

APPENDIX G.8

200-WEST MISCELLANEOUS WASTE SITES (CP-LS-13 CENTRAL PLATEAU) EVALUATION UNIT SUMMARY TEMPLATE

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PART I. EXECUTIVE SUMMARY

EU LOCATION

The 200-W Maintenance Waste Sites EU are made up of 63 miscellaneous waste sites, active and inactive buildings and structures in the west/central portion of the 200-West Area.

RELATED EUs

CP-LS-7

PRIMARY CONTAMINANTS, CONTAMINATED MEDIA AND WASTES

WIDS or other documented inventories are available for only 3 of the 63 miscellaneous sites (216-U-5, 216-U-6, and 216-W-LWC). The only contaminants which cumulatively across these 3 sites have more than 1 curie of radioactivity are:¹

Cobalt-60 (1.23 Ci)

Plutonium-241 (2.3 Ci)

Both radionuclides are located in site 216-W-LWC which was a laundry waste crib. The crib received effluent from the 2724-W, 2724-WA, 2724-WB Laundry facilities, MO-412 Mask Cleaning facility and the 2723-W Old Laundry. Soiled protective work clothing (coveralls, gloves, hoods, canvas boots and rubber shoe covers) were sent to the laundry facilities from all the Hanford work areas. Two thirds of the laundry received was radioactively contaminated. One third consisted of "blue" (non-contaminated) coveralls and towels. The non-contaminated laundry was washed separately from the contaminated laundry. By 1981, approximately three million pounds of laundry was processed per year in 600 pound capacity washing machines and 400 pound capacity dryers. An average of 26,250,000 liters (691,000 gallons) of waste water was discharged to the 216-W-LWC crib each month. This site is located east of Beloit Ave., south of 20th Street.²

BRIEF NARRATIVE DESCRIPTION

The 200-W Maintenance Waste Sites EU are made up of 63 miscellaneous waste sites, active and inactive buildings and structures associated with maintenance operations, laundry, and coal power plant in the west/central portion of 200-W. WIDS or other documented inventories are available for only 3 of the 63 miscellaneous sites (216-U-5, 216-U-6, and 216-W-LWC).

The 216-U-5 and 216-U-6 sites consist of backfilled trenches that are posted "Underground Radioactive Material", and located northwest of the 221-U building. Both were used as disposal sites for liquid unirradiated uranium waste from the cold start-up run at 221-U.

As noted above, the site 216-W-LWC was a laundry waste crib that received effluent from the 2724-W, 2724-WA, 2724-WB Laundry facilities, MO-412 Mask Cleaning facility and the 2723-W Old Laundry.

¹ US Department of Energy, Richland Operations Office, *Maintenance of the Waste Information Data System* (WIDS), TPA-MP-14, Revision 2, September 2011.

² *Hanford Site Waste Management Units Report*, DOE/RL-88-30, Revision 24, U.S. Department of Energy, Richland Operations Office, February 2015

Soiled protective work clothing (coveralls, gloves, hoods, canvas boots and rubber shoe covers) were sent to the laundry facilities from all the Hanford work areas. Two thirds of the laundry received was radioactively contaminated. One third consisted of "blue" (non-contaminated) coveralls and towels. The non-contaminated laundry was washed separately from the contaminated laundry.

Forty-two of the remaining 60 miscellaneous sites are described as buildings or structures, many of which are in active use and are not included within an Operable Unit. A random search for these facilities in the Hanford Site Waste Management Units Report (DOE/RL-88-30, Revision 24) yielded no results.

Ten of the remaining 18 miscellaneous sites are described as burial grounds. Most appear to be locations of where buildings were demolished, and they currently have gravel or concrete surfaces with signs and other indications that asbestos or other hazardous materials may be buried there.²

SUMMARY TABLES OF RISKS AND POTENTIAL IMPACTS TO RECEPTORS

Table G.8-1 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 200 West Miscellaneous waste site area; a Co-located Person (CP) is an individual located 100 meters from the physical boundaries of thee; and the 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 *Not Discernible (ND)* to *High*. The estimated mitigated exposure, which takes engineered and administrative controls and protections into consideration, is shown in Table G.8-1 in parentheses. No Hazard Analysis or Documented Safety Analysis has been prepared on any of these sites, and thus there is insufficient information (IS) to determine a mitigated human health risk.

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 Resources³

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 Resources³

No risk ratings are provided for Cultural Resources. The Table identifies the three overlapping Cultural Resource landscapes that have been evaluated: Native American (approximately 10,000 years ago to the present); Pre-Hanford Era (1805 to 1943) and Manhattan/Cold War Era (1943 to 1990); and provides initial information on whether an impact (both direct and indirect) is KNOWN (presence of cultural

³ 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.

resources established), UNKNOWN (uncertainty about presence of cultural resources), or NONE (no cultural resources present) based on written or oral documentation gathered on the entire EU and buffer area. Direct impacts include but are not limited to physical destruction (all or part) or alteration such as diminished integrity. Indirect impacts include but are not limited to the introduction of visual, atmospheric, or audible elements that diminish the cultural resource’s significant historic features. Impacts to Cultural Resources as a result of proposed future cleanup activities will be evaluated in depth under Section 106 of the National Historic Preservation Act (16 USC 470, et. seq.) during the planning for remedial action.

Table G.8-1. 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 Period	
		Active Cleanup (to 2064)	
		Current Condition: Current Conditions	From Cleanup Actions: Final D&D
Human Health	Facility Worker	Low-ND (IS)	IS
	Co-located Person	Low-ND (IS)	IS
	Public	ND (IS)	IS
Environmental	Groundwater (A&B) from vadose zone ^(a)	<i>Medium</i> – I-129, Cr(tot), Cr-VI <i>ND</i> – others including U(tot) ^(c) & Sr-90 ^(c) Overall: <i>Medium</i>	<i>Medium</i> – I-129, Cr(tot), Cr-VI <i>ND</i> – others including U(tot) ^(c) & Sr-90 ^(c) Overall: <i>Medium</i>
	Columbia River from vadose zone ^(a)	Benthic and Riparian: <i>ND</i> Free-flowing: <i>ND</i> Overall: <i>ND</i>	Benthic and Riparian: <i>ND</i> Free-flowing: <i>ND</i> Overall: <i>ND</i>
	Ecological Resources ^(b)	Low	Low to High
Social	Cultural Resources ^(b)	Native American Direct: Unknown Indirect: Known Historic Pre-Hanford Direct: Unknown Indirect: Known Manhattan/Cold War Direct: Known Indirect: Known	Native American Direct: Unknown Indirect: Known Historic Pre-Hanford Direct: Unknown Indirect: Known Manhattan/Cold War Direct: Known Indirect: Known

a. Threat to groundwater or the Columbia River from Group A and B primary contaminants (PCs) (Table 6-1, CRESP 2015) remaining in the vadose zone.

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. There is no current Sr-90 or total uranium plume associated with CP-LS-13 and thus current ratings are *ND*. The corresponding ratings after the Active Cleanup period are *Low* to account for uncertainties in the evaluation.

SUPPORT FOR RISK AND IMPACT RATINGS FOR EACH POPULATION OR RESOURCE HUMAN HEALTH

Current

The author has assigned a Low-ND human health risk rating to the Facility Worker and Co-located Person, and ND to the Public because there is no information to indicate that any of these sites currently represent a risk to human health, the sites are spread out over a wide area that has little or no worker activity, and the area is restricted from public access.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

There are different and sometimes several cleanup approaches that may be used with these 63 miscellaneous sites and there is insufficient information to determine what the related impacts may be. As such, they are rated IS.

Groundwater, Vadose Zone, and Columbia River

Current

The CP-LS-13 (200-W Miscellaneous Waste Sites) EU is in the 200 West Area to the east of the U and TX-TY Tank and Waste Farms EUs and straddles the boundary between the 200-ZP and 200-UP groundwater interest areas (GWIAs). The 200-ZP and 200-UP GWIAs are described in the CP-GW-2 EU (Appendix D.6). The saturated zone beneath the CP-LS-13 area has elevated levels of carbon tetrachloride (CCl₄), trichloroethene (TCE), and nitrate based on 2014 groundwater monitoring results (<http://phoenix.pnnl.gov/apps/gw/phoenix.html>); the 216-W-LWC Crib and 216-U-5 and 216-U-6 Trenches are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0). The current threats to groundwater and the Columbia River from contaminants already in 200 West groundwater are evaluated as part of the CP-GW-2 EU (Appendix D.6). However, current threats to groundwater corresponding to only the CP-LS-13 EU contaminants *remaining* in the vadose zone (Table G.8-6) has an overall rating of *Medium* (related to multiple primary contaminants) as described in **Part V**. In the 200 West Area, contaminated groundwater is treated in the 200-UP GWIA using the WMA S-SX groundwater extraction system⁴, the U Plant area P&T system (uranium plume), and the I-129 plume hydraulic control system and in the 200-ZP GWIA using the 200 West Pump and Treat (P&T) system⁵ (DOE/RL-2016-09, Rev. 0). As indicated in **Part V**, no plumes have been linked to CP-LS-13 waste sites. Threats from contaminated groundwater in the 200 West Area to contaminate additional groundwater or the Columbia River are evaluated as part of the CP-GW-2 EU (Appendix D.6).

