APPENDIX F.8

U PLANT (CP-DD-3, CENTRAL PLATEAU)
EVALUATION UNIT SUMMARY TEMPLATE

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PART I. EXECUTIVE SUMMARY

EU LOCATION

The 221-U Facility (U Plant) is located within the 200 West Area in the Central Plateau of the Hanford Site in Richland, WA.

RELATED EUS

CP-LS-3

PRIMARY CONTAMINANTS, CONTAMINATED MEDIA AND WASTES

The 221-U Building bounding inventory is primarily Cs-137 and Sr-90 which has been stabilized by encapsulating the cells contents with grout and applying a fixative over 8 feet of wall surface above the operating deck, to equipment removed from the canyon deck, and to the exposed floor area where equipment was removed. At the time that the Interim D&D work was completed in September 2011, radiological surveys of the upper walls (above 8 feet) and ceilings of the canyon and railroad tunnels determined that application of fixative was not required (over those surfaces).

The inventory for the 291-U sand filter is primarily Cs-137, Sr-90 and Pu-239 and is based on known U Plant stack emissions, a comparison to Reduction-Oxidation (REDOX) Plant stack emissions and an assumed sand filter efficiency of 99.95%. All alpha contamination was assumed to be Pu-239 as a worst-case scenario.

This EU also includes three waste sites consisting of underground French drains which combined contain less than one Curie of radiological contamination.[1]

BRIEF NARRATIVE DESCRIPTION

This Evaluation Unit includes the U Plant Canyon, ancillary buildings, structures, and associated near-surface contaminated soils.

The 221-U Facility was originally constructed in 1944 as one of three chemical separation plants for the recovery of plutonium from spent nuclear fuel, however its mission was modified to one of uranium recovery in 1952 (plutonium recovery activities were never conducted in the 221-U Facility). The facility was contaminated with hazardous substances used or generated during the uranium recovery process, and also contains contaminated process equipment from other Hanford Site facilities that was brought into the facility and placed on the canyon deck or in process cells after termination of the recovery process. Prior to completion of Interim D&D activities, the U Plant contained sufficient residual waste and contamination from former operations to result in an initial hazard classification as a Hazard Category 2 nuclear facility.[2]

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

[2] U.S. Department of Energy 2011, *Interim Completion Report for the 221-U Facility*, DOE/RL-2011-80, Revision 0. Richland Operations Office, September 2011.

Based on the completion of Interim D&D activities per the U Plant Facility ROD; the removal of Tank D-10; and the completion of grouting activities in the canyon, the U Plant Facility structure was downgraded to a less than Hazard Category 3 classification. The canyon exhaust air ventilation tunnel up to the inlet of the sand filter and the sand filter exhaust up to the inlet of the 291-U stack exhaust system were grouted as part of these Interim D&D activities, isolating the sand filter which remains a Category 2 segment of the facility. The detached 241-WR Vault is a less than Category 3 segment. The UO3 Uranium Trioxide Plant (224-U) and other U Plant ancillary structures contained no or minimal residual radiological contamination and were categorized as less than Hazard Category 3 nuclear facilities and have since been demolished.

The primary current activity at the site is Surveillance & Maintenance while it awaits final D&D.

SUMMARY TABLES OF RISKS AND POTENTIAL IMPACTS TO RECEPTORS

Table F.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 U Plant facilities; a Co-located Person (CP) is an individual located 100 meters from the physical boundaries of the facilities; and the Public is an individual located at the closest point on the Hanford Site boundary not subject to DOE access control. The nearest public roadway is 4,400 m (14,436 ft) and was used as the minimum distance to the onsite public. The nearest site boundary is 13.1 km (8.1 mi) to the west, and was used as the minimum distance to the maximally-exposed offsite individual.[3] 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 F.8-1 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[4]

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[4]

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

[3] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013.

[4] 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.

initial information on whether an impact (both direct and indirect) is KNOWN (presence of cultural 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 F.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:** Surveillance & Maintenance	 **From Cleanup Actions:** Final D&D
Human Health	Facility Worker	***S&M***: Med-Low (Low)	Med-Low (Low)
	Co-located Person	***S&M***: Med-Low (Low)	Med-Low (Low)
	Public	***S&M***: Low-ND (Low-ND)	Low-ND (Low-ND)
Environmental	Groundwater (A&B) from vadose zone[(a)]	*ND* – Sr-90 and U(tot)[(c)] *Low* – Others with reported inventories **Overall**: *Low*	*ND* – Sr-90 and U(tot)[(c)] *Low* – Others with reported inventories **Overall**: *Low*
	Columbia River from vadose zone[(a)]	Benthic and Riparian: *ND* Free-flowing: *ND* **Overall**: *ND*	Benthic and Riparian: *ND* Free-flowing: *ND* **Overall**: *ND*
	Ecological Resources[(b)]	ND	ND to Low
Social	Cultural Resources[(b)]	**Native American** Direct: Unknown Indirect: Known **Historic Pre-Hanford** Direct: Unknown Indirect: None **Manhattan/Cold War** Direct: Known Indirect: Known	**Native American** Direct: Unknown Indirect: Known **Historic Pre-Hanford** Direct: Unknown Indirect: None **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 the CP-DD-3 EU and thus current ratings are *ND*. The corresponding ratings after the Active Cleanup period are assigned to *Low* to account for uncertainties in the evaluation.

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

Current[5]

The primary current activity at the site is Surveillance & Maintenance while it awaits final D&D.

Seismic Event: The worst-case event is a seismic event of greater magnitude than the design basis. Examining the potential events analyzed in the Hazard Analysis it is apparent that such a seismic event may have the largest U Plant facility-wide impacts, potentially failing both the canyon confinement function and the sand filter. No other event is likely to fail both simultaneously and result in impacts to the radioactive materials. However, contaminated components have been grouted in place in the canyon cells below the deck. In a previous analysis for the 105KE Basin CH2MHill had determined that the ARF, for components that have been grouted, reduces to 0.0 for the postulated seismic and fire scenarios. As such, the inventory associated with components and contaminates that have been moved to the cells and grouted in place and other structures below the canyon deck were not included in the final DSA analysis. The event is assumed to be an "unlikely".

For the seismic event, the worst-case scenario assumed that the 291-U-1 stack fails and impact the roof of the sand filter cover that is above ground level. The estimated inventory for the 291-U sand filter is the significant inventory at risk from the seismic event. The sand filter is underground and most of the radioactive inventory would be buried in rubble from the collapsed sand filter structures as a result of the stack collapsing onto it. The resulting FW and CP dose is estimated to be 5.59 rems and the dose to the Public is 0.0046 rems.

Unmitigated Risk: Facility Worker – Medium; CP – Medium; Public – ND

The TEDE for the collocated worker is 5.59 rems, which is corresponds to a Medium risk; and for the offsite Public it is 0.0046 rems which is an ND risk classification.

Mitigation: Facility Worker – Low; CP – Low; Public – ND

It is recognized that the concrete cover over the sand filter structure does serve a mitigative function for the release. As a result, the sand filter structure is identified as defense-in-depth reducing the risk to Facility Worker and CP to Low and the offsite Public to ND.

Staged Waste Fire: It is assumed that current S&M activities will produce contaminated waste, which will result in various waste packages being staged for transport and disposal. The scenario postulates a medium outside fire initiated by a vehicle impact to a staged waste container array, breaching some of the containers. The TRU waste, mixed-TRU waste, and contamination control wastes (low level) that may be staged in a common area represent an airborne hazard if ignited. The inventory for the TRU component is an estimated inventory to represent the maximum TRU inventory that may be located in the staging area. A typical waste container is expected to consist primarily of step-off and contamination control waste and historically would be well below 1 gram of Pu-239. The use of this quantity anticipates that the inventory is contained within contaminated

[5] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013

equipment that has been removed from the building and packaged and staged as waste. The HA assumes the staged waste fire event as anticipated. The resulting FW and CP dose is estimated to be 6.66 rems and the dose to the Public is 0.424 rems.

Unmitigated Risk: Facility Worker – Medium; CP – Medium; Public – Low

The TEDE for the collocated worker is 6.66 rems, which is corresponds to a Medium risk; and for the offsite Public it is 0.42 rems which is also a Low risk classification.

Mitigation: Facility Worker – Low; CP – Low; Public – Low

The major receptor at risk is the facility worker that may be in or near the staging area. Applicable SMPs that provide worker safety for these types of actions include the fire protection program, waste management/handling, work control process, and the S&M program.

Sand Filter Load Drop: The most significant inventory external to the 221-U canyon building is the radiological hold-up in the sand filter. The structure is a reinforced concrete structure that has the top of the structure exposed to the environment. The planned decommissioning activities for the 221-U Canyon building call for demolition of the canyon roof and walls to the approximate level of the canyon deck. Construction equipment such as nibblers, cranes, and loaders may be used to demolish the structure and facilitate waste removal. Equipment operations present a potential threat to nearby confinement structures such as the sand filter.

During demolition, a crane is used to load debris from the demolition activities. The load exceeds the capacity of the sand filter roof structure causing the roof and load to fall onto the filter material of the sand filter. The sand filter is below grade and is constructed with pre-cast concrete beams. It consists of a bed of rock, gravel and sand constructed in layers. Considering its location, construction, makeup and size (85 ft by 85 ft), a crane drop would be expected to result in limited damage to the confinement capability of the sand filter. The release is assumed to be a ground-level release and assumes no wake effect. The resulting FW and CP dose is estimated to be 0.559 rems and the dose to the Public is 0.00046 rems.

Unmitigated Risk: Facility Worker – Low; CP –Low; Public – ND

The TEDE for the collocated worker is 0.56 rems, which is corresponds to a Low risk; and for the offsite Public it is 0.00046 rems which is an ND risk classification.

Mitigation: Facility Worker – Low; CP – Low; Public – ND

Applicable SMPs include the work control process, construction safety, and, where applicable, the hoisting and rigging requirements found in DOE/RL-92-36. The DSA recognized the confinement features of the 291-U sand filter as defense in depth equipment important-to-safety.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

The several radiological event scenarios identified with current S&M activities at the U Plant would still likely be present during the early D&D phases, but the most serious consequences would diminish as the final D4 phases are completed.

