DOE/RL-2016-15
Revision 0

# Engineering Evaluation/Cost Analysis for the PUREX Complex

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


**P.O. Box 550**
**Richland, Washington 99352**

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***APPROVED***
***By Lynn M. Ayers at 2:52 pm, Jun 06, 2019***

Release Approval Date

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# Executive Summary

This document presents, for public review and comment, the results of an engineering evaluation/cost analysis (EE/CA) for the proposed non-time-critical removal action alternatives at the Plutonium Uranium Extraction (PUREX) Complex in the Hanford Site 200 East Area. The PUREX Complex was used for chemical separation of plutonium from irradiated fuel rods from 1956 through 1972 and from 1983 to 1988, which resulted in contamination of buildings, equipment, and structures within the complex. The scope of this EE/CA includes the 202A Building, which is made up of the canyon building and attached annexes (202A Canyon, 202A East Annex, and 202A West Annex). A removal action is required to mitigate potential threats to human health and the environment (HHE) posed by contamination associated with these buildings and structures.

Four removal action alternatives were developed and evaluated in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA).[1] With the exception of the No Action alternative, the proposed alternatives offer a combination of actions to prevent or reduce the risk of release of hazardous substances including surveillance and maintenance (S&M), hazard abatement, demolition preparation, and demolition.

Removal action alternatives and their estimated costs are summarized in Table ES-1. The cost estimates represent present worth cost for the four alternatives based on present day (2016) dollars (estimates are based on the best available information on anticipated scope). This cost estimates include major costs that apply to all of the alternatives, as well as alternative-specific costs. The major costs are summarized in this EE/CA.

Built in the 1950s and unoccupied since the mid-1990s, the 202A Building has degraded. Spread of contamination has been observed throughout the building and has the potential to continue as the facilities degrade. A CERCLA record of decision is not anticipated until the 2032 time frame, and if not addressed, the degrading conditions at the 202A Building could present an imminent threat to HHE. The proposed actions in this EE/CA target reducing the complexity of future maintenance tasks and the increase in S&M costs, as the costs are expected to rise. The actions also target maintaining a skilled

[1] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: https://www.csu.edu/cerc/researchreports/documents/CERCLASummary1980.pdf.

workforce at the Hanford Site that is experienced in contaminated deactivation and decommissioning work, which will be needed when major funding becomes available in the future. Many of the activities recommended in this EE/CA can be accomplished with available funds identified through efficiencies or with new funding.

Table ES-1. Proposed Alternatives for the PUREX Complex Removal Action

| Alternative | Removal Action Description | Present Worth Cost |
|---|---|---|
| 1 | No Action | $0 |
| 2 | Surveillance and Maintenance of PUREX Complex Structures<br>Hazard Abatement of the 202A Building | $177.9 million |
| 3 | Alternative 2 actions plus:<br>Demo Prep of the 202A East and West Annexes | $190.6 million |
| **4** | **Alternative 3 actions plus:**<br>**Demo Prep of the 202A Canyon Above Deck Areas**<br>**Demolition of the 202A East and West Annexes** | **$217.7 million** |

Notes: Accuracy range of the cost estimate is –30 percent to +50 percent. No sensitivity analyses were performed, and the following factors could impact costs: levels of contamination, amount of equipment in the buildings, and differing structural design.

**Bold** signifies the recommended alternative.

demo prep = demolition preparation

PUREX = Plutonium Uranium Extraction (Complex)

All alternatives were evaluated against established removal action objectives (RAOs) and compared in terms of effectiveness, implementability, and cost. Based on its efficacy in meeting these criteria, Alternative 4 was selected as the recommended removal action alternative. Alternative 4 provides the best combination of actions to protect workers, the public, and the environment while meeting RAOs. Alternative 4 is both technically and administratively feasible and will also support future remedial decisions and characterization activities at the PUREX Complex.

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# Terms

| | |
|---|---|
| AM | action memorandum |
| AMU | aqueous makeup unit |
| ARAR | applicable or relevant and appropriate requirement |
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| CWC | Central Waste Complex |
| demo prep | demolition preparation |
| DOE | U.S. Department of Energy |
| DWMU | dangerous waste management unit |
| Ecology | Washington State Department of Ecology |
| EE/CA | engineering evaluation/cost analysis |
| EPA | U.S. Environmental Protection Agency |
| ERDF | Environmental Restoration Disposal Facility |
| HCP EIS | *Final Hanford Comprehensive Land Use Plan Environmental Impact Statement* |
| HHE | human health and the environment |
| N/A | not applicable |
| NCP | National Contingency Plan |
| NPL | National Priorities List |
| NTCRA | non-time-critical removal action |
| P&O | pipe and operating |
| PCB | polychlorinated biphenyl |
| PFP | Plutonium Finishing Plant |
| PIV | Positive Infinitely Variable (Room) |
| PR | Product Removal (Room or Corridor) |
| PUREX | Plutonium Uranium Extraction |
| RAO | removal action objective |
| RAWP | removal action work plan |
| RCRA | *Resource Conservation and Recovery Act of 1976* |

| | |
|---|---|
| ROD | record of decision |
| S&M | surveillance and maintenance |
| SAP | sampling and analysis plan |
| TBC | to be considered |
| TMV | toxicity, mobility, or volume |
| TPA | Tri-Party Agreement |
| TRU | transuranic |
| WIPP | Waste Isolation Pilot Plant |

# 1 Introduction

This engineering evaluation/cost analysis (EE/CA) has been prepared in accordance with the National Contingency Plan (NCP) (40 CFR 300.415(b)(4)(i), "National Oil and Hazardous Substances Pollution Contingency Plan," "Removal Action") to assist the U.S. Department of Energy (DOE) in identifying the most effective removal action alternative for placing the Plutonium Uranium Extraction (PUREX) Complex in a configuration that is protective of human health and the environment (HHE) in the near term. The 202A Building, including both the canyon and annexes, is addressed in this EE/CA. Section 2.2 provides detailed descriptions of all locations in the 202A Building that are within the scope of this EE/CA. The development of this EE/CA satisfies environmental review requirements and provides for stakeholder involvement while offering a framework for selecting the removal alternative. An Administrative Record for documentation of the removal action will be established.

This non-time-critical removal action (NTCRA) is consistent with the joint DOE and EPA, 1995, *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*, which establishes the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) NTCRA process as the preferred approach for decommissioning surplus DOE facilities. Under this policy, an NTCRA may be taken when DOE determines that the action will prevent, minimize, stabilize, or eliminate a risk to HHE. When DOE determines that a CERCLA NTCRA is necessary, DOE is authorized to evaluate, select, and implement the removal action that DOE determines is most appropriate to address the potential risk posed by the release or threat of release of hazardous substances. This policy states, in part:

> Although the full range of CERCLA response actions may be applicable to decommissioning activities, NTCRAs should be used for decommissioning, consistent with this Policy. The alternative approaches available to conduct decommissioning projects typically are clear and very limited. This often will eliminate the need for the more thorough analysis of alternatives required for remedial actions. NTCRA requirements provide greater flexibility to develop decommissioning plans that are appropriate for the circumstances presented. Statutory time and dollar limits on removal actions do not apply to removal actions conducted by DOE, which increases the scope of projects that may be addressed by DOE removal action. Most importantly, NTCRAs usually will provide benefits to worker safety, public health, and the environment more rapidly and cost effectively than remedial actions. For these reasons, DOE may exercise removal action authority to conduct decommissioning whenever such action is authorized by CERCLA, the NCP, and Executive Order 12580.

Performance of this removal action will place the 202A Building and debris in a configuration that is protective of HHE. Without decommissioning the 202A Building and cleaning up debris, a potential threat of release of hazardous substances exists, and, without action, adverse threats to HHE eventually could occur.

The National Contingency Plan (NCP), 40 CFR, Section 300.415(b)(2), establishes factors to be considered in determining the appropriateness of a removal action. Those factors include:

- Hazardous substances or pollutants or contamination in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release. Hazardous substances, including radioactive substances are contained within the PUREX Complex pipes and process vessels. These substances pose a threat of accidental release that may result from equipment failure resulting from a fire or seismic event.
- Other situations or factors are present that may pose threats to public health or the environment.

Hazardous substances are present as fixed contamination within the cells, equipment and additional structures. These substances pose a threat of release as fixed contamination becomes exposed and as structural integrity is compromised, resulting in a potential direct exposure of nearby personnel and the environment, and exposure to the public through airborne radioactive contaminants. Degradation may not be fully addressed by surveillance and maintenance (S&M) activities and the risk of release of hazardous substances will increase as degradation continues or goes undetected.