For the 200-ZP and 200-UP GWIAs, no plume currently intersects the Columbia River at concentrations exceeding the corresponding water quality standard (WQS) as described in **Part V**. Thus current impacts to the Columbia River benthic and riparian ecology would be rated as *Not Discernible (ND)*. Furthermore, the large dilution effect of the Columbia River on contamination from the seeps and groundwater

⁴ The WMA S-SX groundwater extraction system began operations in 2012 where extracted contaminated water is pumped to the 200 West P&T for treatment (Section 11.12.2, DOE/RL-2016-09, Rev. 0).

⁵ Soil vapor extraction was used between 1992 and 2012 to remove carbon tetrachloride vapors migrating through the vadose zone into 200-ZP groundwater (Section 12.10.2, DOE/RL-2016-09, Rev. 0).

upwellings also results in *ND* ratings. Thus the overall rating for the Columbia River during the Current period is *ND*.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

The plausible remedial actions for the CP-LS-13 EU waste sites are described in **Part VI**. Contaminants from the CP-LS-13 EU waste sites are suspected of impacting the vadose zone but not groundwater; treatment (as described in the previous section) is not predicted to decrease all concentrations to below thresholds before the Active Cleanup phase commences although there should be significant decreases in groundwater contaminant levels in 200 West. Secondary sources in the vadose also threaten to continue to impact groundwater in the future, including the Active Cleanup period⁶. The *Medium* ratings for the CP-LS-13 EU waste sites (Table G.8-6) are associated with I-129 and total and hexavalent chromium that could potentially impact groundwater in the 200 West Area (CP-GW-2, Appendix G.6).

As described in the TC&WM EIS and summarized in **Part V**, there appears to be insufficient impact to the overall rating for CP-LS-13 from radioactive decay (since primary contaminants other than Sr-90 are risk drivers) and recharge rate (due to large amounts of contaminants already in the groundwater). Treatment of contaminants in the 200-ZP and 200-UP GWIAs would support that groundwater ratings would be reduced by the end of the Active Cleanup period; however, these actions would not reduce vadose zone threats or ratings based on vadose zone contamination. There would not be a sufficient impact on peak concentrations in near-shore region of the Columbia River during or after cleanup to modify ratings (which are already *ND*). Thus the ratings for current threats provided in Table G.8-6 would not be modified after the Active Cleanup period, except for Sr-90 and total uranium (to address uncertainty) as described in **Part V**. The overall rating remains *High* for the Active Cleanup and Near-term, Post-Cleanup periods.

Ecological Resources

Current

13% of EU and 39% of the buffer is level 3 or greater. Piper's daisy is within the EU. Black-tailed jack rabbit in buffer. Patches of mature sagebrush are in the EU. Low impacts are based on truck traffic and herbicide applications.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Uncertainties in the remediation activities makes it difficult to predict the extent and magnitude of impacts to the EU and buffer. Options include plans to allow natural attenuation for sites with presence of existing vegetated soil covers. Increased traffic and herbicide application will impact level 3 resources in the buffer. Potential for excavation maybe required and backfill/revegetation would occur. High impacts are likely if level 3 sagebrush are lost during active cleanup.

Cultural Resources

Current

Known archaeological site located within the EU, but associated landscape is undetermined. Area is heavily disturbed and only small portions of the EU have been inventoried for archaeological resources. Geomorphology indicates a low to moderate potential to contain intact archaeological resources on the

⁶ Note that Sr-90 and total uranium, which have small remaining vadose zone sources, are not considered significant threats to groundwater based on inventory and due to limited mobility in the Hanford subsurface and decay. See **Part V** for details.

surface and/or subsurface. Traditional cultural places are visible from EU. A National Register eligible historic/ethnohistoric trail/road is located within 500 meters of the EU.

A National Register eligible Manhattan Project and Cold War Era archaeological resource is located within 500 meters of the EU, which has been mitigated. Direct impacts to contributing components of the archaeological site have not been addressed and are dealt with on a project-by-project basis. National Register eligible Manhattan Project/Cold War Era significant resources located within the EU and 500 meters of the EU will be demolished, but they have already been mitigated.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Archaeological investigations and monitoring may need to occur prior to remediation. The geomorphology indicates a low to moderate potential for intact archaeological resources. Remediation disturbance may result in impacts to archaeological resources if they are present in the subsurface. Temporary indirect effects to viewshed are possible during remediation. Permanent indirect effects to viewshed are possible from capping and residual contamination that may remain.

National Register eligible Manhattan Project/Cold War Era resources have already been mitigated. Indirect effects to contributing components of the National Register-eligible archaeological resource within 500 meters of the EU may occur if remediation activities disturb these areas. Archaeological monitoring or mitigation may need to occur.

Considerations for Timing of the Cleanup Actions

The lack of inventory information on all but 3 of the 63 miscellaneous sites and fact that a large portion of the sites are actively used buildings and structures would indicate that they are of a low priority in terms of cleanup timing.

The saturated zone beneath the CP-LS-13 area currently has elevated levels of carbon tetrachloride (CCl₄), trichloroethene (TCE), and nitrate based on 2014 groundwater monitoring results (<http://phoenix.pnnl.gov/apps/gw/phoenix.html>). Three sites within the CP-LS-13 EU are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0) and may be currently contributing contamination to the vadose zone. Monitoring and treatment of groundwater is being conducted in the 200-UP GWIA using the WMA S-SX groundwater extraction system, the U Plant area P&T system, and the I-129 plume hydraulic control system and in the 200-ZP GWIA using the 200 West Pump and Treat (P&T) system; these actions are described as part of the CP-GW-2 EU (Appendix D.6). Treatment efforts indicate a general downward trend in contaminant concentrations; however, some plume areas have increased (e.g., carbon tetrachloride) and concentrations continue to exceed cleanup levels. Thus additional cleanup actions may be warranted for this EU, including those to manage the vadose zone contamination.

There is potential for additional contaminant release and migration through the vadose that may eventually impact groundwater if additional cleanup activities are delayed. There is also potential risk from direct radiation to workers (and ecological receptors) from routine maintenance operations. However, there would be no *additional* risk to facility workers, co-located persons, or the public if cleanup is delayed.

Near-Term, Post-Cleanup Risks and Potential Impacts

There is insufficient information to determine when and how these miscellaneous sites will be cleaned up, and thus what the near-term and post-cleanup risks might be.

Groundwater: During the Near-term, Post-Cleanup period (described in **Parts V** and **VI** and Table G.8-6), the ratings are maintained at *High* based on several Group A and B primary contaminants with reported inventories with Sr-90 and total uranium having *Low* ratings to address uncertainties.

Columbia River: As indicated in **Part V**, no radionuclides or chemicals from the 200 West Area are predicted to have concentrations exceeding screening values in this evaluation period. Thus the rating will not be modified and all ratings are *Not Discernible (ND)* as is the overall rating (Table G.8-6).

PART II. ADMINISTRATIVE INFORMATION

OU AND/OR TSDF DESIGNATION(S)

200-QA-1, 200-WA-1, 200-IS-1, and others with no OU designation

COMMON NAME(S) FOR EU

200-W Maintenance Waste Sites

KEY WORDS

200 West Miscellaneous Waste Sites

REGULATORY STATUS

Regulatory basis

The selected alternative to perform decommissioning of Hanford excess industrial buildings and structures and cleanup of miscellaneous debris at various Hanford locations are in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). They are also consistent with the joint DOE and EPA *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act*, which establishes the CERCLA non-time-critical removal action (NTCRA) process as an approach for decommissioning.⁷

Applicable regulatory documentation

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

Applicable Consent Decree or TPA milestones⁸

Milestone M-015-00: Complete the RI/FS (or RFI/CMS and RI/FS) process for all non-tank farm operable units except for canyon/associated past practice waste site OUs covered in M-85-00. Due date June 30, 2026.

⁷ *Action Memorandum for General Hanford Site Decommissioning Activities*, Rev. 0, DOE/RL-2010-22, U.S. Department of Energy, Richland Operations Office.