The cleanup remedy for U Plant is to largely leave contamination in place and contain it in such a fashion that it presents no unacceptable risk to human health or the environment. The containment remedy

relies not on meeting cleanup levels to manage risk, but rather on limiting or preventing exposure.[6] The last two phases of this "close-in-place/partially-demolish" approach consist of demolishing the upper structure of the canyon, leaving demolition debris in place, and placing a protective barrier over the demolished building, adjacent waste sites and demolished structures. Demolition methods under consideration include controlled blasting and manual methods including cutting, wrecking balls and jack hammers.[7] The barrier construction phase will then be followed by post-remediation care and environmental monitoring, institutional controls, and 5-year review.

Industrial hazards associated with the selected remedy will be similar to those that are encountered on any large-scale construction and demolition project, including unique hazards associated with demolition operations that include crane operation, concrete sawing, and excavator operation. Typical hazards will include moving machinery, falling, tripping, cutting, sound exposure, and dust inhalation. The risk of injury due to these hazards is addressed in national Occupational Safety and Health Administration and Washington Industrial Safety and Health Administration safety regulations, as well as the Hanford Site-specific procedures that implement the codes. Compliance with the applicable safety codes, regulations, and procedures will mitigate the risk posed by industrial hazards.[4]

Groundwater, Vadose Zone, and Columbia River

Current

The CP-DD-3 (U Plant) EU is located in the 200 East Area in the northern part of the 200-UP groundwater interest area (GWIA). The 200-UP GWIA is described in the CP-GW-2 EU (Appendix D.6). The saturated zone beneath the CP-DD-3 area has elevated levels of carbon tetrachloride (CCl_4), I-129, nitrate, Tc-99, trichloroethene (TCE), and total uranium based on 2014 groundwater monitoring results (http://phoenix.pnnl.gov/apps/gw/phoenix.html); three CP-DD-3 waste sites with small reported inventories are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0)[8]. The current threats to groundwater and the Columbia River from contaminants already in the 200-UP groundwater are evaluated as part of the CP-GW-2 EU (Appendix D.6). However, current threats to groundwater corresponding to only the CP-DD-3 EU contaminants *remaining* in the vadose zone (Table F.8-5) has an overall rating of *Low* (related to various primary contaminants) as described in **Part V**. In the 200 West Area, contaminated 200-UP groundwater is monitored and treated (DOE/RL-2016-09, Rev. 0). As indicated in **Part V**, no plumes have been linked to CP-DD-3 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-UP GWIA, no plume from the CP-DD-3 EU 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*

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[6] CH2MHIll Plateau Remediation Company 2008, *Remedial Design/Remedial Action Work Plan for the 221-U Facility, DOE/RL-2006-21, Revision 0*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management U.S. Department of Energy, December 2008.

[7] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013.

[8] Several waste sites, e.g., 216-U-4A/B and 216-U-7 Cribs, were placed in both CP-DD-3 and CP-LS-3 (U Plant Cribs and Ditches); however, these sites are evaluated as part of CP-DD-3. These are the three waste sites that that are suspected of being able to contribute mobile contaminants to groundwater.

(*ND*). Furthermore, the large dilution effect of the Columbia River on contamination from the seeps and groundwater 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

As described in **Part VI**, remedial actions have not been selected for CP-DD-2 EU legacy wastes sites. Furthermore, contaminants from the CP-DD-3 EU waste sites are not suspected of currently impacting groundwater although they may be contaminating the vadose zone; treatment actions are currently being conducted for 200-UP groundwater using the WMA S-SX groundwater extraction system[9], the U Plant area P&T system (uranium plume), and the I-129 plume hydraulic control system. Secondary sources in the vadose may threaten to impact groundwater in the future, including the Active Cleanup period. The *Low* ratings (for all primary contaminants with reported inventories) for the CP-DD-3 EU waste sites (Table F.8-5) are associated with some mobile primary contaminants that could eventually impact groundwater in the 200 West Area (CP-GW-2, Appendix D.6).

As described in **Part V**, the groundwater transport analysis in the TC&WM EIS (Appendix O, DOE/EIS-0391 2012) for the CP-TF-4 (U Tank and Waste Farms) EU, which is the considered representative of the U Plant EU for the purpose of this evaluation, indicates there is a significant impact of emplacing the engineered surface barrier (and resulting reduction of infiltrating water) on the predicted peak groundwater concentrations (relative to thresholds) at the U Barrier[10]. However, since ratings are already *Low*, these will not be modified to account for any uncertainties in the analysis.

There are only small very quantities of primary contaminants (Table F.8-2 through Table F.8-4) associated with the three cribs that constitute the reported CP-DD-3 vadose zone inventory. Furthermore, expected remedial options would tend to limit infiltrating water, which is the primary motive force to release and transport contaminants to groundwater. Surface barrier emplacement has not begun in the area, but there are active treatment processes ongoing in the 200-UP GWIA. The TC&WM EIS screening groundwater results for the area near the U Plant does indicate that only Tc-99 (of the Group A and B primary contaminants) could be present at the U Barrier at predicted concentrations that would exceed thresholds under the No Action alternative; however, the inventories for Tc-99 are insignificant relative to the other sources in the Central Plateau and thus current and future plumes are not considered linked to CP-DD-3 sources (or at least any contribution from the CP-DD-3 sites would be subsumed in contributions from other EUs). It is also considered unlikely that these small inventories would lead plume areas to increase over time. Because current ratings are already *Low* for primary contaminants[11], these will not be changed based on radioactive decay or recharge impacts. 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

[9] 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).

[10] 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 U Barrier is the closest to the U Tank and Waste Farms EU and is considered representative of the subsurface near the U Plant EU. Despite including sources other than those for the U Plant EU, the analysis in the TC&WM EIS was considered the most reasonable information to assess the impact of the engineered surface barrier emplacement.

[11] Because of the tendency for Sr-90 and uranium to sorb to Hanford sediments (and reinforced by predictions in the TC&WM EIS groundwater transport analysis (Appendix O, DOE/EIS-0391 2012), ratings for these constituents will be *ND* for Active Cleanup period and *Low* afterwards to account for uncertainties in the evaluation.

threats provided in Table F.8-5 would not be modified (at the end of the Active Cleanup period). The overall rating thus remains *Low* (various contaminants) during and after the Active Cleanup period.

Ecological Resources

Current

This area is completely disturbed with buildings, parking areas, and cleared graveled areas. Migratory birds could nest on buildings. Work would be done when birds are not nesting, or other mitigation activities would be implemented.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Removal of facility would include significant truck traffic/roadway disturbance to level 3 and above resources in buffer area (2%). Removal of facility will decrease potential nesting sites, roost sites, and raptor hunting perches. Also, remediation activities may disrupt possible occurrence of Piper's daisy recorded in current evaluations.

Cultural Resources

Current

Area is heavily disturbed and the EU has not been inventoried for archaeological resources. Geomorphology indicates a moderate potential to contain intact archaeological resources on the surface and/or subsurface. Traditional cultural places are visible from EU. National Register eligible Manhattan Project/Cold War Era buildings have been mitigated.

Risks and Potential Impacts from Selected or Potential Cleanup Approaches

Archaeological investigations and monitoring may need to occur prior to remediation. Based on geomorphological indicators, there is a moderate potential for intact archaeological resources. Remediation disturbance may result in impacts to archaeological resources if they are present in the subsurface. Permanent indirect effects to viewshed are possible from demolition, remediation and entombment. Manhattan Project/Cold War Era buildings will be demolished.

Considerations for Timing of the Cleanup Actions

There is no available information that would indicate a need for immediate completion of the final phases of D&D on the U Plant or for giving this work a higher priority than conducting work on the other canyon facilities awaiting D&D. The TPA Milestone requires that D&D on the U Plant be completed by September 30, 2024.

The saturated zone beneath the CP-DD-3 (U Plant) area has elevated levels of carbon tetrachloride (CCl_4), I-129, nitrate, Tc-99, trichloroethene (TCE), and total uranium based on 2014 groundwater monitoring results (http://phoenix.pnnl.gov/apps/gw/phoenix.html). Sites within the CP-DD-3 EU are suspected of being able to contribute mobile contaminants to the saturated zone (DOE/RL-92-16, Rev. 0) and are likely currently contributing contamination to the vadose zone. Monitoring and treatment of groundwater is being conducted within the 200-UP GWIA (via the WMA S-SX groundwater extraction system with treatment in the 200 West Pump and Treat facility, the U Plant area P&T system for the uranium plume, and the I-129 plume hydraulic control system), which is 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., plumes except for nitrates and uranium in 200-UP) and concentrations continue to exceed cleanup levels. Thus additional cleanup actions are likely warranted for this area although perhaps not the EU.

There is potential for additional contaminant release and migration through the vadose that may eventually impact groundwater as 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 (IS) with regard to human health risks because no Hazard Analysis or DSA describing near-term or post-cleanup risks have been prepared.

Groundwater: During the Near-term, Post-Cleanup period (described in **Parts V** and **VI** and Table F.8-6), the ratings for the Group A and B primary contaminants are *Low* to address uncertainties.

Columbia River: As indicated in **Part V**, no radionuclides or chemicals from the 200 West Area (that includes the CP-DD-3 EU waste sites) 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 F.8-6).

PART II. ADMINISTRATIVE INFORMATION

OU AND/OR TSDF DESIGNATION(S)

200-CU-1

COMMON NAME(S) FOR EU

U Plant, 221-U Facility and Uranium Recovery Plant

KEY WORDS

Canyon, Uranium processing

REGULATORY STATUS: (RCRA, CERCLA, ROD IN DISPOSITION TABLE FOR MANY)

Regulatory basis

The 1996 Agreement in Principle (DOE-RL1996) among the Tri-Parties of DOE, USEPA, and Washington State Department of Ecology established that the CERCLA Remedial Investigation/Feasibility Study process would be followed, on a case-by-case basis, to evaluate potential cleanup remedies and identify preferred alternatives for the final end state for the five major canyon buildings in the 200 Area of the Hanford Site. The 221-U Facility was selected as a pilot project for this effort.

Applicable regulatory documentation

In September 2005, the U.S. Environmental Protection Agency (EPA) issued a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) Record of Decision (ROD) for the final remediation of the Hanford Site U Plant Facility using the "Close in Place **-** Partially Demolished Structure" alternative.