As the lead federal agency, DOE has determined that a removal action is an appropriate means to support the final end state and achieve environmental review requirements. With the Tri-Party Agreement and TPA Action Plan Milestone M-085-82, the Washington State Department of Ecology (Ecology) concurs that an NTCRA is warranted to place the 202A Building and debris in a configuration that is protective of HHE. This NTCRA will, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action, as required by the NCP [40 CFR 300.415(d)].

This EE/CA identifies the objectives of the removal action and analyzes the effectiveness, implementability, and estimated cost of the proposed action to satisfy these objectives. This EE/CA also proposes to mitigate the threat to site workers, the public, and the environment by disposing generated waste at the Environmental Restoration Disposal Facility (ERDF). In accordance with Executive Order 12580, *Superfund Implementation*; and Section 7.2.4 of Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan* (hereinafter referred to as the Tri-Party Agreement [TPA] Action Plan), DOE proposes to perform hazard abatement and limited demolition at the PUREX Complex as detailed in this EE/CA. This EE/CA was provided to Ecology, the lead regulatory agency for this action, in December 2017 (17-AMRP-0248, "Proposal to Perform Hazard Abatement and Demolition Activities at the PUREX Complex"). Ecology is the lead regulatory agency for this removal action. The PUREX Complex also contains a number of *Resource Conservation and Recovery Act of 1976* (RCRA) tanks and vessels, one of which is located in the 202A West Annex aqueous makeup unit (AMU) and is in the scope of this EE/CA. Closure of this dangerous waste management unit (DWMU) will be performed in accordance with WAC 173-303, "Dangerous Waste Regulations," and the Hanford Facility RCRA Permit (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion*), and it will be coordinated with the selected removal action.

Removal action taken pursuant to this NTCRA will be conducted in compliance with DOE et al., 2012, *Hanford Federal Facility Agreement and Consent Order Hanford Public Involvement Plan*, and public participation requirements established in the NCP (40 CFR 300.415(n), "Community Relations in Removal Actions"). This EE/CA will undergo a 30-day public comment period. After the public comment period, a written response to significant comments will be provided in accordance with 40 CFR 300.820(a), "Administrative Record File for a Removal Action." The 30-day public comment period will also constitute the public period for removal of the PUREX, 291-A-1, stack from the Air Operating Permit. After considering the comments received from the public, DOE will confer with Ecology in the issuance of an action memorandum (AM). The AM will identify the selected alternative, which may be the alternative recommended here or one of the other alternatives discussed in this EE/CA.

As a part of transitioning the Hanford Site facilities and emission units from an Air Operating permit basis, the Hanford Site Air Operating Permit (#00-05-006) includes an agreement for transition, contained in the *Standard Terms and General Conditions Statement of Basis*. This provides an agreed upon process for removing facilities from the Hanford Title V Air Operating Permit upon the start of CERCLA work activities. After public comment of the EE/CA, a signed action memorandum removal action work plan (RAWP), air monitoring plan, and sampling and analysis plan (SAP) addressing all applicable or relevant and appropriate requirements (ARARs) are approved and issued prior to start of CERCLA work activities. A notice of transition (NOT) for the emission unit(s) will be provided to the regulatory agencies for

review. The NOT will list an effective date (not the approval date) which will coincide with the onset of CERCLA field activities covered under this removal action. DOE is no longer required to certify to the Air Operating Permit requirements after the onset of the field activities covered under the removal action. The necessary air emission controls will be described in the RAWP and associated air monitoring plan.

## 1.1 Purpose and Scope

This EE/CA evaluates the proposed alternatives for meeting the DOE goal of reducing the risk to HHE at the PUREX Complex by removing or stabilizing waste. The 202A Building is located within the 200 East Area on the Hanford Site Central Plateau. DOE, in consultation with Ecology, will use this EE/CA as the basis for selecting a removal action to mitigate potential risks to HHE. Development of an AM, which will document the selected removal action alternative, will be based upon this EE/CA and public comments. A removal action work plan (RAWP) will be prepared to document cleanup standards and removal action methods.

## 1.2 Regulatory Overview

The President of the United States is given authority by CERCLA Section 104, “Response Authorities,” when there is a threat to public health or welfare of the United States or to the environment, to take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release of contaminants into the environment. This authority is delegated to DOE, as the CERCLA lead agency by the NCP (40 CFR 300, Subpart B, “Responsibility and Organization for Response”) through Executive Order 12580. Expedited response actions are addressed by Section 7.2.4 in the TPA Action Plan (Ecology et al., 1989b), which cites and is consistent with Executive Order 12580.

In anticipation of the National Priorities List (NPL) designation (40 CFR 300, Appendix B, “National Priorities List”), DOE, the U.S. Environmental Protection Agency (EPA), and Ecology (also referred to collectively as the Tri-Parties) entered into the TPA (Ecology et al., 1989a), which established a procedural framework and schedule for developing, implementing, and monitoring CERCLA response actions at the Hanford Site. The TPA ensures compliance with remedial and/or removal action requirements under CERCLA and other environmental regulations including closure and post-closure requirements under RCRA. Section 8.0 of the TPA Action Plan (Ecology et al., 1989b) outlines the approach for identifying structures that present sufficient potential environmental concern, for which coordination of the decommissioning process with cleanup activities under the TPA would be deemed necessary.

Portions of the 202A Building are a permitted treatment, storage, and disposal unit under RCRA. A PUREX Part A Form (Hanford Facility RCRA Permit [WA7890008967]) was issued in 1988. The PUREX Part A Form delineates the portions of the 202A Building and other outside tank systems that are part of the treatment, storage, and disposal unit. There is only one DWMU that is planned to be removed as part of this removal action: Tank TK-156, which is located in the 202A West Annex AMU. In accordance with Section 6.0 of the TPA (Ecology et al., 1989a) and WAC 173-303, a closure plan will be prepared for the closure of DWMU Tank TK-156. Ecology will approve the closure plan after the public review and comment period has been completed, and the closure plan will then be included in the Hanford Facility RCRA Permit. Any waste generated under this closure activity will be disposed at ERDF under the authority of this removal action.

Appendix J, “Central Plateau Facilities,” of the TPA Action Plan (Ecology et al., 1989b) lists facilities that are not fully addressed under Sections 6.0 or 7.0 of the TPA (Ecology et al., 1989a) and that have been determined by the Tri-Parties, in accordance with Section 8.0, to be subject to removal or remedial action under CERCLA. Each facility listed in Appendix J that has undergone an evaluation, as required

by Section 8.1.4 of the TPA Action Plan (Ecology et al., 1989b), is designated as a Tier 1 facility, Tier 2 facility, or neither. The 202A Building is designated as a Tier 1 facility in Appendix J of the TPA Action Plan.

As documented in Appendix J of the TPA Action Plan (Ecology et al., 1989b), DOE and Ecology have determined that the ultimate CERCLA response action for the 202A Building will be a remedial action. However, the TPA (Ecology et al., 1989a) does not preclude DOE from undertaking an interim CERCLA removal action to address potential threats of releases from the 202A Building. Any removal action undertaken, pursuant to this EE/CA and the resulting AM, will be consistent with the final remedial action decisions and will contribute to the efficient performance of any anticipated long-term remedial action, as required by NCP regulations (40 CFR 300.415(d)). This EE/CA satisfies the requirement of TPA (Ecology et al., 1989a) Milestone M-085-82, “Submit to Ecology for approval proposal(s) for expedited response actions for one or more of the Tier 1 and Tier 2 facilities in the PUREX Geographical Area listed in HFFACO Appendix J.” In addition, as stipulated within Milestone M-085-82, DOE will submit a Removal Action Work Plan, including schedule, to Ecology as a primary document within 180 days after approval of the AM or interim Record of Decision (ROD) developed for the expedited response action, or an alternative period designated in the AM or interim ROD.

# 2 Site Characterization

This chapter provides a general site description and background for the PUREX Complex, as well as a more detailed description of the areas of the 202A Building included in the scope of this EE/CA. This chapter also provides information about previous deactivation activities and current conditions that justify a removal action.

## 2.1 Site Description and Background

The 202A Building is located within the PUREX Complex in the 200 East Area. The 200 East Area is located on a plateau at an elevation ranging from approximately 620 to 800 ft above mean sea level near the middle of the Hanford Site (Figure 2-1). The PUREX Complex is approximately 6.8 mi from the Columbia River and 5.3 mi from State Highway 240.

Public access to the Hanford Site is currently restricted and controlled at the Wye Barricade on Route 4, and the Yakima and Rattlesnake Barricades on State Highway 240. Unauthorized access to the PUREX Complex is prohibited. The complex buildings/structures are locked, and a 6 ft cyclone fence encloses the immediate areas.

