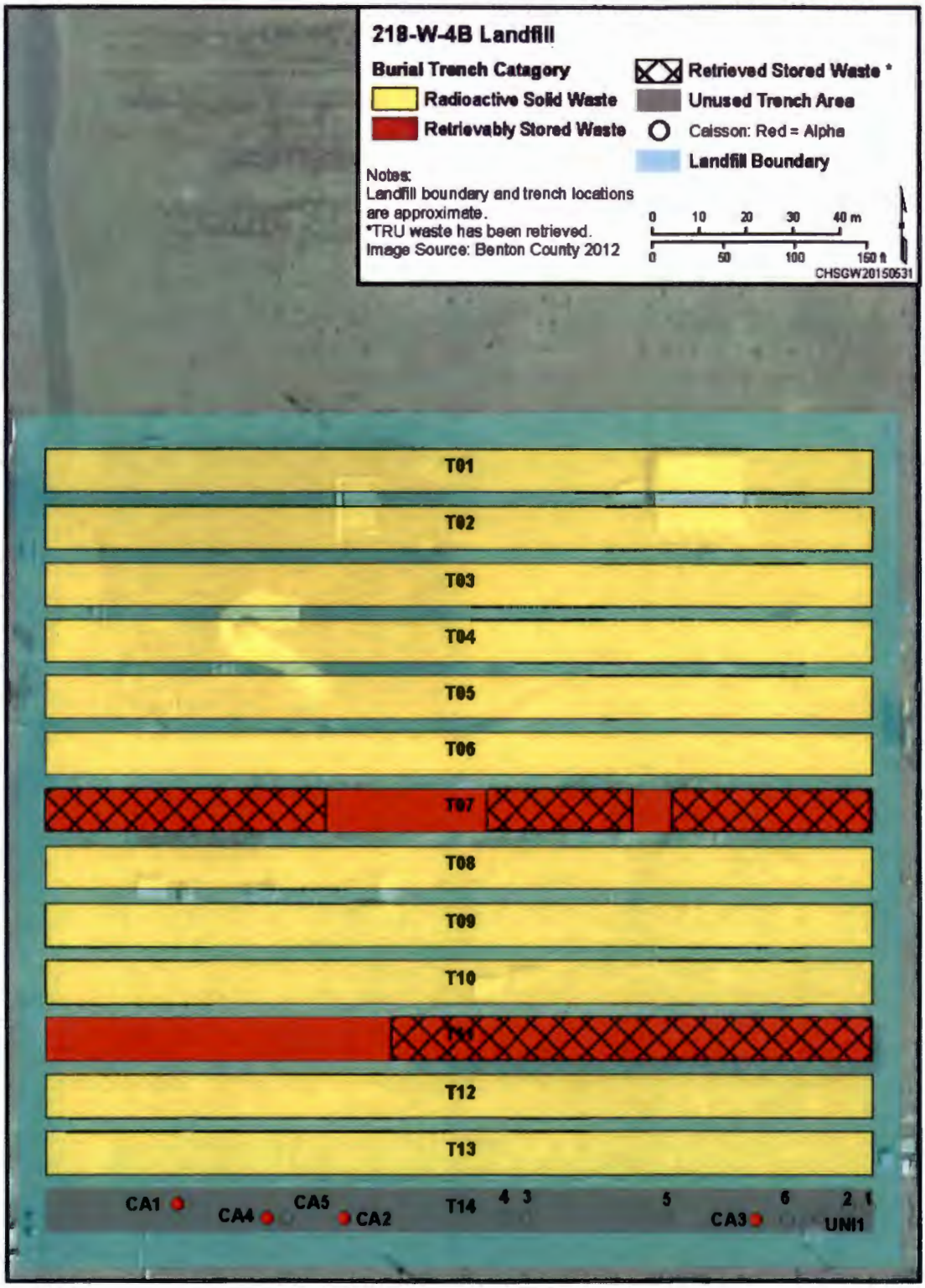

Figure C-2. Trenches in Low-Level Burial Ground 218-W-4B

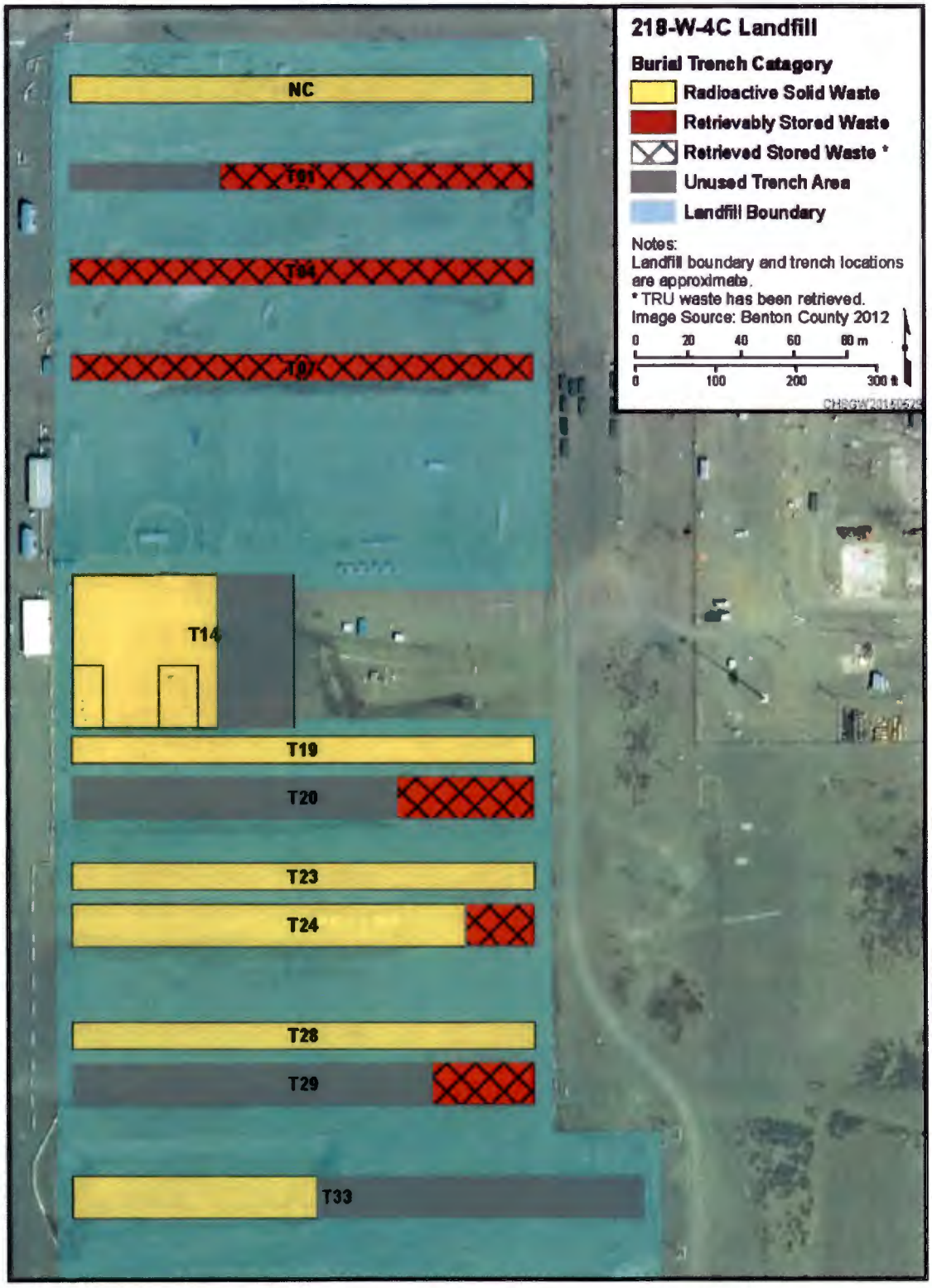

Figure C-3. Trenches in Low-Level Burial Ground 218-W-4C

C1.3 218-W-3A

The 218-W-3A LLBG is located inside the 200 West Area of the Hanford Site. Figure C-4 shows the trenches in the 218-W-3A LLBG. The 218-W-3A LLBG began operating in 1970 and contains solid, dry industrial waste. The RSW is located in 14 trenches: T1, T4, T5, T6, T6S, T8, T9S, T10, T15, T17, T23, T30, T32, and T34.

The 218-W-3A LLBG has no asphalt pads and used only earthen bottom (potentially gravel fill) trenches. Drums were stacked horizontally in earthen trenches from 1970 until approximately 1974. The waste drums were buried directly in the ground without tarps or plywood to separate the soil overlying the waste. Direct contact with the soil increased the probability that containers have corroded and might be breached. The actual date when tarp coverage was initiated has not been established. Later, drums were stacked vertically and placed on plywood, and the completed module waste was covered with nylon tarps and plywood before soil emplacement. RSW in boxes made of various materials (e.g., plywood, concrete, metal, and fiberglass reinforced plywood) were also placed in this burial ground. The 218-W-3A LLBG received RSW until 1987.

C1.4 218-E-12B

The 218-E-12B LLBG is located inside the 200 East Area of the Hanford Site. Figure C-5 shows the trenches in the 218-E-12B LLBG. The RSW is located in two trenches: T17 and T27.

The 218-E-12B LLBG began operating in 1967. The RSW originated from the Plutonium-Uranium Extraction Facility and was placed in 218-E-12B LLBG Trenches T-17 and T-27 between May 1970 and October 1972.

Drums were stacked horizontally in earthen trenches from 1970 to 1972. The waste drums were directly buried in the ground (i.e., not on asphalt pads as they were in the 218-W-4C LLBG) without tarps or plywood to separate the soil overlying the waste. Direct contact with the soil increased the probability that the containers have corroded and might be breached.

C2 References

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: http://epw.senate.gov/cercla.pdf.