Applicable Consent Decree or TPA milestones

In September 2009 the Tri-Party Agreement was changed to create the M-085 milestone series and establish milestones for the 221-U Facility in accordance with the approved Remedial Action Work Plan.[12] Milestone M-085-00U requires "complete remediation of the 221-U key facility per the record of decision remedial alternative; This milestone will be complete when the 221-U facility legacy waste has been consolidated into below-deck locations, grouting activities have been completed, and the facility has been partially demolished, covered with a surface barrier and revegetated" by September 30, 2024. Additional milestones were created to cover completion of a number of interim steps, including M-085-45U requiring DOE to "finalize 221-U Operations and Maintenance Plan by the same September 30, 2024 date.[13]

RISK REVIEW EVALUATION INFORMATION

Completed by

September 20, 2016, updated February 17, 2017

Evaluated by

Henry Mayer, Amoret Bunn, Jennifer Salisbury and Kevin G. Brown

Ratings/Impacts Reviewed by

David Kosson and James Clarke

PART III. SUMMARY DESCRIPTION

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).

[12] CH2MHIll Plateau Remediation Company 2008, *Remedial Design/Remedial Action Work Plan for the 221-U Facility, DOE/RL-2006-21, Revision 0*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management U.S. Department of Energy, December 2008.
[13] US Department of Energy, Federal Facility Agreement and Consent Order Change Control Form, Change Number M-85-09-01, September 21, 2009.

PRIMARY EU SOURCE COMPONENTS

Legacy Source Sites

The CP-DD-3 waste sites with reported inventories consist of a pipeline, sand filter, building, and three cribs. The three cribs are liquid waste disposal sites that constitute the reported vadose zone inventory for this EU.

High-Level Waste Tanks and Ancillary Equipment

Not applicable

Groundwater Plumes

The saturated zone beneath the CP-DD-3 (U Plant) area has elevated levels of carbon tetrachloride (CCl_4), I-129, nitrate, Tc-99, trichloroethene (TCE), and total uranium based on 2014 groundwater monitoring results (http://phoenix.pnnl.gov/apps/gw/phoenix.html). However, there are no reported CCl_4 or TCE inventories for the CP-DD-3 waste sites (Table F.8-4), and there are no CP-DD-3 sources linked to the groundwater plumes (DOE/RL-2016-09, Rev. 0). The 200 West Area plumes are described in detail in the CP-GW-2 EU (Appendix D.6). Waste sites within the CP-DD-3 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 current plumes in the 200 West area (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, the U Plant area P&T system, and the I-129 plume hydraulic control system), which are described as part of the CP-GW-2 EU (Appendix D.6).

Operating Facilities

Not applicable

D&D of Inactive Facilities

The 221-U Facility was contaminated with hazardous substances used or generated during the uranium recovery process. The 221-U Facility ROD identified the following radionuclides in the facility: americium-241, cesium-137, cobalt-60, neptunium-237, plutonium-239/240, strontium-90; and isotopes of europium, thorium, and uranium. Chemical contaminants within the 221-U Facility are antimony, arsenic, barium, cadmium, chromium, lead, mercury, phthalates, polychlorinated biphenyls, selenium, silver, and uranium.[14]

LOCATION AND LAYOUT MAPS

The 221-U Facility (U Plant) is located within the 200 West Area in the Central Plateau of the Hanford Site.

[14]U.S. Department of Energy 2011, *Interim Completion Report for the 221-U Facility*, DOE/RL-2011-80, Revision 0. Richland Operations Office, September 2011.

Figure F.8-1. U Plant Evaluation Unit Map.

Figure F.8-2. U Plant Facility Aerial Photo (December 2010).

PART IV. UNIT DESCRIPTION AND HISTORY

EU FORMER/CURRENT USE(S)

The 221-U Facility was originally constructed during the mid-1940s as one of three Hanford Site chemical separation plants for recovery of plutonium from spent nuclear fuel. Because early operational experience indicated that B Plant and T Plant were sufficient to meet production goals, the 221-U Facility was held in reserve and was never used to extract plutonium from fuel elements. The 221-U Facility was used to train B Plant and T Plant operators until 1952, when it was converted to the tributyl phosphate (TBP) process to recover uranium from high-level bismuth-phosphate process wastes. At that time, it became known as the Uranium Recovery Plant.

The 221-U Facility TBP process recovered residual uranium from B Plant and T Plant waste that had been stored in tank farms in the 200 East and 200 West Areas. The waste tanks were sluiced with their own supernatant to produce a slurry, which was then pumped to the 221-U Facility through underground transfer lines. A counter-current extraction column used organic solutions of TBP in kerosene to preferentially attract uranium, separating it from other fission products and small amounts of plutonium. Uranium was then stripped back into the aqueous phase in a second column. The uranyl nitrate was converted to uranium-trioxide (UO3) by calcination at high temperatures in the U03 Plant. Underground transfer lines were used to pump the 221-U Facility's TBP intermediate-level liquid waste to cribs and trenches located approximately 4.8 km (3 mi) from B Plant in the 200 East Area. The 221-U Facility non-TBP waste was disposed in nearby cribs, trenches, reverse wells, and the U Pond. High-level waste was transferred to the 241-U Tank Farm.[15]

From 1958 to 1964, U Plant was used to receive, decontaminate, and maintain contaminated equipment from other Hanford Site processing facilities. Much of the original canyon equipment was eventually removed from the process cells and used as spare parts for other facilities. Process equipment from other Hanford Site facilities was brought into the 221-U Facility and placed on the canyon deck or in the process cells.

The U Plant Facility structure was downgraded to a less than Hazard Category 3 classification on completion of Interim D&D activities in September 2011. This included the removal of Tank D-10 and the completion of grouting activities in the canyon. The canyon exhaust air ventilation tunnel up to the inlet of the sand filter and the sand filter exhaust up to the inlet of the 291-U stack exhaust system were grouted as part of these Interim D&D activities, isolating the sand filter which remains a Category 2 segment of the facility. The detached 241-WR Vault is a less than Category 3 segment. The UO3 Uranium Trioxide Plant (224-U) and other U Plant ancillary structures contained no or minimal residual radiological contamination were categorized as less than Hazard Category 3 nuclear facilities and have since been demolished.

The primary current activity at the site is Surveillance & Maintenance while it awaits final D&D.

[15] CH2MHill Hanford and I.D. Jacques 2001*, Final Data Report for the 221-U Facility Characterization, BHI-01565, Rev. 0*, Prepared for the U.S. Department of Energy, Richland Operations Office, Office of Environmental Restoration, September 2001.

LEGACY SOURCE SITES[16]

This EU contains three Crib waste sites, 216-U-4A, 4B and 7. The 216-U-4A site received acidic decontamination waste containing fission products from hood sinks in the 222-U from July 1955 to January 1965. Waste flowed to the 216-U-4A French Drain via the overflow line from the deactivated 216-U-4 Reverse Well. From January 1965 to July 1970 the site received Pacific Northwest Laboratory operations decontamination waste from a hood sink in the 222-U Building.

From January 1960 to July 1970 the 216-U-4B site received waste from a hot cell and hood in the 222-U Building. From January 1965 to July 1970 the site received hot cell and hood waste from Pacific Northwest Laboratory experiments conducted in 222-U. The site waste contains nitrate.

The 216-U-7 site received liquid wastes from a counting box floor drain during the metal recovery program. The site waste contains nitrate. Due to UPR-200-W-138, it is assumed that 13 kilograms (30 pounds) of uranium in uranyl nitrate hexahydrate (UNH) solution were also introduced to the soil through the 216-U-7 French Drain.

GROUNDWATER PLUMES

The groundwater beneath the U Plant Area has elevated levels of carbon tetrachloride (CCl_4), I-129, nitrate, Tc-99, trichloroethene (TCE), and total uranium based on 2014 groundwater monitoring results (http://phoenix.pnnl.gov/apps/gw/phoenix.html) from the U Plant Area facilities and other 200 Area facilities. Current plumes are described as part of the 200-UP GWIA described in CP-GW-2 EU (Appendix D.6). Sites within the CP-DD-3 EU, including the 216-U-4A/4B and 216-U-7 Cribs 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 F.8-4 indicates that carbon tetrachloride (CCl_4) and trichloroethene (TCE) were not reported for the CP-DD-3 waste sites, and CP-DD-3 waste sites have not been linked to current 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). Monitoring and remediation of groundwater located under the U Plant Area are being addressed by the *Record of Decision for the 200-UP-1 Interim Remedial Measure,* EPA/541/R-97/048.[17]

D&D OF INACTIVE FACILITIES

The 221-U Facility is a large, concrete structure nominally 810 ft long, 66 ft wide, and 77 ft high; approximately 30 ft of this height is below grade. The concrete walls and floor range from approximately 3 to 9 ft thick. The floor of the expansive main room is referred to as the “canyon deck;” this deck is formed by the removable cover blocks shielding the process cells and hot pipe trench. The process cells and hot pipe tunnel both reside below the canyon deck. The cover blocks have lifting bails that project 32 in. above the surface of the cover blocks. The crane way and operating gallery are situated on the other side of a dividing wall from the canyon deck. Gantry cranes run the length of the canyon. Several other isolated areas, each designed for a specific function associated with the chemical-processing

[16] CH2MHIll Plateau Remediation Company 2016, *Hanford Site Waste Management Units Report*, DOE/RL-88-3-, Revision 25, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 2016.

[17] CH2MHill Plateau Remediation Company 2008, *Remedial Design/Remedial Action Work Plan for the 221-U Facility, DOE/RL-2006-21, Revision 0*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, December 2008.

mission are also located beneath the level of the canyon deck. The piping and electrical galleries are located beneath the canyon deck along one side of the canyon. The hot pipe trench and the ventilation tunnel are located along the other side of the canyon beneath the canyon deck. The 24-in diameter cell drain header is located beneath and traverses the full length of the canyon. Each process cell is equipped with a floor drain that connects to the drain header. The drain header drains to Cell 10. Process Cell 10 is the sump cell with the lowest floor elevation of all the process cells. (Figure F.8-3 shows a cross-sectional sketch of the 221-U Facility)

The 221-U Facility contains 40 process cells. The typical process cell is 17 ft and 8 in. long, 13 ft wide, and 22 ft deep, beneath four cover blocks, which are each 6 ft thick. Process Cell 30 housed Tank D-10, a failed process tank brought to the 221-U facility in 1965 from the Reduction Oxidation Plant (REDOX), which contained remote-handled transuranic waste. The hot pipe trench is 6 ft deep beneath 4-ft-6-in. thick cover blocks. The trench varies from 7-ft-2-in. to 8-ft wide at the trench floor, and runs the entire length of the facility. The process cells, galleries, ventilation tunnel, and hot pipe trench are interconnected with an interior network of pipelines. An exterior 24-in. diameter process sewer pipeline is located on the east side of the 221-U Facility and runs its entire length.

