APPENDIX G.5.2

Plutonium Contaminated Waste Sites
(CP-LS-2, Central Plateau)
EVALUATION UNIT SUMMARY TEMPLATE

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PART I. EXECUTIVE SUMMARY

EU LOCATION:

CP-LS-2 is located in the central portion of the 200 W area.

RELATED EUS:

CC-DD-5 and CP-GW-2; Operable Unit Cross-Walk: 200-PW-1, 3, 6 200-CW-5

PRIMARY CONTAMINANTS, CONTAMINATED MEDIA AND WASTES:

CP-LS-2 is composed of plutonium (Pu) contaminated cribs and trenches and ancillary structures associated with PFP in the central part of the 200-W area. This EU consists of multiple radioactive process sewers, buried Tank Farm pipelines, a burn pit, cribs (a subsurface liquid disposal site), ponds, trenches, ditches, tile fields, French drains, a settling tank, septic tanks, buildings (including process and infrastructure buildings), and storage pads. Only one process sewer is active (the 200-W-207-PL-B; PFP Process Sewer Segments Connecting to the TEDF System). There is one active septic tank (2607-WA). Only three of the 54 buildings in this EU are inactive.

The reported inventories for the radionuclide and chemical contaminants for this collection of sites is provided in Table G.5.2-6 through Table G.5.2-8.

BRIEF NARRATIVE DESCRIPTION:

This Evaluation Unit consists of a variety of plutonium (Pu) contaminated cribs, trenches, piping, burn pits and ancillary structures associated with PFP in the central part of the 200-W area.

From the ROD: these sites "*are associated with subsurface waste handling and disposal sites that were engineered and constructed to dispose of liquid waste into the soil beneath the sites. Pipes conveyed the liquid waste from nuclear processing facilities to the waste sites. At the cribs, tile field, and French drain, liquid waste was discharged into a layer of gravel that drained into the underlying soil and may have drained laterally as well as downward*". As a consequence, the soils in, or underlying, these sites contain substantial amounts of radionuclides including plutonium and cesium, as well as large quantities of chemical constitutes such as carbon tetrachloride, chromium and nitrate.

The large volume of waste associated with these sites and structures makes complete retrieval and disposal infeasible. Where possible transuranic waste will be recovered and disposed of at the Waste Isolation Pilot Plant. Other contaminated soils will be disposed at the Hanford Site Environmental Restoration Disposal Facility (ERDF). However, there will be residual waste left in place that is not feasible to retrieve.

The Record of Decision notes that "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 contaminated soil, structures, and debris; (2) treating these removed wastes as required to meet disposal requirements at ERDF, which is located on the Hanford Site or waste acceptance criteria for off-site disposal at WIPP; and (3) disposal at ERDF or WIPP."

Cleanup levels have been set for these sites which are intended to be protective of groundwater, as well as current and future industrial land use. Examples of selected remedies include excavating

contaminated soils and debris that exceed cleanup levels to a depth of 15 feet below ground surface. The excavated material will be disposed of either at WIPP or ERDF.

SUMMARY TABLE OF RISKS AND POTENTIAL IMPACTS TO RECEPTORS

Table G.5.2-1 provides a summary of nuclear and industrial safety related risks to humans and impacts to important physical Hanford site resources.

Human Health: A Facility Worker is deemed to be an individual located anywhere within the physical boundaries of the immediate areas around the facilities; a Co-located Person (CP) is an individual located 100 meters from the facilities; and Public is an individual located at the closest point on the Hanford Site boundary not subject to DOE access control. The nuclear related risks to humans are based on unmitigated (unprotected or controlled conditions) dose exposures expressed in a range of from Non-Discernable (ND) to High. The estimated mitigated exposure that takes engineered and administrative controls and protections into consideration, is shown in parentheses.

Groundwater and Columbia River: Direct impacts to groundwater resources and the Columbia River, have been rated based on available information for the current status and estimates for future time periods. These impacts are also expressed in a range of from *Not Discernible* (*ND*) to *Very High*.

Ecological Resources[1]: The risk ratings are based on the degree of physical disruption (and potential additional exposure to contaminants) in the current status and as a potential result of remediation options.

Cultural Resources[1]: A rating for cultural resources is not being made because cultural resources will be evaluated under Section 106 of the National Historic Preservation Act (16 USC 470, et. seq.) during the planning for remedial action. The resulting Section 106 process will engage all stakeholders, including Native American Tribes, concerning the Native American, Historic Pre-Hanford, and Manhattan Project/Cold War landscapes. This process will identify all cultural resources and evaluate their eligibility for the National Register of Historic Places, any direct and indirect effects from remediation, as well as the need for any mitigation actions. CRESP has consulted with the Native American Tribes having historical ties to Hanford and they consider the entire Hanford Site to be culturally and historically important.

[1] References throughout this Evaluation Unit Summary Template supporting analyses related to Ecological Resources and/or Cultural Resources may be found in Appendices J and K, respectively. Refer to the specific EU when searching for the reference.

Table G.5.2-1. Risk Rating Summary (for Human Health, unmitigated nuclear safety basis indicated, mitigated basis indicated in parentheses (e.g., "Very High" (Low)).

Population or Resource		Evaluation Time Periods: Active Cleanup (to 2064) – Current Condition – Operations	Evaluation Time Periods: Active Cleanup (to 2064) – From Cleanup Actions
Human	Facility Worker	Low to Not Discernible (ND)	Low to Medium
	Co-located Person	Low to ND	Low
	Public	ND	ND
Environmental	Groundwater (A&B) from vadose zone[a]	*Very High* (CCl_4) *Medium* (Cr(tot), Cr-VI) *Low* (C-14, I-129, Tc-99) *ND* (Sr-90, U(tot))[c]	*Very High* (CCl_4) *Medium* (Cr(tot), Cr-VI) *Low* (C-14, I-129, Tc-99) *ND* (Sr-90, U(tot))[c]
	Columbia River from vadose zone[a]	ND	ND
	Ecological Resources[b]	ND to Low	Low to Medium
Social	Cultural Resources[b]	**Native American:** Direct: Known Indirect: Known **Historic Pre-Hanford:** Direct: Known Indirect: Known **Manhattan/Cold War:** Direct: Known Indirect: Unknown	**Native American**: Direct: Known Indirect: Known **Historic Pre-Hanford**: Direct: Known Indirect: Known **Manhattan/Cold War:** Direct: Known Indirect: Unknown

a. Threat to groundwater or the Columbia River from Group A and B primary contaminants (PCs) (Table 6-1, CRESP 2015a) remaining in the vadose zone. Threats from plumes associated with the Plutonium Contaminated Waste Sites EU are described in **Part V** with additional information provided in Appendix G.6 (CP-GW-2) for the 200-ZP Groundwater Interest Area (GWIA).

b. For both Ecological and Cultural Resources, see Appendices J and K, respectively, for a complete description of Ecological Field Assessments and literature review for Cultural Resources. Ecological ratings are described in Table 4-11 of the Final Report.

c. These ratings are for PCs with reported inventories. (See **Parts V** and **VI** for additional details.) The Sr-90 and total uranium disposed of in the Plutonium Contaminated Waste Sites EU would translate to *Medium* and *Low* ratings, respectively; however, there is no current Sr-90 or total uranium plume in the 200-ZP GWIA (DOE/RL-2016-09, Rev. 0), and it would likely require more than 150 years to reach groundwater in a sufficient amount to exceed the drinking water standard over an appreciable area (**Part V**). The Sr-90 and total uranium ratings *after* the Active Cleanup period are both *Low* to account for uncertainties in the evaluation.

SUPPORT FOR RISK AND IMPACT RATINGS FOR EACH TIME PERIOD

Human Health

Current

Building and facilities: The CP-LS-2 EU is situated in the 200-West area of the Hanford site, which is in the middle of the Central Plateau encompassing the region where chemical processing and waste management activities occurred. Cleanup levels for the Inner Area are expected to be based on industrial land use. There is ongoing remediation activity in the vicinity of the structures associated with this EU. This site includes EU encompasses multiple discrete entities including:

- 2 Burial Grounds
- 12 Cribs (sub surface disposal includes crib, trench, drain, tile field)
- 49 Infrastructure buildings
- 13 Pipelines
- 4 pond/ditches
- 6 Process buildings
- 5 Septic systems
- 2 structures (including storage pads)
- 1 Underground storage tank

Many of the infrastructure buildings associated with this Evaluation Unit are assessed as less than a hazard category 3 in accordance with DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, based on the fact that no radioactive sources are present in the facilities. Consequently the risk from demolition associated with these facilities is a standard industrial accident scenario.

Soils associated with several of the sites under this EU are contaminated with significant concentrations of plutonium or cesium, as well as toxic chemicals such as carbon tetrachloride. However, many of these sites are backfilled and surface stabilized, and marked as to the presence of underground contamination.

There is some potential for long-term groundwater contamination from mobile contaminants such as carbon tetrachloride (CCl_4) and Tc-99. The exposure pathways for workers and the general public, are however, fairly limited. From the ROD (page 19) "*Under current industrial land use and Hanford site-wide institutional control conditions, only a construction worker has the potential to encounter impacted soil. There are no complete and significant pathways for current regular workers. Exposure routes to groundwater and surface water are incomplete*."

Ecological Resources

Current

There are currently no ecological resources on EU or buffer area.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Any ecological risk depends upon the quality and quantity of re-vegetation following remediation; there could be a risk from invasion of exotic species.

Cultural Resources

Current

A rating for cultural resources is not being made because cultural resources will be evaluated under Section 106 of the National Historic Preservation Act (16 USC 470, et. seq.) during the planning for remedial action. The resulting Section 106 process will engage all stakeholders, including Native American Tribes, concerning the Native American, Historic Pre-Hanford, and Manhattan Project/Cold

War landscapes. This process will identify all cultural resources and evaluate their eligibility for the National Register of Historic Places, any direct and indirect effects from remediation, as well as the need for any mitigation actions. CRESP has consulted with the Native American Tribes having historical ties to Hanford and they consider the entire Hanford Site to be culturally and historically important.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

There are no expectations for impacts to known cultural resources.

Considerations for timing of the Cleanup Actions

The selected remedy requires that structures and other debris be removed in order to conduct required remediation. Clean soil covers will be added back over sites to provide at least 15 feet over cesium contaminated soils. Institutional controls and long term monitoring will be required for those sites where contamination is left in place, and to ensure that land use is consistent with the ROD. The selected remedy has some moderate potential for exposure of construction workers as a consequence of local excavation of contaminated material. Neither ground water nor surface water pathways will be completed.

Many of the principal contaminants of concern (plutonium, cesium, strontium, and uranium) are relatively immobile in soils in the absence of significant amounts of water to mobilize them. However, other contaminants such as Tc-99 and carbon tetrachloride will continue to pose a long term threat to groundwater unless they are reduced in concentration.

Near-Term, Post-Cleanup Risks and Potential Impacts

The cleanup criteria for this Evaluation Unit are to industrial use standards. These standards will preclude accessing the subsurface environment where residual contamination resides. Consequently, the near-term post cleanup risks are expected to be low for workers, the public, and the environment.

Long-Term, Post-Cleanup Conditions

The ROD established final cleanup levels for the sites within the EU. These are identified in the Table G.5.2-2.

Table G.5.2-2. From ROD (Table 35. Final Cleanup Levels for 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Soils)

Plutonium-239-240	765	Human Health (Industrial use)	Cancer risk < 1×10^{-4} [c, d]
Americium-241	940	Human Health (Industrial Use)	Cancer risk = 1×10^{-4} [d]
Cesium-137	17.7	Human Health (Industrial Use)	Cancer risk = 1×10^{-4} [d]
Radium-226	4	Human Health (Industrial Use)	Cancer risk = 1×10^{-4} [d]
Strontium-90	20	Ecological Receptor Protection	HQ = 1
PCBs	0.65 mg/kg	Ecological Receptor Protection	HQ = 1
Boron	0.5	Ecological Receptor Protection	HQ = 1
Mercury	0.1	Ecological Receptor Protection	HQ = 1
Carbon Tetrachloride	100 $ppmv^{(a)}$	Groundwater Protection	Excess Lifetime Cancer Risk = 1×10^{-5} [e]
Methylene Chloride	50 $pmv^{(a)}$	Groundwater Protection	1×10^{-5} [e]

a. Soil vapor concentrations will be further refined and assessed to ensure they are protective of groundwater.

b. Cleanup levels are based on an industrial land use scenario. When cleanup levels for ecological receptors or groundwater protection were lower than human health protection, the lower value was used as the final cleanup level.

c. The preliminary remediation goal identified in the FSs based on 10^{-4} risk was 2,900 pCi/g for plutonium 239-240. However, DOE has agreed to a more conservative value of 765 pCi/g for this remedial action.

d. Final verification sampling for radiological contaminants at the Z-Ditches Waste Group will be evaluated to confirm that the aggregate risk level is less than 1×10^{-4}.

e. The DOE will cleanup up COCs for the 200-PW-1 OU subject to WAC 173-340, “Model Toxics Control Act-Cleanup” (carbon tetrachloride and methylene chloride), so the total excess lifetime cancer risk from carbon tetrachloride and methylene chloride does not exceed 1 x 10-5 at the conclusion of the remedy.

PART II. ADMINISTRATIVE INFORMATION

OU AND/OR TSDF DESIGNATION(S)

200-PW-1, 3, 6; 200-CW-5

COMMON NAME(S) FOR EU

Plutonium Contaminated Waste Sites

KEY WORDS

D7D, Soils, Cribs, Trenches

EU Designation: CP-LS-2 (Plutonium Contaminated Waste Sites)

REGULATORY STATUS

Regulatory basis: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Hanford Federal Facility Agreement and Consent Order (also known as the Tri-Party Agreement), and, to the extent practicable, the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 Code of Federal Regulations [CFR] 300) (National Contingency Plan [NCP]).