The 202A Building is made up of the canyon, east annex and west annex. The term PUREX Complex refers to all structures contained within the PUREX Implementation Area. Appendix A provides a description of the PUREX Implementation Area, and Figures A-1 and A-2 illustrate the area boundary and structures within the implementation area. Many of the buildings/structures within the PUREX Complex have been, or will be, demolished under DOE/RL-2010-22, *Action Memorandum for General Hanford Site Decommissioning Activities*, or DOE/RL-2010-102, *Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Tier 2 Buildings/Structures*.

### 2.1.1 Background

The PUREX Complex was designed and operated to recover plutonium, uranium, and neptunium from irradiated fuel elements received from the reactors on the Hanford Site. Before irradiation in the reactors, the fuel elements were clad with zircaloy (zirconium alloy). At PUREX, this cladding was removed by dissolution in an ammonium fluoride and ammonium nitrate solution. Once declad, the fuel elements were treated with potassium hydroxide and then dissolved in nitric acid. The resultant feed solution entered the solvent extraction columns where the plutonium, uranium, and neptunium could be extracted.

PUREX was constructed between 1952 and 1956 and was in full operation between 1956 and 1972. Plant operations were then downgraded to wet standby until 1978, with process and support equipment operating on a regular basis and failed equipment either upgraded or replaced. From 1978 to 1983, the plant progressed from wet standby, through cold startup tests, to full operations. PUREX was in full operation for the second time, actively recovering plutonium from irradiated fuel, until 1988 when it was shut down again. Plant operations transitioned into cold standby from 1990 to 1992. In 1992, planning was initiated to change the status of PUREX from cold standby to deactivation (i.e., transition to shutdown).

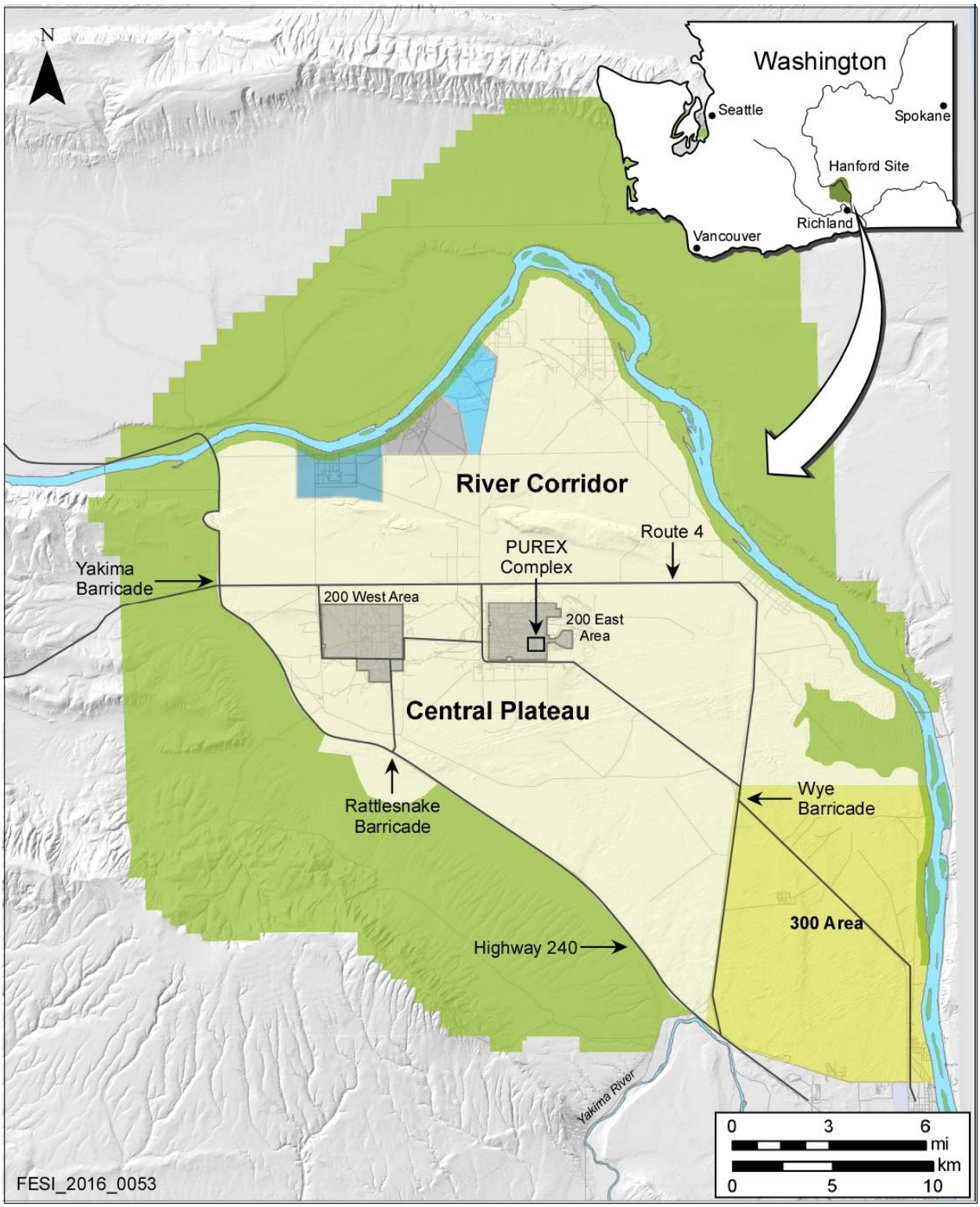


Figure 2-1. Hanford Site and PUREX Complex Location

Deactivation activities included the flushing of vessel system loops and tanks. All flushed vessels were emptied to a minimum heel, and associated piping was drained. Further information on the flushing of these systems can be found in DOE/RL-95-78, *PUREX Facility Preclosure Work Plan*. Other deactivation activities in support of long-term surveillance and maintenance (S&M) included removing bulk and easily removable materials (e.g., chemicals, batteries, pump oils, combustibles, and excess tools and equipment), shutting off utilities to the building, consolidating ventilation systems, and removing the need for the building to be occupied. Deactivation was completed in 1998, and the complex has been under S&M since that time. S&M activities are being performed in accordance with the current S&M plan [DOE/RL-98-35, *Surveillance and Maintenance Plan for the Plutonium-Uranium Extraction (PUREX) Facility*]. Current conditions are summarized in Section 2.2. S&M activities will continue as part of this removal action and details will be included in the associated RAWP.

### 2.1.2 Physical Setting

The Hanford Site encompasses approximately 586 $mi^2$ in southeastern Washington State (Figure 2-1). It is north of the confluence of the Columbia, Yakima, and Snake Rivers. The Columbia River flows east through the northern part of the Hanford Site and, turning south, forms the eastern boundary. The Yakima River runs along part of the southern boundary and joins the Columbia River at the City of Richland, which bounds the Hanford Site on the southeast.

The Hanford Site lies east of the Cascade Mountains and has a semiarid climate caused by the rain shadow effect of the mountains. Climatological data are monitored at the Hanford Meteorological Station, which is located between the 200 East and 200 West Areas. Weather stations are located throughout the Hanford Site. The seasonal average winter temperature (December through February) is 33.7°F, and the seasonal average summer temperature (June through August) is 73.7°F. The average normal maximum temperature is 91.6°F in July, and the average normal minimum temperature is 24.6°F in January (PNNL-15160, *Hanford Site Climatological Summary 2004 with Historical Data*). Average annual precipitation is 6.98 in. Most precipitation occurs during late autumn and winter, with more than half of the annual amount occurring from November through February.

### 2.1.3 Geology and Hydrology

The geology of the 200 East Area consists of the Elephant Mountain Member of the Saddle Mountains Basalt, Columbia River Basalt Group, and the Ringold Formation and Hanford formation sedimentary sequences. Ringold Formation sediments were reworked and/or removed when Pleistocene epoch cataclysmic flooding flowed through Gable Gap and into the central portion of Hanford (SGW-54165, *Evaluation of the Unconfined Aquifer Hydraulic Gradient Beneath the 200 East Area, Hanford Site*). During this post-Ringold erosional period, erosion created a northwest-southeast oriented paleochannel that filled with highly permeable Hanford formation sediments (PNNL-12261, *Revised Hydrogeology for the Suprabasalt Aquifer System, 200-East Area and Vicinity, Hanford Site, Washington*).

Beneath the 200 East Area, the groundwater flows to the south-southeast influenced by the buried paleochannel. The unconfined aquifer within the area exhibits high hydraulic conductivity and has a low hydraulic gradient resulting in slow groundwater movement. The water table in the 200 East Area is very flat and more than 300 ft below ground surface. While regional groundwater flows across Hanford are generally influenced by the Columbia River, groundwater within the Central Plateau is locally influenced by artificial recharge from waste disposal sources, which is currently limited to the Treated Effluent Disposal Facility. The Ringold lower mud unit represents the base of the unconfined aquifer in the southern portions of the 200 East Area (DOE/RL-2011-118, *Hanford Site Groundwater Monitoring for 2011*).

