1218469

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

13-AMRP-0064

DEC 20 2012

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

Dear Mr. Faulk:

COMPLETION OF HANFORD FEDERAL FACILITY AND CONSENT ORDER (TRI-PARTY AGREEMENT) MILESTONE M-016-93B AND M-16-93 WORK PLAN, DOE/RL-2009-130, REVISION 2

The purpose of this letter is to formally notify the U.S. Environmental Protection Agency (EPA) of the completion of Tri-Party Agreement Milestone M-016-93B. This milestone requires transmittal of the attached revised work plan to EPA by December 31, 2012, to address the acquisition of capabilities necessary to prepare transuranic waste generated by Comprehensive Environmental Response Compensation and Liability Act cleanup actions for disposal.

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

Sincerely,

Jonathan A. Dowell, Assistant Manager
for the River and Plateau

AMRP:MSC

Attachment

cc: See Page 2

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cc w/attach:
G. Bohnee, NPT
R. Buck, Wanapum
D. R. Einan, EPA
S. Harris, CTUIR
J. A. Hedges, Ecology
R. Jim, YN
S. L. Leckband, HAB
N. M. Menard, Ecology
K. Niles, ODOE
D. Rowland, YN
D. G. Singleton, Ecology
Administrative Record
Environmental Portal

cc w/o attach:
L. T. Blackford, CHPRC
L. M. Dittmer, CHPRC
R. A. Kaldor, MSA
T. W. Noland, MSA
R. E. Piippo, MSA

CHPRC-1204936
ATTACHMENT

DOE/RL-2009-130
Revision 2

M-16-93 Work Plan

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

U.S. DEPARTMENT OF ENERGY Richland Operations Office
P.O. Box 550
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

CHPRC-1204936
ATTACHMENT

DOE/RL-2009-130
Revision 2

M-16-93 Work Plan

Date Published
December 2012

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

U.S. DEPARTMENT OF ENERGY Richland Operations Office
P.O. Box 550
Richland, Washington 99352

APPROVED
By Julia Raymer at 3:00 pm, Dec 04, 2012

Release Approval Date

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DOE/RL-2009-130
Revision 2

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Terms

CCP	Central Characterization Project
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CH	contact-handled
CWC	Central Waste Complex
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
FS	feasibility study
FY	fiscal year
LLW	low-level waste
MLLW	mixed low-level waste
OU	operable unit
PFP	Plutonium Finishing Plant
RCRA	*Resource Conservation and Recovery Act of 1976*
RH	remote-handled
RI	remedial investigation
ROD	record of decision
RSW	retrievably stored waste
RTD	removal, treatment, and disposal
SLB-2	standard large box - 2
SWB	standard waste box
TPA	Tri-Party Agreement
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TRUM	transuranic mixed
WIPP	Waste Isolation Pilot Plant
WMA	waste management area
WRAP	Waste Receiving and Processing Facility

1 TRU and TRUM Waste Generated from CERCLA Cleanup Actions

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 586 square mile site is located in southeastern Washington State. The Central Plateau covers approximately 75 square miles in the center of the Hanford Site. Much of the legacy waste and contaminated materials from the site's defense mission remains on the Central Plateau, however some legacy waste remains in the other areas of the Site.

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 that identifies cleanup actions and schedules referred to as milestones (Ecology et al., 1989a). As required per Milestone M-016-93B, this Work Plan addresses the acquisition of capabilities necessary to prepare transuranic (TRU) and transuranic mixed (TRUM) waste within the scope of the M-016 Milestone series for the disposal at the Waste Isolation Pilot Plant (WIPP) located in Carlsbad, New Mexico.

A goal of DOE, Ecology, and EPA is to integrate the Hanford Site cleanup activities to the extent possible to enable efficient, effective management of waste. The three agencies agreed to integrate the capabilities for managing TRU and TRUM waste under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) cleanup actions with plans to manage similar waste forms under the M-091 Milestone work scope documented in the M-091 Project Management Plan (HNF-19169). This Work Plan reflects retrieval decisions, projected waste volumes, and schedules for CERCLA cleanup actions authorized in records of decision (RODs) and action memoranda at the Hanford Site. The remedial actions for all non-tank farm and non-canyon operable units (OUs) are to be completed by September 30, 2024 per Milestone M-016-00.