⁸ *Final Approval Package for the Tentative Agreement on Hanford Federal Facility Agreement and Consent Order Revisions for Central Plateau Cleanup*, US Department of Energy, US Environmental Protection Agency, and State of Washington, Department of Ecology, May 2016

EU Designation: CP-LS-13

Milestone M-016-00: Complete remedial actions for all non-tank farm and non-canyon operable units in accordance with schedules established in approved RD/RA work plans. Due Date September 30, 2042.

The schedule for completion of the construction of the remedy will reflect the scope and complexity of the selected remedial action. The schedule for remedial action implementation will be established upon regulatory agency approval of the RD/RA Work Plans and is enforceable as a HFFACO requirement.

RISK REVIEW EVALUATION INFORMATION

Completed

August 29, 2016, updated February 19, 2017

Evaluated by

Henry Mayer, Amoret Bunn, Jennifer Salisbury and Kevin Brown

Ratings/Impacts Reviewed by

Kevin G. Brown

PART III. SUMMARY DESCRIPTION

The 200-W Maintenance Waste Sites EU are made up of 63 miscellaneous waste sites, active and inactive buildings and structures associated with maintenance operations, laundry, and coal power plant in the west/central portion of 200-W. WIDS or other documented inventories are available for only 3 of the 63 miscellaneous sites (216-U-5, 216-U-6, and 216-W-LWC). Forty-two of the sites are described as buildings or structures, many of which are in active use and are not included within an Operable Unit. Ten of the sites are described as burial grounds.

CURRENT LAND USE

Industrial

DESIGNATED FUTURE LAND USE

Pursuant to the 1999 Record of Decision: Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS), the Central Plateau (200 Areas) geographic area is designated as Industrial-Exclusive (an area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, nonradioactive wastes, and related activities).

PRIMARY EU SOURCE COMPONENTS

Legacy Source Sites

The 216-U-5 and 216-U-6 sites consist of backfilled trenches that are posted "Underground Radioactive Material", and located northwest of the 221-U building. Both were used as disposal sites for liquid unirradiated uranium waste from the cold start-up run at 221-U. The waste in 216-U-5 and U-6 contained 0.427 Ci of total Pu, and hundreds of kilograms of each of Ca, Cl, Cr, Fe, K, Na, NH₃, Ni, NO₂, Si, SO₄, and CO₃.

Site 216-W-LWC was a laundry waste crib that received effluent from the 2724-W, 2724-WA, 2724-WB Laundry facilities, MO-412 Mask Cleaning facility and the 2723-W Old Laundry. Soiled protective work clothing (coveralls, gloves, hoods, canvas boots and rubber shoe covers) were sent to the laundry facilities from all the Hanford work areas. Two thirds of the laundry received was radioactively contaminated. One third consisted of "blue" (non-contaminated) coveralls and towels. The non-contaminated laundry was washed separately from the contaminated laundry. Only two radionuclides were present with greater than 1 curie of radioactivity:

Cobalt-60 (1.23 Ci)

Plutonium-241 (2.3 Ci)

Forty-two of the remaining 60 miscellaneous sites are described as buildings or structures, many of which are in active use and are not included within an Operable Unit. A random search for these facilities in the Hanford Site Waste Management Units Report (DOE/RL-88-30, Revision 24) yielded no results.

Ten of the remaining 18 miscellaneous sites are described as burial grounds. Most appear to be locations of where buildings were demolished, and they currently have gravel or concrete surfaces with signs and other indications that asbestos or other hazardous materials may be buried there.

High-Level Waste Tanks and Ancillary Equipment

Not applicable

Groundwater Plumes

The saturated zone beneath the CP-LS-13 (200-W Maintenance Waste Sites) area has elevated levels of carbon tetrachloride (CCl₄), trichloroethene (TCE), and nitrate based on 2014 groundwater monitoring results (<http://phoenix.pnnl.gov/apps/gw/phoenix.html>). However, there are no reported CCl₄ or TCE inventories for the CP-LS-13 waste sites (Table G.8-4), and there are no CP-LS-13 sources linked to the groundwater plumes (DOE/RL-2016-09, Rev. 0) (where the focus is on Group A and B primary contaminants). The 200 West Area plumes are described in detail in the CP-GW-2 EU (Appendix D.6). Waste sites within the CP-LS-13 EU are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0) but have not been linked as sources for plumes in the 200 West area (DOE/RL-2016-09, Rev. 0). Monitoring and treatment of groundwater is being conducted within the 200-UP (using the WMA S-SX groundwater extraction system, the U Plant area P&T system, and the I-129 plume hydraulic control system) and 200-ZP (in the 200 West P&T facility) GWIAs, which are described as part of the CP-GW-2 EU (Appendix D.6).

Operating Facilities

Not applicable

D&D of Inactive Facilities

Forty-two of the miscellaneous sites are described as buildings or structures, many of which are in active use and thus not identified as surplus and available for D4.

LOCATION AND LAYOUT MAPS

The 63 miscellaneous sites making up this EU are located in the west/central portion of 200-West Area.

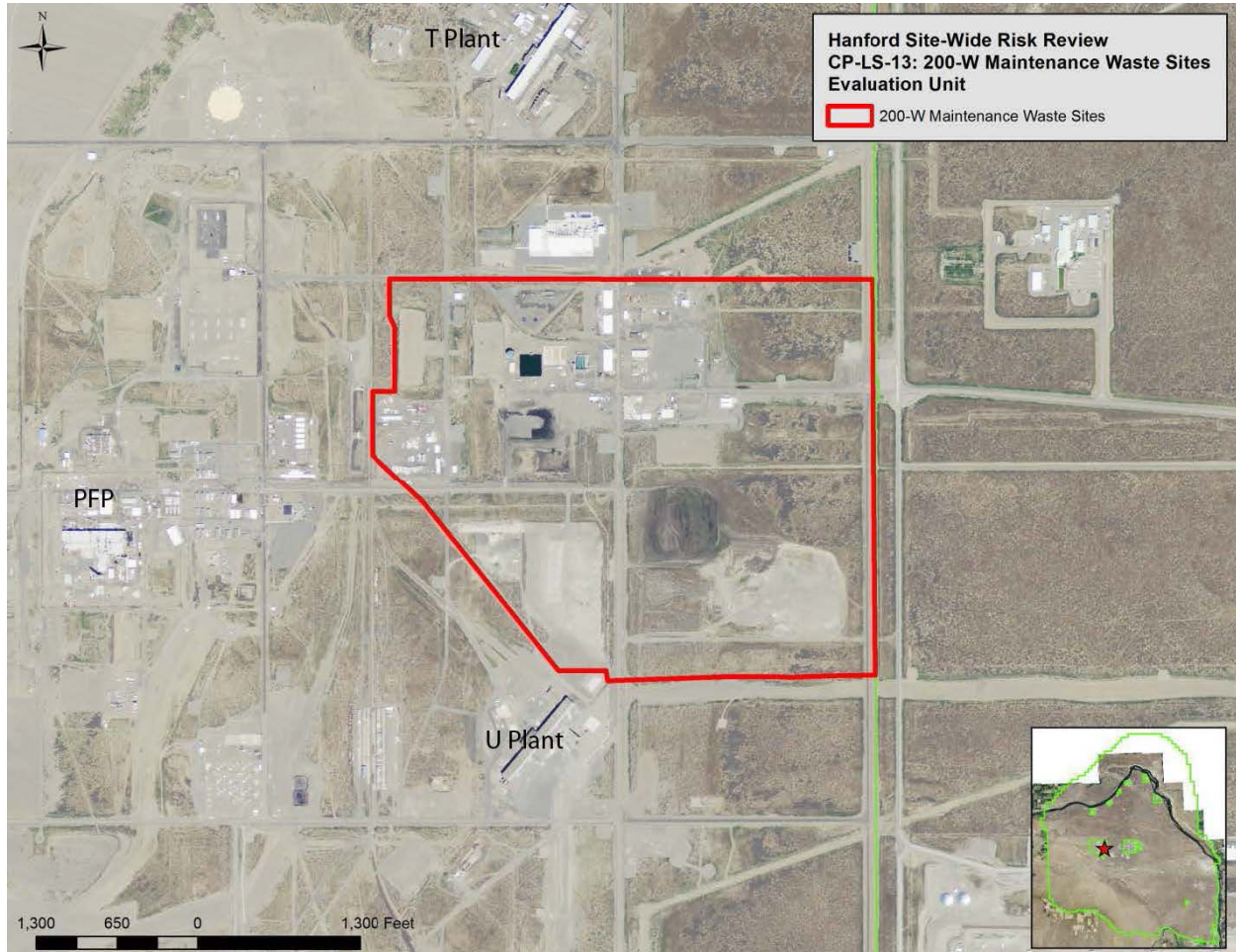


Figure G.8-1. Map of 200-W Maintenance Waste Sites

PART IV. UNIT DESCRIPTION AND HISTORY

EU FORMER/CURRENT USE(S)

LEGACY SOURCE SITES

The 200-W Maintenance Waste Sites EU are made up of 63 miscellaneous waste sites, active and inactive buildings and structures associated with maintenance operations, laundry, and coal power plant in the west/central portion of 200-W. WIDS or other documented inventories are available for only three sites (216-U-5, 216-U-6, and 216-W-LWC).