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

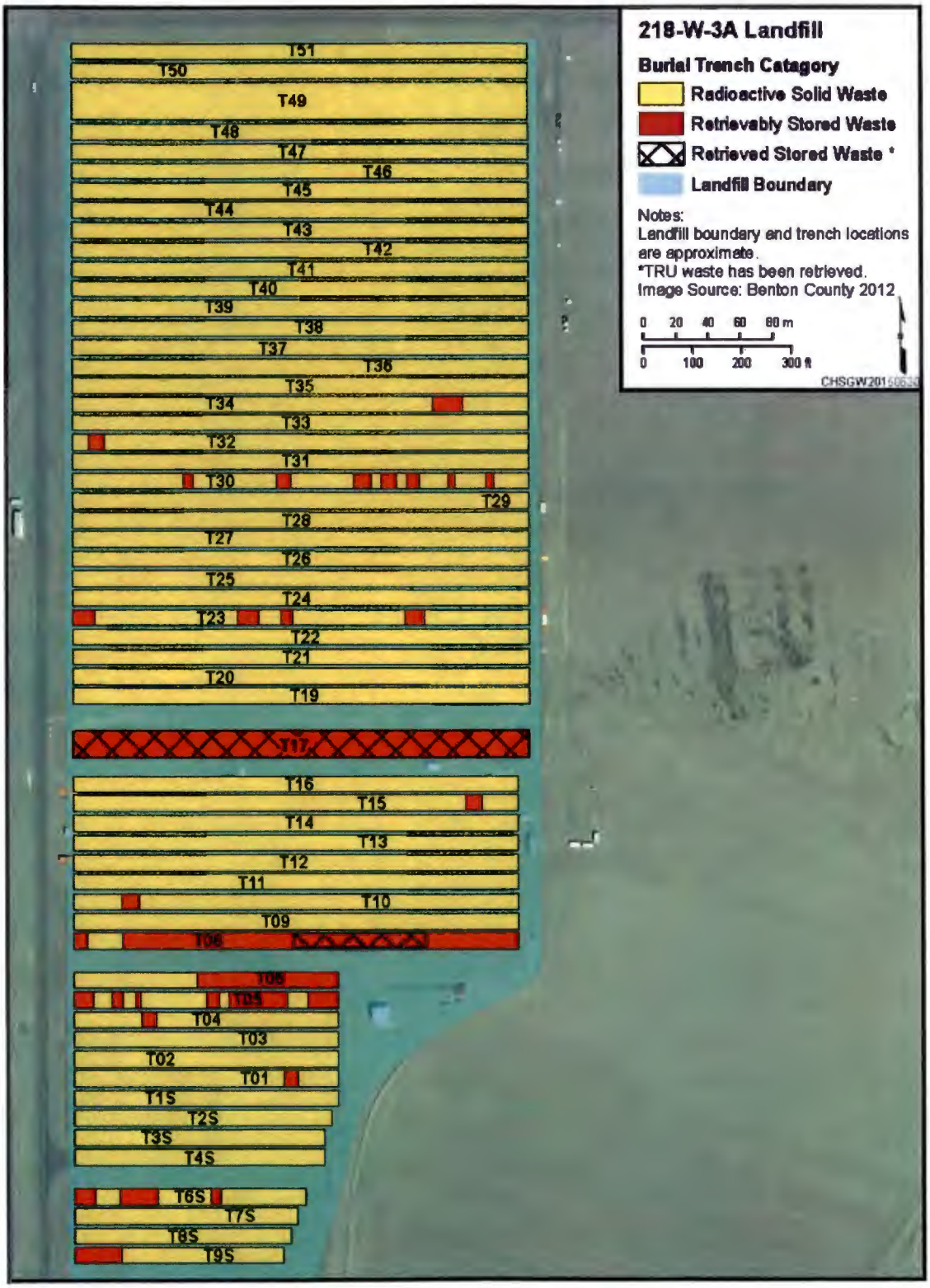

Figure C-4. Trenches in Low-Level Burial Ground 218-W-3A

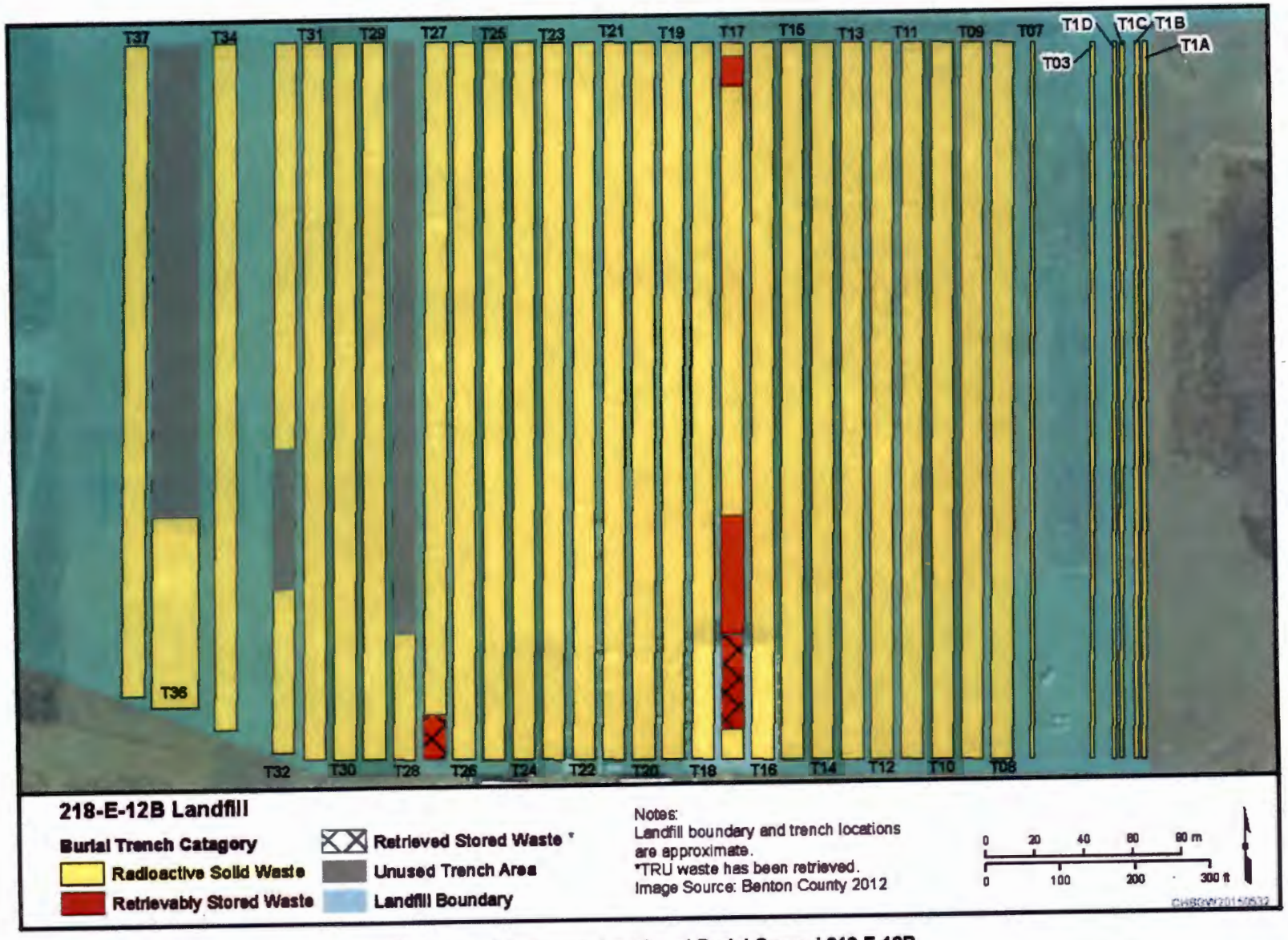

Figure C-5. Trenches in Low-Level Burial Ground 218-E-12B

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Appendix D

Basis for Figures

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Terms

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CH	contact-handled
DOE	U.S. Department of Energy
FY	fiscal year
MLLW	mixed low-level waste
PMP	Project Management Plan
RH	remote-handled
RSW	retrievably stored waste
SWITS	Solid Waste Information and Tracking System
TRU	transuranic
TRUM	transuranic mixed waste
WIPP	Waste Isolation Pilot Plant

D1 Tables

Tables D-1 through D-5 describe the data sources, analytical bases, and underlying assumptions for certain figures included in the main text of this document.

Table D-1. Basis for Figure 3-1

	Data Source, Analytical Basis, and Underlying Assumptions
Data Source	• RSW consists of suspect TRUM waste in 218-W-3A, 218-W-4B, 218-W-4C, and 218-E-12B Burial Grounds. • The volume of RSW as reported in SWITS. • Volumes are internal volumes of a waste container (e.g., a 55 gal drum has an internal volume of 0.208 m^3 and an external volume of 0.257 m^3). • SWITS is a dynamic database and is updated frequently to reflect updated information. As a result, data presented in this revision of the PMP may differ from previous volumes as follows: – The volume of RSW retrieved is based on the actual volume measured when the container is removed from the trench. In some instances, the dimension of a container in SWITS does not represent the actual dimensions of a container retrieved. In these instances, SWITS will be updated with the actual volume removed, and this volume will be used to count towards the Tri-Party Agreement (Ecology et al., 1989) M-091-49 Milestone. For example, when the culverts (cylinders) are retrieved, the original volume in SWITS was based on a rectangular container. SWITS was updated with the actual volume of the cylinder. – For failed containers that are repacked in the trench prior to retrieval, the waste volume reported in SWITS will be the volume counted towards the milestone.
Analytical Basis	• Projected annual volumes are based on the funding profile given in Figure 8-1. • Due to rounding, the total may not equal the sum of individual values.
Underlying Assumptions	• The retrieving and characterizing of the remaining RSW is being addressed under Milestone M-091-51 (see Chapter 2). • Retrieval will be completed by September 30, 2026, with completion of all the M-091 milestones by September 30, 2030.

Table D-2. Basis for Figures 4-2 and 5-1

	Data Source, Analytical Basis, and Underlying Assumptions
Data Source	• Inventory based on SWITS data sorts. • The volume of an RSW container is as reported in SWITS; volumes will be adjusted based on actual volumes removed during waste retrieval operations. • Volumes are internal volumes of a waste container (e.g., a 55 gal drum has an internal volume of 0.208 m^3 and an external volume of 0.257 m^3).
Analytical Basis	• Projected annual volumes are based on the funding profile given in Figure 8-1: – Projections used throughout this PMP are based on level loaded workoff rates. – FY 2016 to FY 2018, 280 m^3 of TRUM waste will be repackaged at a commercial facility per annum.