Applicable regulatory documentation

Record of Decision Hanford 200 Area Superfund Site

200-CW-5 AND 200-PW-1, 200-PW-3, AND 200-PW-6 Operable Units, September 2011

Applicable Consent Decree or TPA milestones

Not Applicable

RISK REVIEW EVALUATION INFORMATION

Completed: January 30, 2015; updated March 16, 2017

Evaluated by: KA Higley and Kevin Brown

Reviewed by: H. Mayer

PART III. SUMMARY DESCRIPTION

CURRENT LAND USE

DOE Hanford industrial area site

DESIGNATED FUTURE LAND USE

Industrial (From the USDOE Hanford 200 Area ROD - Cleanup levels for the Inner Area are expected to be based on industrial land use)

PRIMARY EU SOURCE COMPONENTS

Legacy Source Sites

This EU encompasses multiple discrete entities including:

- 2 Burial Grounds
- 12 Cribs (sub surface disposal includes crib, trench, drain, tile field)
- 49 Infrastructure buildings
- 13 Pipelines
- 4 pond/ditches
- 6 Process buildings
- 5 Septic systems
- 2 structures (including storage pads)
- Underground storage tank

High-Level Waste Tanks and Ancillary Equipment

Not Applicable

Groundwater Plumes

The saturated zone beneath the CP-LS-2 (Plutonium Contaminated Waste Sites) area currently has elevated levels of carbon tetrachloride (CCl_4) and nitrate based on 2014 groundwater monitoring results (http://phoenix.pnnl.gov/apps/gw/phoenix.html). The 200 West Area plumes are described in detail in the CP-GW-2 EU (Appendix D.6). Many waste sites within the CP-LS-2 EU are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0), and CP-LS-2 sites have been linked as sources for the carbon tetrachloride in the 200 West area[2] (DOE/RL-2016-09, Rev. 0). Monitoring and treatment of groundwater is being conducted within the 200-ZP GWIA using 200 West Pump and Treat (P&T) facility, which are described as part of the CP-GW-2 EU (Appendix D.6).

Operating Facilities

Not Applicable

D&D of Inactive Facilities

Not Applicable

[2] Primary sources for the 200-West carbon tetrachloride plume were discharges of liquid waste from the PFP plutonium separation processes to the 216-Z-1A, 216-Z-9, and 216-Z-18 Cribs and Trenches (DOE/RL-92-16, Rev. 0) that are included in the CP-LS-2 EU.

LOCATION AND LAYOUT MAPS

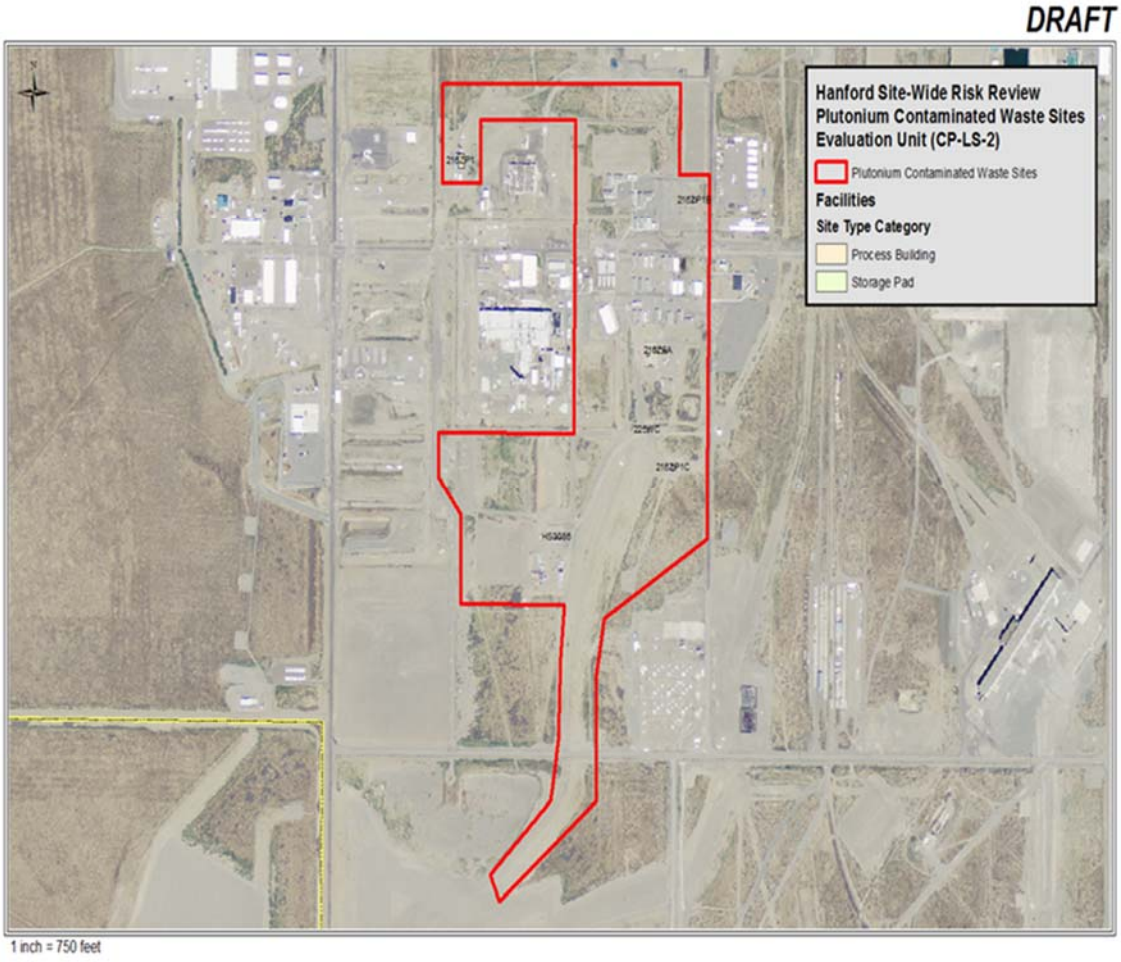

Figure G.5.2-1 Location of EU CP-LS-2

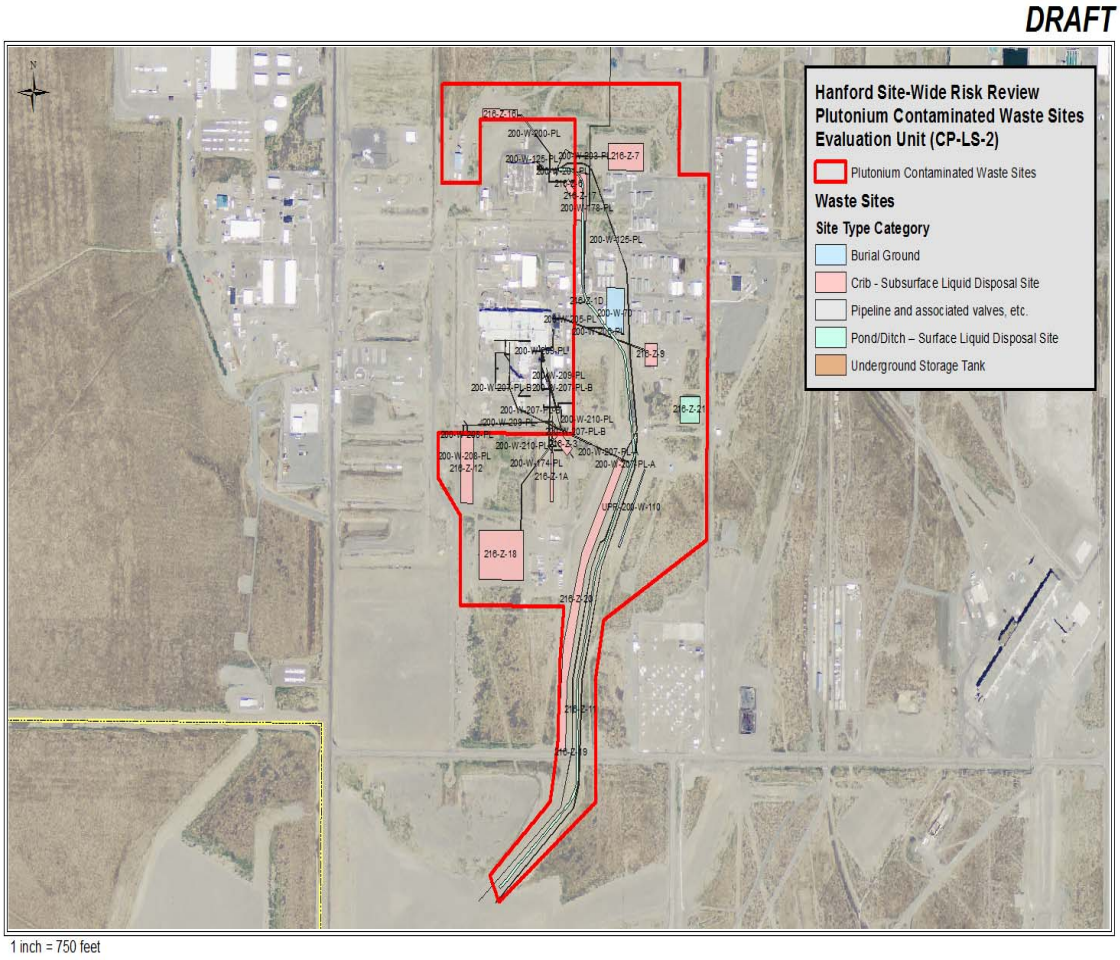

Figure G.5.2-2 Categories of sites within EU CP-LS-2

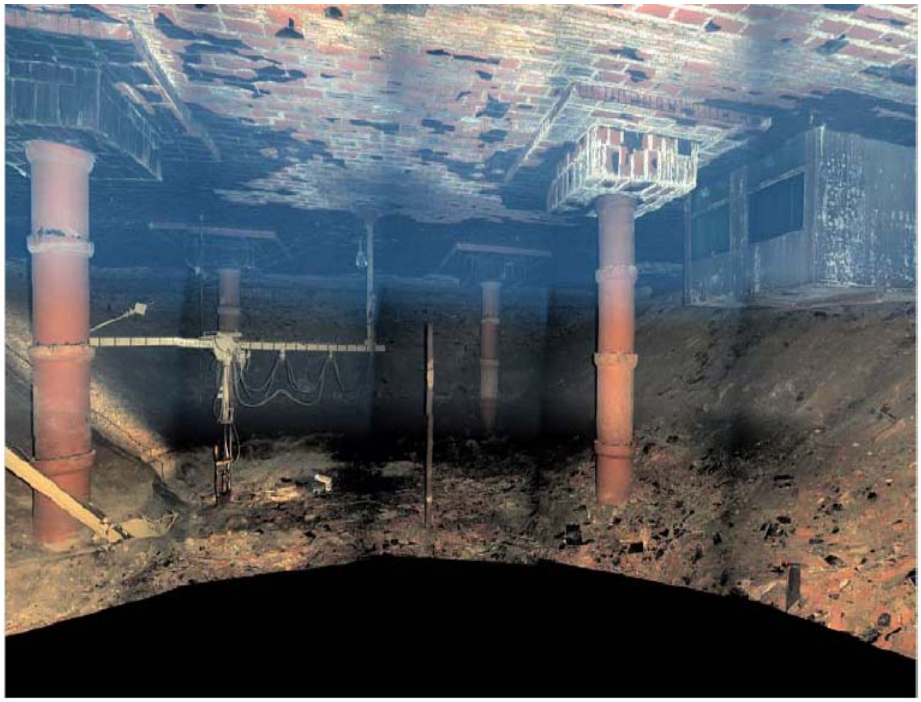

Figure G.5.2-3. Composite of High Resolution Pictures of the Interior of the Z-9 Crib

PART IV. UNIT DESCRIPTION AND HISTORY

EU FORMER/CURRENT USE(S)

What is the origin and history of the contamination (e.g., accidental release, intentional discharge, multiple discharges)?

This Evaluation Unit consists of a variety of plutonium (Pu) contaminated cribs, trenches, piping, burn pits and ancillary structures associated with PFP in the central part of the 200-W area.

From the ROD: these sites "*are associated with subsurface waste handling and disposal sites that were engineered and constructed to dispose of liquid waste into the soil beneath the sites. Pipes conveyed the liquid waste from nuclear processing facilities to the waste sites. At the cribs, tile field, and French drain, liquid waste was discharged into a layer of gravel that drained into the underlying soil and may have drained laterally as well as downward*". As a consequence, the soils in, or underlying, these sites contain substantial amounts of radionuclides including plutonium and cesium, as well as large quantities of chemical constitutes such as carbon tetrachloride, chromium and nitrate.

What are the primary contaminants (risk drivers)?

The reported inventories for the primary contaminants in the CP-LS-2 EU are provided in Table G.5.2-6 through Table G.5.2-8. The current threats to groundwater are evaluated in Table G.5.2-9.