The 216-U-5 and 216-U-6 sites consist of backfilled trenches that are posted "Underground Radioactive Material", and located northwest of the 221-U building. Both were used as disposal sites for liquid unirradiated uranium waste from the cold start-up run at 221-U.

Site 216-W-LWC was a laundry waste crib that received effluent from the 2724-W, 2724-WA, 2724-WB Laundry facilities, MO-412 Mask Cleaning facility and the 2723-W Old Laundry. Soiled protective work clothing (coveralls, gloves, hoods, canvas boots and rubber shoe covers) were sent to the laundry

facilities from all the Hanford work areas. Two thirds of the laundry received was radioactively contaminated. One third consisted of "blue" (non-contaminated) coveralls and towels. The non-contaminated laundry was washed separately from the contaminated laundry.

Forty-two of the sites are described as buildings or structures, many of which are in active use and are not included within an Operable Unit. A random search for these facilities in the Hanford Site Waste Management Units Report (DOE/RL-88-30, Revision 24) yielded no results.

Ten of the sites are described as burial grounds. Most appear to be locations of where buildings were demolished, and they currently have gravel or concrete surfaces with signs and other indications that asbestos or other hazardous materials may be buried there.

GROUNDWATER PLUMES

The saturated zone beneath the CP-LS-13 area (200-W Maintenance Waste Sites) currently has elevated levels of carbon tetrachloride (CCl₄), trichloroethene (TCE), and nitrate based on 2014 groundwater results (<http://phoenix.pnnl.gov/apps/gw/phoenix.html>). 200 West Area plumes are described as part of the 200-UP and 200-ZP GWIAs described in CP-GW-2 EU (Appendix D.6). Sites within the CP-LS-3 EU, including the 216-W-LWC Crib and 216-U-5 and 216-U-6 Trenches are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0); however, the inventory information in Table G.8-4 indicates that carbon tetrachloride (CCl₄) and trichloroethene (TCE) were not reported for the CP-LS-13 waste sites and CP-LS-13 waste sites have not been linked to Group A and B plumes (DOE/RL-2016-09, Rev. 0). Monitoring and treatment of groundwater is being conducted within the 200-UP GWIA (using the WMA S-SX groundwater extraction system, U Plant area P&T system, and I-129 plume hydraulic control system) and in the 200-ZP GWIA (using the 200 West P&T facility). No plumes in the 200-UP GWIA have been linked to CP-LS-13 waste sites.

D&D OF INACTIVE FACILITIES

Forty-two of the sites are described as buildings or structures, many of which are in active use. Most will be demolished to their slab, if and when they become inactive and surplus facilities.

ECOLOGICAL RESOURCES SETTING

Landscape Evaluation and Resource Classification

Habitat within the EU is fragmented by the numerous buildings, roads, pipelines and waste sites (Figure 24). Over 87% of the EU is classified as a level 2 or below resource (Appendix J, Table 24). Level 3 resources form the remaining 13% biological resources, occurring primarily along the east side of the EU and 200-W Area.

Approximately 350 ft (106 m) separates level 3 habitat in the EU from level 4 habitat outside the 200-W Area. Several small circular patches of level 3 resources within the EU indicate previous locations of Piper's daisy (*Erigeron piperianus*), a Washington state sensitive species. Although none were observed in 2015, it is considered likely to occur in the EU.

The amount and proximity of biological resources surrounding the 200-W Miscellaneous Waste Sites EU were examined within the adjacent landscape buffer area, which extends 5027 ft (1532 m) from the geometric center of the EU. Much of the buffer area falls within the 200-W Area (Appendix J, Figure 24). Within the combined EU and adjacent buffer area, 65% of the biological resources are classified as level

2 or below. Most of these lower quality resources occur within the EU and are also fragmented by buildings, roads and waste sites.

Level 3 resources (15% of the combined EU and buffer area) occur in a north-south band in the middle of the combined EU and buffer area. These patches contain shrub-steppe communities dominated by big sagebrush (~25% cover) with cheatgrass and a mixture of native forbs and grasses in the understory. Level 4 resources occur outside the EU and 200-W Area boundaries within the eastern portion of the buffer area and cover nearly 20% of the combined EU and buffer area.

Field Survey

Pedestrian surveys of the 200-W Miscellaneous Waste Sites EU were performed over two days in May, 2015. The EU habitat is fragmented by waste sites, pipelines, buildings, well pads and roads that are all free of vegetation. Part of the EU contains highly disturbed habitat where cheatgrass (*Bromus tectorum*), *Amsinckia* species (a native weedy forb) and several introduced forbs typically occur. About a third of the EU is classified as a level 2 resource dominated by native grasses (primarily Sandberg's bluegrass [*Poa secunda*]) (Appendix J). Gray rabbitbrush (*Ericameria nauseosa*) is also present in many of the level 2 patches, where it forms a stable long-term community with the grasses.

Large patches of level 3 biological resources occur along the east side of the EU where big sagebrush (*Artemisia tridentata*) provides up to 25% cover and cheatgrass and native grasses are the dominant understory species (Appendix J, J.32). Field data records at the end of this EU description in Appendix J provides lists of the plants and animals observed during the May 2015 surveys.

CULTURAL RESOURCES SETTING

Portions of the CP-LS-13, 200-W Miscellaneous Waste Sites EU have been inventoried for cultural resources under four previous reviews. It is unknown if an NHPA Section 106 review has been completed specifically for the remediation of the CP-LS-13, 200-W Miscellaneous Waste Sites EU. It is unlikely that intact archaeological materials are present in the EU, both on the surface and in the subsurface, because the soils in the EU have been extensively disturbed.

One archaeological resource likely associated with the Pre-Hanford Early Settlers/Farming Landscape has been documented within the CP-LS-13, 200-W Miscellaneous Waste Sites EU. This archaeological site has not been evaluated for listing in the National Register of Historic Places. Segments of the National Register-eligible Hanford Site Plant Railroad, a contributing property within the Manhattan Project and Cold War Era Historic District, with documentation required have also been documented within the EU. Additionally, 6 National Register-eligible buildings that are contributing properties within the Manhattan Project and Cold War Era Historic District have been recorded within the EU boundary (all 6 are contributing properties within the Manhattan Project and Cold War Era Historic District, 1 with individual documentation required, and 5 with no documentation required). In accordance with the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan* (DOE/RL-97-56), all applicable documentation requirements have been met for these properties.

Appendix K, Table 4, contains more information about the 6 buildings that are National Register-eligible Manhattan Project and Cold War Era buildings located within the CP-LS-13, 200-W Miscellaneous Waste Sites EU.

A non-contributing segment of a National Register eligible historic/ethnohistoric trail/road has been recorded within 500 meters of the CP-LS-13, 200-W Miscellaneous Waste Sites EU. One National Register eligible archaeological site associated with the Manhattan Project and Cold War Era Landscape has been recorded within 500 meters of the EU. In addition, 16 National Register-eligible buildings that

are contributing properties within the Manhattan Project and Cold War Era Historic District that are located within 500 meters of the CP-LS-13 200-W Miscellaneous Waste Sites EU (8 with individual documentation required, 8 with no additional documentation required). In accordance with the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan (DOE/RL-97-56)* (DOE-RL 1998), all documentation requirements have been completed for these properties. Additionally, it should be noted that T Plant (221-T) is located within 500 meters of the EU. This building has been selected for preservation, and HAER level documentation has been completed. Additionally, T Plant (221-T) has been identified as part of the Manhattan Project National Historic Park by the National Park Service.

Historic maps and aerial imagery for this area do not indicate any cultural features within or in the vicinity of the EU. This suggests a low potential for archaeological resources associated with the Pre-Hanford Early Settlers/Farming Landscape to be present within the EU. Geomorphology indicates a moderate potential for the presence of archaeological resources associated with the Native American Precontact and Ethnographic Landscape to be present within the CP-LS-13, 200-W Miscellaneous Waste Sites EU. Given the presence of one archaeological site associated with the Pre-Hanford Early Settlers/Farming Landscape and the extensive ground disturbance within the entire EU, there is moderate potential for additional resources, to be present in areas of intact or undisturbed soils.