Table D-2. Basis for Figures 4-2 and 5-1

	Data Source, Analytical Basis, and Underlying Assumptions
	– FY 2019 through FY 2025, 400 m^3 of TRUM waste will be repackaged at a commercial facility per annum. – Additional necessary repack facilities to process waste containers that could not be shipped offsite will be operational by FY 2026 at which time production will ramp up. – Starting in FY 2024 and continuing to 2030, 2 to 3 shipments of M-091 CH-TRUM waste are shipped to WIPP per week using 40 weeks per year. – Starting in FY 2024 and continuing to 2030, 6 to 7 shipments of M-091 RH-TRUM waste are shipped to WIPP per week using 40 weeks per year. – Number of shipments to WIPP per week is dependent on priority across the DOE Complex. • Certified and shipped volume is the treated volume. During repackaging of CH-TRUM waste, it has been found that for every 4 drums repackaged, 5 drums of certified waste are generated, on average, resulting in a factor increase of 1.25. This factor is also assumed valid for noncaisson RH-TRUM waste. Volume increases can result from activities such as repackaging performed to generate compliant packages ready for final characterization, certification, and shipment to WIPP. For caisson RH-TRUM waste, a factor increase of 10 was used because the waste in a single container will need to be redistributed in several certified containers to minimize dose rates and maintain isotopic distribution. • Due to rounding, the total may not equal the sum of individual values.
Underlying Assumptions	• After retrieval and assay, a significant portion of RSW will be designated as non-TRU waste based on the change in the definition of TRU waste (to 100 nCi/g from the former definition of 10 nCi/g), which occurred after the waste was placed into retrievable storage in the trenches. Based on this change in definition, waste records, and field experience, the following percentages of MLLW and TRUM waste were derived (operational experience may make it necessary to change these assumptions in future revisions of this PMP): – CH-RSW in small containers is 52 percent CH-TRUM waste. – CH-RSW in large containers is 68 percent CH-TRUM waste. – Noncaisson RH-RSW is 50 percent RH-TRUM waste. – Alpha caisson RH-RSW is 100 percent RH-TRUM waste. • Based on experience of repackaging large container CH-TRUM waste commercially, it is assumed that 45% of the original volume of the waste will remain as TRUM. The balance will be void space and MLLW. This assumption will be refined in future revisions of the PMP. • Retrieval will be completed by the end of FY 2026. • WIPP will be available to receive shipments of TRUM waste by the end of FY 2023. With shipments from Hanford starting in FY 2024 and continue through FY 2030. • Shipments of TRUM waste (M-091-48 Milestone) will be completed at the end of FY 2030. • Onsite TRUM waste processing will begin in FY 2024 and continue through FY 2029. • Additional capabilities necessary to complete repackaging of TRUM waste and shipments to WIPP are being addressed under Milestone M-091-51 (see Chapter 2). • Commercial capability will be available to process a portion of TRUM waste.