Schedules for CERCLA cleanup actions are established through the following CERCLA process and documentation included in the Administrative Record:

1. **Prepare Remedial Investigation (RI) and Feasibility Study (FS).** The RI presents data collected during the investigation and other characterization activities (analogous to the *Resource Conservation and Recovery Act of 1976* (RCRA) facility investigation). The FS 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.** Ecology, EPA, and DOE 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 Ecology, EPA, and DOE in selecting a final decision on the preferred remedial alternative that will be taken to clean up the contamination associated with the OUs described in the Proposed Plan.

5. **Prepare ROD.** After Ecology, EPA, and DOE consideration of 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 1 summarizes the OUs and/or facilities that will or will not be addressed in this Work Plan. 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 waste management areas (WMAs) are not addressed in this Work Plan.

Table 1. Summary of Operable Units and Facilities

Operable Unit or Facility	Comment
300-FF-2, PFP, 221-U Facility, 100 K Basins, 209E, 200-BC-1, 200-PW-1, 200-PW-6, 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, 209E, 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. • Addressed in this Work Plan (Table 2).
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 Work Plan.
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 Work Plan.
WMA Series	• Tank farm WMAs are covered under the M-045 Milestone series. • Not addressed in this Work Plan.

2 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 Memorandas that have generated, or are projected to generate, TRU or TRUM waste. Table 2 presents the forecast volumes of these cleanup actions that were provided from the projects in HNF-EP-0918, *Solid Waste Integrated Forecast (SWIFT) FY2012—FY2050*, published in September 2012, and represents a forecast subject to time changes. The following subsections discuss these cleanup actions.

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

	FY 2013		FY 2014		FY 2015		FY 2016		FY 2017		FY 2018		Total	
Generator	CH	RH	CH	RH	CH	RH	CH	RH	CH	RH	CH	RH	CH	RH
PFP[a]	122		211		25								358	0
100 K[a]				111		51							0	162
618-10/11[a]	60	98	50	445	19	108							129	651
200-PW-1, 200-PW-6 OUs													2,340[b]	

Contact-handled = CH

Remote-handled = RH

FY = fiscal year

Projected volumes, in m^3, are from current performance measurement baseline.

a. Projected volumes, in m^3, are from HNF-EP-0918, *Solid Waste Integrated Forecast (SWIFT) FY 2012-2050*, and the internal volume of the container is used.

b. Preliminary volume based on DOE/RL-2009-117, *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, and ROD.

2.1 Plutonium Finishing Plant

The Plutonium Finishing Plant (PFP) represented the end of the line associated with plutonium production at Hanford. The 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 the 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 gloveboxes and associated piping and ductwork. From FY 2013 through FY 2015, an estimated 358 m^3 of contact-handled (CH) TRU waste is expected to be generated (HNF-EP-0918). To date, over 830 m^3 of TRU waste has been transferred from PFP to the Waste Receiving and Processing Facility (WRAP) and/or the Central Waste Complex (CWC) for certification and shipment to WIPP. DOE is utilizing existing capabilities to disposition the TRU waste generated during the slab-on-grade activities. DOE recently implemented the use of standard large

box-2 (SLB-2) containers that allow glove boxes and miscellaneous debris (e.g., piping, ductwork) to be removed with limited size reduction and packaged in 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.

2.2 100 K Basin

The K Basin Interim Remedial Action ROD Amendment indicates that 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, begin to transfer them to T Plant in FY 2014, and place them into interim storage until a new treatment and packaging facility is available. The K Basin Remediation is being performed in accordance with *Amendment to the Interim Remedial Action Record of Decision for the 100 K Area K Basins* (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. DOE has begun 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. Current efforts are reviewing the approach being taken by the project; the scope of the siting study; and the decision process being used. 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 remote-handled (RH) TRU(M) sludge (e.g., U Plant Tank D-10).