The Columbia River and its tributary, the Yakima River, are the primary Hanford surface water features. West Lake, about 12.9 ac and less than 3 ft deep, is the only natural lake on the Hanford Site. Artificial surface water bodies, such as those currently within the vicinity of PUREX (207A Retention Basin, 282E Reservoir, and 289E Purgewater Storage Facility) were created and used for wastewater disposal across Hanford in the past.

### 2.1.4 Anticipated Future Land Use

The reasonably anticipated future land use for the portion of the Inner Area, where the 200-CP-1 Operable Unit is located, is designated as industrial.

DOE worked for several years with cooperating agencies to define land use goals for the Hanford Site. The cooperating agencies and stakeholders included the National Park Service, Tribal Nations, the states of Washington and Oregon, local/county and city governments, economic and business development interests, environmental groups, and agricultural interests. Drummond, 1992, *The Future for Hanford: Uses and Cleanup: The Final Report of the Hanford Future Site Uses Working Group*, was an early product of the efforts to develop land-use assumptions. The report recognized that the Central Plateau would be used for waste management activities for the foreseeable future. Following the report, DOE issued DOE/EIS-0222F, *Final Hanford Comprehensive Land Use Plan Environmental Impact Statement* (HCP EIS), the associated ROD in 1999 [64 FR 61615, "Record of Decision: Hanford Comprehensive Land Use Plan Environmental Impact Statement (HCP EIS)"], and a supplement analysis in 2008 (DOE/EIS-0222-SA-01, *Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, Draft).

The HCP EIS (DOE/EIS-0222F) analyzed the potential environmental impacts of alternative land use plans for the Hanford Site and considered the land use implication of ongoing and proposed activities. Under the preferred land use alternative selected in the HCP EIS ROD (64 FR 61615), the Central Plateau was designated for industrial-exclusive use, defined as areas "suitable and desirable for management of hazardous, dangerous, radioactive, and nonradioactive waste, as well as related activities." The 2008 supplemental analysis reconfirmed the land-use designations in the HCP EIS (DOE/EIS-0222F) and clarified that the comprehensive land-use plan will remain in effect as long as DOE retains legal control of some portion of the Hanford Site, which is expected to be longer than 50 years.

The area designated as the Central Plateau in the Drummond (1992) report and the HCP EIS (DOE/EIS-0222F) is only a portion of the area now commonly known as the Central Plateau. The current 75 $mi^2$ area encompassed by the Central Plateau also includes a portion of the land known in previous documents as all other areas, with a designated land use of conservation (mining). The Inner Area portion of the Central Plateau is contained within the area designated for industrial/industrial-exclusive land use. At approximately 10 $mi^2$, the Inner Area covers about half of the industrial-exclusive area and is defined by DOE as the final footprint area of the Hanford Site that will be dedicated to permanent waste management and containment of residual contamination.

### 2.1.5 Cultural Resources

A Section 106 cultural resource review (*National Historic Preservation Act of 1966*) would be conducted to address removal action activities. The removal action activities would be performed in areas that have been extensively disturbed by past construction activities. Buildings/structures that require cultural resource review will be evaluated using a Historic Property Inventory Form or Expanded Historic Property Inventory Form. As appropriate, walkthroughs of the structures would be conducted before demolition to finalize all mitigation requirements. Cultural resource review documentation for any specific building/structure would be finalized before removal action activities begin. Tagged artifacts (if they can be removed) would be collected for long-term curation. Tagged artifacts that cannot be

removed would be photographed or documented. At the time of removal, assessments would be made regarding options and the feasibility of long-term curation of tagged artifacts.

Hanford Site structures have been evaluated for their National Register of Historic Places eligibility as part of DOE/RL-97-56, *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan*. Some buildings/structures have been determined to be contributing properties to the Manhattan Project/Cold War Era Historic District with mitigation in the form of documentation required. DOE/RL-97-56 also requires that walkthroughs of these structures be completed to identify artifacts that are of educational and interpretive value.

### 2.1.6 Ecological Resources

The land area around the structures addressed by this NTCRA has been disturbed by construction and site operations. Because most of the proposed action would occur in previously disturbed areas, the potential for affecting sensitive ecological resources is expected to be minimal. Ecological reviews would be conducted before work begins to identify areas where the potential exists for adverse impacts to sensitive or rare biological resources, consistent with existing routine procedures (DOE/RL-95-11, *Ecological Compliance Assessment Management Plan*).

The 202A Building has the potential to support nesting by migratory birds; therefore, building-specific surveys must be conducted at each building/structure prior to beginning removal action activities. Project engineers would consult with the ecological compliance staff well in advance of planned removal action activities to allow for sufficient surveys. If nesting migratory birds are observed, removal action activities would be delayed until after the end of the nesting season. Prior to decontamination, deactivation, decommissioning, and demolition of a structure, a facility walkdown/survey will be performed during daylight hours to document any evidence that could indicate high numbers of bats that could suggest possible roosting site(s). In the event such evidence is discovered, DOE will be consulted for further recommendations.

No plant or animal species listed as threatened or endangered under the federal *Endangered Species Act of 1973*, or candidates for such protection, are known to be in the vicinity of the structure planned to undergo removal action activities. Very little native or natural habitat is present near the structure planned to undergo removal action activities. Care will be taken to avoid or minimize damage to any native vegetation, especially shrubs near the structure.

Impacts on ecological resources would continue to be mitigated in accordance with DOE/RL-96-32, *Hanford Site Biological Resources Management Plan*.

## 2.2 PUREX Complex Description

This section describes the PUREX Complex, summarizes the processes that occurred, and defines which areas of the complex are in scope. The principal structure within the PUREX Complex is the 202A Building, which includes the Canyon, East Annex, and West Annex (Figure 2-2). The PUREX Complex contains other structures such as chemical tank farms, cribs, retention basins, and two belowgrade storage tunnels. These areas are not in the scope of this EE/CA. Appendix A contains figures and a list of all structures within the PUREX Complex Implementation Area and discusses their associated decision documentation. The following subsections identify and briefly describe the buildings and components of PUREX that are the subject of the removal action alternatives presented in this NTCRA.