Because only small portions of the EU have been previously inventoried for cultural resources, and because of the potential for buried archaeological deposits within the CP-LS-13, 200-W Miscellaneous Waste Sites EU, it may be appropriate to conduct surface and subsurface archaeological investigations in these areas prior to initiating any remediation activities. Indirect effects are always possible when TCPs are known to be located in the general vicinity. 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 and the Prosser Cemetery Association, the Reach, and the B-Reactor Museum Association) may 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

CONTAMINATION WITHIN PRIMARY EU SOURCE COMPONENTS

Legacy Source Sites

WIDS or other documented inventories are available for only 3 of the 63 miscellaneous sites (216-U-5, 216-U-6, and 216-W-LWC). The only contaminants which cumulatively across these 3 sites have more than 1 curie of radioactivity are:

Cobalt-60 (1.23 Ci)

Plutonium-241 (2.3 Ci)

Both radionuclides are located in site 216-W-LWC which was a laundry waste crib that received effluent from the 2724-W, 2724-WA, 2724-WB Laundry facilities, MO-412 Mask Cleaning facility and the 2723-W Old Laundry.

The 216-U-5 and 216-U-6 sites consist of backfilled trenches that are posted "Underground Radioactive Material", and located northwest of the 221-U building. Both were used as disposal sites for liquid unirradiated uranium waste from the cold start-up run at 221-U. The waste in 216-U-5 and U-6

contained 0.427 Ci of total Pu, and hundreds of kilograms of each of Ca, Cl, Cr, Fe, K, Na, NH₃, Ni, NO₂, Si, SO₄, and CO₃.

The lack of any information with regard to contaminant inventories on the other 60 sites could be construed to indicate that there are no contaminants at these sites, as it is reasonable to believe that some type of investigation would have been conducted if there was a concern that radioactive or hazardous materials were present and thus represent a risk to public health.

Vadose Zone Contamination

The CP-LS-13 waste sites with reported inventories (Table G.8-2 through Table G.8-4) consist of one crib and two trenches that represent significant soil and other vadose zone contamination. The inventories provided represent the reported contamination originally discharged (without decay correction⁹) to the vadose zone from the CP-LS-13 waste sites. These values are used to estimate the inventory remaining in the vadose zone using the process described in the Methodology Report (CRESP 2015) for the 2013 groundwater plume information as revised for the 2015 Groundwater Monitoring Data (DOE/RL-2016-09, Rev. 0) described in Appendix D.1. The focus in this section will be on the Group A and B contaminants (CRESP 2015) in the vadose zone due to their mobility and persistence and potential threats to groundwater (a protected resource); however, no plumes have been associated with CP-LS-13 waste sites. To summarize (DOE/RL-2016-09, Rev. 0)¹⁰:

- *Chromium* – There are reported inventories for chromium in the CP-LS-13 waste sites (Table G.8-4) but none of the current plumes in 200 West are associated with CP-LS-13 sources. The inventory is dominated by the 216-U-5 and 216-U-6 Trenches.
- *Carbon tetrachloride (CCl₄), cyanide (CN), and trichloroethene (TCE)* – There are no reported vadose zone inventories for these contaminants for the CP-LS-13 waste sites (Table G.8-4).
- *I-129* – There is a small reported inventory (0.05 Ci) for the CP-LS-13 EU (Table G.8-2) in the 216-W-LWC Crib. This waste site is not associated with any plumes in the area.
- *Tc-99* – There is no reported vadose zone inventories for the CP-LS-13 EU (Table G.8-3) and the waste sites in this EU are unrelated to plumes in both 200 East and 200 West Area.
- *Uranium* – There are reported vadose zone inventories for the CP-LS-13 EU (Table G.8-3 and Table G.8-4) that are unrelated to the plumes in 200 West. The CP-LS-13 vadose zone inventory is dominated by the 216-U-5 and 216-U-6 Trenches.
- *Sr-90 and other Group A&B Primary Contaminants (PCs)* – There are reported vadose zone inventories for Sr-90 (Table G.8-3) but not for C-14 (Table G.8-2) or Cl-36 (Table G.8-2). The small reported Sr-90 vadose zone inventory (0.2 Ci) is in 216-W-LWC Crib.

No CP-LS-13 waste sites have been linked to existing plumes in the Hanford Central Plateau (DOE-RL/2016-09, Rev. 0). Because of the tendency of uranium and Sr-90 to sorb to Hanford vadose zone

⁹ As described in the Methodology Report (CRESP 2015) values are typically not decay corrected because of the large uncertainties in many of the values used in the CRESP evaluations and the rough-order-of-magnitude evaluations presented in the Review. One exception, for example, is when evaluating long-term impacts to groundwater for Group A and B radionuclides (e.g., Sr-90) with half-lives that are relatively short relative to the evaluation period (CRESP 2015).

¹⁰ The plume information is primarily taken from PHOENIX (<http://phoenix.pnnl.gov/apps/gw/phoenix.html>) that show the 2014 groundwater plumes. These plumes were assumed representative of 2015 groundwater plumes.

media and that the TC&WM EIS groundwater transport analysis at the T Barrier¹¹ (see Section 2.5 in Appendix E.2) indicates that neither Sr-90 or uranium are expected to migrate appreciably in the area (Appendix O, DOE/EIS-0391 2012), these primary contaminants (both with small reported inventories) are given *Not Discernible (ND)* current ratings and *Low* ratings afterwards to address uncertainties in the evaluation. For the other Group A and B constituents, the TC&WM EIS groundwater transport analysis indicates that predicted peak concentrations at the T Barrier for Tc-99, I-129, and chromium could exceed thresholds during the evaluation period; however, sources for the plumes for these contaminants are not part of CP-LS-13 and thus any contributions from CP-LS-13 in the future would be assumed to be subsumed in existing plumes. The ratings for these are thus not changed based on this analysis.

Using the process outlined in Chapter 6 of the Methodology Report (CRESP 2015) for the 2013 groundwater results as revised for the 2015 Groundwater Monitoring Data (DOE/RL-2016-09, Rev. 0) described in Appendix D.1, the remaining vadose zone inventories for CP-LS-13 in

Table G.8-5 are estimated by difference and used to calculate Groundwater Threat Metric (GTM) values for the Group A and B contaminants remaining in the vadose zone. The vadose zone (VZ) ratings *Medium* for I-129 and total and hexavalent chromium and *ND* for the remaining primary contaminants where ratings for Sr-90 and total uranium are described above. The overall current rating is defined as the highest over all the ratings and thus *Medium*.

Groundwater Plumes

Three sites within the CP-LS-13 EU with reported inventories are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0). Monitoring and treatment of groundwater is being conducted within the 200-UP GWIA using the WMA S-SX groundwater extraction system, the U Plant area P&T system, and the I-129 plume hydraulic control system and in the 200-ZP GWIA using the 200 West Pump and Treat (P&T) system; these actions are described as part of the CP-GW-2 EU (Appendix D.6). As shown in

Table G.8-5, no saturated zone inventories have been associated with CP-LS-13; the process for deriving these inventories is described in CRESP Methodology Report (CRESP 2015) originally for the 2013 groundwater plume information as revised for the 2015 Groundwater Monitoring Data (DOE/RL-2016-09, Rev. 0) described in Appendix D.1.

In general the 2015 groundwater plumes are evaluated in separate EUs (see Appendix D.1 through Appendix D.6); furthermore, as described in the previous sections, no portions of the groundwater plumes are associated with CP-LS-13 (DOE/RL-2016-09, Rev. 0). Note that nitrate, hexavalent chromium, tritium (H-3), and I-129 are risk drivers (*Medium*) for the 200-UP GWIA and carbon tetrachloride (*Very High*) is the primary risk driver for the 200-ZP GWIA; however, there are no CP-LS-13 sources associated with these plumes, and the remaining vadose zone sources from other EUs would drive future risks to groundwater.

¹¹ The barrier represents the edge of the infiltration barrier to be constructed over disposal areas that are within 100 meters [110 yards] of facility fence lines (DOE/EIS-0391 2012). The T Barrier is proximate to CP-LS-13. Despite including sources other than those for CP-LS-13, the analysis in the TC&WM EIS was considered a reasonable source of information to assess the potential transport in the Hanford subsurface.