During K Basin cleanup, an estimated 162 m^3 of waste with TRU constituents greater than 100 nCi/g is projected to be generated.

2.3 209E Critical Mass Laboratory

DOE used the 209E Critical Mass Laboratory from 1961 through 1983. The radioactive nature of the work that was done in this building has resulted in some parts of the building becoming contaminated. It was designed to provide a heavily shielded reactor room where quantities of plutonium and uranium in solution could be brought to near critical configurations under carefully controlled and monitored conditions. DOE completed the CERCLA cleanup actions at the 209E Building in accordance with *Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Area Tier 2 Buildings/Structures* (DOE/RL-2010-102) and the *Removal Action Work plan for the 209E Critical Mass Laboratory* (DOE.RL-2011-10).

The 209E Building has been demolished to slab-on-grade, and underground tanks/equipment containing TRU waste were excavated and removed. The TRU waste was shipped to CWC for interim storage prior to being sent to Perma-Fix Northwest for size reduction and packaged into WIPP certifiable containers. The WIPP compliant containers will be stored at CWC for the interim prior to shipment to WIPP. No new capabilities will be required to disposition this waste.

2.4 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 Addenda for the Disposition of Tank D-10 from Cell 30 within the 221-U Plant Canyon Facility*. The tank heel contains

approximately 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 the *Record of Decision 221-U Facility (Canyon Disposition Initiative) Hanford Site, Washington* (Ecology et al., 2005).

DOE will disposition the Tank D-10 heel at 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.

2.5 618-10 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 that 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 that was used for developing and manufacturing reactor fuel and conducting laboratory research during Hanford'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 buried vertically about 3 m (10 ft) apart. The caissons were constructed of galvanized corrugated metal pipe (10 ft high, 8 ft diameter) and buried approximately 15 ft underground. DOE is performing the 618-10 and 618-11 Burial Ground remediation in accordance with *Record of Decision for Remedial Actions in the 300-FF-2 Operable Unit* (Ecology et al., 2001).

DOE has begun remediation of the 618-10 and 618-11 Burial Grounds. 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 x-ray 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 compliantly manage the drums at WRAP. DOE has also begun conducting demonstrations of the vertical pipe unit remediation and is exploring options for removing the caissons, which will present more of a challenge. The TRU waste will be sent to CWC for interim storage prior to disposition. The expectation is that the waste coming out of the caissons will be RH-TRU waste. DOE will continue to explore integration of TRU waste disposition activities.

DOE has a milestone to cleanup both burial grounds by the end of FY 2018.

2.6 200-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 was signed by the Tri-Parties in October of 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.

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 contaminates 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 the Environmental Restoration Disposal Facility (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 disposal at ERDF. Cleanup levels have been selected which are protective of groundwater and the current and reasonably expected future industrial land use.

- The 200-CW-5 OU, also known as the Z-Ditches, will use the RTD approach to excavate contaminated soils and debris exceeding cleanup levels to a depth of up to 15 ft below ground surface with disposal at ERDF or WIPP, as appropriate. Waste generated during this activity is expected to be LLW and will be shipped to ERDF for disposal.

- Three of the six 200-PW-1 waste sites (216-Z-1A, 216-Z-9, 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 2 feet 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 and three of the six 200-PW-1 waste sites (216-Z-5, 216-Z-1&2, 216-Z-3, 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 22 ft 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 to 5.5 m (17 to 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, then taken out of service in May of 1973 when discharge of contaminated waste streams to the ground from the PFP was discontinued as a matter of policy. All available information indicates that the settling 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:

- Removal of sludge from 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 does not meet WIPP disposal criteria will be treated if necessary and sent to ERDF for disposal.
- Verification of removal of tank contents prior to grouting will be conducted in accordance with the RD/RA work plan.
- Grouting of empty tanks with a suitable fill material to remove the potential of collapse. Tanks will remain in place.

In addition, remediation of the tanks will be conducted to satisfy substantive requirements for closure of dangerous waste tanks.