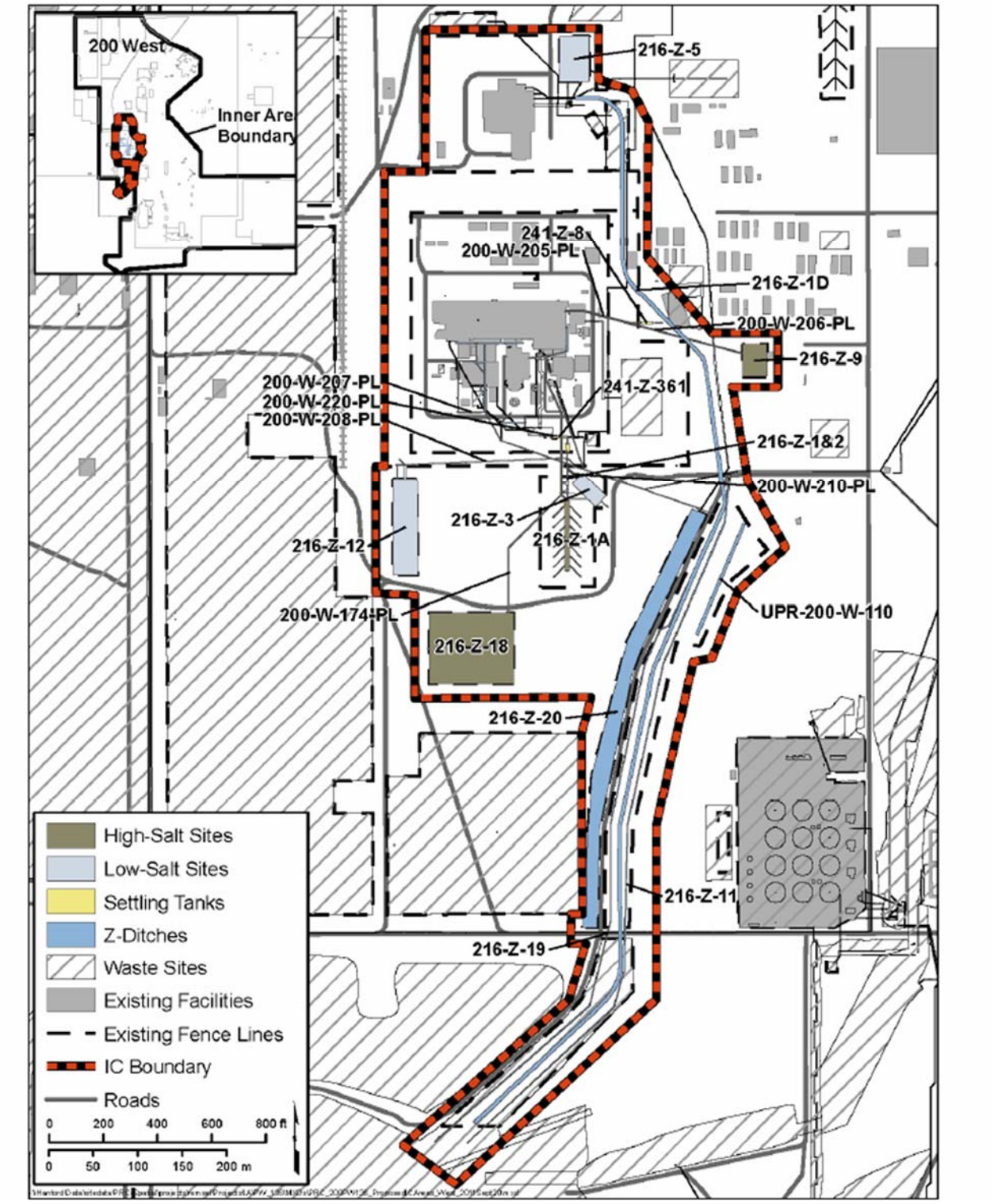

Figure G.5.2-4. 200-CW-5, 200-PW-1, 200-PW-6 OU IC Boundaries (From ROD, page 95).

Are there co-contaminants that will affect mobility of the primary contaminants?

Waste site within this EU consist of high-salt sites (such as 216-Z-9), low salt sites, settling tanks ditches and more. Sites such as the 216-Z-9 trench have an inventory of transuranics as well as high concentrations of carbon tetrachloride.

What is the depth of contamination and soil type/stratigraphy associated with the contamination? Is the soil profile primarily natural or heavily disrupted?

From the ROD (PAGE 25): "*At the 216-Z-9 Trench, the discharged effluent volume was greater than soil column pore volume, which indicates the volume of effluent released was sufficient to reach the unconfined aquifer during operation of this waste site. The data, including soil moisture content measurements, indicates that the 216-Z-9 Trench is not a significant current source of groundwater contamination*."

What is the physical state of the primary contaminants (i.e., adsorbed in contaminated soil, as debris, in subsurface piping)?

The contaminants are in the soil. For some waste sites the highest concentration of contaminants in the vadose zone are associated with fine-grained layers of silt.

Is information available indicating the partition coefficients and other important transport parameters for the primary contaminants with the type of soil (if yes, provide table)?

There is a general Hanford database that provides lists of distribution coefficients.

What is the source and reliability of the information available to describe the contaminants (risk drivers) and materials present?

There are a variety of sources of information of reasonable reliability. Some sites, such as 216-Z-9 have been the subject of substantial characterization and remediation efforts.

Legacy Source Sites

This EU includes multiple discrete entities including:

- 2 Burial Grounds
- 12 Cribs (sub surface disposal includes crib, trench, drain, tile field)
- 49 Infrastructure buildings
- 13 Pipelines
- 4 pond/ditches
- 6 Process buildings
- 5 Septic systems
- 2 structures (including storage pads)
- Underground storage tank

See **Part V** for more details.

High-Level Waste Tanks

Not Applicable

Groundwater Plumes

The saturated zone beneath the CP-LS-2 (Plutonium Contaminated Waste Sites) area currently has elevated levels of carbon tetrachloride (CCl_4) and nitrate based on 2014 groundwater monitoring results (http://phoenix.pnnl.gov/apps/gw/phoenix.html). The 200 West Area plumes are described in detail in the CP-GW-2 EU (Appendix D.6). Sites within the CP-LS-2 EU with reported inventories (Table G.5.2-6

through Table G.5.2-8), including the 216-Z-1&2, 216-Z-3, 216-Z-7, 216-Z-12, 216-Z-16, 216-Z-18, and 216-Z-20 Cribs; 216-Z-11, 216-Z-17, and 216-Z-19 Ditches; 216-Z-1A Tile Field; and 216-Z-9 Trench are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0). CP-LS-2 sites have also been linked as sources for the carbon tetrachloride in the 200 West area[3] (DOE/RL-2016-09, Rev. 0). Monitoring and treatment of groundwater is being conducted within the 200-ZP GWIA using 200 West Pump and Treat (P&T) facility, which are described as part of the CP-GW-2 EU (Appendix D.6).

D&D of Inactive Facilities

Not applicable

Operating facilities

Not applicable

ECOLOGICAL RESOURCES SETTING

Landscape Evaluation and Resource Classification

More than 60% of the acreage in the Plutonium Contaminated Waste Sites EU is classified as level 0 or level 1 habitat and does not provide significant habitat resources**.** The EU contains approximately 4.2 acres (less than 5%) of level 3 biological resources. The amount and proximity of the biological resources to the EU was examined within the adjacent landscape buffer area radiating 1,365 m from the geometric center of the EU (equivalent to 1,357 acres). More than half of the combined total area (EU and adjacent landscape buffer area) is classified as level 0 or 1 habitat, with level 2 habitat resources comprising 38.5% and level 3 and above resources comprising only 3.4% of the area at the landscape level. Some of the habitat patches within this EU are contiguous with habitat in the surrounding adjacent landscape buffer area, but the patches in the adjacent landscape buffer are not contiguous with habitat outside the 200 West industrial area and generally represent isolated habitat fragments.

Field Survey

PNNL biologists conducted pedestrian and vehicle surveys throughout the EU. Canopy cover of species was estimated visually in level 2 resource areas, and measured along a transect in a level 3 resource area. Much of the EU has been previously disturbed by ongoing operations and the installation and operation of various pump and treat wells and remaining habitat occurs in strips and patches surrounded by roads and infrastructure. Vegetation measurements confirmed the status of resources within the EU. Two individual species occurrences of Piper's daisy (*Erigeron piperianus*) were previously noted in the EU, but were not relocated during October 2014 survey of the unit.

Some wildlife sign was observed during the October survey including small mammal tracks and burrows, coyote tracks (*Canis latrans*), unidentified lizards, rabbit tracks, and harvester ant hills. These observations match wildlife observations and sign noted previously by the PNNL ECAP surveys. PNNL ECAP surveys conducted in 2009 and 2010 recorded mountain cottontail (*Sylvilagus nutalli*), northern pocket gopher (*Thomomys talpoides*), side-blotched lizard (*Uta stansburiana*), western kingbird (*Tyrannus verticalis*), lark sparrow (*Chondestes grammacus*), rock dove (*Columba livia*), American robin

[3] Primary sources for the 200-West carbon tetrachloride plume were discharges of liquid waste from the PFP plutonium separation processes to the 216-Z-1A, 216-Z-9, and 216-Z-18 Cribs and Trenches (DOE/RL-92-16, Rev. 0) that are included in the CP-LS-2 EU.

(*Turdus migratorius*), American kestrel (*Falco sparverius*), and mourning dove (*Zenaida macroura*) within the multiple habitat patches in this EU.

CULTURAL RESOURCES SETTING

Cultural resources known to be recorded within the Plutonium Contaminated Waste Sites EU are limited to the National Register-eligible buildings associated with the Manhattan Project/Cold War Era Landscape with documentation required. These include the Hanford Site Plant Railroad and the seven buildings listed below.

Table G.5.2-3. Cultural Resource National Register-eligible Buildings.

242Z	Waste Treatment Facility
234-5ZA	PFP Micon, Aces, and Mask Fit Stations
231Z	Materials Engineering Laboratory
234-5Z	Plutonium Fabrication Facility
2736Z	Plutonium Storage Building
2736ZB	Plutonium Storage Support Facility
291Z	Exhaust Air Filter Stack Building
236Z	Plutonium Reclamation Facility
2736ZA	Plutonium Storage Ventilation Structure

All National-Register-eligible Manhattan Project and Cold War Era buildings been documented as described in the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan* (DOE/RL-97-56).

Much of the Plutonium Contaminated Waste Sites EU has not been inventoried for archaeological resources and it is unknown if an NHPA Section 106 review has been completed for remediation of the Plutonium Contaminated Waste Sites EU as one was not located. One small archaeological survey was completed under with negative findings. It is unlikely that intact archaeological material is present in the areas that have not been inventoried for archaeological resources (both on the surface and in the subsurface), because the soils in the EU are extensively disturbed.

There are 2 archaeological sites identified within 500 meters of the Plutonium Contaminated Waste Sites EU a non-contributing segment of a National Register-eligible historic/ethnohistoric Trail/Road associated with the Pre-Hanford Early Settlers/Farming and Native American Precontact and Ethnographic Landscapes, and a site likely associated with the Pre-Hanford Early Settlers/Farming Landscape. Additionally two isolated finds one associated with the Native American Precontact and Ethnographic Landscape and one associated with the Pre-Hanford Early Settlers/Farming Landscape have also been identified. None of these resources is considered to be National Register-eligible.

Historic maps and cultural resources surveys indicate there is evidence of historic and ethnohistoric land use associated with transportation and travel through the area as a historic/ethnohistoric Trail/Road is located within close proximity to the Plutonium Contaminated Waste Sites EU. Geomorphology indicates a moderate potential for the presence of Native American Precontact and Ethnographic cultural resources to be present subsurface within the small pocket of Holocene Dune Sands deposits

contained within the Plutonium Contaminated Waste Sites EU. Extensive ground disturbance within the entire EU however, may negate this moderate potential. Because the historic/ethnohistoric Trail/Road is located in such close proximity to the Plutonium Contaminated Waste Sites EU, mitigation for indirect impacts may need to be considered as part of the remediation efforts including measures undertaken to avoid and protect this area. Consultation with Hanford Tribes (Confederated Bands of the Yakama Nation, Wanapum, Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce) and other groups associated with these landscapes (e.g. East Benton Historical Society, the Franklin County Historical Society, the Prosser Cemetery Association, the Reach, and the B-Reactor Museum Association) may need to occur. Indirect effects are always possible when TCPs are known to be located in the general vicinity. Consultation with Hanford Tribes may also be necessary to provide input on indirect effects to both recorded and potential unrecorded TCPs in the area and other cultural resource issues of concern.

PART V. WASTE AND CONTAMINATION INVENTORY

From the ROD: these sites "*are associated with subsurface waste handling and disposal sites that were engineered and constructed to dispose of liquid waste into the soil beneath the sites. Pipes conveyed the liquid waste from nuclear processing facilities to the waste sites. At the cribs, tile field, and French drain, liquid waste was discharged into a layer of gravel that drained into the underlying soil and may have drained laterally as well as downward*". As a consequence, the soils in, or underlying, these sites contain substantial amounts of radionuclides including plutonium and cesium, as well as large quantities of chemical constitutes such as carbon tetrachloride, chromium and nitrate.

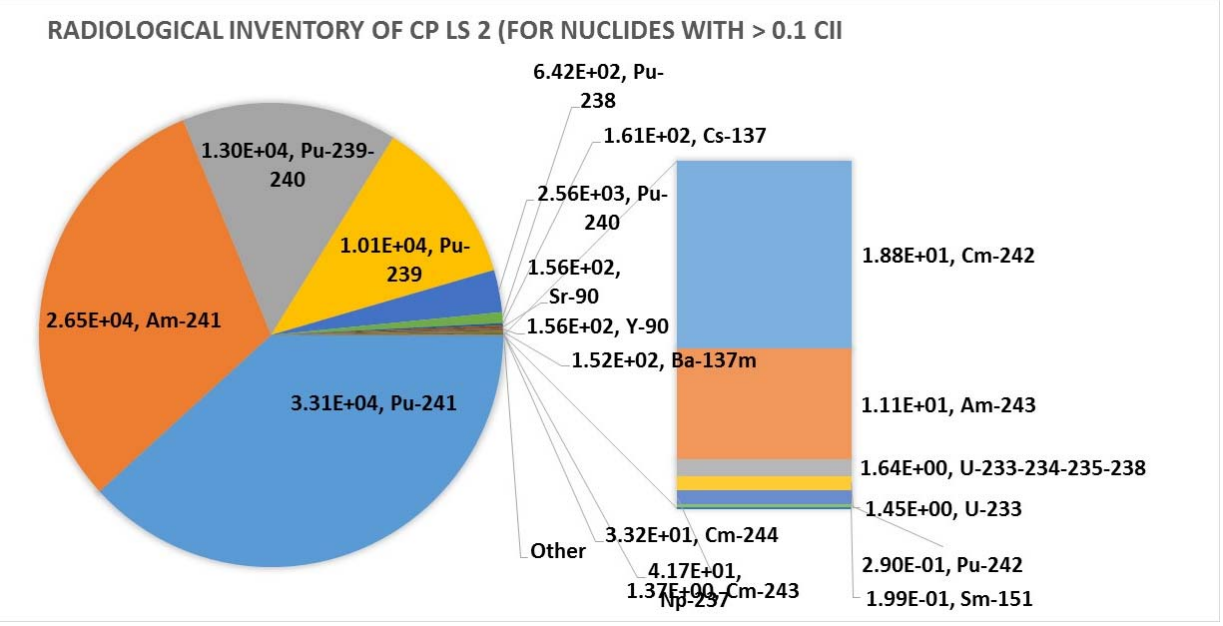

Figure G.5.2-5. Radiological Inventory of CP-LS-2

What is the physical state of the primary contaminants (e.g., adsorbed in contaminated soil, as debris, in subsurface piping)?