Impact of Recharge Rate and Radioactive Decay on Groundwater Ratings

As described in Section 2.5 of Appendix E.2 for the T Tank and Waste Farms EU (CP-TF-1), the TC&WM EIS screening groundwater transport analysis (Appendix O, DOE/EIS-0391 2012) indicates that there is little impact of emplacing an engineered surface barrier (and resulting reduction of infiltrating water) on the predicted peak groundwater concentrations (relative to thresholds) at the T Barrier, which is assumed representative of impacts in the CP-LS-13 area. This result is likely due to the significant amounts of contaminants already in the groundwater including from sources including other than CP-LS-13 and not due to an ineffective surface barrier. To summarize, the screening groundwater results at the T Barrier (Appendix O, DOE/EIS-0391 2012) include:

- Tc-99 peak concentration is 6,480 pCi/L (CY 2050) for the No Action Alternative versus 6,600 pCi/L (CY 2051) for Landfill Closure where the threshold value is 900 pCi/L.
- I-129 peak concentration is 26.1 pCi/L (CY 4560) for the No Action Alternative versus 12.6 pCi/L (CY 2050) for Landfill Closure where the threshold value of 1 pCi/L.
- Chromium peak concentration is 336 µg/L (CY 2036) for the No Action Alternative versus 353 µg/L (CY 2045) for Landfill Closure where the threshold value is 100 µg/L (total) or 48 µg/L (hexavalent).
- Uranium peak concentration is 9 µg/L (CY 11,840) for the No Action Alternative versus 1 µg/L (CY 11,843) for Landfill Closure where the threshold value is 30 µg/L. Thus no appreciable uranium plume is expected during the evaluation period; the rating will be *Low* after the Current period to address uncertainty in the evaluation. Uranium is not considered a threat to groundwater; furthermore, because the rating would be *Low* if considered mobile in the environment, the reported inventory for uranium from CP-LS-13 is not considered a significant threat to the vadose zone or groundwater even if conditions change significantly.
- No values are reported at the T Barrier for Sr-90 for either scenario, which indicates that predicted peak fluxes that were less than 1×10^{-8} Ci/yr (Appendix O, DOE/EIS-0391 2012, p. O-2).

Thus an appreciable Sr-90 plume is also not expected in the next 150 years due to retardation in the vadose zone or after due to radioactive decay (+97% reduction in inventory). This result is reinforced by the fact that the reported inventory for Sr-90 from the CP-LS-13 sites would correspond to a *Low* rating even if considered mobile in the subsurface. Thus Sr-90 from CP-LS-13 is not considered a significant threat to the Hanford groundwater or vadose zone or groundwater even if conditions change significantly.

Since the predicted peak concentrations are predicted to remain above thresholds for Tc-99, I-129, and chromium even after surface barrier emplacement, it is decided to not alter the CP-LS-13 ratings related to groundwater based on different recharge rate scenarios. This effect is likely not due to an ineffective surface barrier but instead the amount of these contaminants already in the groundwater and possible contributions of sources outside CP-LS-13 (used in the TC&WM EIS analysis¹²). Furthermore, groundwater is being treated in the area; these potential impacts are described below.

¹² Analyses specific to each Tank Farm or Central Plateau EU are not available; thus the aggregate screening analysis provided in the TC&WM EIS was used as an indication.

EU Designation: CP-LS-13

Columbia River

Threats to the Columbia River similar to those presented by the CP-LS-13 EU were evaluated in Section 2.5 of Appendix E.2 for CP-TF-1 (T Single-shell Tank and Waste Farm in 200 West) where all risks and potential impacts were rated *Not Discernible (ND)*.

Table G.8-2. 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 ^(c)			0.013	NR	NR	1.2	0.26	NR	0.011	4.40E-05	0.051
216-W-LWC	Cribs	2001	SIM	0.013	NR	NR	1.2	0.26	NR	0.011	4.40E-05	0.051
216-U-5	Trenches	2001	SIM	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-U-6	Trenches	2001	SIM	NR	NR	NR	NR	NR	NR	NR	NR	NR

- a. NR = Not reported
- b. SIM = RPP-26744, Rev. 0
- c. Radionuclides are summed without decay correction since the uncertainties in inventories are large.

Table G.8-3. 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 ^(c)			NR	NR	2.3	0.19	NR	0.86
216-W-LWC	Cribs	2001	SIM	NR	NR	2.3	0.19	NR	0.0025
216-U-5	Trenches	2001	SIM	NR	NR	NR	NR	NR	0.43
216-U-6	Trenches	2001	SIM	NR	NR	NR	NR	NR	0.43

- a. NR = Not reported
- b. SIM = RPP-26744, Rev. 0
- c. Radionuclides are summed without decay correction since the uncertainties in inventories are large.

Table G.8-4. Inventory of Primary Contaminants (cont)^(a)

WIDS	Descrip-tion	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		NR	NR	1,900	NR	2.5	50,000	210	NR	NR	1,300
216-W-LWC	Cribs	SIM	NR	NR	32	NR	0.31	1,400	110	NR	NR	2.9
216-U-5	Trenches	SIM	NR	NR	940	NR	1.1	24,000	52	NR	NR	640
216-U-6	Trenches	SIM	NR	NR	940	NR	1.1	24,000	52	NR	NR	630

- a. NR = Not reported
- b. SIM = RPP-26744, Rev. 0

Table G.8-5. 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	---	---	---	---	---	ND
I-129	A	1 pCi/L	0.23	0.2	1.84	5.08E-02 Ci	---	---	5.08E-02 Ci	1.95E+01	Medium
Sr-90	B	8 pCi/L	0.23	22	1.84	1.92E-01 Ci	---	---	1.92E-01 Ci	1.35E-01	ND ^(e)
Tc-99	A	900 pCi/L	0.23	0	1.84	---	---	---	---	---	ND
CCl4	A	5 µg/L	0.23	0	1.84	---	---	---	---	---	ND
Cr	B	100 µg/L	0.23	0	1.84	1.91E+03 kg	---	---	1.91E+03 kg	1.91E+01	Medium
Cr-VI	A	48 µg/L ^b	0.23	0	1.84	1.91E+03 kg	---	---	1.91E+03 kg	3.99E+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	1.27E+03 kg	---	---	1.27E+03 kg	5.73E+00	ND ^(e)

- a. Parameters obtained from the analysis provided in Attachment 6-1 to Methodology Report (CRESO 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 (CRESO 2015).
- e. As discussed in **Part V**, no appreciable Sr-90 or total uranium plume would be expected in the next 150 years due to transport and decay considerations. Thus the *Low* rating would apply after the Active Cleanup is complete to account for uncertainties.

PART VI. POTENTIAL RISK/IMPACT PATHWAYS AND EVENTS

CURRENT CONCEPTUAL MODEL

Pathways and Barriers

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 only known radionuclide contaminates are located in site 216-W-LWC which was a laundry waste crib that received effluent from the 2724-W, 2724-WA, 2724-WB Laundry facilities, MO-412 Mask Cleaning facility and the 2723-W Old Laundry. No accident and risk related scenarios have been developed for this site.

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

NA

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

NA

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?

Available information is insufficient to identify current barriers to release or dispersion of these contaminants.

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

Available information is insufficient to identify current barriers to release or dispersion of these contaminants.

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

IS

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

IS

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

IS

POPULATIONS AND RESOURCES CURRENTLY AT RISK OR POTENTIALLY IMPACTED

Facility Worker

IS

Co-Located Person (CP)

IS

Public

IS

Groundwater

Table G.8-5 represents the risks and associated ratings for groundwater from remaining vadose zone contamination associated with the CP-LS-13 waste sites. Sites within the CP-LS-13 EU have likely contaminated the vadose zone, and three sites (216-W-LWC Crib and 216-U-5 and 216-U-6 Trenches) are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0). The current risk and potential impact ratings for the CP-LS-13 EU Group A and B primary contaminants are *Medium* (I-129 and total and hexavalent chromium) and *ND* (others) (Table G.8-5). Monitoring and treatment of groundwater is being conducted in the 200-UP GWIA using the WMA S-SX groundwater extraction system, the U Plant area P&T system, and the I-129 plume hydraulic control system and in the 200-ZP GWIA using the 200 West P&T system, which are described as part of the CP-GW-2 EU (Appendix D.6). No plumes have been linked to CP-LS-13 EU waste sites.

Columbia River

As described in Appendix D.6 (CP-GW-2 EU) and **Part V**, no plumes from the 200 West Area (that includes the CP-LS-13 waste sites) currently intersect the Columbia River, thus current ratings for all contaminants for the benthic, riparian, and free-flowing ecology are *ND*.

Ecological Resources

Summary of Ecological Review:

- 87% of the 200-W Miscellaneous Waste Sites EU is classified as resource level 2 or below. The remaining EU landscape is classified as a level 3 resource dominated by big sagebrush. Loss of this habitat during cleanup activities is not expected to significantly impact connectivity with habitats outside the 200-W Area, represents a decrease in the available level 3 habitat.
- 65% of the combined EU and adjacent landscape buffer area is classified as resource level 2 or below.
- Approximately 35% of the combined EU and buffer area is classified as a resource level 3 or level 4. Most of this habitat occurs along the east half of the combined area.
- In the past, Piper's daisy, a state sensitive species, has been observed at numerous locations within the EU, however, none were observed in 2015. It is considered likely to occur in the area. Loss of individual Piper's daisies is not expected to affect population viability.