In September 2005, the U.S. Environmental Protection Agency (EPA) issued a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) Record of Decision (ROD) for the final remediation of the Hanford Site U Plant Facility. The five major components of the remedy selected include:

1. Equipment size reduction and placement
2. Cell 30 Tank D-10 contents disposition
3. Canyon void space grouting
4. Canyon demolition
5. Engineered barrier construction

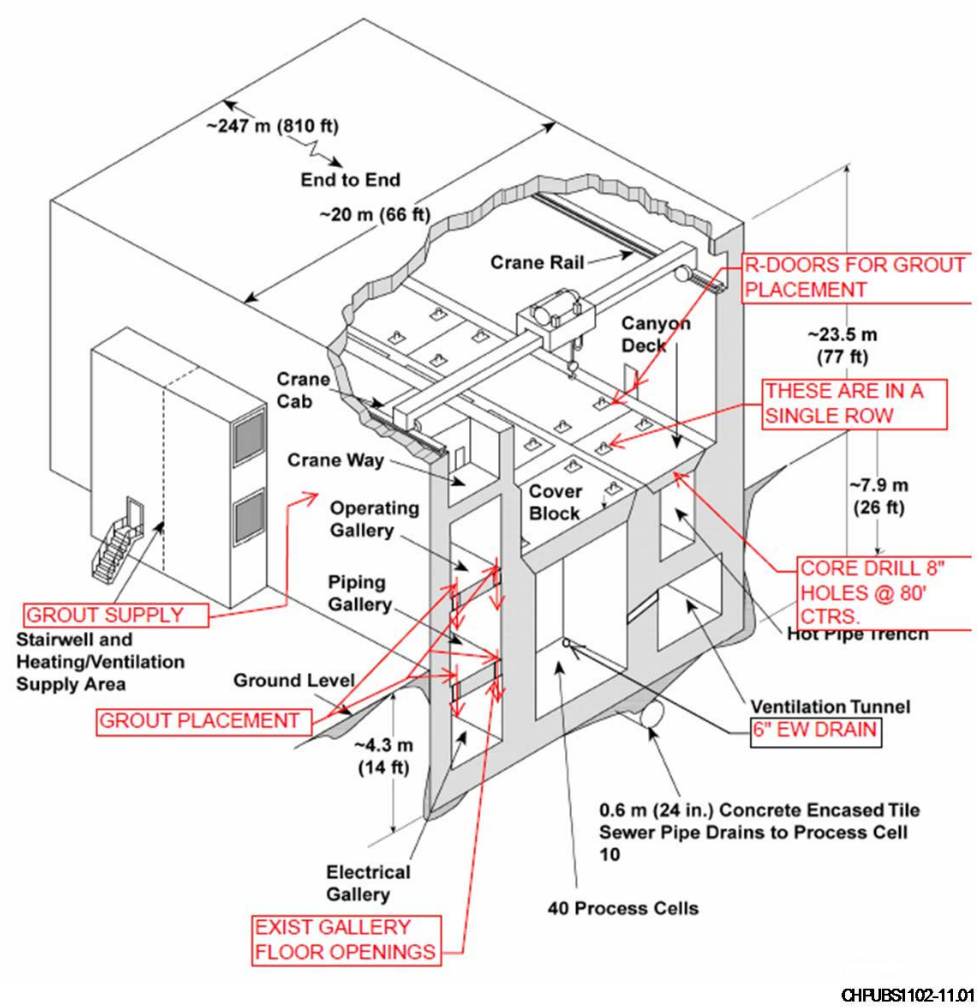

Figure F.8-3. 221-U Canyon Cross-section View.

Interim D&D activities completed the first three components in 2011. The equipment size reduction and placement remedy component involved consolidation of equipment from the canyon deck into process cells and the hot pipe trench. The Cell 30 Tank D-10 contents disposition remedy component involved removal of Tank D-10, along with its contents, from Cell 30 and shipment to the Central Waste Complex for interim storage pending final treatment, packaging, and shipment to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The canyon void space grouting remedy component filled the process cells, hot pipe trench, piping and electrical galleries, drain header, process sewer, and ventilation tunnel and ducts with grout. Completion of these remedy components was consistent with the remedial action identified in the 221-U Facility ROD.[18]

A *Polymeric Barrier System* ([PBS] MSDS 032197) fixative was applied to equipment and canyon areas to minimize airborne contamination during movement of equipment. It was applied in stages to equipment and to the floor areas which were exposed when equipment was moved (i.e., fixative was sprayed on

[18] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013.

equipment prior to relocating the equipment; once equipment was moved, fixative was applied to the floor where the equipment had been situated). Approximately 76,000 ft^2 of fixative was applied in the canyon (floor and 8 ft up the walls) and 9,000 ft^2 in the railroad tunnel (floor and 8 ft up the walls) were covered with the PBS fixative. The canyon deck floor received two applications of the fixative. Radiological surveys of the upper walls (above 8 ft) and ceilings of the canyon and railroad tunnels determined that application of fixative was not required. [19]

Equipment located on the canyon deck ranged from 126 larger pieces such as shipping casks, centrifuges, and tanks to nonreleasable hand-held tools (see Figure F.8-4). Of the 40 process cells in the canyon, 37 process cells were available for equipment storage. Most of the 37 cells already contained some equipment either original equipment or equipment from other facilities that had been placed in the cell for storage at some earlier time. A path forward was established that mapped the majority of the large equipment to specific process cells in order to more efficiently use cell space, minimize worker exposure, and facilitate grouting of equipment with large internal void spaces. General industrial-use and over-the-counter size reduction technologies, i.e., cutters, hole saws, mechanical saws, and mobile shears, were determined to be most appropriate for this action. The canyon deck (approximately 29,760 ft^2) was cleared of equipment (see Figure F.8-4).

The canyon void space grouting remedy component involved installation of an onsite batch plant for grout production with raw material storage, equipment cleaning, and wastewater management areas. The batch plant, located just north of the 221-U Facility, had the capability to produced 160 yd^3 of grout per hour. Grout was delivered into the canyon through 11 pumping locations. The grout external conveyance system penetrated the outer canyon walls, which varied in thickness from 3 to 5 ft. The grout internal conveyance system was equipped with flexible hose and supplied grout to multiple process cells from one pumping location. A twelfth pumping location was installed in the external ventilation system. For those process cells that contained equipment with the potential to become buoyant during grout filling operations, cover blocks were removed to allow for manual grouting of the equipment's interior void space. Grout conveyance holes were drilled into the cover blocks of select process cells to minimize the number of cover blocks requiring removal.

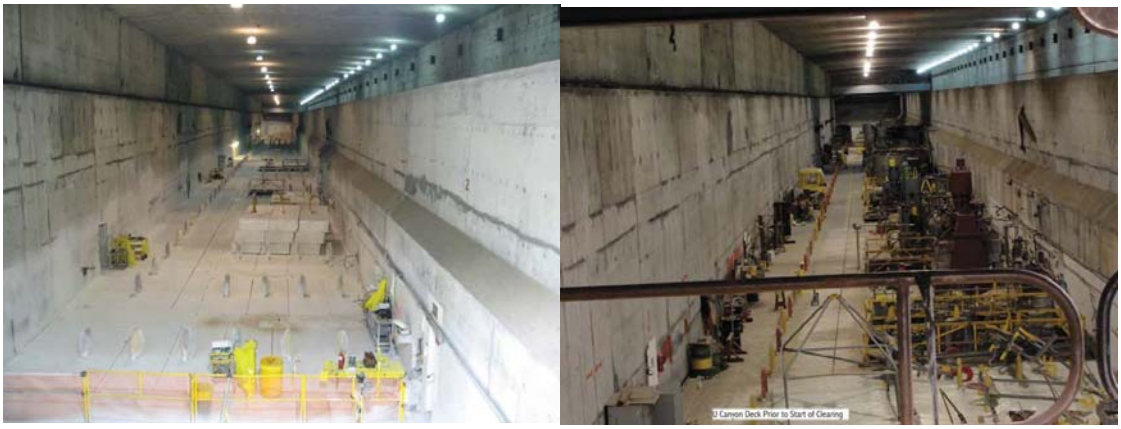

Figure F.8-4. U Plant Canyon Before and After.

[19] U.S. Department of Energy 2011, *Interim Completion Report for the 221-U Facility*, DOE/RL-2011-80, Revision 0. Richland Operations Office, September 2011.

Grout placement was sequenced to control the heat of hydration, prevent grout from escaping the canyon, and for other operations purposes, as well as the need to isolate the sand filter (Waste Information Data System [WIDS] waste site 200-E-30), located upstream of the stack, to allow for future characterization.

Some demolition preparation activities have begun in the 221-U Operating Gallery in support of the future canyon demolition remedy component. These activities include:

- Removal and disposition of hazardous material,
- Pipeline draining and removals,
- Asbestos abatement

A separate hazards analysis and DSA revision will be required prior to performing sand filter D&D activities that will reduce its classification to less than a Hazard Category 3. The sand filter consists of seven layers of sand and gravel material in a concrete housing equipped with tiles. The layers decrease in size from coarse gravel and rock on the bottom layer, to progressively finer sand on the top layer. The top layer of fine sand is covered with a crushed rock layer. It is currently isolated as a result of the grouting of the canyon exhaust air ventilation tunnel on the inlet side and the stack exhaust system on the exhaust side.

The last two phases of this "close-in-place/partially-demolish" approach consists demolishing the upper structure of the canyon, leaving demolition debris in place, and placing a protective barrier over the demolished building, adjacent waste sites and demolished structures. Demolition methods under consideration include controlled blasting and manual methods including cutting, wrecking balls and jack hammers.[20]

In preparation for the engineered barrier construction remedy component, barrier fill material has been staged at the 221-U Facility. Concrete rubble from the 183-KW Sedimentation Basin and WIDS waste site 600-275, Igloo Site has been approved for reuse in the U Canyon barrier, along with concrete rubble and excavated soil from the WIDS waste site 100-C-7, 183-C Filter Building/Pump room Facility Foundation and Demolition Waste.

ECOLOGICAL RESOURCES SETTING

Landscape Evaluation and Resource Classification

Although the buildings and utility poles within the EU offer some habitat for birds, 100% of the U Plant EU is classified as resource level 0.