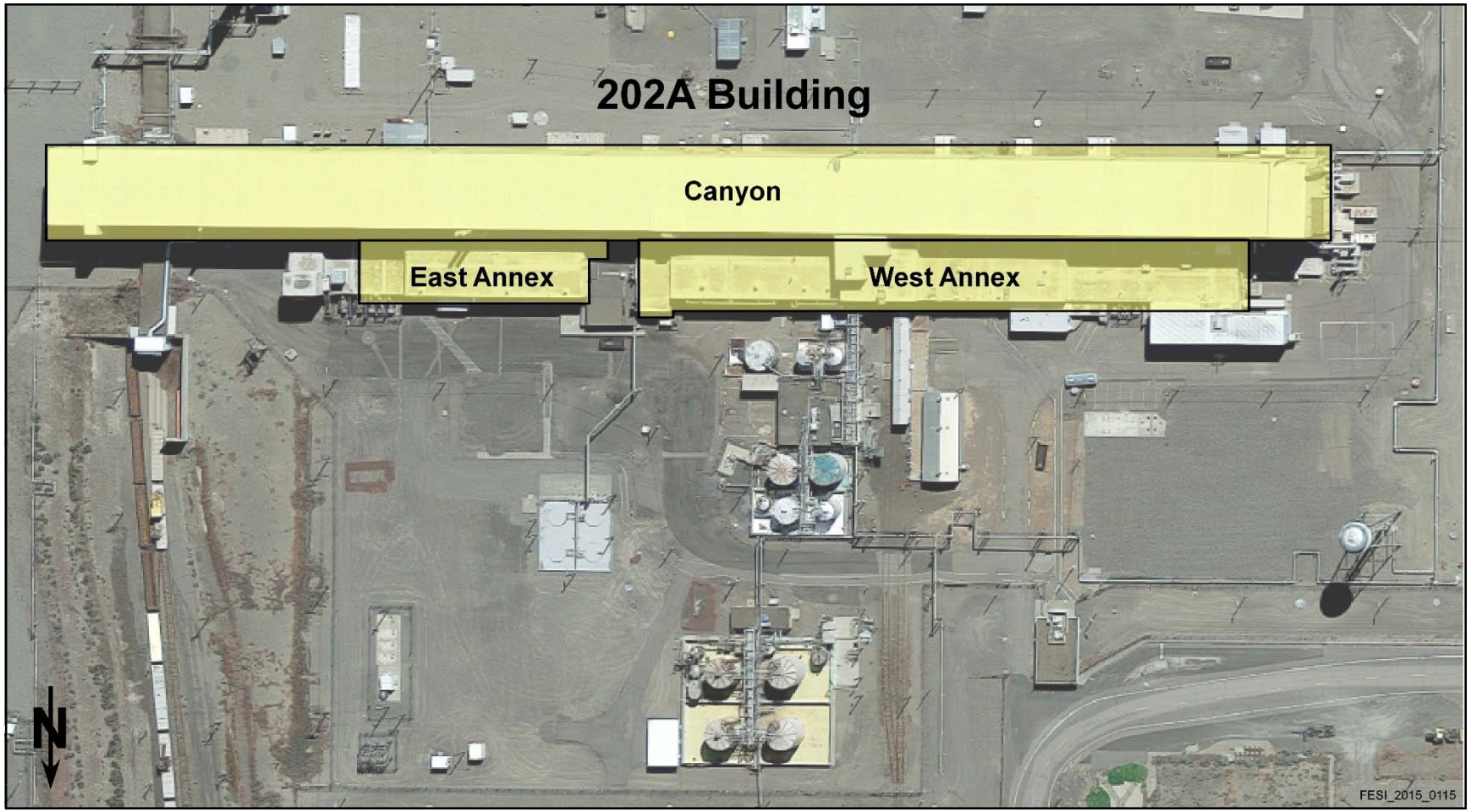


Figure 2-2. PUREX 202A Building

### 2.2.1 202A Building

This section provides a brief overview of the 202A Building and identifies which areas of the building are in scope and out of scope. The 202A Building consists of a canyon and annexes (East Annex and West Annex) attached to the north side of the canyon. The canyon is a thick walled, heavily shielded concrete area that includes four gallery levels, a canyon deck, a row of process cells, a hot (radioactive) pipe trench, and an air tunnel. The four gallery levels (Crane Cab, Pipe and Operating [P&O], Sample, and Storage) are located parallel to, but isolated. from, the Canyon Deck and process cells on the north side of the structure (Figures 2-3 and 2-4). Each level contains a gallery area of the same name and additional support rooms. Figures 2-5 through 2-8 depict a plan view of each of these levels. Perpendicular to the east end of the canyon, a railroad spur enters the complex belowgrade. Above the railroad, an extension called the east crane maintenance platform was added to the existing building in 1957. The East and West Annexes are service structures. The East Annex is a two-level abovegrade structure, and the West Annex is a five-level structure that includes a basement.

#### *2.2.1.1 In-Scope Areas*

The areas that will be addressed under this removal action are areas that can be accessed, adequately ventilated for worker safety, and have immediate need for near term action. The specific areas of the 202A Building that are in the scope of this EE/CA include the Canyon Deck, Crane Cab Gallery, West Crane Maintenance Platform, P&O Gallery, White Room, Canyon Lobby & Storage Room, Sample Gallery, Storage Gallery, Positive Infinitely Variable (PIV) Room, Product Removal (PR) Room, PR Corridor, N Cell, and entire East Annex and West Annex structures.

#### *2.2.1.2 Out-of-Scope Areas*

The areas within the 202A Building that are out of scope are considered more difficult to access safely, and, therefore, will be addressed at a later date. Specific areas that are not in the scope of this EE/CA include the 12 Process Cells, Hot Pipe Trench, Air Tunnel, Slug Storage Basin, Pool Cell, Q Cell, Hot Shop, two Master Cranes, Slave Crane, East Crane Maintenance Platform, and two railroad tunnels: Storage Tunnel #1 and Storage Tunnel #2.

Cross sectional views of the 202A Building can be found in Figures 2-3 and 2-4. Plan views of the 202A Building levels can be found in Figures 2-5 through 2-8. Types and estimated quantities of radiological waste are provided in Section 2.4.1.

### 2.2.2 202A Canyon

The 202A Canyon structure is 1,005 ft long, 30.5 ft wide, and 104 ft high, with about 40 ft of this height belowgrade. The building is supported on a 5.5 ft thick concrete slab with reinforcement in the top half. The roof is concrete, with no internal trusses supporting it. A metal roof was installed over the top of the concrete roof in 2002. There are transverse expansion joints throughout the length of the building.

Contents throughout the building include, but are not limited to, structural materials, pumps, pipes, tanks, boilers, compressors, gloveboxes, ductwork, electrical components, and other equipment. The canyon is subdivided into a single row of process cells and is paralleled on the south side by a hot pipe trench. Underneath the pipe trench is an air tunnel, which provides ventilation capability for the process cells and pipe trench. Above the cells, the concrete shield wall becomes the parapet wall of the shielded crane way (Crane Cab Gallery) for the two master cranes. A heavy concrete shielding wall separates the process cells from the galleries. The following subsections describe the areas of the 202A Canyon that are in scope.