EU Designation: CP-LS-2 (Plutonium Contaminated Waste Sites)

Primary contaminants are in soils underlying the waste sites.

CONTAMINATION WITHIN PRIMARY EU SOURCE COMPONENTS

Legacy Source Sites

The sites that are included as part of this EU are shown in Table G.5.2-4.

Table G.5.2-4. Sites included in EU CP-LS-2.

Site Code	Name, Aliases, Description	Site Status	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation
216ZP1	MAIN 200W PUMP AND TREAT PROCESS FACILITY	ACTIVE	BUILDING	Process Building		
216ZP1B	EXTRACTION MANIFOLD BUILDING	ACTIVE	BUILDING	Process Building		
216ZP1C	EXTRACTION MANIFOLD BUILDING	ACTIVE	BUILDING	Process Building		
225WC	INSTRUMENTATION AND LOCAL CNTRL UNIT 55C-23	ACTIVE	BUILDING	Process Building		
2702Z	TELECOMMUNICATIONS	ACTIVE	BUILDING	Infrastructure Building		X
HO6403544	SEMI-TRAILER NEAR Z-9	ACTIVE	BUILDING	Infrastructure Building		X
MO011	MOBILE OFFICE EAST OF PFP	ACTIVE	BUILDING	Infrastructure Building		X
MO015	MOBILE OFFICE AT 234-5Z	ACTIVE	BUILDING	Infrastructure Building		X
MO016	MOBILE OFFICE AT 234-5Z	ACTIVE	BUILDING	Infrastructure Building		X
MO017	MOBILE OFFICE AT 234-5Z	ACTIVE	BUILDING	Infrastructure Building		X
MO031	MOBILE OFFICE AT 234-5Z	ACTIVE	BUILDING	Infrastructure Building		X
MO032	MOBILE OFFICE AT 234-5Z	ACTIVE	BUILDING	Infrastructure Building		X
MO191	ZP-1 OPERATIONS TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2100	MO2100 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2101	MO2101 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2102	MO2102 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2103	MO2103 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2104	MO2104 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2105	MO2105 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2106	MO2106 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X

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Site Code	Name, Aliases, Description	Site Status	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation
MO2107	MO2107 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2108	MO2108 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2109	MO2109 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2110	MO2110 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2111	MO2111 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2112	MO2112 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2113	MO2113 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2114	MO2114 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2115	MO2115 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2116	MO2116 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2117	MO2117 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2118	MO2118 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2119	MO2119 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2120	MO2120 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2121	MO2121 CREW TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2122	MO2122 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2123	MO2123 OFFICE TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2124	TOOL CRIB AT PFP PROTECTED AREA	ACTIVE	BUILDING	Infrastructure Building		X
MO2301	MO2301 RESTROOM TRAILER	ACTIVE	BUILDING	Infrastructure Building		X
MO2302	MO2302 RESTROOM TRAILER AT PFP PARKING LOT	ACTIVE	BUILDING	Infrastructure Building		X
MO2303	RESTROOM TRAILER AT PFP N PARKING LOT	ACTIVE	BUILDING	Infrastructure Building		X
MO2304	RESTROOM TRAILER AT PFP PARKING LOST W OF MO290	ACTIVE	BUILDING	Infrastructure Building		X
MO2305	RESTROOM TRL AT PFP PARKING LOT WEST OF MO290	ACTIVE	BUILDING	Infrastructure Building		X

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Site Code	Name, Aliases, Description	Site Status	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation
MO2306	RESTROOM TRL AT PFP PARKING LOT EAST OF MO273	ACTIVE	BUILDING	Infrastructure Building		X
MO2307	RESTROOM TRL AT PFP PARKING LOT EAST OF MO273	ACTIVE	BUILDING	Infrastructure Building		X
MO244	CHANGE TRAILER EAST OF PFP	ACTIVE	BUILDING	Infrastructure Building		X
MO249	MOBILE OFFICE AT 234-5Z PFP TRAINING	ACTIVE	BUILDING	Infrastructure Building		X
MO250	MOBILE OFFICE AT 234-5Z PFP TRAINING	ACTIVE	BUILDING	Infrastructure Building		X
MO273	MOBILE OFFICE AT PFP	ACTIVE	BUILDING	Infrastructure Building		X
MO290	MOBILE OFFICE	ACTIVE	BUILDING	Infrastructure Building		X
MO939	MOBILE OFFICE AT 234-5Z	ACTIVE	BUILDING	Infrastructure Building		X
216Z9A	CONTAINMENT STRUCTURE 216Z9 MINING OPERATION	INACTIVE	BUILDING	Process Building		
216Z9B	OPERATOR'S CUBICLE 216Z9 MINING OPERATION	INACTIVE	BUILDING	Process Building		
MO546	GRP FIELD TRAILER SOUTH OF 234-5	INACTIVE	BUILDING	Infrastructure Building		X
200-W-70	200-W-70; 2731 Burning Pit; Old Burn Pit Southeast of Z Plant; 200 West Original Burn Pit	Inactive	Burn Pit	Burial Ground	Not Applic	
216-Z-1&2	216-Z-1&2; 216-Z-7; 234-5 No. 1 Crib; 234-5 No. 2 Crib; 216-Z-1 & 2TF; 216-Z-1 and 216-Z-2 Cribs	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-PW-1	
216-Z-12	216-Z-12; 241-Z-12 Crib	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-PW-1	
216-Z-16	216-Z-16; 216-Z-16 Crib	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-WA-1	
216-Z-18	216-Z-18; 216-Z-18 Crib	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-PW-1	
216-Z-20	216-Z-20; Z-19 Ditch Replacement Tile Field	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-CW-5	

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Site Code	Name, Aliases, Description	Site Status	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation
216-Z-3	216-Z-3; 216-Z-3 Culvert; 216-Z-8; 234-5 No. 3 & 4 Cribs	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-PW-1	
216-Z-6	216-Z-6; 216-Z-6 & 6A Crib; 231-W Crib; 231-W-4 Crib; 231-Z-6; 216-W-4; 216-Z-4	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-WA-1	
216-Z-7	216-Z-7; 231-W Crib; 231-W Trench; 216-Z-6	Inactive	Crib	Crib - Subsurface Liquid Disposal Site	200-WA-1	
200-W-178-PL	200-W-178-PL; Lines HSW-202 and HSW-203; Pipeline from 241-Z to 244-TX DCRT	Inactive	Direct Buried Tank Farm Pipeline	Pipeline and associated valves, etc.	TBD	
216-Z-11	216-Z-11; 216-Z-11 Ditch; Z Plant Ditch	Inactive	Ditch	Pond/Ditch – Surface Liquid Disposal Site	200-CW-5	
216-Z-19	216-Z-19; 216-Z-19 Ditch; Z Plant Ditch; 216-U-10 Ditch	Inactive	Ditch	Pond/Ditch – Surface Liquid Disposal Site	200-CW-5	
216-Z-1D	216-Z-1D; Drainage Ditch to U Swamp; Z Plant Ditch; 216-Z-1	Inactive	Ditch	Pond/Ditch – Surface Liquid Disposal Site	200-CW-5	
216-Z-1A	216-Z-1A; 216-Z-1A Tile Field; 216-Z-1AA; 216-Z-1AB; 216-Z-1AC; 216-Z-7; 234-5 Tile Field	Inactive	Drain/Tile Field	Crib - Subsurface Liquid Disposal Site	200-PW-1	
216-Z-8	216-Z-8; 216-Z-8 Crib; 216-Z-9; 234-5 Recuplex French Drain	Inactive	French Drain	Crib - Subsurface Liquid Disposal Site	200-PW-6	
216-Z-21	216-Z-21; 216-Z-21 Seepage Basin; PFP Cold Waste Pond	Inactive	Pond	Pond/Ditch – Surface Liquid Disposal Site	200-WA-1	
200-W-207-PL-B	200-W-207-PL-B; PFP Process Sewer Segments Connecting to TEDF System	Active	Radioactive Process Sewer	Pipeline and associated valves, etc.	Not Applic	
200-W-125-PL	200-W-125-PL; 216-Z-1 Ditch Replacement Pipeline	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-174-PL	200-W-174-PL; 216-Z-1A Modified Pipeline; Lines 1035 and 1036; Pipelines from 234-5Z to 216-Z-1A and 216-Z-18 Crib	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	

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Site Code	Name, Aliases, Description	Site Status	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation
200-W-200-PL	200-W-200-PL; 216-Z-16 Crib Pipeline	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-201-PL	200-W-201-PL; 216-Z-17 Crib Pipeline	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-203-PL	200-W-203-PL; Pipeline from 231-W-151 Vault to 216-Z-7 Crib	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-205-PL	200-W-205-PL; Pipelines from 235-5Z to 241-Z-8 Silica Storage Tank and 216- Z-8 French Drain	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-206-PL	200-W-206-PL; Pipelines from 234-5Z to 216-Z-9 Crib	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-207-PL-A	200-W-207-PL-A; Segment of PFP Process Sewer from manhole Z8 to Z Ditches	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-208-PL	200-W-208-PL; Pipeline from Diversion Boxes 200-W-58 and 200-W-59 to 216- Z-12 Crib	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-209-PL	200-W-209-PL; 207-Z Pipelines	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
200-W-210-PL	200-W-210-PL; Pipeline from 241-Z-361 Settling Tank to 216-Z-1, 216-Z-2 and 216-Z-3 Cribs and 216-Z-1A Tile Field	Inactive	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD	
2607-WA	2607-WA	Active	Septic Tank	Septic System	Not Applic	X
2607-W8	2607-W8	Inactive	Septic Tank	Septic System	200-WA-1	X
2607-WB	2607-WB; 2607-WB Septic System	Inactive	Septic Tank	Septic System	Not Applic	X
2607-Z	2607-Z	Inactive	Septic Tank	Septic System	200-WA-1	X
2607-Z8	2607-Z8	Inactive	Septic Tank	Septic System	Not Applic	X
241-Z-8	241-Z-8; 241-Z-TK-8; IMUST; Inactive Miscellaneous Underground Storage Tank; Silica Slurry Tank; 216-Z-8	Inactive	Settling Tank	Underground Storage Tank	200-PW-6	
2508W12	SIREN NORTHWEST OF 231Z EAST OF RR SPUR	ACTIVE	STRUCTURE	Infrastructure Building		X

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Site Code	Name, Aliases, Description	Site Status	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation
HS0086	HAZARDOUS STORAGE CONTAINER S OF 216Z1A	ACTIVE	STRUCTURE	Storage Pad		
HS0087	HAZARDOUS STORAGE CONTAINER S OF 216Z1A	ACTIVE	STRUCTURE	Storage Pad		
216-Z-17	216-Z-17; 216-Z-17 Ditch	Inactive	Trench	Crib - Subsurface Liquid Disposal Site	200-WA-1	
216-Z-9	216-Z-9; 216-Z-9 Cavern; 216-Z-9 Covered Trench; 216-Z-9 Crib and Support Structures; 216-Z-9A; 216-Z-9B; 216-Z-9C; 234-5 Recuplex Cavern	Inactive	Trench	Crib - Subsurface Liquid Disposal Site	200-PW-1	
UPR-200-W-110	UPR-200-W-110; Contaminated Soil from 216-Z-1; UN-216-W-20 Spoil Trench	Inactive	Trench	Burial Ground	200-CW-5	

The sites can be categorized as shown in Table G.5.2-5.

Table G.5.2-5. Facilities in EU CP-LS-2.

Number of Facilities	Category
54	Building
2	Burial Ground
12	Crib - Subsurface Liquid Disposal Site
49	Infrastructure Building
13	Pipeline and associated valves, etc.
4	Pond/Ditch – Surface Liquid Disposal Site
6	Process Building
5	Septic System
2	Storage Pad
1	Underground Storage Tank

Many of the buildings are excluded from evaluation and are assessed as less than Hazard Category 3 because they do not contain an inventory of radionuclides. Several of the waste sites do have substantial inventories of

The following descriptions of waste sites are taken verbatim from DOE/RL-88-30 R23, Feb 2014.

200 CW 3

216-Z-1D; Drainage Ditch to U Swamp; Z Plant Ditch; 216-Z-1

Description The 216-Z-1D Ditch is a backfilled, surface stabilized ditch that runs from a point east of the 231-Z Building, curving southward to the 216-U-10 Pond. In 1949, the northern portion of the ditch was backfilled. The backfilled portion of the ditch was replaced with an underground pipeline (see sitecode 200-W-125-PL) to transport 231-Z effluent. The southern portion of the ditch is co-located within a large Underground Radioactive Material area that also includes the 216-Z-11 and 216-Z-19 ditches.