The amount and proximity of biological resources surrounding the U Plant EU were examined within the adjacent landscape buffer area, which extends 1159 ft (353 m) from the geometric center of the EU. Nearly 98% of the combined EU and buffer area is level 2 or lower (Appendix J, Table J.75). A little over 2 % of the combined EU is contained in the circular patches of level 3 resources, which are based on previous individual occurrences of the state sensitive Piper's daisy (*Erigeron piperianus*). No Piper's daisies were observed during the May 28, 2015 survey.

[20] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013.

Field Survey

No vegetation occurs within the U Plant EU boundary and no measurements were made (Appendix J, Figure J.88). No field measurements of vegetation were taken; visual and pedestrian survey of the evaluation unit indicated that the unit consists mainly of graveled surfaces and buildings, (cover =100%). The area contains several buildings surrounded by graveled surfaces that are sprayed with herbicides to prevent vegetation growth (Appendix J, Table J.74). Common ravens (*Corvus corax*) and rock doves (*Columba livia*) were noted on or near the buildings.

Landscape Evaluation and Resource Classification:

Although the buildings and utility poles within the EU offer some habitat for birds, 100% of the U Plant EU is classified as resource level 0 (Appendix J, Table J.75Figure J.88).

CULTURAL RESOURCES SETTING

The CP-DD-3, U Plant EU has not been inventoried for archaeological resources and it is unknown if an NHPA Section 106 review was completed for remediation activities at U Plant. It is unlikely that intact archaeological material is present in the EU, both on the surface and in the subsurface, because the soils in the EU have been extensively disturbed.

Cultural resource documented within the CP-DD-3, U Plant EU include: four National Register-eligible buildings that are contributing properties within the Manhattan Project and Cold War Era Historic District, with no documentation required. In accordance with the 1998 *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan (*DOE/RL-97-56), all documentation requirements have been completed for these properties. National Register-eligible Manhattan Project and Cold War Era buildings located within the CP-DD-3 U Plant EU: 221-U, U Plant Canyon; 271-U, Office and Service Building; 291-U, Exhaust Fan & Stack; and 292-U, Gas Sampling Building.

Cultural resource documented within 500 meters of the CP-DD-3 U Plant EU include: 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; one National Register-eligible building that is a contributing property within the Manhattan Project and Cold War Era Historic District, with documentation required; and three National Register-eligible buildings that are contributing properties within the Manhattan Project and Cold War Era Historic District, with no documentation required. Mitigation for contributing buildings/structures has been completed as per the *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan* (DOE/RL-97-56) (DOE-RL 1998).

Historic maps and aerial imagery of the area do not indicate any cultural features or use within or near this EU. This suggests a low potential for the presence of archaeological resources associated with the Pre-Hanford Early-Settlers/Farming landscape within the EU boundary. 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-DD-3 U Plant EU. However, extensive ground disturbance within the entire EU suggests little to no potential for intact cultural resources at or below ground surface.

Because the EU has not been inventoried for cultural resources, it may be appropriate to conduct surface 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

This EU contains three Crib waste sites, 216-U-4A, 4B and 7. The 216-U-4A site received acidic decontamination waste containing fission products from hood sinks in the 222-U from July 1955 to January 1965. Waste flowed to the 216-U-4A French Drain via the overflow line from the deactivated 216-U-4 Reverse Well. From January 1965 to July 1970 the site received Pacific Northwest Laboratory operations decontamination waste from a hood sink in the 222-U Building.

From January 1960 to July 1970 the 216-U-4B site received waste from a hot cell and hood in the 222-U Building. From January 1965 to July 1970 the site received hot cell and hood waste from Pacific Northwest Laboratory experiments conducted in 222-U. The site waste contains nitrate.

The 216-U-7 site received liquid wastes from a counting box floor drain during the metal recovery program. The site waste contains nitrate. Due to UPR-200-W-138, it is assumed that 13 kilograms (30 pounds) of uranium in uranyl nitrate hexahydrate (UNH) solution were also introduced to the soil through the 216-U-7 French Drain.

Vadose Zone Contamination

The CP-DD-3 legacy waste sites with reported inventories (Table F.8-2 through Table F.8-4) represent vadose zone and other contamination. The inventories for the cribs provided represent the reported contamination originally discharged (without decay correction[21]) to the vadose zone from the CP-DD-3 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-DD-3 waste sites. To summarize[22]:

- *Chromium* – There are small reported inventories for chromium (Table F.8-4) dominated by the 216-U-4A Crib.
- *Carbon tetrachloride (CCl_4), cyanide* (*CN*), and *trichloroethene (TCE)* – There are no reported vadose zone inventories for these contaminants (Table F.8-4).

[21] 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).

[22] 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.

- *I-129* – There are very small reported inventories (Table F.8-2) in the 216-4A and 216-U-7 Cribs.
- *Tc-99* – There are very small reported vadose zone inventories (Table F.8-3) in the 216-4A and 216-U-7 Cribs.
- *Uranium* – There are small reported vadose zone inventories (Table F.8-3 and Table F.8-4) that dominated by the 216-U-4A Crib.
- *Sr-90 and other Group A&B Primary Contaminants (PCs)* – There are very small reported vadose zone inventories for Sr-90 (Table F.8-3) and C-14 (Table F.8-2) but none for Cl-36 (Table F.8-2). The reported Sr-90 and C-14 vadose zone inventory is distributed over the three cribs.

No CP-DD-3 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 media and that the TC&WM EIS groundwater transport analysis at the U Barrier[23] (see Section 5.5 in Appendix E.5) 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 reported inventories) are given *Not Discernible* (*ND*) current ratings and *Low* ratings after the Active Cleanup period 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 U Barrier for only Tc-99 could exceed thresholds during the evaluation period (for the No Action alternative); however, sources for the plumes for these contaminants are not part of CP-DD-3 and thus any contributions from CP-DD-3 in the future would be assumed to be subsumed in the exiting 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-DD-3 in Table F.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 are *Not Discernible* (*ND*) for Sr-90 and total uranium (as described above) and *Low* for the other Group A and B primary contaminants with reported inventories. The overall current rating is defined as the highest over all the ratings and thus *Low.*

Groundwater Plumes

Three waste sites within the CP-DD-3 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, U Plant area P&T system, and I-129 plume hydraulic control system); these actions are described as part of the CP-GW-2 EU (Appendix D.6). As shown in Table F.8-5, no saturated zone inventories have been associated with CP-DD-3; 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.

[23] 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 U Barrier is the closest to CP-DD-3. Despite including sources other than those for CP-DD-3, the analysis in the TC&WM EIS was considered a reasonable source of information to assess the potential transport in the Hanford subsurface.

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-DD-3 (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; however, there are no CP-DD-3 sources associated with these plumes, and the remaining vadose zone sources from other EUs would drive future risks to groundwater.

Impact of Recharge Rate and Radioactive Decay on Groundwater Ratings

As described in Section 5.5 of Appendix E.5 for the U Tank and Waste Farms EU (CP-TF-4), the TC&WM EIS screening groundwater transport analysis (Appendix O, DOE/EIS-0391 2012) indicates that there is a significant impact of emplacing the engineered surface barrier (and resulting reduction of infiltrating water) on the predicted peak groundwater concentrations at the U Barrier[24]. To summarize, the results for Central Plateau sources including those in addition to the U Plant EU (Appendix O, DOE/EIS-0391 2012) include:

- Tc-99 peak concentration is 9830 pCi/L (CY 3985) for the No Action Alternative versus 259 pCi/L (CY 3296) for the Landfill Scenarios where the threshold value is 900 pCi/L.
- Nitrate and uranium peak concentrations were all lower than the standard for both the No Action and Landfill Scenarios.
- No values are reported at the U Barrier for Sr-90 and various other contaminants for either scenario, which indicates that the appropriate sources were not considered in the analysis, or peak fluxes that were less than 1×10^{-8} Ci/yr for radioactive contaminants, or 1×10^{-8} g/yr for chemical contaminants (Appendix O, DOE/EIS-0391 2012, p. O-2).

The predicted peak concentrations at the U Barrier for the Landfill Scenarios remain below threshold values during the TC&WM EIS evaluation period (10,000 years) and thus the saturated zone ratings for the Active and Near-term Post-Cleanup periods would be rated as *Low* for this period (where the *Low* rating was maintained to account for uncertainty)[25]. Furthermore, groundwater is being treated in the area; these potential impacts are described below.

Columbia River

Threats to the Columbia River similar to those presented by the CP-DD-3 EU were evaluated in Section 5.5 of Appendix E.5 for CP-TF-4 (U Single-shell Tank and Waste Farm in 200 West) where all risks and potential impacts were rated *Not Discernible* (*ND*).

Facilities for D&D

The 221-U Building bounding inventory[26] is primarily Cs-137 and Sr-90 which has been stabilized by encapsulating the cells contents with grout and applying a fixative over 8 feet of wall surface above the

[24] 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 U Barrier is the closest to the U Plant EU. Despite including sources other than those for the U Plant EU, the analysis in the TC&WM EIS was considered a reasonable source of information to assess the impact of the engineered surface barrier emplacement.
[25] 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.
[26] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013.

operating deck, to equipment removed from the canyon deck, and to the exposed floor area where equipment was removed. At the time that the Interim D&D work was completed in September 2011, radiological surveys of the upper walls (above 8 feet) and ceilings of the canyon and railroad tunnels determined that application of fixative was not required (over those surfaces).

Two authoritative sources, the 2012 *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)* (DOE/EIS-0391) and the December 2010 *U Plant Documented Safety Analysis, HNF-13829, Revision 4* [OUO document] differ significantly from the more current February 2013 *U Plant Documented Safety Analysis, HNF-13829, Revision 5* with regard to the amount of Cs-137 and Sr-90, as measured in curies, estimated to be present in the 221-U Canyon building.

Isotope	**EIS/DSA Rev 4**	**DSA Rev 5**
Cs-137	240	25,000
Sr-90	100,000	25,000

The DSA Revision 5 inventories are based on a June 2011 analysis of inventories contained in *221-U Process Cell Grouting Final Hazard Categorization, CHPRC-01356, Revision 2* [OUO Document]. This analysis started with the same assumption as the EIS and DSA Rev. 4 that all of the 1.00E+05 Ci estimated beta inventory in the Canyon was in the form of Sr-90, but it made two primary revisions. The first was to recognize that this was the amount in 1982 and that with a half-life of 29.1 yrs that it should be reduced to 50,000 Ci. The second revision was to account for the fission products being a combination of Sr-90 and Cs-137. The mix, based on analysis of the PUREX tunnels and other Hanford locations was found to be about 1:1 which accounts for current estimated inventories of 25,000 Ci for each of Sr-90 and Cs-136.