Table D-5. Basis for Figure 8-1

Underlying Assumptions
• FY 2016 escalated dollars. • Based on CH2M HILL Plateau Remediation Company baseline and DOE/RL-2013-02, *2014 Hanford Lifecycle Scope, Schedule and Cost Report*. Out-year (FY 2019 and beyond) funding given in DOE/RL-2013-02 was adjusted, as appropriate, to account for work scope not included in FY 2016 to FY 2018 baseline. Funding levels are subject to change as planning is refined. • Work breakdown structure 013.04 for FY 2020 to FY 2030 is funding for the treatment of MLLW dropout during the repackaging of large container CH-TRUM waste. • Funding has been identified for Environmental Restoration Disposal Facility expansion in FY 2022. • Funding profile for CERCLA activities discussed in Chapter 7 is not included. • Other activities include management reserve, fee, and assessments.

D2 References

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: http://epw.senate.gov/cercla.pdf.

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Appendix E

Out-Year CERCLA Cleanup Actions

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Table E-1. Operable Units and Facilities with Potential to Generate Waste with Transuranic Constituents Greater Than 100 nCi/g during CERCLA Cleanup Actions E-3

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Terms

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CMS	corrective measures study
FS	feasibility study
LLW	low-level waste
MLLW	mixed low-level waste
OU	operable unit
PUREX	Plutonium Uranium Extraction
RCRA	*Resource Conservation and Recovery Act of 1976*
RD/RA	remedial design/remedial action
REDOX	reduction oxidation
RFI	RCRA facility investigation
RI	remedial investigation
TBD	to be determined
TRU	transuranic
TSD	treatment, storage, and/or disposal

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E1 Introduction

Appendix E categorizes the Operable Units and Facilities with Potential to Generate Waste with Transuranic Constituents Greater Than 100 nCi/g during CERCLA Cleanup Actions and the scheduled actions.

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Table E-1. Operable Units and Facilities with Potential to Generate Waste with Transuranic Constituents Greater Than 100 nCi/g during CERCLA Cleanup Actions