Waste description The 216-Z-1D Ditch received process cooling water, steam condensate, and pump sealant waters from the 231-Z, 234-5Z, and 291-Z Buildings. It is classified as a transuranic contaminated soil site. Plutonium and americium are the dominant radionuclides present in the ditch. The majority of the plutonium was retained in the ditch sediments and did not flow into the 216-U-10 Pond. A comparison of annual plutonium discharges for the dates when the 216- Z-1 Ditch was active indicates that at least 1.4 kilograms (3 pounds) of plutonium was released to the 216-Z-1 Ditch. The contamination burden includes 137 curies of Pu-239 and 37 curies of Pu-240. Previously, in 1959, when the entire ditch was open from its original inlet from the 234-5Z Building (before the upper 526 meters were replaced with a pipeline), a mud sampling project took three samples of the ditch sediment every 100 feet from the inlet pipe to the outlet into 216-U-10 Pond (81 samples from the Z-1D ditch, plus others from 216-U-10 Pond shoreline). The levels of plutonium ranged up to 27.1 micrograms per gram plutonium (almost all plutonium 239) at 800 feet from the inlet. The levels at 485 meters (1600 feet) from the inlet were still at 1.7 micrograms per gram plutonium. The 1959 report concluded that there was between 3 and 10 kilograms of plutonium in the ditch.

216-Z-11; 216-Z-11 Ditch; Z Plant Ditch

Description The 216-Z-11 ditch is a backfilled, surface stabilized ditch that ran from the east side of the 234- 5Z facility southward to the 216-U-10 Pond. The ditch is currently co-located within a large, posted Underground Radioactive Material area that also includes the 216-Z-1D and 216-Z-19 ditches. When active, the unit was a long narrow ditch with 2.5:1 sloped sides and a 0.05% grade.

Waste description The total volume discharged to this ditch is unknown. The ditch received process cooling water and steam condensate from the 234-5Z Building, cooling and seal water from the 291-Z Stack, and laboratory waste from 231-Z. It also received storm water from an elevated tank located south to 234-5Z. The site is a transuranic contaminated soil site. During the 1960's, a special Space Nuclear Auxiliary Power program was operating in Z-Plant. The program isolated plutonium-238 and released plutonium 239/240 to the 216-Z-11 ditch as waste. Plutonium and americium were the dominant radionuclides in the effluent discharge. The ditch has been reported to contain 137 curies of plutonium 239 and 37 curies of plutonium 240.

216-Z-19; 216-Z-19 Ditch; Z Plant Ditch; 216-U- 10 Ditch

Description The 216-Z-19 Ditch is a backfilled, surface stabilized site. The ditch is currently co-located within a large Underground Radioactive Material area that also includes the 216-Z-1D and 216- Z-11 ditches.

Waste description The unit is considered a transuranic contaminated soil site. The effluents received by this ditch include process cooling water, steam condensate, pump seal waste from Plutonium Finishing Plant, and cooling water from the 231-Z Buildings. The dominant radionuclides present include plutonium, americium, strontium, and cesium. Approximately 60 grams of plutonium was released to the ditch in March 1976.

216-Z-20; Z-19 Ditch Replacement Tile Field

Description The site is marked and posted as an Underground Radioactive Material area. The site was permanently isolated by filling the manhole at the head end of the crib with concrete on 6/1/95.

Waste description The site has received cooling water, steam condensate, storm sewer, building drains, Hanford Engineering and Development Laboratory Radioactive Acid Digestion Test Unit (HEDL RADTU) cooling water, and chemical drains waste from the 234-5Z Building; cooling water steam condensate and laboratory drains from the 231-Z Building; and miscellaneous drains waste from 291-Z, 232-Z, and 236-Z buildings. The unit also received wastes from 2736-Z Building, (Construction Project B-246). In 1987, 70 gallons per minute of non-radioactive, thermally warm (105 degrees F), water from Z Plant was permanently diverted from the 216-Z- 20 to the 216-Z-21 Seepage Basin.

UPR-200-W-110; Contaminated Soil from 216-Z- 1; UN-216-W-20 Spoil Trench

Description The site is a one-time use waste disposal trench. The trench is the location where backfill material from the north end of the 216-Z-1 Ditch was placed following excavation for a new ditch. During construction for the 216-Z-19 Replacement Ditch, workers placed the excavated material on a spoils pile. Later that material was found to be contaminated and it was moved to the disposal trench.

The ditches and the trench have been backfilled and are co-located within an "Underground Radioactive Material" (URM) zone. This area was surface stabilized in 1982. The area is marked with concrete posts and an intermittent light chain.

The site is vegetated with crested wheatgrass and Indian rice grass over very sandy soil. There is evidence of rodent burrowing on and adjacent to the URM area. An air monitor is on the site at the north end.

Waste description. Decayed vegetation matting from the bottom of the 216-Z-1 Ditch was found to contain alpha contamination to a maximum of 100,000 disintegrations per minute. The 216-Z-1 Ditch was contaminated with americium and plutonium originating from process leaks contaminating the Z Plant cooling water discharge system. The contamination subsequently settled out of the water or was absorbed by aquatic plant life growing on the sides and bottom of the ditch. Radioactivity computed from soil samples taken from the spoil pile showed an alpha concentration of 0.34 nanocuries per gram of soil. This was 30 times less than the minimum 10 nanocuries per gram standard that required packaging for recovery" plutonium burials.

200 PW – 1

216-Z-1&2; 216-Z-7; 234-5 No. 1 Crib; 234-5 No. 2 Crib; 216-Z-1 & 2TF; 216-Z-1 and 216-Z- 2 Cribs

Description The 216-Z-1&2 Cribs consist of two wooden timber boxes connected by a central pipe. The 216-Z-2 crib overflowed into the 216-Z-1 crib which overflowed into the 216-Z-1A tile field. Each unit is set and backfilled in a deep, square excavation. Two risers were visible from the surface of each crib.

Waste description The 216-Z-1 and 2 Cribs received liquid process waste from the 234-5Z Building. The cribs received aqueous and organic wastes from the Plutonium Reclamation Facility, Americium Recovery Line wastes from the 236-Z and 242-Z Buildings, and uranium wastes from the 236-Z Building.

216-Z-1A; 216-Z-1A Tile Field; 216-Z-1AA; 216-Z-1AB; 216-Z-1AC; 216-Z-7; 234-5 Tile Field

Description: The tile field is located inside a chain link fence. It is a below grade trunk line orientated north to south with seven pairs of lateral pipes spaced in a herring bone pattern. The vitrified clay pipe lies on a gravel bed. The length of the tile field was expanded twice. The original section is known as 216-Z-1AA. The expanded sections are known as 216-Z-1AB, and 216-Z-1AC. The excavation was backfilled to grade. The fence is radiologically posted.

Waste description: The216-Z-1A Tile Field originally received overflow from the 216-Z-1 and the 216-Z-2 Cribs. The cribs received aqueous and organic wastes from the Plutonium Reclamation Facility, americium recovery line wastes from the 236-Z and the 242-Z Buildings, and uranium wastes from the 236-Z Building.

Material discharged to the tile field reportedly included 57 kg (126 lb) of plutonium, 1 kg (2.2 lb) of Am-241, 270,000 kg (594,000 lb) of carbon tetrachloride, and 3,000 kg (6,600 lb) of nitrate. The carbon tetrachloride was discharged to the 216-Z-1A Tile Field in combination with other organics, as a small entrained fraction of process aqueous wastes, and as DNAPL.

216-Z-3; 216-Z-3 Culvert; 216-Z-8; 234-5 No. 3 & 4 Cribs

Description: The crib is posted with identification signs. It is inside the locked and posted chain link fence surrounding the 216-Z-1A tile field. The 216-Z-3 Crib was constructed of three 1.2 meter (4 foot) long, perforated corrugated metal culverts that were laid horizontally, end to end, on a gravel filled excavation. Wire screens were welded on the ends of the pipes to prevent gravel from intruding into the pipe. 2.5-centimeter (1-inch) holes were drilled every 15 centimeters (6 inches) around the circumference of the pipe at 30-centimeter (1-foot) intervals. The culvert rests on a 5-meter (17-foot) bed of gravel, 2.4 meters (8 feet) below grade. Two layers of asphalt roofing paper were laid over the crib construction and the site was backfilled to grade.

Waste description: The site received process waste, analytical and development laboratory wastes from the 234-5Z Building via the 241-Z Settling Tank. The waste was neutral to basic. The waste includes approximately 5.7 kilograms (12.6 lbs) of plutonium.

216-Z-9; 216-Z-9 Cavern; 216-Z-9 Covered Trench; 216-Z-9 Crib and Support Structures; 216-Z-9A; 216-Z-9B; 216-Z-9C; 234-5 Recuplex Cavern

Description: The 216-Z-9 trench is marked and posted with Underground Radioactive Material signs. In 1999, a gravel bio-barrier, measuring 6.1 meter (20 feet) by 4 meters (13 feet), was placed over an area of surface contamination. This area is also posted as Underground Radioactive Material. The 216-Z-9 Crib is an inactive, below grade waste management unit. It is a rectangular structure, with a concrete cover supported by six concrete columns with a concrete cover. The trench walls and support columns are covered in an acid resistant brick. Two stainless steel pipes discharge effluent above the trench bottom. Three above grade structures (216-Z-9A, 216-Z-9B and 216-Z-9C) were constructed to support the crib soil mining operations.

Waste description: The trench received aqueous process waste, and organic process waste. The aqueous process waste is characterized as an acidic, high salt, low level radioactive waste, and the organic process is considered slightly acidic, low salt, high organic, radioactive liquid waste with intermediate levels of plutonium and other transuranic components. Fabrication oil used as a cutting and milling lubricant was estimated to be 50% carbon tetrachloride and 50% lard oil. The site received an estimated 270,000 to 460,000 liters of carbon tetrachloride as waste.

216-Z-12; 241-Z-12 Crib

Description: The site is an inactive, below-grade waste management unit. The site consists of a deep rectangular excavation with a vitrified, perforated, clay pipe running the length of the crib. A second six inch diameter steel pipe (bypass pipeline) was installed in 1968 and runs the length of the crib to the west of the original pipe. The bottom 1.5 meters (5 feet) of the excavation was backfilled with gravel and covered with a polyethylene barrier. The remaining excavation was backfilled to grade. It is marked and posted with Underground Radioactive Material signs.

Waste description: The site received process waste and analytical and development laboratory waste from the 234- 5Z Building via the 241-Z-361 Settling Tank. The waste is slightly acidic. Low salt waste was adjusted to a pH of 8 to 10 before disposal. The waste disposed of to the crib included approximately 25 kilograms (55 lbs) of plutonium.

216-Z-18; 216-Z-18 Crib

Description: The 216-Z-18 Crib is a below grade inactive management unit. The crib consists of five parallel, north-south running trenches bisected by a steel distribution pipe. Near the center of each

trench two perforated, fiberglass reinforced epoxy pipes exit each side of the distribution line. The distribution and trench piping lie on a 0.3-meter (1-foot) thick bed of gravel. The pipes were buried under an additional 0.3 meters (1 foot) of gravel, a membrane, and sand cover. The trenches were then backfilled to grade. The site is marked and posted with Underground Radioactive Material signs.

Waste description: The crib received solvent and acidic aqueous waste from the Plutonium Reclamation Facility in the 236-Z Building. The crib received high salt, acidic, and organic liquid waste. Wastes disposed of at the site include carbon tetrachloride, tributyl phosphate, and plutonium.

241-Z-361; 241-Z-361 Settling Tank; IMUST Inactive Miscellaneous Underground Storage Tank

Description: The unit is an underground reinforced concrete structure with a 0.95-centimeter (3/8-inch) steel liner. The tank has inside dimensions of 7.9 by 4.0 meters (26 by 13 feet) with 0.3-meter (1-foot) thick walls. The bottom slopes, resulting in an internal height variation between 5.2 and 5.5 meters (17 and 18 feet). The top is 0.6 meters (2 feet) below grade. A 15-centimeter (6-inch) stainless steel inlet pipe from the 241-Z Tank Pit (WIDS Site Code 241-Z) enters the tank from the north. A single 20-centimeter (8-inch) stainless steel pipe exits the tanks from the south. There are two manhole covers and frames and several risers visible above grade.

Waste description: The unit received radioactively contaminated liquid. The tank is estimated to contain a residual 30 to 75 kilograms (66 to 165 pounds) plutonium in the sludge. (See HNF-8735 for detailed sludge sample analysis)

200-PW-6

216-Z-5; 231-W Sumps; 231-W-1 & 2 Cribs

Description: The 216-Z-5 Crib is an inactive waste management unit located below grade. The crib is oriented in a north-south configuration with a transfer pipe connecting to two wooden sump boxes. Each box was placed at the bottom of a rectangular excavation. The two excavations were the backfilled to grade.

Waste Description: The site received process waste from the 231-Z Building via the 231-W-151 Vault. An estimated 3,000 grams of plutonium was discharged from 231-Z to these cribs. The cribs were plugged with sludge and abandoned. It is believed the plutonium is in the sludge or directly beneath the crib area.

216-Z-8; 216-Z-8 Crib; 216-Z-9; 234-5 Recuplex French Drain

Description: The french drain is constructed of two sections of 0.9-meter (3-foot) high standard clay tile culverts, stacked vertically underground. The culverts are filled with gravel and rest on a 1.5-meter (5-foot) diameter by 0.9-meter (3-foot) deep bed of gravel with a slope of 2.5:1. There is a 10-centimeter (4-inch) thick concrete top that is 2.4 meter (8 feet) below grade. The bottom of the french drain is 5.57 meters (17 feet) below grade.

Waste description: The site received overflow from the Recuplex Silica Tank (neutral to basic Recuplex waste). As of June 30 1978 the calculated radionuclide content included 48.4 grams (0.1 pounds) of plutonium. The adjacent well (#299-W15-202) shows a maximum of 4,400 picocuries/gram of plutonium-239 and 440 picocuries/gram of americium-241 near the bottom of the french drain structure.