The inventory for the 291-U sand filter is primarily Cs-137, Sr-90 and Pu-239 and was based on known U Plant stack emissions, a comparison to Reduction-Oxidation (REDOX) Plant stack emissions and an assumed sand filter efficiency of 99.95%. All alpha contamination was assumed to be Pu-239 as a worst-case scenario.

Isotope	**Ci**
Cs-137	6,800
Sr-90	790
Pu-239	41

These and other values from the DSA Version 5 are contained in Tables F.8-2 and F.8-3 below.

Table F.8-2. Inventory of Primary Contaminants [a]

WIDS	Description	Decay Date	Ref[b,c,d]	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[e]			0.64	0.015	NR	0.0066	31,800	9.90E-10	7.60E-08	0.32	2.60E-10
200-W-42	Process Sewer	2001	SIM	NR	NR	NR	NR	NR	NR	NR	0.32	NR
200-W-44	Sand Filter	2011	DSA	NR	NR	NR	NR	6,800	NR	NR	NR	NR
221-U	Canyon Building	2011	DSA	0.32	NR	NR	NR	25,000	NR	NR	NR	NR
241-WR	Vault	2011	DSA	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-U-4A	Cribs	2001	SIM	0.3	0.014	NR	0.0062	0.0079	8.60E-10	6.50E-08	5.70E-07	2.30E-10
216-U-4B	Cribs	2001	SIM	0.018	0.00087	NR	0.00038	0.00044	NR	NR	NR	NR
216-U-7	Cribs	2001	SIM	1.40E-09	4.40E-10	NR	3.50E-09	4.80E-05	1.30E-10	1.10E-08	1.90E-08	2.20E-11

a. NR = Not reported
b. EIS-S = DOE/EIS-0391 2012
c. SIM = RPP-26744, Rev. 0
d. DSA = U Plant Documented Safety Analysis, HNF-13829, Revision 5
e. Radionuclides are summed without decay correction since the uncertainties in inventories are large.

Table F.8-3. Inventory of Primary Contaminants (cont)[a]

WIDS	Description	Decay Date	Ref[b, c,d]	Ni-59 (Ci)	Ni-63 (Ci)	Pu (total) (Ci)	Sr-90 (Ci)	Tc-99 (Ci)	U (total) (Ci)
All	Sum[e]			3.90E-09	3.70E-07	43.3	25,790	2.50E-07	0.0023
200-W-42	Process Sewer	2001	SIM	NR	NR	1.70E-06	NR	NR	3.70E-07
200-W-44	Sand Filter	2011	DSA	NR	NR	41	790	NR	NR
221-U	Canyon Building	2011	DSA	NR	NR	0.76	25,000	NR	NR
241-WR	Vault	2011	DSA	NR	NR	1.0	60	NR	NR
216-U-4A	Cribs	2001	SIM	3.30E-09	3.10E-07	0.52	0.00074	2.30E-07	0.0022
216-U-4B	Cribs	2001	SIM	NR	NR	0.026	4.10E-05	NR	0.00013
216-U-7	Cribs	2001	SIM	7.00E-10	6.70E-08	7.00E-09	3.90E-07	1.20E-08	3.80E-11

a. NR = Not reported
b. EIS-S = DOE/EIS-0391 2012
c. SIM = RPP-26744, Rev. 0
d. DSA = U Plant Documented Safety Analysis, HNF-13829, Revision 5
e. Radionuclides are summed without decay correction since the uncertainties in inventories are large

Table F.8-4. Inventory of Primary Contaminants (cont)[a]

WIDS	Description	Ref[b, c]	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	0.5	NR	0.013	180	0.3	NR	NR	3
200-W-42	Process Sewer	SIM	NR	NR	0.0012	NR	3.20E-05	170	NR	NR	NR	0.00046
200-W-44	Sand Filter	EIS-S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
221-U	Process Building	EIS-S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
216-U-4A	Cribs	SIM	NR	NR	0.49	NR	0.012	4.9	0.29	NR	NR	2.9
216-U-4B	Cribs	SIM	NR	NR	0.017	NR	0.00073	0.017	0.017	NR	NR	0.17
216-U-7	Cribs	SIM	NR	NR	0.00018	NR	3.50E-11	2.1	1.80E-08	NR	NR	9.80E-09

a. NR = Not reported
b. EIS-S = DOE/EIS-0391 2012
c. SIM = RPP-26744, Rev. 0

Table F.8-5. Summary of the Evaluation of Current 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	1.52E-02 Ci	---	---	1.52E-02 Ci	7.58E-03	*Low*
I-129	A	1 pCi/L	0.23	0.2	1.84	2.56E-10 Ci	---	---	2.56E-10 Ci	9.86E-08	*Low*
Sr-90	B	8 pCi/L	0.23	22	1.84	7.84E-04 Ci	---	---	7.84E-04 Ci	5.53E-04	*ND*[(e)]
Tc-99	A	900 pCi/L	0.23	0	1.84	2.46E-07 Ci	---	---	2.46E-07 Ci	2.74E-07	*Low*
CCl4	A	5 µg/L	0.23	0	1.84	---	---	---	---	---	*ND*
Cr	B	100 µg/L	0.23	0	1.84	5.03E-01 kg	---	---	5.03E-01 kg	5.03E-03	*Low*
Cr-VI	A	10 µg/L[b]	0.23	0	1.84	5.03E-01 kg	---	---	5.03E-01 kg	1.05E-02	*Low*
TCE	B	5 µg/L	0.23	2	1.84	---	---	---	---	---	*ND*
U(tot)	B	30 µg/L	0.23	0.8	1.84	3.04E+00 kg	---	---	3.04E+00 kg	1.37E-02	*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).

e. As discussed in **Part V**, no appreciable total uranium or Sr-90 plume would be expected in the TC&WM EIS evaluation period due to transport considerations. Thus the *Low* rating would apply after the Active Cleanup 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 worst case accident scenarios are a seismic event of greater magnitude than design basis and a staged waste fire. The seismic event may have the largest facility-wide impacts, potentially failing both the canyon confinement function and the sand filter. No other event is likely to fail both simultaneously, resulting in impacts to the radioactive materials. The TRU waste, mixed-TRU waste, and contamination control wastes (low level) that may be staged in a common area (e.g., 2714-U) represent an airborne hazard if ignited.

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

Given the conservative assumptions of the DSA analysis and the fact that seismic scenario is a NRH event, no safety-class or safety-significant SSCs and no technical safety requirements (TSR) to reduce potential consequences to the target receptors were identified for this event. Applicable safety management programs (SMPs) include the emergency response program.

The major receptor at risk in a staged waste fire is the facility worker that may be in or near the staging area. Applicable SMPs that provide worker safety for these types of actions include the fire protection program, waste management/handling, work control process, and the S&M program.

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

The sand filter is underground and is constructed with pre-cast concrete beams. Most of its radioactive inventory would be buried in rubble from a structural collapse resulting from a seismic event that causes the stack to collapse onto it.

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?

To bind and stabilize contamination in the 221-U Building Canyon area, a contamination fixative (PBS) was applied on the canyon deck surfaces and 8 ft. up the walls as part of the Interim D&D activities. Contaminated components were placed in the canyon process cells, the cells were filled with grout, the cover blocks were installed and sealed in place; the ventilation tunnels to the sand filter and from the sand filter to the stack were grouted in place. Additionally, the railroad tunnel was grouted from the interface with the 221-U Building extending through the access airlock to the top of Process Cell 3 (including the grout cap).

The sand filter consists of seven layers of sand and gravel material in a concrete housing equipped with tiles. The layers decrease in size from coarse gravel and rock on the bottom layer, to progressively finer sand on the top layer. The top layer of fine sand is covered with a crushed rock layer. The U Plant ventilation system has been grouted from the ventilation tunnel to the sand filter, and from the exhaust stack back to the sand filter. The sand filter is isolated via the grouting of the canyon exhaust air

ventilation tunnel on the inlet side and the stack exhaust system on the exhaust side. The concrete cover over the sand filter structure serves a mitigative function for the release.

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

A seismic event of greater than design basis has the potential to degrade the barriers.

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

Both the seismic event and a staged waste fire are assumed to cause a ground level atmospheric dispersion of radioactive contaminants that would be breathed by humans at risk.

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

Within seconds

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

None

POPULATIONS AND RESOURCES CURRENTLY AT RISK OR POTENTIALLY IMPACTED

Facility Worker

Only those involved in quarterly S&M activities.

Co-Located Person (CP)

No one other than Facility Worker conducting S&M activities should be present.

Public

N/A - The nearest public access point is 4,400 m (14,436 ft). No unescorted visitor access is allowed.

Groundwater

Table F.8-5 represents the risks and associated ratings for the saturated zone (groundwater) from remaining vadose zone contamination associated with the CP-DD-3 waste sites. Sites within the CP-DD-3 EU may have contaminated the vadose zone and 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-DD-3 EU are *ND* (Sr-90 and total uranium) and *Low* (other Group A and B PCs with reported inventories) (Table F.8-5). 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), which is described as part of the CP-GW-2 EU (Appendix D.6). No plumes within the 200-UP GWIA have been linked to CP-DD-3 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-DD-3 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:

- 100% of the U Plant EU consists of the canyon building and surrounding graveled surfaces and paved areas.

- Individual occurrences of Piper's daisy have been previously documented in the buffer area adjacent to the EU boundary, however, none were observed during the 2015 survey. Loss of individual plants of this species is not likely to affect population viability for the Washington State sensitive species.
- The loss of the remaining habitat within the EU (i.e., the canyon building and power poles) is not expected to cause significant changes in habitat connectivity.
- No level 1, 4 or 5 resources were present within the U Plant EU or its adjacent landscape buffer area.

Cultural Resources

The CP-DD-3, U Plant EU has not been inventoried for archaeological resources and it is unknown if an NHPA Section 106 review was completed for remediation activities at U Plant. It is unlikely that intact archaeological material is present in the EU, both on the surface and in the subsurface, because the soils in the EU have been extensively disturbed.

Cultural resource documented within the CP-DD-3, U Plant EU include: four National Register-eligible buildings that are contributing properties within the Manhattan Project and Cold War Era Historic District, with no documentation required. In accordance with the 1998 *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan (*DOE/RL-97-56), all documentation requirements have been completed for these properties.