Operable Unit/ Site Name	Description	Potential Waste with Transuranic Constituents Greater Than 100 nCi/g			Schedule
		Waste Unit Name	Waste Form	Volume	
200-BC-1	The 216-B-53A Trench is 18.3 by 3 m (60 by 10 ft) at the base. The site received waste from the liquid release at the Plutonium Recycle Test reactor in the 300 Area during which secondary cooling waste became contaminated with plutonium and mixed fission products. Of all the specific retention trenches in the BC Cribs and Trenches area, only the 216-B-53A Trench is considered to have the potential to contain concentrations of transuranic constituents greater than 100 nCi/g. **Reference:** DOE/RL-2009-36, *BC Cribs and Trenches Excavation-Based Treatability Test Report.* DOE/RL-2010-49, *Remedial Investigation/Feasibility Study Work Plan 200-WA-1 and 200-BC-1 Operable Units*, Draft B	216-B-53A, Trench	Soil, Rock, Gravel	38 m^3 (1,342 ft^3)	*M-015-91B*: Submit FS Report(s) and Proposed Plan(s) for the 200-BC-1/ 200-WA-1 OUs (200 West Inner Area) by 12/31/2015. (TPA negotiations underway to adjust the milestone date). *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024. (TPA negotiations underway to adjust the milestone date)
200-SW-2	There are 24 landfills assigned to the 200-SW-2 OU. These landfills consist of excavated trenches that received either LLW or MLLW. The majority of the waste disposed in the 200-SW-2 landfills originated from the processing facilities located in the 200 East and 200 West Area, with some of the waste originating from the 100 and 300 Areas, as well as from offsite sources. There are collocated waste sites within the footprint of several 200-SW-2 landfills. These waste sites include 3 ponds, a burn pit, and a ditch. Before 1970, LLW was disposed in the same landfill trenches as waste that contained transuranic elements and/or mixed fission products. After 1970, waste that was designated as TRU waste was segregated in either specified low-level burial ground trenches or underground concrete caissons within the landfills for future retrieval. Retrieval of this TRU waste (currently known as retrievably stored suspect TRU waste) is accomplished under Tri-Party Agreement (Ecology et al., 1989) Milestones M-091-40 and M-091-41, as discussed in Chapter 3 of this Project Management Plan. Prior to 1960, detailed inventory records were not maintained and specific information about the early landfills often is not available. **References:** DOE/RL-2004-60, *200-SW-2 Radioactive Landfills Group Operable Unit RCRA Facility Investigation/Corrective Measures Study/Remedial Investigation/Feasibility Study Work Plan.* Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order.* Solid Waste Information Tracking System.	218-E-12B, Landfill	Debris	120 m^3 (4,238 ft^3)	*M-015-93B*: Submit RFI/CMS, RI/FS, and Proposed Corrective Action Decision/ Proposed Plan for the 200-SW-2 OU by 12/31/2016. (TPA negotiations underway to adjust the milestone date) *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024. (TPA negotiations underway to adjust the milestone date)
		218-E-5, Landfill		140 m^3 (4,944 ft^3)	
		218-W-1, Landfill		7,100 m^3 (250,734 ft^3)	
		218-W-2, Landfill		8,200 m^3 (289,580 ft^3)	
		218-W-2A, Landfill		280 m^3 (9,888 ft^3)	
		218-W-3, Landfill		5,900 m^3 (208,357 ft^3)	
		218-W-3A, Landfill		60 m^3 (2,119 ft^3)	
		218-W-4A, Landfill		12,000 m^3 (423,776 ft^3)	
		218-W-4B, Landfill		710 m^3 (25,073 ft^3)	
		Total		**34,510 m^3 (1,218,709 ft^3)**	
200-WA-1	200 West Inner Area (200-WA-1) is defined as other sites in the 200 West Area not included in 200-CR-1; 200-IS-1; 200-PW-1,-6; 200-BC-1; 200-CW-5; or 200-SW-2 are within the new 200-WA-1 OU. **References:** DOE/RL-2003-64, *Feasibility Study for the 200-TW-1 Scavenged Waste Group, the 200-TW-2 Tank Waste Group, and the 200-PW-5 Fission-Product Rich Waste Group Operable Units.* DOE/RL-2005-61, *Remedial Investigation Report for the 200-LW-1 (300 Area Chemical Laboratory Waste Group) and 200-LW-2 (200 Area Chemical Laboratory Waste Group) Operable Units.* DOE/RL-2007-02, *Supplemental Remedial Investigation/Feasibility Study Work Plan for the 200 Area Central Plateau Operable Units.* From Table 2-15 in RHO-RE-ST-30 P, *Hanford Defense Waste Disposal Alternatives: Engineering Support Data for the Hanford Defense Wasted-Environmental Impact Statement.* DOE/RL-2010-49, *Remedial Investigation/Feasibility Study Work Plan 200-WA-1 and 200-BC-1 Operable Units*, Draft B	216-S-1, & -2, Crib	Soil, Gravel, Rock	1,700 m^3 (60,035 ft^3)	*M-015-91B*: Submit FS Report(s) and Proposed Plan(s) for the 200-BC-1/ 200-WA-1 OUs (200 West Inner Area) by 12/31/2015. (TPA negotiations underway to adjust the milestone date) *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024. (TPA negotiations underway to adjust the milestone date)
		216-Z-7, Crib		590 m^3 (20,836 ft^3)	
		241-T-361	Sludge/Liquid	88 m^3 (3,108 ft^3)	

Table E-1. Operable Units and Facilities with Potential to Generate Waste with Transuranic Constituents Greater Than 100 nCi/g during CERCLA Cleanup Actions