The southeastern most edge of the buffer area falls within habitat identified as black-tailed jackrabbit habitat (MSA 2015).

Cultural Resources

The CP-LS-13 200-W Miscellaneous Waste Sites EU is located within the 200-West Area of the Hanford Site, an area known to have low potential to contain Native American Precontact and Ethnographic archaeological resources and Pre-Hanford Early Settlers/Farming resources. Much of the 200 Areas were addressed in a cultural resources report entitled *Archaeological Survey of the 200 East and 200 West Areas, Hanford Site* (Chatters and Cadoret 1990). The focus of this archaeological survey was on inventorying all undisturbed portions of the 200-East and 200-West Areas. This report concluded that

much of the 200-East and 200-West Areas can be considered areas of low archaeological potential with the exception of intact portions of an historic/ethnohistoric trail/road corridor which runs through the 200-West Area.

Small portions of the EU have been surveyed for cultural resources under four reviews: HCRC#96-200-058 (Nickens et al. 1996), HCRC#2002-200-015 (Prendergast Kennedy 2002), HCRC#2011-200-032 (Mendez 2011), and HCRC#2011-200-052 (Clark and Mendez 2012). HCRC#96-200-058 resulted in the identification of one cultural resource, a site likely associated with the Pre-Hanford Early Settlers/Farming Landscapes, within the EU. It is unknown if an NHPA Section 106 review has been completed specifically for remediation of CP-LS-13, 200-W Miscellaneous Waste Sites EU. It is possible, but unlikely that intact previously undocumented archaeological material is present in the EU, both on the surface and in subsurface areas, because the soils in the CP-LS-13, 200-W Miscellaneous Waste Sites EU appear to have been extensively disturbed by Hanford Site activities.

Archaeological sites, buildings and Traditional Cultural Properties (TCPs) located within the EU¹³

- There is one archaeological site, likely associated with the Pre-Hanford Early Settlers/Farming Landscapes, which has been identified within the EU. This site has not been evaluated for listing in the National Register of Historic Places.
- Segments of the National Register-eligible Hanford Site Plant Railroad, a contributing property within the Manhattan Project and Cold War Era Historic District, with documentation required, are located within the CP-LS-13, 200-W Miscellaneous Waste Sites EU. In accordance with the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan (DOE/RL-97-56)* (DOE-RL 1998), all documentation requirements have been completed for this property.
- There are 6 National Register-eligible buildings that are contributing properties within the Manhattan Project and Cold War Era Historic District that are located within CP-LS-13, 200-W Miscellaneous Waste Sites EU (all 6 are contributing properties within the Manhattan Project and Cold War Era Historic District, 1 with individual documentation required, and 5 with no additional documentation required). In accordance with the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan (DOE/RL-97-56)* (DOE-RL 1998), all documentation requirements have been completed for this property.

Appendix K, Table 9, has more information about the 6 buildings that are National Register-eligible Manhattan Project and Cold War Era buildings located within CP-LS-13, 200-W Miscellaneous Waste Sites EU.

Archaeological sites, buildings, and TCPs located within 500 meters of the EU

- A non-contributing segment of a National Register Eligible historic/ethnohistoric trail/road is located within 500 meters of the EU.
- A National Register eligible archaeological site associated with the Manhattan Project/Cold War Era Landscape is located within 500 meters of the EU.
- There are 16 National Register-eligible buildings that are contributing properties within the Manhattan Project and Cold War Era Historic District that are located within 500 meters of the CP-LS-13 200-W Miscellaneous Waste Sites EU (8 with individual documentation required, 8 with no

¹³ Traditional cultural property has been defined by the National Park Service as “a property, a place, that is eligible for inclusion on the National Register of Historic Places because of its association with cultural practices and beliefs that are (1) rooted in the history of a community, and (2) are important to maintaining the continuity of that community’s traditional beliefs and practices” (Parker & King 1998).

additional documentation required). In accordance with the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan* (DOE/RL-97-56) (DOE-RL 1998), all documentation requirements have been completed for these properties.

Appendix K, Table 10, contains more information about the 16 buildings that are National Register-eligible Manhattan Project and Cold War Era buildings located within 500 meters of the CP-LS-13 200-W Miscellaneous Waste Sites EU.

- T Plant (221-T) is located within 500 meters of the CP-LS-13, 200-W Miscellaneous Waste Sites EU. This building has been selected for preservation, and HAER level documentation has been completed. Additionally, T Plant (221-T) has been identified as part of the Manhattan Project National Historic Park by the National Park Service.

Closest Recorded TCP

There are two recorded TCPs associated with the Native American Precontact and Ethnographic Landscape that are visible from the CP-LS-13, 200-W Miscellaneous Waste Sites EU.

CLEANUP APPROACHES AND END-STATE CONCEPTUAL MODEL

Selected or Potential Cleanup Approaches

Several future cleanup approaches based on existing action memorandums for similar sites at Hanford will likely be considered. The first is relevant to the disposition of the substantial number of buildings and structures in this EU, if and when they become inactive and surplus, as well as a number of burial grounds containing debris from previous building demolitions. Action memoranda are in place^{14,15} to D4 buildings and facilities to slab-on-grade and evaluate below-grade portions for contamination, and cleanup of debris. The types of wastes and debris likely to require disposal include, but are not limited to, solid waste, low-level radioactive waste, asbestos waste, and polychlorinated biphenyl (PCB)-contaminated waste.

The second approach will be relevant to cleaning up those sites that are believed to contain contaminated soil, structures and debris. Action memoranda^{16,17} are in place to pursue a Confirmatory Sampling/No Further Action (CS/NFA) alternative or a Removal, Treatment, and Disposal (RTD) option. Under CS/NFA, sampling and analysis will be conducted on waste sites to confirm that soil contaminant concentrations are at or below removal action levels (RALs) and that no further action is required. Radiological surveys will be included in the initial site investigation as appropriate for site conditions to support the selection of sampling locations. If confirmatory sampling results indicate that the RALs are

¹⁴ *Action Memorandum for General Hanford Site Decommissioning Activities*, Rev. 0, DOE/RL-2010-22, U.S. Department of Energy, Richland Operations Office.

¹⁵ *Action Memorandum for the Non-Time Critical Removal Action for the 212-N, 212-P, and 212-R Facilities, Addendum 1: Disposition of Railcars*, Rev. 0, DOE/RL-2008-80-ADD1, U.S. Department of Energy, Richland Operations Office.

¹⁶ *Action Memorandum for the Non-Time Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit*, DOE/RL-2009-86, Revision 0, U.S. Department of Energy, Richland Operations Office.

¹⁷ *Action Memorandum for the Non-Time Critical Removal Action for 200-MG-2 Operable Unit*, DOE/RL-2009-37, Revision 0, U.S. Department of Energy, Richland Operations Office.

not met (i.e., soil concentrations of COPCs exceed RALs), then the RTD alternative will be implemented or the waste site will be evaluated as part of a final remedial action.

Contaminant Inventory Remaining at the Conclusion of Planned Active Cleanup Period

There is insufficient information with regard to existing contaminant inventories at 60 of the 63 sites and what future cleanup approaches will be used, and thus what contaminant inventories will remain at conclusion of the active cleanup period.

Risks and Potential Impacts Associated with Cleanup

There is insufficient information with regard to existing contaminant inventories at 60 of the 63 sites and what future cleanup approaches will be used, and thus the risks involved.

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

Facility Worker

The only humans at risk or impacted would be those working on the active remediation activities. Otherwise, workers are not directly exposed to contaminated soils or other materials.