CLEANUP APPROACHES AND END-STATE CONCEPTUAL MODEL

Selected or Potential Cleanup Approaches

The "close-in-place/partially-demolish" approach consists of removing certain material and equipment from the building as required, consolidating contaminated equipment currently in U Plant into the below-deck process cells, filling the process cells, galleries and other canyon voids with grout to the level of the bottom of the cover blocks, demolishing the upper structure of the canyon, leaving demolition debris in place, and placing a protective barrier over the demolished building, adjacent waste sites and demolished structures. In preparation, barrier fill material has been staged at the U Plant Facility.

Contaminant Inventory Remaining at the Conclusion of Planned Active Cleanup Period

Inventories of readily dispersible hazardous substances, radiological material and hazardous chemicals and toxic materials, were removed as part of the deactivation efforts. The remaining materials primarily consist of:[27]

- Residual contamination that remains on the canyon deck, walls, and ceiling, including the craneway area;
- Contamination that is retained in the 291-U sand filter; and
- Residual contamination that remains in the 241-WR Vault.

Residual hazardous substances (i.e., lead, asbestos, lubricants, etc.) may remain but do not represent release hazards because of their limited quantities and distribution. All of these contaminants would remain but be entombed by building rubble and a protective barrier over the demolished building, adjacent waste sites and demolished structures.

[27] CH2MHIll Plateau Remediation Company 2013, *U Plant Documented Safety Analysis, HNF-13829, Revision 5*, Prepared for the U.S. Department of Energy Assistant Secretary of Environmental Management, February 22, 2013.

The remedial actions that are being evaluated would leave existing vadose zone contamination in CP-DD-3 waste sites as well as any contamination that has been released from CP-DD-3 waste sites into the vadose zones. Waste sites within the CP-DD-3 EU may have contributed mobile contaminants to the vadose zone and may eventually threaten groundwater, which is being treated in 200-UP using the WMA S-SX groundwater extraction system, the U Plant area P&T system, and I-129 plume hydraulic control system (DOE/RL-2016-09, Rev. 0). However, remedial actions will be taken until resulting residual contamination levels satisfy remedial objectives and monitoring of both vadose and saturated zone contamination will continue to assess remedial action performance. Residual concentrations cannot be determined at this time.

Risks and Potential Impacts Associated with Cleanup

Methods under consideration include controlled blasting and manual methods including cutting, wrecking balls and jack hammers which will introduce worker risks similar to D&D building demolitions carried out on other buildings at Hanford. No DSA or other risk analysis of these last phases of D&D has been developed to determine major risks and potential impacts.

Populations and Resources at Risk or Potentially Impacted During or as a Consequence of Cleanup Actions

Facility Worker

Protection of workers from physical, chemical, and radiological hazards would be achieved by mitigating hazards, extensive planning, use of mock ups, and worker training and protection (see attached *Hanford Site Hazards Guide* and CH2MHill Safety Reference Documents at http://chprc.hanford.gov/page.cfm/CHPRCSafetyReferenceDocuments).

Co-located Person

Protection of workers and other individuals located 100 meters from the PUREX boundary from physical, chemical, and radiological hazards would be achieved by mitigating hazards, extensive planning, use of mock ups, and worker training. Also see references in Worker section above.

Public

Surveillance and maintenance activities will continue throughout the D&D process to monitor radiological conditions, check safety related items, provide for facility-security controls and ensure there is no public access to the PUREX site by unauthorized personnel or the public.

Groundwater

As described in **Part V**, there is likely to be very little discernible impact to groundwater during this period from primary contaminants from the U Plant EU. These impacts are described in more detail in Appendix G.6 for the CP-GW-2 EU.

Furthermore, there are contaminant sources (legacy source sites) in the vadose zone that pose continuing risk to groundwater (via the vadose zone). The vadose zone (VZ) GTM values for the Group A and B primary contaminants for the U Plant EU translate to ratings of *Low* (to represent uncertainty). As indicated in **Part V**, Sr-90 or uranium are unlikely to impact the groundwater in sufficient quantities to exceed the drinking water standard and thus are not considered a significant future threat. These ratings correspond to an overall rating of *Low* for both the Active and Near-term, Post-Cleanup periods to account for uncertainties.

The WMA S-SX groundwater extraction system, the U Plant area P&T system, and the I-129 plume hydraulic control system in the 200-UP GWIA are assumed to be operational during this evaluation period, which will be treating 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 the U Plant waste sites are described in Appendix G.6 for the CP-GW-2 EU (200-UP 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 truck, heavy equipment (including drill rigs) traffic on roads through the non-target and target (remediation) 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. 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 the remediation of buildings, structures and associated near-surface contaminated soils) may lead to an alteration of the landscape. 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 no 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 and the utilization of caps and/or other containments 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 no recolonize or thrive.

Additional Risks and Potential Impacts if Cleanup is Delayed

There are no known additional risks or potential impacts to human health that would arise from a delay in completing the last D&D phases.

Sites within the CP-DD-3 EU have likely contaminated the vadose zone and may eventually impact groundwater (DOE/RL-92-16, Rev. 0); however, reported vadose inventories are very low and unlikely to significantly increase plume areas. Furthermore, there are on-going treatment actions (WMA S-SX groundwater extraction system, U Plant area P&T system, and I-129 plume hydraulic control system) that will also limit any additional impact to groundwater. Additional remedial actions may be required in the future if conditions change dramatically.

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

The “close-in-place/partially-demolish” approach consists of removing certain material and equipment from the building as required, consolidating contaminated equipment currently in U Plant into the below-deck process cells, and filling the process cells, galleries and other canyon voids with grout to the level of the bottom of the cover blocks. This has already been completed. The final phases of demolishing the upper structure of the canyon, leaving demolition debris in place, and placing a protective barrier over the demolished building, adjacent waste sites and demolished structures are intended to ensure that workers and the public are adequately protected from any buried hazards.

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

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

Population or Resource		Risk/Impact Rating	Comments
Human	Facility Worker	ND	No facility workers present except during annual and five-year inspections
	Co-located Person	ND	
	Public	ND	
Environmental	Groundwater (A&B) from vadose zone[a]	*Low* (Group A&B PCs) **Overall**: *Low*	*Current* GTM values for Group A&B primary contaminants (Table F.8-5): *ND* (U(tot) and Sr-90) and *Low* (other PCs with reported inventories). Sr-90 and U(tot) not likely to impact groundwater (**Part V**) and are given Low ratings here to address uncertainties. Treatment in 200-UP assumed effective for groundwater but would not impact vadose zone ratings.
	Columbia River from vadose zone[a]	Benthic: *ND* Riparian: *ND* Free-flowing: *ND* **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]	ND to Low	Post-cleanup monitoring might pose a risk to level 3 and above resources in the buffer area. Possible disruption of migratory bird nesting and Piper's daisy.
Social	Cultural Resources[b]	**Native American** Direct: Unknown Indirect: Known **Historic Pre-Hanford** Direct: Unknown Indirect: None **Manhattan/Cold War** Direct: None Indirect: None	Permanent indirect effects are possible if residual contamination remains after remediation. 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 U Plant Cribs and Ditches 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

The U-221 Facility remedy will result in protection of human health and the environment based on the exposure assumptions contained in the 200 Area industrial use scenario and:

- Construction of an engineered barrier over the remnants of the canyon building (with the possible inclusion of inert rubble from the demolition of ancillary facilities as fill material);
- Planting of semiarid-adapted vegetation on the barrier to enhance evapotranspirative design of the barrier;
- Institutional controls to ensure that the remedy is protected and changes in land use do not occur that could result in unacceptable exposures to residual contamination;
- Post-closure care, including barrier inspection and maintenance; and
- Ongoing barrier performance and groundwater monitoring to ensure effectiveness of the remedial action and to support five-year remedy reviews.[28]

[28] Record of Decision for the USDOE Hanford 200 Area 221-U Facility Final Remedial Action between the United States Department of Energy and the United States Environmental Protection Agency, with concurrence by the Washington State Department of Ecology. September 30, 2005.

PART VII. SUPPLEMENTAL INFORMATION AND CONSIDERATIONS

Table F.8-7. CP-DD-3 (U Plant) Waste Site and Facility List

Site Code	Name, Aliases, Description	Feature Type	Site Status	ERS Classification	ERS Reclassification	Site Type	Site Type Category	Operable Unit	Exclude from Evaluation	Comments
241-UX-302A	241-UX-302A; Lines V380 and V381; 241-U-302 Catch Tank; 241-UX-302; 241-UX-302 Catch Tank	Waste Site	Inactive	Accepted	None	Catch Tank	Underground Storage Tank	200-IS-1		
200-W-248-PL	200-W-248-PL; Direct Buried lines from 241-UX-154 to 200-W-244-PL and 241-WR Vault; Line Numbers 4866, 4976 and 4977	Waste Site	Inactive	Accepted	None	Direct Buried Tank Farm Pipeline	Pipeline and associated valves, etc.	200-WA-1		
241-UX-154	241-UX-154; 241-UX-154 Diversion Box	Waste Site	Inactive	Accepted	None	Diversion Box	Pipeline and associated valves, etc.	200-IS-1		
200-W-100-PL	200-W-100-PL; Encased Pipeline from 241-UX-154 to 241-SX-152 and 241-S-151 Diversion Boxes; Lines V762/4853, V503/4700 and V505/4701	Waste Site	Inactive	Accepted	None	Encased Tank Farm Pipeline	Pipeline and associated valves, etc.	TBD_200-IS-1		
200-W-105-PL	200-W-105-PL; Encased Lines V375, V376, V382, 4877, 4851 and 4859/4703, 4878, 4832, 4876, 4897, 4707, 4701, 4700, 4855, 4854 and 4853; Encased Transfer Line between 241-UX-154 Diversion Box and 241-TX-155-Diversion Box and between 241-UX- 154 Diversion Bo	Waste Site	Inactive	Accepted	None	Encased Tank Farm Pipeline	Pipeline and associated valves, etc.	TBD_200-IS-1		
200-W-244-PL	200-W-244-PL; Encased Pipelines from 221-U Canyon Building to 241-WR Vault; Lines 4705, 4707, 4709, 4711, 4861, 4871	Waste Site	Inactive	Accepted	None	Encased Transfer Piping	Pipeline and associated valves, etc.	200-WA-1		
200-W-234	200-W-234; 291-U Sand Filter French Drain	Waste Site	Inactive	Accepted	None	French Drain	Crib - Subsurface Liquid Disposal Site	TBD		
216-U-4A	216-U-4A; 216-U-4 Dry Well; 216-U-4 Reverse Well Replacement French Drain	Waste Site	Inactive	Accepted	None	French Drain	Crib - Subsurface Liquid Disposal Site	200-WA-1		
216-U-4B	216-U-4B; 216-U-4B Dry Well; 216-U-4B French Drain	Waste Site	Inactive	Accepted	None	French Drain	Crib - Subsurface Liquid Disposal Site	200-WA-1		
216-U-7	216-U-7; 221-U Counting Box French Drain; 221-U	Waste	Inactive	Accepted	None	French Drain	Crib - Subsurface	200-WA-1		