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

An estimated 2,200 m^3 of TRU soil/rock/gravel waste is anticipated to be generated during the RTD of these OUs and an estimated 140 m^3 of TRU sludge from the two settling tanks. It is expected that any TRU waste generated during the remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 OUs will be packaged in WIPP certifiable containers at the point-of-generation and no new capabilities will be required. Remedial actions for the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 OUs are expected to be completed by September 30, 2024 (M-016-00).

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

Table A-1 in Appendix A describes the OUs and facilities with 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 work plans and closure conditions/schedules established in the Hanford Facility Dangerous Waste Permit, where applicable. Table A-1 in Appendix A 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 waste generation.

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 as follows: (1) soil/gravel/rock, (2) debris, and (3) sludge. The following subsections outline the waste disposition approach of each of these categories.

3.1 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 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 Records of Decision. 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 contaminated area has been removed; (2) removal of contaminated soil/gravel/rock using conventional excavation technology and placement into WIPP certifiable containers (standard waste box [SWB] or drums); and (3) assay of containers to determine whether they are TRU waste or low-level waste (LLW)/mixed low-level waste (MLLW). The TRU waste containers will be certified by the Central Characterization Project (CCP) and shipped to WIPP, and the LLW/MLLW containers to ERDF.

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 barrier as necessary and replant surface with native vegetation.

3.2 Debris

During the CERCLA cleanup actions of facilities and burial grounds, an upper bound estimate of 28,700 m^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.

For debris 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 also be used to repackage this waste. Yet to be determined, waste in this category could include a portion of the 27,290 m^3 of debris waste potentially removed from the 200-SW-2 landfills. The debris waste from the landfills could also be repackaged at WRAP, T Plant, or commercially as is being done with the M-091 retrievably stored waste (RSW) from the low-level burial grounds.

3.3 Sludge

During the CERCLA cleanup actions of facilities, an estimated 170 m^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. An absorbent 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.

The design of the treatment and packaging system for the K Basin sludge is not mature enough to determine whether the solidification and packaging system could be used for packaging of other TRU sludge.

4 References

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Appendix A

Outyear CERCLA Cleanup Actions

Terms

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CMS	corrective measures study
EE/CA	engineering evaluation/cost analysis
ERDF	Environmental Restoration Disposal Facility
FS	feasibility study
LLBG	low-level burial ground
LLW	low-level waste
MLLW	mixed low-level waste
OU	operable unit
PFP	Plutonium Finishing Plant
PMP	Project Management Plan
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
SWB	solid waste box
SWITS	Solid Waste Information and Tracking System
TBD	to be determined
TPA	Tri-Party Agreement
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TRUM	transuranic mixed
TSD	treatment, storage, and/or disposal
WIPP	Waste Isolation Pilot Plant

Table A-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.*	216-B-53A, Trench	Soil, Rock, Gravel	38 m^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. *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024.
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, 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 product. After 1970, waste that was designated as TRU waste was segregated in either specified LLBG 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 TPA Milestones M-091-40 and M-091-41, as discussed in Chapter 3 of this PMP. Prior to 1960, detailed inventory records were not maintained and specific information about the early landfills often is not available. **References:** The estimated volumes are based on currently available data in SWITS. DOE/RL-2004-60, *200-SW-1 Nonradioactive Landfills Group Operable Unit and 200-SW-2 Radioactive Landfills Group Operable Unit Remedial Investigation/Feasibility Study Work Plan.*	218-B-12B, Landfill	Debris	120 m^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. *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024.
		218-E-5, Landfill		140 m^3	
		218-W-1, Landfill		6,560 m^3	
		218-W-2, Landfill		8,240 m^3	
		218-W-2A, Landfill		180 m^3	
		218-W-3, Landfill		5,930 m^3	
		218-W-3A, Landfill		50 m^3	
		218-W-4A, Landfill		5,140 m^3	
		218-W-4B, Landfill		1,110 m^3	
		Total		27,290 m^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-2007-02, *Supplemental Remedial Investigation Feasibility Study Work Plan for the 200 Area Central Plateau 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.* From Table 2-15 in RHO-RE-ST-30P, *Hanford Defense Waste Disposal Alternatives: Engineering Support Data for the Hanford Defense Wasted- Environmental Impact Statement.* 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.*	216-S-1, & -2, Crib	Soil, Gravel, Rock	1,700 m^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. *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024.
		216-Z-7, Crib		590 m^3	
		241-T-361	Sludge/Liquid	93 m^3	