Operable Unit/ Site Name	Description	Potential Waste with Transuranic Constituents Greater Than 100 nCi/g			Schedule
		Waste Unit Name	Waste Form	Volume	
200-DV-1	The 200-DV-1 OU includes waste sites with deep vadose zone contamination that may be a potential threat to groundwater and cannot be remediated using typical surface techniques (e.g., excavation and capping). The vadose zone is defined as the unsaturated region of soil between the ground surface and the water table. **References:** Estimated volumes taken from Table 2-15 in RHO-RE-ST-30 P, *Hanford Defense Waste Disposal Alternatives: Engineering Support Data for the Hanford Defense Wasted-Environmental Impact Statement.* DOR/RL-2011-102 Draft A, *Remedial Investigation/Feasibility Study and RCRA Facility Investigation/Corrective Measures Study Work Plan for the 200-DV-1 Operable Unit.*	216-T-3, Injection/Reverse Well	Soil, Rock, Gravel	<10 m^3 (353 ft^3)	*M-015-110B*: Submit CMS, FS, and Proposed Plan/Proposed Corrective Action Decision for 200-DV-1 by 9/30/2015. (TPA negotiations underway to adjust the milestone date). *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024. (TPA negotiations underway to adjust the milestone date)
		216-B-5, Injection/Reverse Well		60 m^3 (2,119 ft^3)	
		216-B-7A & -7B, Crib		430 m^3 (15,185 ft^3)	
		216-T-32, Crib		460 m^3 (16,245 ft^3)	
		216-T-18, Crib		590 m^3 (20,836 ft^3)	
		216-T-5, Trench		TBD	
		216-T-7, Tile Field		TBD	
		216-T-6, Crib		290 m^3 (10,241 ft^3)	
		Total		**1,840 m^3 (64,979 ft^3)**	
200-IS-1, 200-EA-1	200 East Inner Area (200-EA-1) and 200-IS-1 sites not included in one of the canyon OUs will remain in the 200-IS-1 OU. Other waste sites not included in 200-CS-1, 200-CP-1, 200-PW-3, or 200-SW-2 are reassigned to the new 200-EA-1 OU. The 200-IS-1 OU includes pipelines, diversion boxes, catch tanks, related structures, and RCRA TSD tanks. Potential source of TRU waste is residual sludge/liquid within the structures. Associated pipelines and structures (e.g., diversion boxes, catch tanks, vaults, and storage tanks) are expected to be LLW. The 241-CX-72 Storage Tank is located at the former Hot Semiworks Facility, east of B Plant in the 200 East Area. The 200-EA-1 OU includes the 241-B-361 Settling Tank, which was used for waste originating in B Plant. **References:** Volume of residual sludge in Tank 241-CX-72 from DOE/RL-2002-14, *Tanks/Lines/Pits/Boxes/Septic Tank and Drain Fields Waste Group Operable Unit RI/FS Work Plan and RCRA TSD Unit Sampling Plan; Includes: 200-IS-1 and 200-ST-1 Operable Units.* Volume of residual sludge in 241-B-361 from Table 2-3 in DOE/RL-2003-64, *Feasibility Study for the 200-TW-1 Scavenged Waste Group, the 200-TW-2 Tank Waste Group, and the 200-PW-5 Fission-Product Rich Waste Group Operable Units.* DOE/RL-2010-114, *200-IS-1 Operable Unit Pipeline System Waste Sites RFI/CMS/RI/FS Work Plan.* RHO-RE-ST-30 P, *Hanford Defense Waste Disposal Alternatives: Engineering Support Data for the Hanford Defense Waste-Environmental Impact Statement.*	241-CX-72, Storage Tank	Sludge/Liquid	9 m^3 (318 ft^3)	*M-015-92A*: Submit an RFI/CMS and RI/FS work plan for the 200-EA-1 OU (200 East Inner Area) by 6/30/2015. (TPA negotiations underway to adjust the milestone date) *M-015-92B*: Submit CMS, FS, 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) by 12/31/2016. (TPA negotiations underway to adjust the milestone date) *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024. (TPA negotiations underway to adjust the milestone date) *M-037-10*: Complete unit-specific closure requirements according to the closure plan for 241-CX Tank System (241-CX-70/71/72) by 9/30/2020. (TPA negotiations underway to adjust the milestone date)
		241-B-361, Settling Tank		180 m^3 (6,357 ft^3)	
		Diversion Boxes, Catch Tanks		TBD	
		Total		**189 m^3 (6,674 ft^3)**	

Table E-1. Operable Units and Facilities with Potential to Generate Waste with Transuranic Constituents Greater Than 100 nCi/g during CERCLA Cleanup Actions

Operable Unit/ Site Name	Description	Potential Waste with Transuranic Constituents Greater Than 100 nCi/g			Schedule
		Waste Unit Name	Waste Form	Volume	
200-CP-1, PUREX Tunnel #1 and Tunnel #2	The PUREX Plant consists of the main fuels reprocessing building (202-A) and a number of ancillary buildings. WHC-IP-0977 (Section 4.0) describes the many process vessels, chemical storage tanks, and other types of equipment that are potential candidates for removal and processing as solid waste. The volume of potential solids waste is estimated at 9,660 m^3 (341,140 ft^3) of which it is estimated that 8 percent is TRU. The PUREX Plant is designated as a Tier 1 facility. Final disposition to be addressed using the CERCLA remedial action coordinated with RCRA closure. Completion schedules to be established with the RI/FS work plans and RD/RA work plans and closure conditions/schedules established in the Hanford Facility Dangerous Waste Permit. **Reference:** WHC-IP-0977, *Estimation of PUREX Equipment and Materials That are Candidates for Removal and Waste Processing During PUREX Plant Closure.* The two PUREX tunnels (Tunnel #1 and Tunnel #2) were used for interim storage to shelter failed or obsolete process equipment. The process equipment, bulky and highly radioactive, could not be removed from the PUREX Plant. Tunnel #1 is filled to capacity with eight railcars that contain approximately 590 m^3 (20,835 ft^3) of unsegregated radioactive waste. Section 3.1 of WHC-IP-0977 describes the equipment stored in Tunnel #1. It is estimated that approximately 45 percent of the waste could be classified as TRU, while the remainder is LLW. Tunnel #2, which currently holds 28 railcars, contains approximately 2,200 m^3 (78,000 ft^3) of unsegregated radioactive waste. Approximately 35 percent of the unsegregated radioactive waste is estimated to be TRU. **References:** HNF-SD-EN-WAP-007, *PUREX Storage Tunnels Waste Analysis Plan.* WHC-IP-0977, *Estimation of PUREX Equipment and Materials That are Candidates for Removal and Waste Processing During PUREX Plant Closure.*	PUREX Complex	Debris	750 m^3 (26,486 ft^3)	*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 by TBD.
		PUREX Tunnel #1		270 m^3 (9,535 ft^3)	
		PUREX Tunnel #2		780 m^3 (27,545 ft^3)	
		Total		**1,800 m^3 (63,566 ft^3)**	
224-B	The 224-B Building, located in the 200 East Area of the Hanford Site, was used to purify and concentrate diluted plutonium nitrate solution that was the product of the 221-B Building bismuth-phosphate process. The building consists of a single canyon-type building, constructed of reinforced concrete and concrete block. There are six hot cell areas within the 224-B Building. Majority of the radioactive inventory exists within the process cell equipment and piping. The 224-B Building is designated as a Tier 1 Facility based on the fact that an engineering evaluation/cost analysis has already been developed and not on the results of the graded approach process. Final demolition of the 224-B Building will be in accordance with DOE/RL-2004-36. **References:** DOE/RL-2000-06, *Engineering Evaluation/Cost Analysis for the 224-B Plutonium Concentration Facility.* DOE/RL-2004-36, *Action Memorandum for the Non-Time Critical Removal Action for the 224-B Plutonium Concentration Facility.* SD-DD-TRP-002, *Radiological Characterization of the 224-B Hot Cells.*	224-B	Debris	TBD	*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 by TBD.