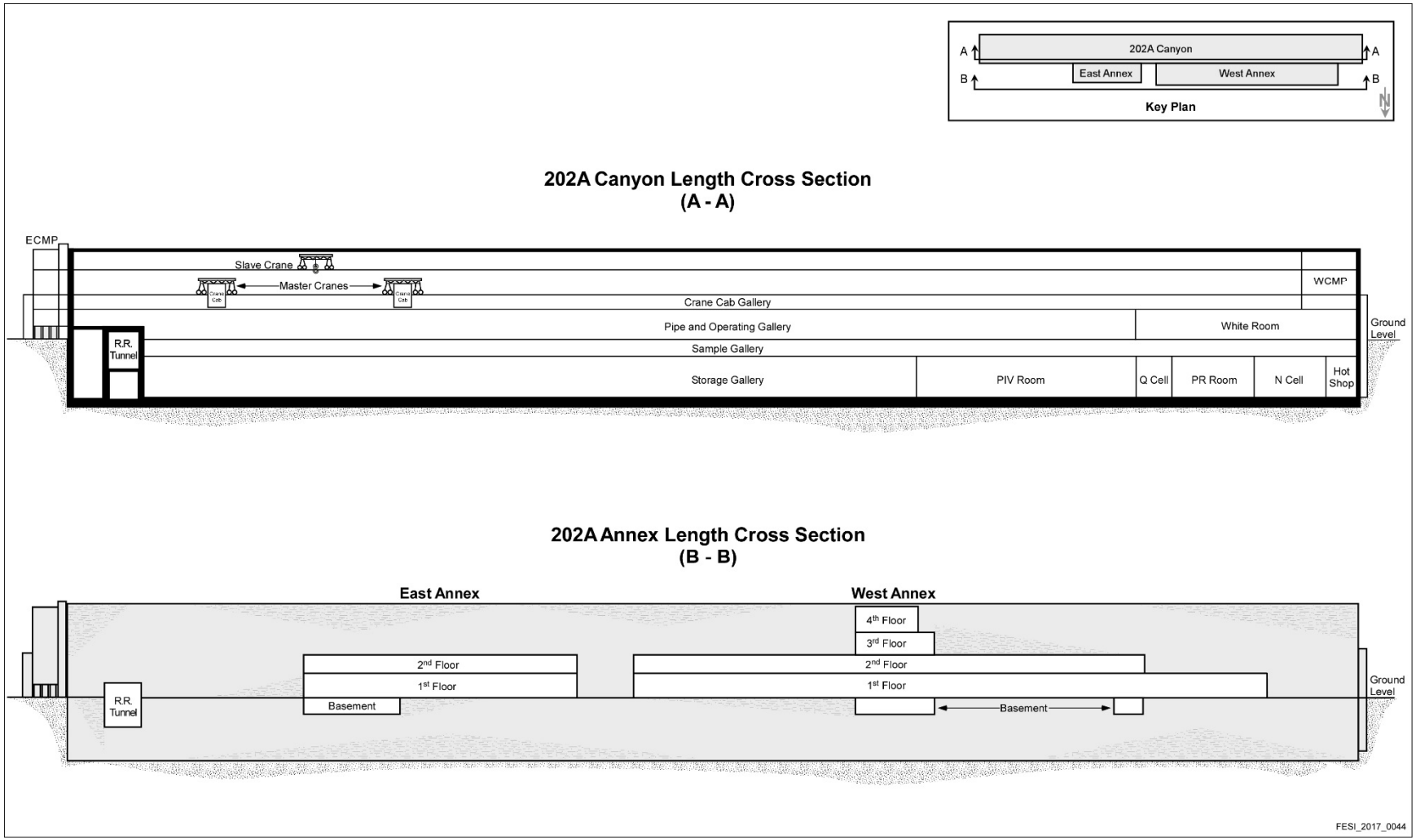


Figure 2-3. 202A Building Length Cross Section

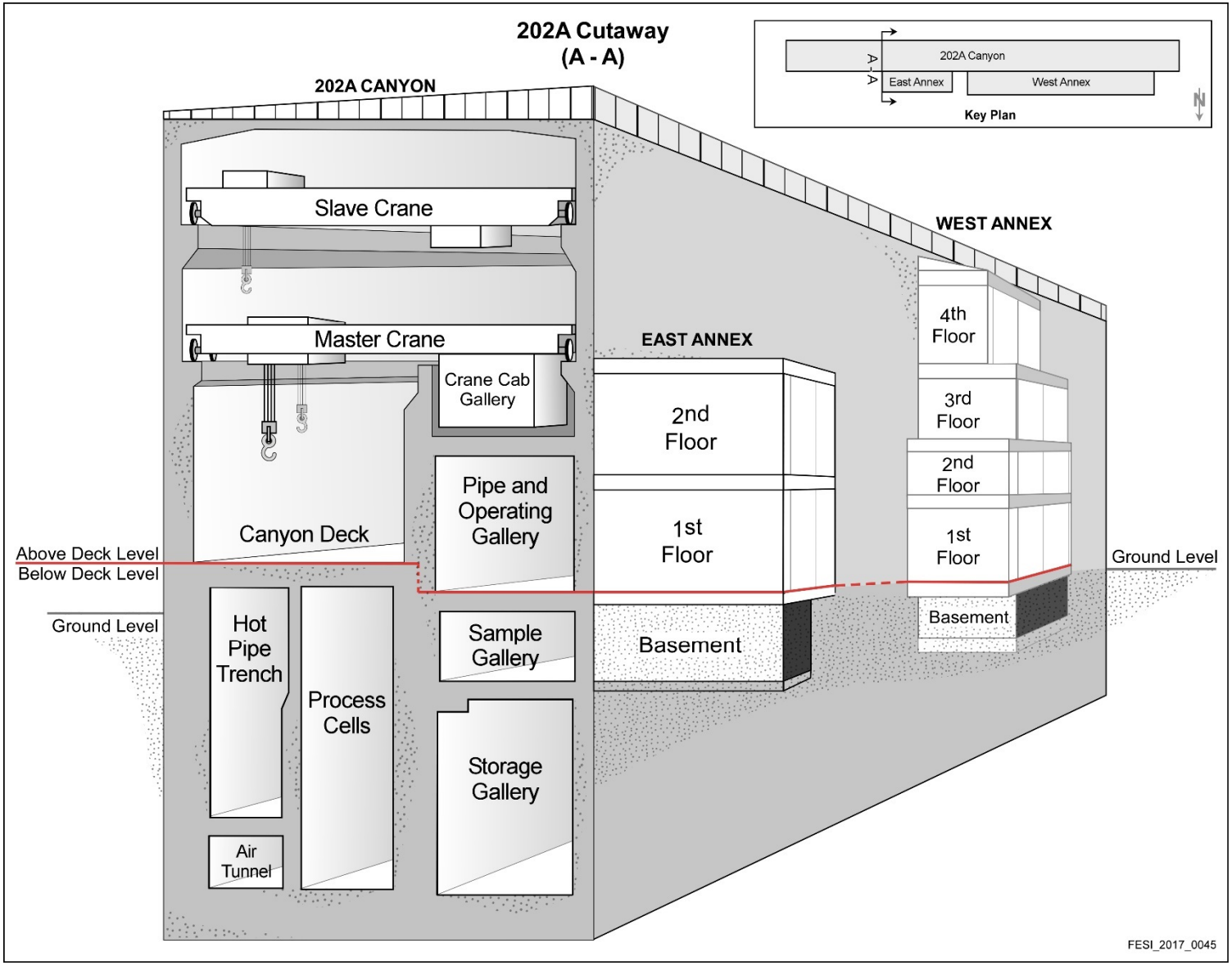


Figure 2-4. 202A Building Cutaway

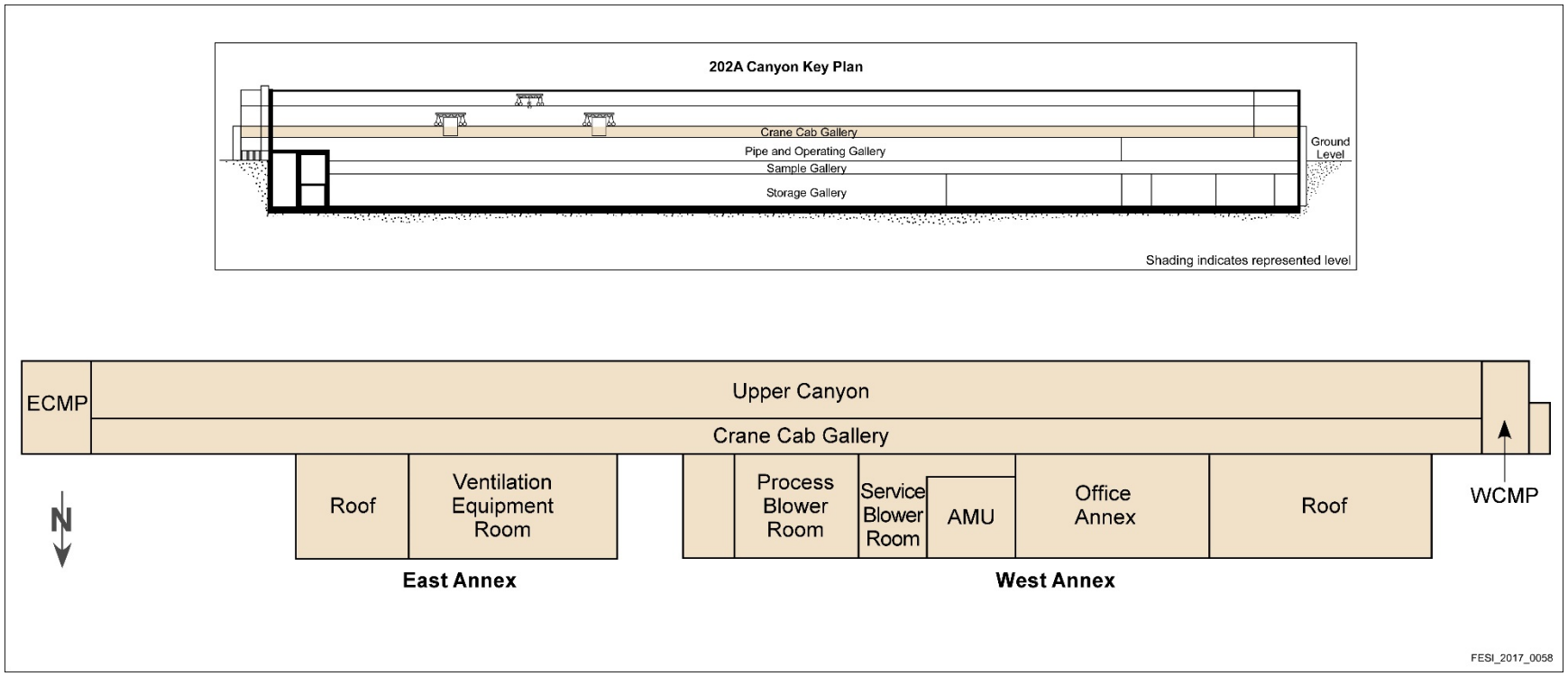


Figure 2-5. 202A Building Crane Cab Gallery Level Plan View

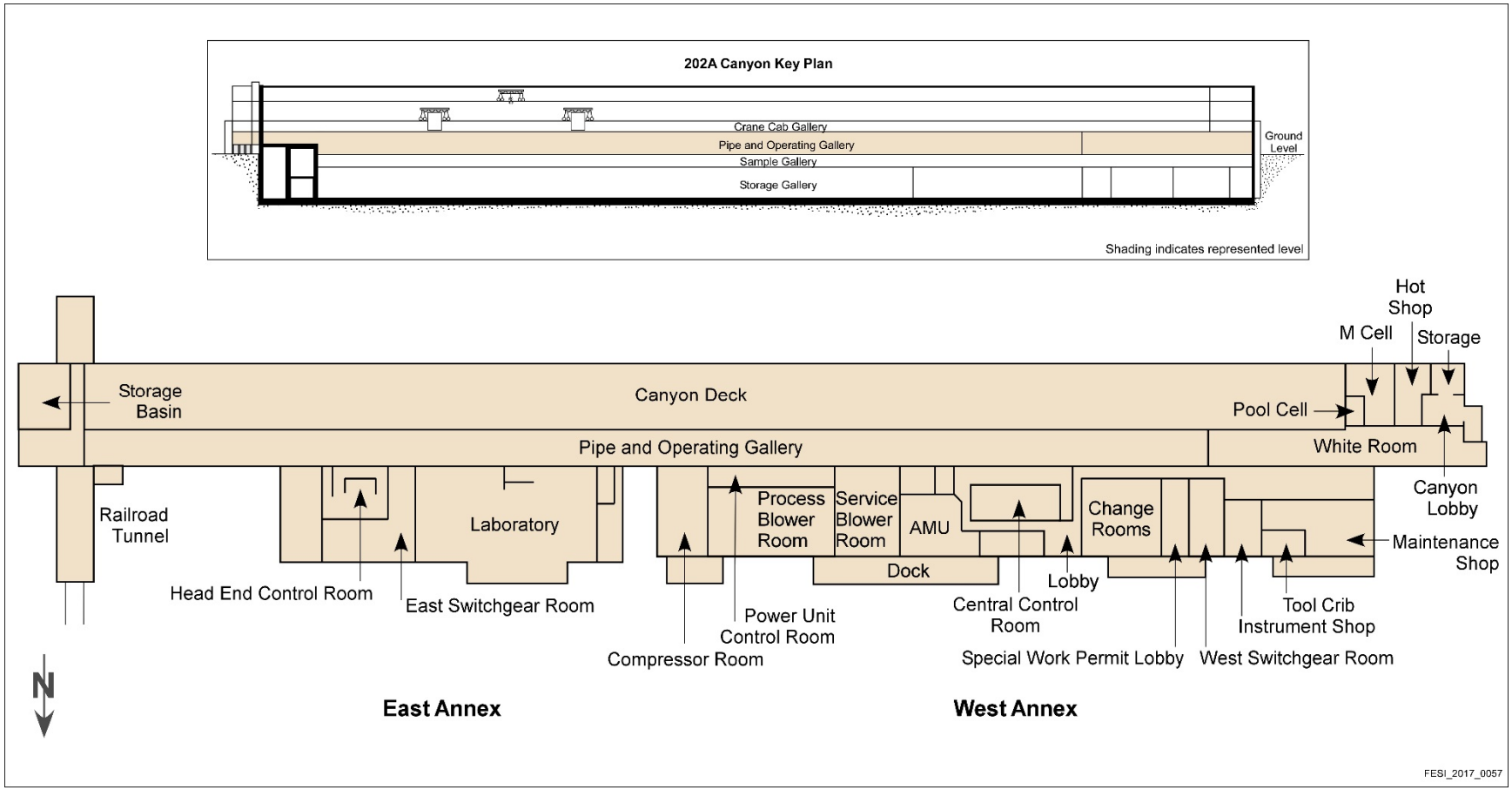


Figure 2-6. 202A Building P&O Gallery Level Plan View

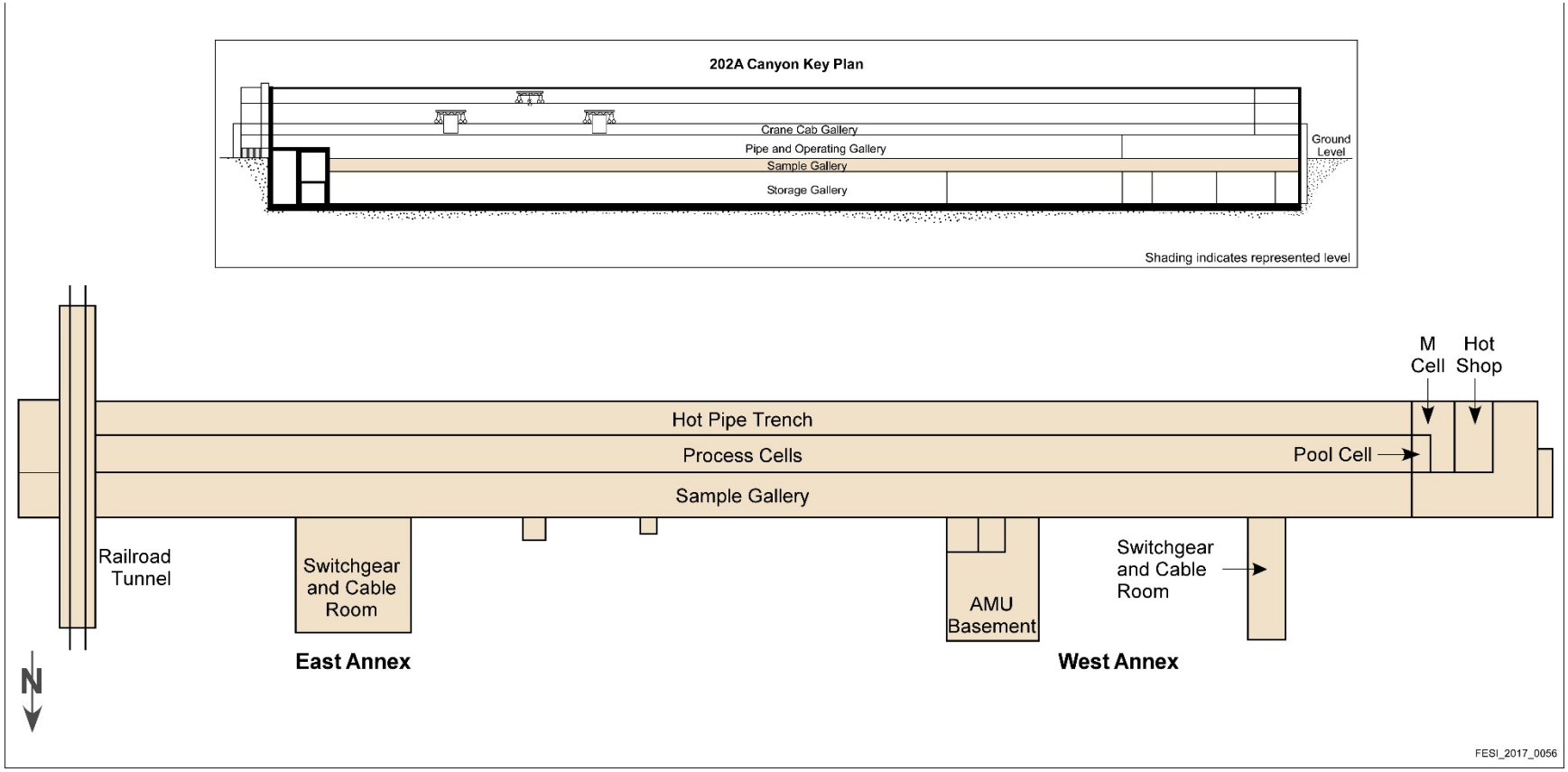


Figure 2-7. 202A Building Sample Gallery Level Plan View

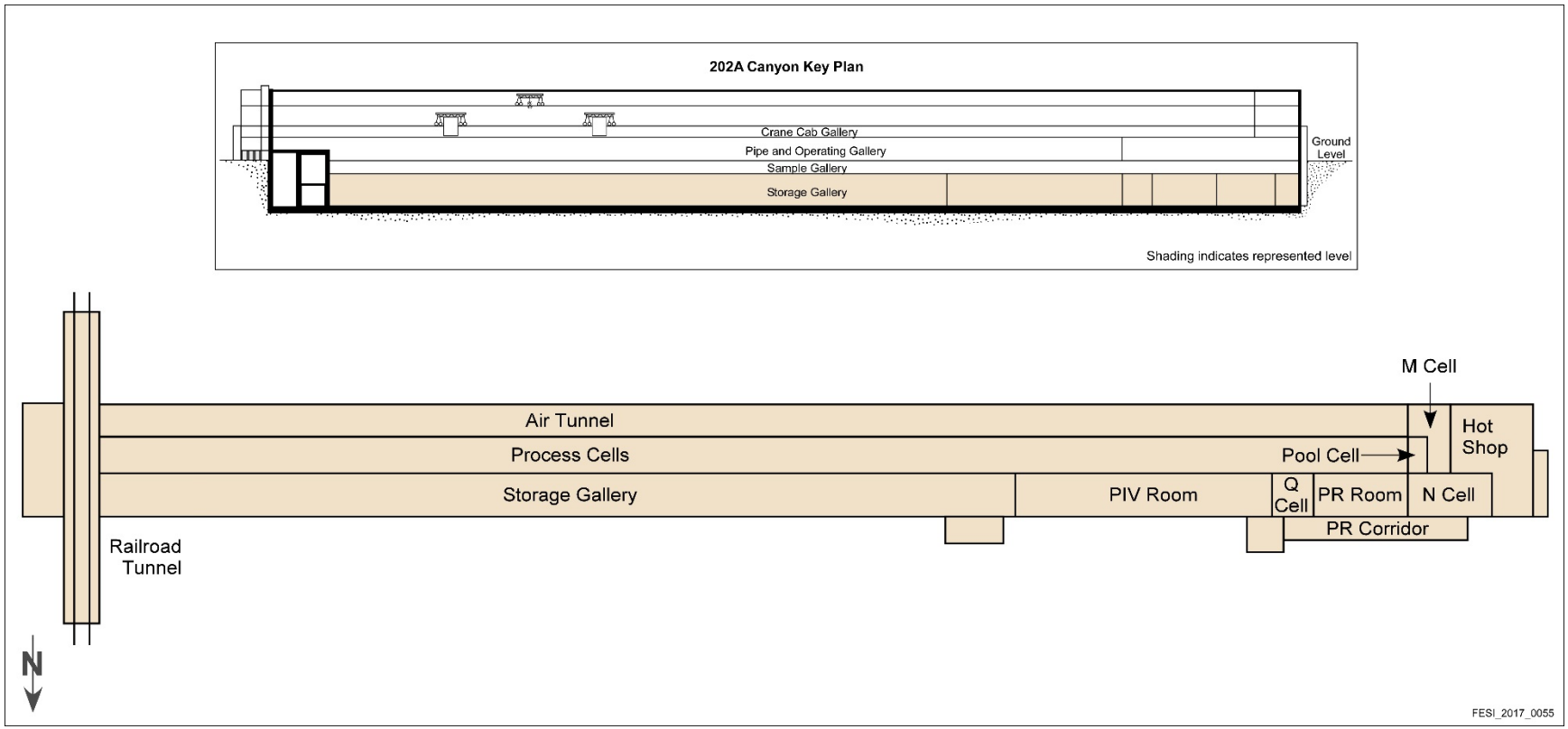


Figure 2-8. 202A Building Storage Gallery Level Plan View

#### *2.2.2.1* Crane Cab Gallery Level

The Crane Cab Gallery Level is the uppermost gallery level. Rooms on this level are the Crane Cab Gallery and West Crane Maintenance Platform. A plan view of the Crane Cab Gallery Level can be found in Figure 2-5:

- The Crane Cab Gallery is located above the P&O Gallery and is the corridor of travel for the master crane cabs.
- The West Crane Maintenance Platform is located at the west end of the crane way, above the Canyon Lobby & Storage Area. It was used to repair the two 40-ton, bridge-type master cranes and one slave crane.

#### *2.2.2.2 Pipe and Operating Gallery Level*

The P&O Gallery Level is located below the Crane Cab Gallery Level. The rooms on this level are the Canyon Deck, P&O Gallery, White Room, and Canyon Lobby & Storage Area. A plan view of the P&O Gallery Level can be found in Figure 2-6:

- The Canyon Deck, which consists of the cell cover blocks, is located above the canyon process cells and adjacent to the P&O Gallery. The cell cover blocks can be removed by the master and slave cranes.
- The P&O Gallery, located below the Crane Cab Gallery, contains deactivated instrument racks, electrical motor controls, steam and cooling water supply lines, centrifuge bowl spray pumps, dissolver water tanks, and piping and associated valves for transferring nonradioactive chemical solutions that served the in-cell equipment. Due to various process upsets, these chemical lines are contaminated. All chemical lines were flushed and drained during deactivation.
- The White Room is the west end of the P&O Gallery. The White Room is separated from the rest of the gallery by a 10 ft high personnel control barrier. The room was isolated shortly after plant startup due to a release of contamination. In order to stabilize the contamination, several coats of paint were applied to the floor and walls.
- The Canyon Lobby & Storage Area is located south of the White Room on the west side of the building.

#### *2.2.2.3 Sample Gallery Level*

The Sample Gallery Level is located below the P&O Gallery Level. The Sample Gallery is the only room on this level (plan view of Sample Gallery Level is shown in Figure 2-7). It contains remote samplers that were used for obtaining process samples from the cell equipment. A shielded pipe chase behind the remote sampler boxes contains header piping for recovered nitric acid, organic solvent, drains, and lines to and from the cell equipment. The piping was drained and/or flushed, and the drains were sealed during deactivation. There is minor contamination on the outside of the samplers. Sample hoods and ducts were sealed during deactivation to prevent the migration of contamination.