Co-located Person

See above

Public

See above

Groundwater

As described in **Part V**, there is unlikely to be a significant impact during this period to groundwater (as a protected resource) from mobile primary contaminants from CP-LS-13. However, there are contaminant sources (legacy source sites) in the vadose zone that may pose a continuing risk to groundwater (via the vadose zone). Because the area associated with CP-LS-13 sources is considered represented by the T Barrier analysis in Appendix E.2 (see previous section), the vadose zone (VZ) GTM values for the Group A and B primary contaminants for CP-LS-13 (during the Active Cleanup period) translate to ratings of *ND* or *Medium* (because of large amounts of contaminants in the vadose zone to be treated). As indicated in **Part V**, Sr-90 and uranium are unlikely to impact the groundwater in sufficient quantities to exceed the drinking water standard by the end of the Active Cleanup period and are thus rated *Low* to address uncertainty in the analysis. Groundwater is being treated in the 200-UP GWIA using the WMA S-SX groundwater extraction system, the U Plant area P&T system, and the I-129 plume hydraulic control system and in the 200-ZP GWIA using the 200 West Pump and Treat (P&T) system, which when combined with expected future measures to limit the infiltration of water, could result in lower ratings for those CP-LS-13 primary contaminants being treated (i.e., total and hexavalent chromium where the focus here is on Group A and B primary contaminants); however, these actions do not impact the threat and thus ratings for the vadose zone contaminants. Future actions that manage the vadose zone contamination and limit infiltrating water would impact these ratings. The ratings correspond to an overall rating of *Medium* for both the Active and Near-term, Post-Cleanup periods. The WMA S-SX groundwater extraction system, U Plant area P&T system, I-129 plume hydraulic control system, and 200 West Area P&T system are assumed to be operational during this evaluation period, which will be treating necessary groundwater contamination in the 200 West Area.

It is considered unlikely that additional groundwater resources would be impacted as a result of either interim remedial actions (e.g., pump and treat) or final closure activities (that are not covered in the Ecological or Cultural Resources results).

Columbia River

As described in **Part V**, impacts to the Columbia River benthic, riparian, and free-flowing ecology for the Active Cleanup and Near-term, Post Cleanup periods are rated as *Not Discernible (ND)*. Additional information on groundwater plumes and potential threats associated with sources including those from CP-LS-13 waste sites are described in Appendix G.6 for the CP-GW-2 EU (200-ZP GWIA).

It is considered unlikely that additional benthic or riparian resources would be impacted as a result of either interim remedial actions (e.g., pump and treat) or final closure activities (that are not covered in the Ecological or Cultural Resources results).

Ecological Resources

Remove, Treat and Dispose of waste involves personnel through the target (remediation) area, car and pickup truck traffic through the non-target and target (remediation) area, truck, heavy equipment (including drill rigs) traffic on roads through the non-target and target area, caps (and other containment), soil removal and contamination in the soil, vegetation control, and irrigation (for revegetation) will cause the following disturbance from remediation activities: Carry seeds or propagules (pieces of vegetation or other biological parts that can grow and/or reproduce) on tires of vehicles or blowing from heavy equipment; injure or kill vegetation or small invertebrates or small animals; vehicle traffic can make paths, compact soil, scare or displace animals, can impact animal behavior or reproductive success; affect animal dispersion and habitat use (e.g., some birds avoid nesting near roads because of song masking); displacement of animals from near roads due to increased noise or other disturbances; and heavy equipment may permanently destroy areas of the site with intense activity. soil removal can cause more severe effects because of blowing soil (and seeds) 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. Use of non-specific herbicides for vegetation control results in some mortality of native vegetation (especially native forbes), and allows exotic species to move in; it may change species composition of native communities, but it also could make it easier for native species to move in; improved methods could yield positive results. Irrigation 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.

Alternatively, barriers could be the remediation option and involves personnel car and pickup truck traffic through the non-target and target (remediation) area, truck and heavy equipment traffic on roads through the non-target and target area, dust suppression, and irrigation (for revegetation) will cause the following disturbance from remediation activities: Carry seeds or propagules (pieces of vegetation or other biological parts that can grow and/or reproduce) on person (boots, clothes, equipment) or tires of vehicles or blowing from heavy equipment; injure vegetation or small invertebrates or small animals (e.g., insects, snakes); make paths or compact soil; scare or displace animals. Caps and other containment can cause 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. Destruction of soil invertebrates at depths of pits. Potential bringing up of dormant seeds from soil layers; disruption of ground-living small mammals and hibernation sites of snakes and other animals on-site of containment; often disrupts local aquatic environment and drainage; often non-native plants

used on caps (which can become exotic/alien adjacent to the containment site). 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. Irrigation 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. These effects will be higher in the EU itself.

Cultural Resources

Potential direct effects are possible from personnel, car, pick-up, truck and heavy equipment traffic/use through both target (remediation) and non-target areas during active cleanup. These activities may inadvertently expose resources close to the surface. Additionally, traffic through these areas may lead to the introduction of invasive species and/or a decrease in the presence of native plants used for medicinal or tribal religious purposes. Heavy equipment use for remedial activities (such as RTD of waste sites and/or contaminated soils) may lead to an alteration of the landscape, and the act of soil removal may destroy resources; if resources are not destroyed, then, soil removal may disturb or adversely affect resources. Utilization of caps and/or other containments may destroy resources located close to the surface. If resources are not destroyed, containments may disturb or adversely affect resources. Lastly, during remediation, radionuclides or other contamination released or spilled on the surface could have long-term effects if the contamination remains and resources become contaminated and/or plants having cultural importance to Tribes do not recolonize or thrive.

Potential indirect effects are possible from personnel traffic through target (remediation) areas as well as car, pick-up, truck and heavy equipment traffic/use through both target (remediation) and non-target areas. It is possible that these activities may decrease viewshed values and/or impact viewshed through the introduction of increased dust, the creation of trails, etc. Heavy equipment use for remedial actions/soil removal and the utilization of caps and/or other containments (i.e. barriers) could potentially cause alterations to the landscape and impacts to viewsheds. Lastly, during remediation, radionuclides or other contamination released or spilled on the surface could have long-term effects if the contamination remains and resources become contaminated and/or plants having cultural importance to Tribes do not recolonize or thrive.

ADDITIONAL RISKS AND POTENTIAL IMPACTS IF CLEANUP IS DELAYED

There is insufficient information with regard to existing contaminant inventories at 60 of the 63 sites, and what is known about the three other sites does not indicate a threat to human health if cleanup is delayed.

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

There is insufficient information with regard to existing contaminant inventories at 60 of the 63 sites and what future cleanup approaches will be used, and thus what contaminant inventories will remain at conclusion of the active cleanup period and any risks they may present.

**POPULATIONS AND RESOURCES AT RISK OR POTENTIALLY IMPACTED AFTER CLEANUP ACTIONS
(FROM RESIDUAL CONTAMINANT INVENTORY OR LONG-TERM ACTIVITIES)**

Table G.8-6. Summary of Populations and Resources at Risk or Potentially Impacted after Cleanup.

Population or Resource		Risk/Impact Rating	Comments
Human	Facility Worker	IS	Insufficient information on existing contaminant inventories at 60 of the 63 sites and what future cleanup approaches will be used
	Co-located Person	IS	
	Public	IS	
Environmental	Groundwater (A&B) from vadose zone ^(a)	<i>Medium</i> – I-129, Cr(tot), Cr-VI Low – U(tot) & Sr-90 <i>ND</i> – others PCs Overall: Medium	<i>Current</i> GTM values for Group A&B primary contaminants (Table G.8-5): <i>Medium</i> (I-129, Cr(tot), Cr-VI), <i>ND</i> (others, including Sr-90 and U(tot)). Sr-90 and U(tot) not likely to impact groundwater (Part V) but given <i>Low</i> rating here to address uncertainties. Treatment in 200 West would not change vadose zone ratings. Predicted impact from changes in recharge rates not sufficient to change ratings.
	Columbia River from vadose zone ^(a)	Benthic: <i>Not Discernible (ND)</i> Riparian: <i>ND</i> Free-flowing: <i>ND</i> Overall: ND	TC&WM EIS screening results indicate that exposure to radioactive and chemical contaminants from peak groundwater discharge below benchmarks for both benthic and riparian receptors (Part V). Dilution factor of greater than 100 million between Columbia River and upwellings.
	Ecological Resources ^(b)	Low	Post-cleanup monitoring might pose a risk to level 3 and above resources in the buffer area. Possible disruption of sagebrush habitat.
Social	Cultural Resources ^(b)	Native American Direct: Unknown Indirect: Known Historic Pre-Hanford Direct: Unknown Indirect: Known Manhattan/Cold War Direct: None Indirect: Known	Permanent direct effects are possible if residual contamination remains after remediation. Permanent indirect effects to viewshed are possible from capping and from residual contamination that may remain. National Register eligible Manhattan Project/Cold War Era buildings will be demolished.

- a. Threat to groundwater or Columbia River for Group A and B contaminants remaining in the vadose zone. Threats from existing plumes associated with the CP-LS-13 EU are described in **Part V** with more detailed evaluation in Appendix G.6 (CP-GW-2).
- 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.

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

There is insufficient information with regard to existing contaminant inventories at 60 of the 63 sites and what future cleanup approaches will be used, and thus what contaminant inventories will remain at conclusion of the active cleanup period.

PART VII. SUPPLEMENTAL INFORMATION AND CONSIDERATIONS

Not applicable

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