Table E-1. Operable Units and Facilities with Potential to Generate Waste with Transuranic Constituents Greater Than 100 nCi/g during CERCLA Cleanup Actions

Operable Unit/ Site Name	Description	Potential Waste with Transuranic Constituents Greater Than 100 nCi/g			Schedule
		Waste Unit Name	Waste Form	Volume	
200-CR-1	The REDOX Facility, also called the 202-S Process Canyon Building or S Plant, is a chemical separation facility constructed in 1952 to employ an advanced organic solvent extraction process as a replacement for the B and T Plants. Irradiated rods were transferred to the REDOX Facility where plutonium was extracted and transferred as plutonium nitrate to Z Plant for final processing. As with other canyon buildings, the REDOX Facility is constructed entirely of concrete, and its process equipment is contained in cells. The REDOX Canyon and Service Facility is designated as a Tier 1 facility. Final disposition of the REDOX Facility is to be addressed using CERCLA remedial action. Completion schedules to be established with RI/FS work plans and RD/RA work plans. **Reference:** BHI-00176, *S Plant Aggregate Area Management Study Technical Baseline Report.*	REDOX	Debris	TBD	*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 by TBD.

E2 References

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Appendix F

Critical Path Schedule

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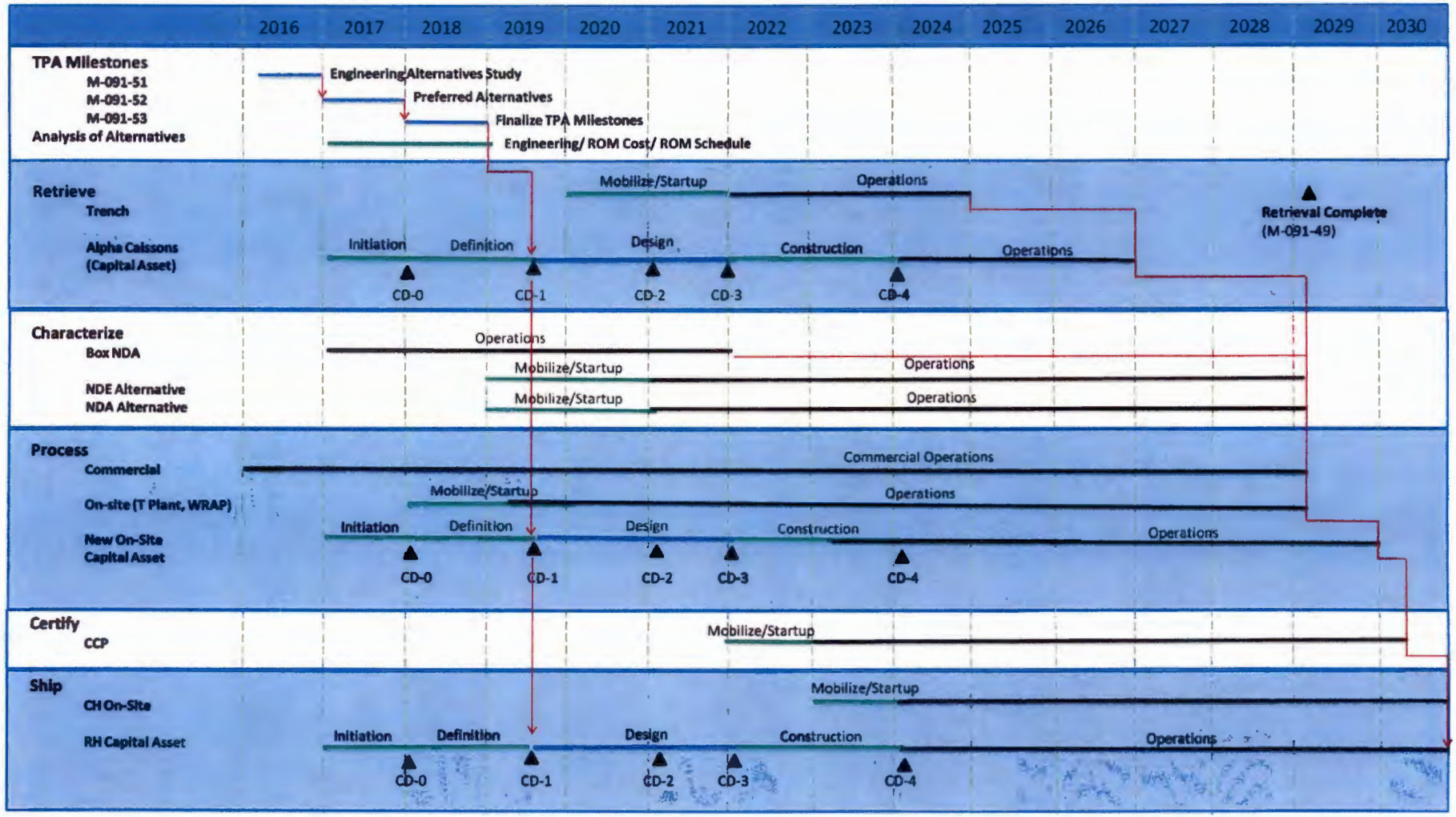

F-1. Critical Path Schedule

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