#### *2.2.2.4 Storage Gallery Level*

The Storage Gallery Level is located below the Sample Gallery. The Storage Gallery, PIV Room, PR Room, PR Corridor, and N Cell are located on this level. These areas have been deactivated by sealing gloveboxes, removing small process equipment, and removing or stabilizing residual radioactive materials. A plan view of the Storage Gallery Level can be found in Figure 2-8:

- The Storage Gallery is located in the east half of the level. The Storage Gallery was used to store miscellaneous equipment. All of the equipment has been removed.

- The PIV Room houses the PIV frequency motor alternator sets that supply electric power to the pulse generators and the central exchange for the in-plant private telephone system.
- The PR Room was used for filling containers with plutonium nitrate solution and plutonium oxide product for shipment. The PR Room contains hoods and gloveboxes used for sampling, transfer, loadout, and recycling of plutonium nitrate solution. As a part of deactivation, internal surfaces of the gloveboxes and hoods were painted to affix contamination.
- The PR Corridor is located north of the PR Room and provides access to the Q Cell, PR Room, N Cell, and 276-A R Cell.
- N Cell was used to purify plutonium product using ion exchange columns and later modified to process plutonium oxide. Plutonium nitrate solution was transferred to N Cell where it was treated and calcined to produce plutonium oxide. N Cell contains plutonium processing equipment, six full size gloveboxes, two extra-large gloveboxes, four small gloveboxes, process hoods, and equipment to rework substandard product. As a part of deactivation, the internal surfaces of the gloveboxes and hoods were painted to affix contamination. Following cleanout and decontamination, N Cell process hoods and ducts were sealed to prevent migration of radioactive material. A two-story control room is part of the N Cell processing area.

#### *2.2.2.5 202A East Annex*

The East Annex is a two-story, abovegrade, steel and transite sided structure. The East Annex is attached to the northeast side of the canyon and contains multiple service rooms. A plan view of the East Annex can be found in Figures 2-5 through 2-7:

- The two-story analytical and control laboratory is located on the west side of the East Annex. The first floor contains a laboratory work area, lunch room, and change rooms. This floor is on the same level as the P&O Gallery. The floor and walls of the first floor are made of reinforced concrete for radiation shielding. The second floor, which houses the ventilation equipment and service piping, has transite walls. The laboratory hoods and ventilation system are highly contaminated. The laboratory hoods are foamed to stabilize contamination in place.