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Table A-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-30P, *Hanford Defense Waste Disposal Alternatives: Engineering Support Data for the Hanford Defense Wasted- Environmental Impact Statement.*	216-T-3, Injection/Reverse Well	Soil, Rock, Gravel	<10 m^3	*M-015-110A*: Submit RFI/CMS and RI/FS work plan for the 200-DV-1 OU by 3/31/2015. *M-015-110B*: Submit CMS, FS, and Proposed Plan/Proposed Corrective Action Decision for 200-DV-1 by 9/30/2015. *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024.
		216-B-5, Injection/Reverse Well		60 m^3	
		216-B-7A & -7B, Crib		430 m^3	
		216-T-32, Crib		460 m^3	
		216-T-18, Crib		590 m^3	
		216-T-5, Trench		TBD	
		216-T-7, Crib		TBD	
		216-T-6, Crib		290 m^3	
		Total		**1,840 m^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 was used for waste originating in B Plant. **References:** Volume of residual sludge in Tank 241-CX-72 from Table 2-2 in DOE/RL-2002-14, *241-CX-72 Tanks/Lines/Pits/Boxes/Septic Tank and Drain Fields Waste Group OU RI/FS Work Plan and RCRA TSD Unit Sampling Plan; Includes: 200-IS-1 and 200-ST-1 OUs.* 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 OUs.* DOE/RL-2010-114, *200-IS-1 Operable Unit Pipeline System Waste Sites RFI/CMS/RI/FS Work Plan*	241-CX-72, Storage Tank	Sludge/Liquid	3 m^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. *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. *M-016-00*: Complete remedial actions for all non-tank farm and non-canyon OUs by 9/30/2024. *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.
		241-B-361, Settling Tank		78 m^3	
		Diversion Boxes, Catch Tanks		TBD	
		Total		81 m^3	
200-CP-1, PUREX Tunnel #1 and Tunnel #2	The PUREX plant consists of the main fuels reprocessing building (202A) 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 of which it is estimated that seven percent is TRU.	PUREX Complex	Debris	680 m^3	*M-085-20A*: Submit RI/FS work plan for the 200-CP-1 OU (PUREX Canyon/associated past practice waste sites) by 9/30/2015. *M-085-00*: Complete response actions for
		PUREX Tunnel #1		270 m^3	
		PUREX Tunnel #2		410 m^3	

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Table A-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	
	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) 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 17 railcars, contains approximately 1,370 m^3 (61,094 ft) of unsegregated radioactive waste. Section 3.2 of WHC-IP-0977, describes the equipment stored in Tunnel #2. Approximately 30 percent of the unsegregated radioactive waste is estimated to be TRU. **Reference:** WHC-IP-0977, *Estimation of PUREX Equipment and Materials That are Candidates for Removal and Waste Processing During PUREX Plant Closure.*	Total		1,360 m^3	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.
224B	The 224B Building, located in the 200 East Area of the Hanford Site, was used to purify and concentrate diluted plutonium nitrate solution that was the 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 224B Building. Majority of the radioactive inventory exists within the process cell equipment and piping. The 224B Building is designated as a Tier 1 Facility based on the fact that an EE/CA has already been developed and not on the results of the graded approach process. Final demolition of the 224B Building will be in accordance with DOE/RL-2004-36, *Action Memorandum for the Non-Time Critical Removal Action for the 224-B Plutonium Concentration Facility.* **References:** 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 224B Hot Cell.*	224B	Debris	TBD	*M-085-50*: Submit revised removal action work plan for the 224B Concentration Facility by 12/31/2015. *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.
200-CR-1	The REDOX Facility, also referred to as the 221-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 the 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-085-30A*: Submit RI/FS work plan for the 200-CR-1 OU (REDOX Canyon/associated past practice waste sites) by 12/31/2017. *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.

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