216-Z-10; 216-Z-2; 231-W Reverse Well; 231-W-150; 231-W-151 Dry Well or Reverse Well; 231-Z Well; 299-W15-51

Description: This site is a reverse well that protruded approximately 0.31 meters (1 foot) above grade. The protruding end is capped with a flange. The well casing is constructed of steel pipe. The site was interim stabilized in 1990.

Waste description: The site received process and laboratory waste from the 231-Z Building, via the 231-W-151 Sump. The transuranic contaminated process waste was discharged at a rate of 76 liters (20 gallons) per minute. HW-28471 states that the small diameter well became plugged with sludge in June 1945. Approximately 988,000 liters (260,000 gallons) of liquid containing approximately 50 grams of plutonium was discharged to this unit.

241-Z-8; 241-Z-TK-8; IMUST; Inactive Miscellaneous Underground Storage Tank; Silica Slurry Tank; 216-Z-8

Description: The tank is a horizontal cylindrical vessel located 1.8 meters (6 feet) below grade. The area above the tank is surrounded by a light weight chain barricade marked "Caution Underground Radioactive Material" and IMUST signs. Inside the barricade on the north end are two capped 10 centimeters (4 inches) steel vent pipes.

Waste description: The tank was used as a solids settling tank for backflushes of the feed filter in the Recuplex. Silica gel was used as a settling agent on the dissolved solids. The solids and the silica gel were then flushed to this unit with nitric acid. In July 1959, records indicate the tank was filled to capacity 58,428 liters (15,435 gallons). No records were found to indicate the tank was pumped between 1959 and 1962. In 1974, a total waste volume of 30,850 liters (8,150 gallons) was reported. A total of 27,580 liters (7,285 gallons) has not been accounted for in historical records. The tank measures 2.4 meters (8 feet) diameter by 12.2 meters (40 feet) length, constructed of 0.79 centimeters (5/16 inch) steel or wrought iron pate, buried horizontally about 1.8 meters (6 feet) below grade. There are two blanked inlet pipes on the west end and on overflow pipe on the east end of the tank, all three are 15 centimeters (6 inches) below tank top. In the east half of the top centerline of the tank, there are two 10-centimeter (4-inch) vent risers that extend above grade, a 0.3-meter (1-foot) diameter pump access opening, and a 0.6-meter (2-foot) diameter manhole; both bolted over.

Vadose Zone Contamination

For some of the waste sites within this EU there are no contaminants that will migrate through the soil that could affect groundwater. However, based on vadose zone plume data, some of these waste sites were past sources of groundwater contamination. The current unsaturated vadose zone conditions are such that the remaining contaminants in the vadose zone are not considered a significant current source of groundwater contamination. However, for others the presence of volatile contaminants (notably carbon tetrachloride and methyl chloride) have the potential to migrate through the soil from sites such as the 216-Z-1A Tile Field, 216-Z-9 Trench, and 216-Z-18 Crib (and impact groundwater above the federal MCLs within 1,000 years if remediation is discontinued. Tc-99 and nitrate also have the potential to contaminate groundwater.

Detailed inventories are provided in Table G.5.2-6, Table G.5.2-7, and Table G.5.2-8. All values are to 2 significant figures. The source document should be consulted for greater precision data. The sum for each primary contaminant is shown in the first row. Table G.5.2-9 provides a summary of the evaluation of threats to groundwater as a protected resource from saturated zone and remaining vadose zone contamination associated with the evaluation unit.

Table G.5.2-6. Inventory of Primary Contaminants[a]

WIDS	Description	Decay Date	Ref[b]	Am-241 (Ci)	C-14 (Ci)	Cl-36 (Ci)	Co-60 (Ci)	Cs-137 (Ci)	Eu-152 (Ci)	Eu-154 (Ci)	H-3 (Ci)	I-129 (Ci)
All	Sum			27000	0.000015	NR	0.026	160	0.000069	0.007	0.0015	0.0037
216-Z-11	Other	1986	EIS-S	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-Z-1A	Other	2001	SIM	3900	NR	NR	0.0024	1	0.0000011	0.00012	NR	NR
216-Z-1D	Other	1986	EIS-S	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-Z-21	Pond	2001	SIM	0.0000019	NR	NR	NR	0.0000011	NR	NR	NR	NR
216-Z-1&2	Cribs	2001	SIM	190	NR	NR	0.00016	0.011	0.000000059	0.0000069	NR	NR
216-Z-12	Cribs	2001	SIM	8500	NR	NR	0.0081	0.71	0.0000032	0.00036	NR	NR
216-Z-16	Cribs	2001	SIM	2.7	NR	NR	NR	0.000048	0.00000011	0.000011	NR	NR
216-Z-18	Cribs	2001	SIM	760	NR	NR	0.0014	0.059	0.00000052	0.000058	NR	NR
216-Z-20	Cribs	2001	SIM	0.54	NR	NR	NR	0.00000045	NR	NR	NR	NR
216-Z-3	Cribs	2001	SIM	5200	NR	NR	0.000092	0.32	0.00000012	0.000014	NR	NR
216-Z-6	Cribs	2001	SIM	19	NR	NR	0.000038	0.5	0.00000015	0.000017	NR	NR
216-Z-7	Cribs	2001	SIM	7300	0.000015	NR	0.012	160	0.000063	0.0064	0.0015	0.0037
216-Z-8	Cribs	2001	SIM	0.67	NR	NR	NR	6.8E-12	NR	NR	NR	NR
216-Z-17	Trenches	2001	SIM	0.99	NR	NR	NR	0.000017	0.000000038	0.000004	NR	NR
216-Z-9	Trenches	2001	SIM	560	NR	NR	0.0015	0.062	0.00000054	0.000061	NR	NR

a. NR = Not reported for indicated EU

b. SIM = RPP-26744, Rev. 0

c. EIS-S = DOE/EIS-0391 2012

Table G.5.2-7. Inventory of Primary Contaminants (cont)[a]

WIDS	Description	Decay Date	Ref[b]	Ni-59 (Ci)	Ni-63 (Ci)	Pu (total) (Ci)	Sr-90 (Ci)	Tc-99 (Ci)	U (total) (Ci)
All	Sum			0.00014	0.013	47000	160	0.0036	1.7
216-Z-11	Other	1986	EIS-S	NR	NR	170	NR	NR	NR
216-Z-1A	Other	2001	SIM	NR	NR	19000	0.98	0.000071	0.000066
216-Z-1D	Other	1986	EIS-S	NR	NR	170	NR	NR	NR
216-Z-21	Pond	2001	SIM	NR	NR	0.000068	0.00000048	NR	0.00048
216-Z-1&2	Cribs	2001	SIM	NR	NR	720	0.017	0.0000048	0.0000072
216-Z-12	Cribs	2001	SIM	NR	NR	12000	0.71	0.00021	0.00015
216-Z-16	Cribs	2001	SIM	NR	NR	16	0.000044	0.0000055	0.00031
216-Z-18	Cribs	2001	SIM	NR	NR	10000	0.057	0.000033	0.000018
216-Z-20	Cribs	2001	SIM	NR	NR	13	0.00000019	NR	0.00019
216-Z-3	Cribs	2001	SIM	NR	NR	180	0.32	0.0000084	0.000011
216-Z-6	Cribs	2001	SIM	NR	NR	1.7	0.49	0.0000095	0.00002
216-Z-7	Cribs	2001	SIM	0.00014	0.013	720	150	0.0033	1.7
216-Z-8	Cribs	2001	SIM	NR	NR	5.2	3E-12	NR	3.2E-09
216-Z-17	Trenches	2001	SIM	NR	NR	5.9	0.000016	0.000002	0.00011
216-Z-9	Trenches	2001	SIM	NR	NR	3300	0.06	0.000035	0.000017

a. NR = Not reported for indicated EU

b. SIM = RPP-26744, Rev. 0

c. EIS-S = DOE/EIS-0391 2012

Table G.5.2-8. Inventory of Primary Contaminants (cont)[a]

WIDS	Description	Ref[b]	CCl4 (kg)	CN (kg)	Cr (kg)	Cr-VI (kg)	Hg (kg)	NO3 (kg)	Pb (kg)	TBP (kg)	TCE (kg)	U (total) (kg)
All	Sum		910000	NR	3500	NR	760000	7900000	480	110000	NR	220
216-Z-11	Other	EIS-S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-Z-1A	Other	SIM	310000	NR	93	NR	140000	1300000	93	32000	NR	0.093
216-Z-1D	Other	EIS-S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-Z-21	Pond	SIM	7900	NR	400	NR	22	NR	16	NR	NR	0.63
216-Z-1&2	Cribs	SIM	38000	NR	16	NR	5300	55000	16	1300	NR	0.01
216-Z-12	Cribs	SIM	140000	NR	52	NR	430000	4400000	50	6100	NR	0.19
216-Z-16	Cribs	SIM	NR	NR	13	NR	NR	NR	NR	NR	NR	0.42
216-Z-18	Cribs	SIM	190000	NR	7.1	NR	88000	840000	7.1	20000	NR	0.024
216-Z-20	Cribs	SIM	290	NR	290	NR	0.16	100000	290	30000	NR	0.25
216-Z-3	Cribs	SIM	22000	NR	16	NR	0.0077	190000	14	NR	NR	0.016
216-Z-6	Cribs	SIM	1.2	NR	0.001	NR	NR	160	NR	2.7	NR	0.03
216-Z-7	Cribs	SIM	360	NR	2600	NR	NR	160000	NR	850	NR	220
216-Z-8	Cribs	SIM	360	NR	0.0024	NR	0.00014	NR	0.000096	38	NR	0.0000048
216-Z-17	Trenches	SIM	NR	NR	4.6	NR	NR	NR	NR	NR	NR	0.15
216-Z-9	Trenches	SIM	210000	NR	NR	NR	92000	890000	NR	22000	NR	0.025

a. NR = Not reported for indicated EU

b. SIM = RPP-26744, Rev. 0

c. EIS-S = DOE/EIS-0391 2012

Table G.5.2-9. Summary of the Evaluation of Threats to Groundwater as a Protected Resource from Saturated Zone (SZ) and Remaining Vadose Zone (VZ) Contamination associated with the Evaluation Unit

PC	Group	WQS	Porosity[a]	K_d (mL/g)[a]	ρ (kg/L)[a]	VZ Source M^{Source}	SZ Total M^{SZ}	Treated[c] M^{Treat}	VZ Remaining M^{Tot}	VZ GTM (Mm^3)	VZ Rating[d]
C-14	A	2000 pCi/L	0.23	0	1.84	1.50E-05 Ci	---	---	1.50E-05 Ci	7.51E-06	*Low*
I-129	A	1 pCi/L	0.23	0.2	1.84	3.71E-03 Ci	---	---	3.71E-03 Ci	1.43E+00	*Low*
Sr-90	B	8 pCi/L	0.23	22	1.84	1.56E+02 Ci	---	---	1.56E+02 Ci	1.10E+02	*ND*[e]
Tc-99	A	900 pCi/L	0.23	0	1.84	3.64E-03 Ci	---	---	3.64E-03 Ci	4.04E-03	*Low*
CCl_4	A	5 µg/L	0.23	0	1.84	9.11E+05 kg	4.53E+04 kg	9.82E+04 kg	5.76E+05 kg	1.15E+05	*Very High*
Cr	B	100 µg/L	0.23	0	1.84	3.52E+03 kg	---	---	3.52E+03 kg	3.52E+01	*Medium*
Cr-VI	A	48 µg/L[b]	0.23	0	1.84	3.52E+03 kg	---	---	3.52E+03 kg	7.33E+01	*Medium*
TCE	B	5 µg/L	0.23	2	1.84	---	---	---	---	---	*ND*
U(tot)	B	30 µg/L	0.23	0.8	1.84	2.22E+02 kg	---	---	2.22E+02 kg	1.00E+00	*ND*[e]

a. Parameters obtained from the analysis provided in Attachment 6-1 to Methodology Report (CRESP 2015).

b. "Model Toxics Control Act—Cleanup" (WAC 173-340) Method B groundwater cleanup level for hexavalent chromium.

c. Treatment amounts from the 2015 Hanford Annual Groundwater Report (DOE/RL-2016-09, Rev. 0).

d. Groundwater Threat Metric rating based on Table 6-3, Methodology Report (CRESP 2015). These contaminants are being treated using the 200-West P&T Facility.

e. Based on an analysis similar to the one discussed in Appendix E.2 (T Tank and Waste Farms), no appreciable total uranium or Sr-90 plume would be expected in the next 150 years due to transport and decay (Sr-90) considerations. The *Low* rating is applied after the Active Cleanup is completed to account for uncertainties.

PART VI. POTENTIAL RISK/IMPACT PATHWAYS AND EVENTS

CURRENT CONCEPTUAL MODEL

Pathways and Barriers: (1. description of institutional, natural and engineered barriers (including material characteristics) that currently mitigate or prevent risk or impacts, 2. Time scale from loss of each barrier to realization of risk or impacts)

Briefly describe the current institutional, engineered and natural barriers that prevent release or dispersion of contamination, risk to human health and impacts to resources:

1. *What nuclear and non-nuclear safety accident scenarios dominate risk at the facility? What are the response times associated with each postulated scenario?*

The inactive waste facilities have a range of contamination; some is high activity or high hazard. However a hazard assessment or DBA has not been found for these specific sites. It is estimated that the principal hazards are due to collapse of trenches with potential for small localized release of radioactive materials.

2. *What are the active safety class and safety significant systems and controls?*

The majority of buildings associated with this EU are classified as less than hazard category three – they do not have a radiological inventory associated with them that leads to a release. The majority of buildings associated with this EU are classified as less than hazard category three – they do not have a radiological inventory associated with them that leads to a release.