	Vessel Vent Blower Pit French Drain	Site					Liquid Disposal Site			
224-U CNT	224-U CNT; 224-U Condensate Neutralization Tank; 224-U Process Condensate Neutralization Tank; 224-U-TK-C-5; Process Condensate Elementary Neutralization Unit; Tank TK-C-5	Waste Site	Inactive	Accepted	None	Neutralization Tank	Underground Storage Tank	Not Applicable		
270-W	270-W; 270-W Neutralization Tank; 270-W Tank; IMUST; Inactive Miscellaneous Underground Storage Tank	Waste Site	Inactive	Accepted	None	Neutralization Tank	Underground Storage Tank	200-WA-1		
271-U	271-U; 271-U Building; 271-U Office Building	Waste Site	Inactive	Accepted	None	Office	Infrastructure Building	200-CU-1		
221-U	221-U; 221-U Building; 221-U Canyon Building; 276-U; U Plant	Waste Site	Inactive	Accepted	None	Process Unit/Plant	Process Building	200-CU-1		
291-U	291-U; 291-U Fan Control House	Waste Site	Inactive	Accepted	None	Process Unit/Plant	Process Building	200-CU-1		
292-U	292-U; 292-U Stack Monitoring Station; 291-U Stack Exhaust Monitoring Building	Waste Site	Inactive	Accepted	None	Process Unit/Plant	Infrastructure Building	200-CU-1		
200-W-192-PL	200-W-192-PL; Pipeline from 221-U, 222-U and 224-U to the 207-U Retention Basin; U Plant Process Sewer	Waste Site	Inactive	Accepted	None	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD_200-IS-1		
200-W-193-PL	200-W-193-PL; Pipeline from 224-U to 241-U-361 Settling Tank	Waste Site	Inactive	Accepted	None	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD_200-IS-1		
200-W-195-PL	200-W-195-PL; Pipeline from 224-U to 216-U-17 Crib	Waste Site	Inactive	Accepted	None	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD_200-IS-1		
200-W-217-PL	200-W-217-PL; Pipeline from the Counting Box to 216-U-7 French Drain	Waste Site	Inactive	Accepted (Proposed)	None	Radioactive Process Sewer	Pipeline and associated valves, etc.	TBD		
200-W-42	200-W-42; 200-W-42-PL; U Plant Radioactive Process Sewer from 221-U to 216-U-8 & 216-U-12 Cribs	Waste Site	Inactive	Accepted	None	Radioactive Process Sewer	Pipeline and associated valves, etc.	200-WA-1		
200-W-84-PL	200-W-84-PL; U Plant Chemical Process Sewer to 216-U-14 Ditch; VCP Process Sewer; 200-W-84	Waste Site	Inactive	Accepted	None	Radioactive Process Sewer	Pipeline and associated valves, etc.	200-IS-1		
200-W-44	200-W-44; 291-U Stack Sand Filter	Waste Site	Inactive	Accepted	None	Sand Filter	Process Building	TBD		
291-U-1	291-U-1; 291-U-1 Stack, 221-U Stack; 291-U Stack	Waste Site	Inactive	Accepted	None	Stack	Process Building	200-CU-1		

200-W-136	200-W-136; Demolished 224-U, 224-UA, 203-U, 203-UX, 222-U; Posted Underground Radioactive Material Area; Potential Asbestos in Soil	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Subsurface	TBD		
600-284-PL	600-284-PL; Cross Site Transfer Pipeline; Lines V360, V361, V362, V363, V364 and V366; Old Cross Site Transfer Line; Original Cross Site Transfer Pipeline; Piping Associated with UPR-600-20, Cross Site Transfer Line	Waste Site	Inactive	Accepted	None	Encased Tank Farm Pipeline	Pipeline and associated valves, etc.	TBD_200-IS-1	X	Included in 200 Area HLW Transfer Line Eval.
200-W-112	200-W-112; Miscellaneous Stream #52; Steam Condensate	Waste Site	Inactive	Accepted	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	Not Applicable	X	Included in U Plant Cribs and Ditches Eval.
200-W-113	200-W-113; Miscellaneous Stream #54; North Steam Pit	Waste Site	Inactive	Accepted	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	Not Applicable	X	Included in U Plant Cribs and Ditches Eval.
200-W-114	200-W-114; Miscellaneous Stream #55	Waste Site	Unknown	Discovery	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	TBD	X	Included in U Plant Cribs and Ditches Eval.
200-W-119	200-W-119; Miscellaneous Stream #142; Steam Trap 007	Waste Site	Inactive	Accepted	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	Not Applicable	X	Included in U Plant Cribs and Ditches Eval.
216-U-4	216-U-4; 216-U-4 Dry Well; 222-U Dry Well; 222-U-110 Dry Well; 216-U-2	Waste Site	Inactive	Accepted	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	200-WA-1	X	Included in U Plant Cribs and Ditches Eval.
200-W-107	200-W-107; 222-U Building Stormwater Runoff; Miscellaneous Stream #685	Waste Site	Inactive	Not Accepted (Proposed)	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	200-WA-1	X	Not Accepted
200-W-108	200-W-108; 222-U Building Stormwater Runoff; Miscellaneous Stream #687	Waste Site	Inactive	Not Accepted (Proposed)	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	200-WA-1	X	Not Accepted
200-W-109	200-W-109; 222-U Building Stormwater Runoff; Miscellaneous Stream #521	Waste Site	Inactive	Not Accepted (Proposed)	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal	200-WA-1	X	Not Accepted

							Site			
200-W-111	200-W-111; 222-U Building Stormwater Runoff; Miscellaneous Stream #394	Waste Site	Inactive	Not Accepted (Proposed)	None	Injection/Reverse Well	Crib - Subsurface Liquid Disposal Site	200-WA-1	X	Not Accepted
276-U	276-U; 276-U Solvent Facility; 276-U Solvent Handling Facility; 276-U Solvent Recovery Facility	Waste Site	Inactive	Accepted	Rejected	Process Unit/Plant	Process Building	Not Applicable	X	Rejected
296-U-10	296-U-10; 296-U-10 Stack	Waste Site	Inactive	Accepted	Rejected	Stack	Process Building	Not Applicable	X	Rejected
224-U HWSA	224-U HWSA; 224-U Hazardous Waste Storage Area	Waste Site	Inactive	Accepted	Rejected	Storage Pad (<90 day)	Storage Pad	Not Applicable	X	Rejected
200-W-239	200-W-239; 211-U and 211-UA Potential Asbestos in Soil; Post Remediation URMA	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Surface/Near Surface	TBD	X	Included in U Plant Cribs and Ditches Eval.
UPR-200-W-118	UPR-200-W-118; Contamination at 211-U; UN-200-W-118; UN-216-W-28	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Surface/Near Surface	200-WA-1	X	Included in U Plant Cribs and Ditches Eval.
Site Code	**Name, Aliases, Description**	**Feature Type**	**Site Status**	**ERS Classification**	**ERS Reclassification**	**Site Type**	**Site Type Category**	**Operable Unit**	**Exclude from Evaluation**	**Comments**
UPR-200-W-138	UPR-200-W-138; UPR-200-W-22; 221-U Vessel Vent Blower Pit French Drain; UN-200-W- 138; UN-200-W-22; UN-216-W-11	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Surface/Near Surface	200-WA-1	X	Included in U Plant Cribs and Ditches Eval.
UPR-200-W-162	UPR-200-W-162; Contaminated Area on East Side of 221-U; UN-216-W-37	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Surface/Near Surface	200-WA-1	X	Included in U Plant Cribs and Ditches Eval.
UPR-200-W-33	UPR-200-W-33; Ground Contamination at 224-U; UN-200-W-33	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Surface/Near Surface	200-WA-1	X	Included in U Plant Cribs and Ditches Eval.
UPR-200-W-39	UPR-200-W-39; 224-U Buried Contamination Trench; UN-200-W-39	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release -	200-WA-1	X	Included in U Plant

							Surface/Near Surface			Cribs and Ditches Eval.
UPR-200-W-55	UPR-200-W-55; Uranium Powder Spill at 224-U; UN-200-W-55	Waste Site	Inactive	Accepted	None	Unplanned Release	Unplanned Release - Surface/Near Surface	200-WA-1	X	Included in U Plant Cribs and Ditches Eval.
292U	STACK MONITORING STATION	Facility	INACTIVE			BUILDING	Infrastructure Building		X	Duplicative
221U	U PLANT CANYON AND SERVICE BUILDING	Facility	INACTIVE			BUILDING	Process Building		X	Duplicative
271U	OFFICE AND SERVICE UPLANT	Facility	INACTIVE			BUILDING	Infrastructure Building		X	Duplicative
291U	EXHAUST FAN CONTROL HOUSE PLENUMS SAND FILTER BLOW	Facility	INACTIVE			BUILDING	Process Building		X	Duplicative
2712U	ELECTRICAL/INSTRUMENTATION BUILDING	Facility	INACTIVE			BUILDING	Infrastructure Building		X	Duplicative
MO2316	REMOVED FROM SITE -- RESTROOM TRL E OF 221U	Facility	REMOVED			BUILDING	Infrastructure Building		X	Removed
241UX154	DIVERSION BOX AT U PLANT	Facility	INACTIVE			STRUCTURE	Infrastructure Building		X	Duplicative
291U001	221U MAIN STACK	Facility	INACTIVE			STRUCTURE	Process Building		X	Duplicative
276U	SOLVENT RECOVERY TANK	Facility	INACTIVE			TANK	Infrastructure Building		X	Duplicative
241UX302A	CATCH TANK WITH PUMP PIT	Facility	INACTIVE			TANK	Underground Storage Tank		X	Duplicative

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