3. *What are the passive safety class and safety significant systems and controls?*

Standard industrial safety activities

4. *What are the current barriers to release or dispersion of contamination from the primary facility? What is the integrity of each of these barriers? Are there completed pathways to receptors or are such pathways likely to be completed during the evaluation period?*

The waste sites are stabilized backfilled and covered with soil. There are no completed pathways

5. *What forms of initiating events may lead to degradation or failure of each of the barriers?*

Animal intrusion or inadvertent excavation

6. *What are the primary pathways and populations or resources at risk from this source?*

Workers and collocated workers exposed to small resuspension of contamination

7. *What is the time frame from each of the initiating events to human exposure or impacts to resources?*

Seconds to minutes

8. *Are there current on-going releases to the environment or receptors?*

Some animal intrusion has been noted for some of the inactive waste sites and there is groundwater contamination from past discharges (but the driving force has been removed through soil vapor extraction and cessation of the addition of process water).

POPULATIONS AND RESOURCES CURRENTLY AT RISK OR POTENTIALLY IMPACTED

Facility Worker

Workers may be exposed to residual radioactive and chemical contaminants, but are protected by special equipment. Workers not currently directly exposed to the contaminated soils because they are located below grade beneath a concrete slab and / or backfilled soils. Because the contamination remains underground, there is not a dispersion pathway for the material to reach the atmosphere.

Co-Located Person (CP)

Under current industrial land use and Hanford site-wide institutional control conditions, only a construction worker (outdoor workers that are involved in active soil disturbance (e.g., putting in an underground utility line or constructing a building) have the potential to encounter impacted soil. There are no complete and significant pathways for current regular workers. Exposure routes to groundwater and surface water are incomplete.

Public

The contamination remains underground, there is not a dispersion pathway for the material to reach the atmosphere and travel outside the site boundary.

Groundwater

The liquid waste infiltrated the soil and, in some cases, reached groundwater. However, migration of the contaminants through the soil into groundwater requires a driving force (source of water to mobilize the contamination). Based on an analysis similar to the one discussed in Appendix E.2 (T Tank and Waste Farms), no appreciable total uranium or Sr-90 plume would be expected in the next 150 years due to transport and decay (Sr-90) considerations; thus *Not Discernible* (*ND*) ratings apply during the Active Cleanup period. A *Low* rating would apply *after* the Active Cleanup is completed to account for uncertainties in the evaluation.

Table G.5.2-9 shows that C-14, I-129, and Tc-99 have *Low* ratings; total and hexavalent chromium have *Medium* ratings; and carbon tetrachloride (CCl_4) has a *Very High* rating. The current overall rating is *Very High* due to CCl4.

Columbia River

The liquid waste infiltrated the soil and, in some cases, reached groundwater. The existing contamination will potentially continue migration towards the Columbia River. However, new mobilization of contamination through the soil into groundwater and onto the Columbia River requires a driving force (source of water to mobilize the contamination). Based on a similar evaluation as that discussed in Appendix G.6 (CP-GW-2 in 200-West Evaluation Unit Summary Template) **Part V**, the rating is *Not Discernible* (*ND*).

Ecological Resources

Summary of Ecological Review:

- More than 60% of the acreage in the Plutonium Contaminated Waste Sites EU is classified as level 0 or level 1 habitat and does not provide significant habitat resources.
- Approximately 4 acres of level 3 habitat exist within the Plutonium Contaminated Waste Sites EU; total loss of this habitat would result in a change of 0.3% at the landscape level.
- The remaining level 2 and level 3 habitat within the EU are fragmented and isolated from habitat surrounding the 200 West Area.

- Individual species occurrences of Piper's daisy represent approximately 1 acre of level 3 resources within the EU. Loss of individual plants of this species is not likely to affect population viability for the Washington State sensitive species.
- Because remaining habitat within the EU and adjacent landscape buffer area is isolated from contiguous habitat outside the 200 West Area, any loss of habitat within the Plutonium Contaminated Waste Sites EU would not be expected to impact habitat connectivity at the landscape level.

Cultural Resources

Summary

- A non-contributing segment of the National Register-eligible historic/ethnohistoric Trail/Road is located within 100 meters of the Plutonium Contaminated Waste Sites EU.
- There are one archaeological site, likely associated with the Pre-Hanford Early Settlers/Farming Landscapes and two isolated finds one associated with the Native American Precontact and Ethnographic Landscape and one associated with the Pre-Hanford Early Settlers/Farming Landscape have also been identified. None of these resources is considered to be National Register-eligible.
- The 270Z PFP support building is a National Register-eligible contributing property within the Manhattan Project and Cold War Era Historic District, with no documentation required, located adjacent to the Plutonium Contaminated Waste Sites EU.

Closest Recorded TCP

- There are two recorded TCPs associated with the Native American Precontact and Ethnographic Landscape that are visible from the Plutonium Contaminated Waste Sites EU.

CLEANUP APPROACHES AND END-STATE CONCEPTUAL MODEL

Selected or Potential Cleanup Approaches

What are the selected cleanup actions or the range of potential remedial actions?

Because this EU has multiple sites within it, the ROD has identified a series of remedial actions that will be taken with the sites, based on their specific characteristics and inventories. The cleanup actions that have been selected are shown in Table G.5.2-10.

Table G.5.2-10. Summary of Remedial Actions Selected by Waste Group (From ROD, Table 32, p. 88)

Waste Group	Selected Remedy
Z-Ditches	RTD with disposal at ERDF or WIPP, as appropriate.
High-Salt	RTD—Option A: Remove soil to 0.6 m (2 ft) below the bottom of the disposal structure to 20 ft – 23 ft bgs. Plutonium waste will be disposed of at WIPP or ERDF, as appropriate. SVE to treat
Low-Salt	RTD—Option C: Remove soil up to a depth of 22 ft - 33 ft at each waste site. Plutonium waste will be disposed of at
Cesium-137	Maintain/Enhance Soil Cover. Maintain a 15-ft thickness of soil cover over these waste sites.
Settling Tanks	Sludge Removal and Tank Stabilization.
Other Sites	No action since these waste sites do not pose a risk to human health and the environment

What is the sequence of activities and duration of each phase?

From the ROD

Z Ditches

- Removal and stockpiling of clean overburden for backfilling.
- Removal of contaminated soils and debris to a depth of 15 ft bgs that exceed the cleanup levels identified in Table G.5.2-10 for contaminants specified above.
- Removal of structures and other debris within the excavation areas. This includes the 200-W-207PL pipeline associated with this waste group.
- Sampling during design to confirm the extent of excavation required.
- Placement of contaminated soil and debris in waste containers.
- Screening of waste in containers to determine if it qualifies for disposal at ERDF. If transuranic waste is present in the containers, it will be packaged to meet waste disposal criteria for disposal at WIPP.
- Treatment of waste to meet disposal requirements (if needed).
- Sampling for plutonium 239/240, americium-241, cesium-137, radium-226, strontium-90, PCBs, boron, and mercury to verify the remediation meets the cleanup levels identified in Table G.5.2-10 after excavation is complete and before backfilling occurs.
- Sampling of nitrate, at the request of Ecology, to confirm that nitrate levels do not pose an unacceptable risk to groundwater. Sampling will be done in accordance with a sampling and analysis plan that will be part of the RD/RA work plan. In the event sampling indicates contaminant levels do pose an unacceptable risk to groundwater, then the CERCLA process will be used to modify the remedy as necessary to protect groundwater.
- Backfilling of the excavations with clean fill followed by compaction and revegetation.

High Salt Waste Group

- Removal and stockpiling of clean overburden for backfilling.
- Removal of soils and debris to 6.1 m (20 ft) bgs at the 216-Z-1A Tile Field, 7 m (23 ft) bgs at the 216-Z-9 Trench, and 6.1 m (20 ft) bgs at the 216-Z-18 Crib. This includes the 200-W-174-PL and 200-W-206-PL pipelines and removal of the above-grade structures at the 216-Z-9 Trench.
- Removal of structures and other debris within the excavation areas or that must be removed in order to conduct required remediation. This may include removal of parts of the 200-W-178 pipeline from the 241-Z building to the 3rd bend in the 200-W-178-PL pipeline. The 200-W-178 pipeline is part of a Dangerous Waste Management Unit (DWMU) and any necessary removal of parts of the 200-W-178 pipeline will satisfy applicable or relevant and appropriate requirements for DWMUs.
- Placement of contaminated soil and debris in waste containers.
- Screening of waste in containers to determine if it qualifies as transuranic waste. Waste that qualifies as transuranic waste will be packaged to meet waste disposal criteria for disposal at WIPP. Other waste will be packaged to meet disposal criteria for disposal at ERDF.
- Treatment of waste to meet disposal requirements (if needed).
- Sampling of nitrate and technetium-99, at the request of Ecology, to confirm that contaminant levels do not pose an unacceptable risk to groundwater. Sampling will be done in accordance with a sampling and analysis plan that will be part of the RD/RA work plan. In the event sampling indicates contaminant levels do pose an unacceptable risk to groundwater, then the CERCLA process will be used to modify the remedy as necessary to protect groundwater.
- After excavating to the specified depths in these waste sites, plutonium-239/240 levels will be assessed in accordance with a sampling and analysis plan that will be part of the RD/RA work plan. DOE will consider removing additional plutonium-contaminated soil from these waste sites.
- Backfilling of the excavations with clean fill, followed by compaction.
- Construction of evapotranspiration (ET) barriers over each waste site. ET barrier construction will include planting the barrier surface with vegetation.

Low Salt Waste Group

- Removal and stockpiling of clean overburden for backfilling.
- Removal of soils and debris to 7.6 m (25 ft) bgs at the 216-Z-1&2 Crib, 10.1 m (33 ft) bgs at the 216-Z-3 Crib, 6.7 m (22 ft) bgs at the 216-Z-5 Crib, and 7.3 m (24 ft) bgs at the 216-Z-12 Crib.
- Removal of structures and other debris within excavation areas or that must be removed in order to conduct required remediation. This includes the 200-W-208-PL and 200-W-210-PL pipelines.
- Placement of contaminated soil and debris in waste containers
- Screening of waste in containers to determine if it qualifies for offsite disposal at the Waste Isolation Pilot Plant (WIPP). Waste that does not meet waste acceptance criteria for WIPP will be sent to the Hanford Environmental Restoration and Disposal Facility (ERDF).
- Treatment of waste to meet disposal requirements (if needed).

- Backfilling of the excavations with clean fill, followed by compaction.
- Construction of evapotranspiration (ET) barriers over each waste site. The requirements for these ET barriers are the same as for the High-Salt Waste Group.

Settling Tanks

- Removal of sludge from the tanks.
- Packaging of 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.
- 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 for collapse. Tanks will remain in place.

Other Sites

The two waste sites in the Other Sites Group, the 216-Z-8 French Drain and 216-Z-10 Injection/Reverse Well, were determined to have limited contamination and do not pose a risk to human health and the environment; therefore, no action has been selected for these waste sites.

What is the magnitude of each activity (i.e., cubic yards of excavation, etc.)?

Unknown from available data sources; however capital costs are available from the ROD for each of the waste groups.

Contaminant Inventory Remaining at the Conclusion of Planned Active Cleanup Period

Unknown from current data sources. The preferred cleanup remedy approach will remove or fully stabilize the contaminated soils.

Risks and Potential Impacts Associated with Cleanup

The preferred cleanup alternatives will put cleanup workers at risk from exposure to contaminated soils and from potential industrial accidents.

POPULATIONS AND RESOURCES AT RISK OR POTENTIALLY IMPACTED DURING OR AS A CONSEQUENCE OF CLEANUP ACTIONS

Facility Workers

From the ROD, page 100: "*The selected remedy for remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 OUs will be protective of human health and the environment through removal, treatment (if needed), and disposal of contaminated soils, evapotranspiration barriers, soil covers, institutional controls, and long-term monitoring. These portions of the selected remedy will eliminate the exposure pathways for workers to encounter contaminated soil, thus controlling the potential exposure pathways from ingestion, inhalation, dermal contact, and external radiation. Additionally, exposure pathways to ecological receptors will be removed*."

Co-Located Person (CP)

See statement above – there is limited potential for co-located worker exposure during or as a consequence of cleanup actions

Public

See statement above – there is limited potential for public exposure during or as a consequence of cleanup actions

Groundwater

The liquid waste infiltrated the soil and, in some cases, reached groundwater. However, migration of the contaminants through the soil into groundwater requires a driving force (source of water to mobilize the contamination). Based on an analysis similar to the one discussed in Appendix E.2 (T Tank and Waste Farms), no appreciable total uranium or Sr-90 plume would be expected in the next 150 years due to transport and decay (Sr-90) considerations. Thus the *Low* rating would apply after the Active Cleanup is completed to account for uncertainties.

Table G.5.2-9 shows current ratings: C-14, I-129, and Tc-99 have Low ratings; total and hexavalent chromium have *Medium* ratings; and carbon tetrachloride (CCl4) has a *Very High* rating. Although groundwater contamination is being effectively treated (where 200-West groundwater plumes are directly evaluated in Appendix D.6), current treatment in these areas does not address removal / immobilization of vadose zone contamination and thus the vadose zone threat posed to groundwater is not impacted and ratings in Table G.5.2-9 (other than Sr-90 and total uranium) are not changed. The overall rating is *Very High* due to CCl4.

Columbia River

See statement above – there is limited potential for impact to the Columbia River during or as a consequence of cleanup actions. Based on a similar evaluation as that discussed in Appendix G.6 (CP-GW-2 in 200-West Evaluation Unit Summary Template) **Part V**, the rating is *Not Discernible* (*ND*).

Ecological Resources

There are two options proposed that have different types of disturbances and effects on ecological resources. Removal of waste to ERDF: Trucks, heavy equipment and drill rigs on roads through non-target areas or remediation site carry seeds or propagules on tires, injure or kill vegetation or animals, make paths, cause greater compaction of soil, displace animals and disrupt behavior/reproductive success. Also seeds and propagules can be dispersed from soil from truck or blowing from heavy equipment. Often permanent or long-term compaction can result in the destruction of soil invertebrates. Compaction can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. Compaction of soils may permanently destroy areas of the site with intense activity. Drilling can cause destruction of soil invertebrates at greater depths, and has the potential to bring up dormant seeds from deeper soil layers. Drilling can cause disruption of ground-living small mammals and hibernation sites of snakes and other animals. Construction of new buildings can cause permanent destruction of plants and animals, and of the on-site ecosystem larger than the footprint of the building. Effects will radiate from the building, and post-remediation effects depend on the degree of use (e.g., personnel and truck traffic, type of truck traffic and heavy equipment activity). Additional water from dust suppression could lead to more diverse and abundant vegetation in areas that receive water, which could encourage invasion of exotic species. The latter could displace native plant communities. Excessive dust suppression activities

could lead to compaction, which can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. Soil removal can cause complete destruction of existing ecosystem, all of the above effects on adjacent sites, but these effects are potentially more severe because of blowing soil (and seeds) and the potential for exposure of dormant seeds. In the re-vegetation stage, there is the potential for invasion of exotic species, changing the species diversity of native communities. During remediation, radionuclides or other contaminants could be released or spilled on the surface, and depending upon the type and quantity, could have adverse effects on the plants and animals on site. Construction of a barrier: Personnel, cars, trucks, heavy equipment and drill rigs on roads through non-target areas or remediation site carry seeds or propagules on tires, injure or kill vegetation or animals, make paths, cause greater compaction of soil, displace animals and disrupt behavior/reproductive success. Also seeds and propagules can be dispersed from soil from truck or blowing from heavy equipment. Often permanent or long-term compaction can result in the destruction of soil invertebrates. Compaction can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. Compaction of soils may permanently destroy areas of the site with intense activity. Construction of new buildings can cause permanent destruction of plants and animals, and of the on-site ecosystem larger than the footprint of the building. Effects will radiate from the building, and post-remediation effects depend on the degree of use (e.g., personnel and truck traffic, type of truck traffic and heavy equipment activity). Irrigation for re-vegetation requires a system of pumps and water, resulting in physical disturbance. Repeated irrigation from the same locations could result in some soil compaction, which can decrease plant growth in those areas, decrease abundance and diversity of soil invertebrates, and prevent fossorial snakes or mammals from using the area. Soil removal can cause complete destruction of existing ecosystem, all of the above effects on adjacent sites, but these effects are potentially more severe because of blowing soil (and seeds) and the potential for exposure of dormant seeds. In the re-vegetation stage, there is the potential for invasion of exotic species, changing the species diversity of native communities. During remediation, radionuclides or other contaminants could be released or spilled on the surface, and depending upon the type and quantity, could have adverse effects on the plants and animals on site. Caps and other containment systems can disrupt local resources and drainage; often non-native plants used on caps (which can become exotic/alien adjacent to the containment site).

Cultural Resources

Personnel, car, and truck traffic on paved roads as well as use of heavy equipment and drill rigs will not have any direct impact on archaeological resources because there is no disturbance to soil/ground or alteration to the landscape. Assuming heavy equipment locations and staging areas have been cleared for cultural resources, then it is assumed adverse effects would have been resolved and/or mitigated. If heavy equipment locations and staging areas have not been cleared, this could result in artifact breakage and scattering, compaction and disturbance to the soil surface and immediate subsurface, thereby compromising stratigraphic integrity of an archaeological site. TCPs may be directly affected if personnel are on roads located on TCP and if personnel are unaware of cultural resource sensitivity, appropriate behaviors and protocols. For traffic on paved roads located on TCP, direct effects include visual, auditory and vibrational alterations to landscape/setting. Heavy equipment may cause direct effects to TCPs including destruction of culturally important plants, physical attributes of the TCP and introduction of noise and vibrations also altering the setting. These actions may interfere with traditional uses of TCP. Construction of buildings, staging areas, caps and other containment systems, and/or soil removal activities are assumed to have been cleared for cultural resources and any adverse effects would be resolved and/or mitigated. If building locations and staging areas have not been reviewed for cultural resources this could result in compaction and disturbance to the soil surface and

throughout the subsurface leading to permanent adverse effects to the surface and subsurface integrity of an archaeological site by destroying the stratigraphic relationships of the soil, archaeological artifacts and features as well as all proximal information associated with archaeological artifacts and features. Construction of buildings and staging areas can have direct effects to TCPs including destroying physical attributes of TCP, destruction of culturally important plants, alteration of the setting and introduction of noise and vibrations also altering the setting. These actions may interfere with traditional uses of TCP. In some instances the waste site is considered an archaeological site and/or pockets of undisturbed soils and potentially intact archaeological material are present. In these instances, effects could include preservation of artifacts in-situ if any information had already been gleaned from archeological site testing prior to capping. Otherwise, capping could result in compaction and compression of artifacts by destroying the stratigraphic relationships of the soil, archaeological artifacts and features as well as all proximal information associated with archaeological artifacts and features. Direct effects to TCPs include permanent alteration of physical setting and design of TCP, permanent viewshed impacts and possibly permanent interference with traditional use of TCP. Revegetation activities may cause direct effects to TCPs include physical alteration to or restoration of TCP depending on how the area is recontoured and what plants are selected for revegetation. Contamination remaining in situ may have direct effects including permanent physical alteration of TCP, and lead to permanent intrusion in long-term use and access to TCP.

Indirect effects from personnel, car, and truck traffic on paved roads as well as use of heavy equipment may lead to the introduction of invasive plant species or removal of culturally important plants that alters the landscape/setting for roads located within the viewshed and noise-scape of TCP. Existing road causes no alteration to viewshed or noise-scape. Presence of vehicles may result in visual, auditory and vibrational alterations to landscape/setting. Remediation actions may lead to visual alteration of landscape/setting. Introduction of noise alters landscape/setting. Introduction of equipment and buildings may interfere with traditional uses of TCP. During construction, indirect effects could result in temporary auditory, visual and vibrational effects. Revegetation could lead to indirect effects from visual alterations to setting depending on how the area is recontoured and what plants are selected for revegetation. Remaining contamination could lead to indirect effects from permanent intrusion, which could limit the use and access to TCP.

ADDITIONAL RISKS AND POTENTIAL IMPACTS IF CLEANUP IS DELAYED

Limited additional risks to workers if cleanup is delayed. The risks are attributed to loss of institutional knowledge of placement of waste sites and associated inventories. Some minor potential for migration of some residual wastes. No additional risks for co-located workers or public.

NEAR-TERM, POST-CLEANUP STATUS, RISKS AND POTENTIAL IMPACTS

Table G.5.2-11. Population or Resource Risk/Impact Rating.

Population or Resource		Risk/Impact Rating	Comments
Human	Facility Worker	Not Discernible (ND) to Low	No workers other than monitoring
	Co-located Person	ND	None
	Public	ND	None
Environmental	Groundwater (A&B) from vadose zone[a]	*Very High* (CCl_4) *Medium* (Cr(tot), Cr-VI) *Low* (C-14, I-129, Tc-99, Sr-90, U(tot)) **Overall**: *Very High* (CCl_4)	Based on an analysis similar to the one discussed in Appendix E.2, no appreciable total uranium or Sr-90 plume would be expected in the next 150 years due to transport and decay (Sr-90) considerations. Thus the *Low* rating would apply here to account for uncertainties. Table G.5.2-9 (current) shows that C-14, I-129, and Tc-99 have *Low* ratings; Cr(tot) and Cr-VI have *Medium* ratings; and CCl_4 has a *Very High* rating. These ratings do not change because current remedial actions do not impact vadose zone sources. The overall rating is *Very High* due to CCl_4.
	Columbia River from vadose zone[a]	ND	See Appendix G.6 (CP-GW-2 Evaluation Unit Summary Template).
	Ecological Resources[b]	Low-Medium	There are 2 waste sites with contamination in place, which will have continued monitoring, which leads to disturbance, and the potential for exotic species to invade and disrupt native habitat.
Social	Cultural Resources[b]	**Native American:** Direct: Unknown Indirect: Known **Historic Pre-Hanford:** Direct: None Indirect: None **Manhattan/Cold War**: Direct: None Indirect: None	No expectations for impacts to known cultural resources.

a. Threat to groundwater or Columbia River for Group A and B contaminants remaining in the vadose zone. No existing plumes are associated with the CP-LS-2 EU as described in **Part V**. More detailed information on all threats to groundwater as a protected resource are described in Appendix G.6.

b. For both Ecological and Cultural Resources see Appendices J and K, respectively, for a complete description of Ecological Field Assessments and literature review for Cultural Resources. Ecological ratings are described in Table 4-11 of the Final Report.

The preferred cleanup option will remove a majority of the contamination and fully stabilize the contaminated soil sites with the contamination transported to ERDF or WIPP. The site will be maintained at industrial use standards.

POPULATIONS AND RESOURCES AT RISK OR POTENTIALLY IMPACTED AFTER CLEANUP ACTIONS

Facility Workers

Limited potential for exposure, as residual contamination is buried

Co-located Person

Limited potential for exposure, as residual contamination is buried

Public

Limited potential for exposure, as residual contamination is buried and area will be maintained for institutional controls.

Groundwater

Based on an analysis similar to the one discussed in Appendix E.2 (T Tank and Waste Farms) Section 2.5 (Vadose Zone Contamination), no appreciable total uranium or Sr-90 plume would be expected in the next 150 years due to transport and decay (Sr-90) considerations. Thus the *Low* rating would apply after the Active Cleanup is completed to account for uncertainties. The current ratings in Table G.5.2-9 showing that C-14, I-129, and Tc-99 have *Low* ratings; total and hexavalent chromium have *Medium* ratings; and carbon tetrachloride (CCl_4) has a *Very High* rating. Because current treatment actions (P&T) do not directly impact the vadose zone contamination, these ratings are not changed. The overall rating is *Very High* due to CCl4.

Columbia River

See statement above – there is limited potential for impact to the Columbia River during or as a consequence of cleanup actions. Based on a similar evaluation as that discussed in Appendix G.6 (CP-GW-2 in 200-West Evaluation Unit Summary Template) **Part V**, the rating is Not Discernible (ND).

Ecological Resources

There are two options proposed that have different types of disturbances and effects on ecological resources. Removal of waste to ERDF: Personnel, car, and pick-up truck traffic through non-target and remediated areas will likely no longer cause an effect on the ecological resources, unless heavy traffic caused ruts. If alien/exotic species became established during remediation, their presence could continue to affect the ecological resources. Construction of a barrier: Personnel, car, and pick-up truck traffic through non-target and remediated areas will likely no longer cause an effect on the ecological resources, unless heavy traffic caused ruts. If alien/exotic species became established during remediation, their presence could continue to affect the ecological resources. Permanent effects remain in the area of site with barrier or cap. Permanent effects remain in area surrounding cap or containment, depending upon traffic and current activities. During remediation, radionuclides or other contaminants released or spilled on the surface could have long-term effects if the contamination remained, and plants did not recolonize or thrive. Such disruptions could affect the associated animal community.

Cultural Resources

Personnel, car and truck traffic on paved roads will likely have no direct effects on the cultural resources assuming the resources were not disturbed during remediation. If the remedial action included

construction of buildings, cap or other type of containment then there are permanent effects in the area of the site. If archaeological resources or TCPs were directly or indirectly damaged or altered during construction of buildings or cap, cumulative effects include continued erosion and adverse effects to both archaeological site and TCP. If contamination is left behind and controlled by a barrier or other containment, then permanent effects to the cultural resources may occur in the area. If archaeological resources or TCPs were directly or indirectly damaged or altered during contamination, then cumulative effects include permanent adverse effects to both archaeological site and TCP.

LONG-TERM, POST-CLEANUP STATUS – INVENTORIES AND RISKS AND POTENTIAL IMPACT PATHWAYS

From the ROD: An unrestricted land use scenario is not the anticipated land use> Under current industrial land use and Hanford site-wide institutional control conditions, only a construction worker has the potential to encounter impacted soil. There are no complete and significant pathways for current regular workers. Exposure routes to groundwater and surface water are incomplete. The direct soil pathways for future regular industrial workers are identified as potentially complete but insignificant, under the assumption that the drill cuttings would not be spread around a place of business.

PART VII. SUPPLEMENTAL INFORMATION AND CONSIDERATIONS

The ROD for the Hanford 200 Area Superfund Site 200-CW-5 AND 200-PW-1, 200-PW-3, AND 200-PW-6 Operable Units presents the selected final remedial action for the 200-CW-5, 200-PW-1, 200-PW-3, and 200PW-6 OUs which are part of the overall soil remediation effort in the Inner Area. Groundwater located beneath these OUs in the 200 West Area is being addressed through separate CERCLA processes for the 200-ZP-1 and 200-UP-1 groundwater OUs. The remaining Inner Area waste sites and 200 East groundwater OUs will be addressed under separate CERCLA processes for the appropriate OUs.

REFERENCES

Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan DOE.RL-97-56

Section 106 of the National Historic Preservation Act (16 USC 470, et. seq.)

Record of Decision Hanford 200 AREA SUPERFUND SITE 200-CW-5 AND 200-PW-1, 200-PW-3, AND 200-PW-6 OPERABLE UNITS September 2011

Plutonium Finishing Plant Hazard Categorizations, HNF 32080 Revision 1, Prepared for the U. S. Department of Energy Assistant Secretary for Environmental Management by CCH2MHILL, Plateau Remediation Company, Richland, Washington 99352, October 2012.

Feasibility study for the plutonium/organic-rich process waste group operable unit: includes the 200-PW-1, 200-PW-3 and 200-PW-6 Operable Units; DOE/RL 2007-27 Draft C. November 2010, US Department of Energy, Assistant Secretary for Environmental Management.

DOE/RL-2016-09, Rev. 0. Hanford Site Groundwater Monitoring Report for 2015, U.S. Department of Energy, Richland Operations Office, Richland, Washington.