- Adjacent to the laboratory is the east switchgear room that houses the electrical distribution system and a battery room used to power switchgear and equipment for converting from normal to standby power. The batteries were removed during the deactivation period.
- The head end control room, located at the east end of the East Annex, contains controls for acid concentration, fuel decladding, and fuel dissolution processes.
- The ventilation equipment room, located above the laboratory, contains controls and equipment for the building ventilation systems.

#### *2.2.2.6 202A West Annex*

The West Annex is a five-story, steel and transite sided structure that includes a basement. The West Annex is attached to the northwest side of the canyon and contains multiple service rooms. A plan view of the West Annex can be found in Figures 2-5 through 2-7:

- A maintenance shop, located on the west end of the annex, includes a central tool crib, instrument shop, clerical office, and overhead monorail system.
- Adjacent to the instrument shop, the west switchgear room contains electrical distribution system equipment for the building.

- The special work permit lobby is adjacent to the change rooms. The special work permit lobby contains a supply room, cabinets, a radiation monitoring station, and step-off pads.
- The central control room contains controls and instrumentation for the solvent extraction process equipment.
- A five-story AMU, located adjacent to the central control room, was used to prepare, store, and transfer chemicals during PUREX processing. The basement of the AMU contains tanks and pumps; the second level contains chemical and service piping and additional makeup tanks and headers; the third level contains additional head tanks and vessels; and the fourth level contains a general utility head tank located in a regulated work area. All 37 AMU makeup tanks were flushed and drained during the deactivation period, and sampling was performed to ensure that the flushed water no longer exhibited dangerous waste characteristics. Tank TK-156 held nitric acid and is a 405 gal DWMU located on the second floor of the AMU. Sampling results for tank TK-156 noted a pH of 2.66, with all dangerous waste constituents below the dangerous waste designation threshold. Tank TK-156 is the only DWMU in the scope of this EE/CA.
- A service blower room and process blower room are located immediately east of the AMU area. Each room contains several air supply blowers, which serviced the different ventilation system loops.
- Adjacent to the process blower room, a power unit control room contains controls for the building ventilation systems, laboratory ventilation systems, compressor equipment, and instrumentation for the steam and sanitary water utility services.
- The compressor room houses compressors and dryers that produced instrument air, process air, and fresh breathing air.

## 2.3 Previous Investigations and Removal Actions

Various soil and groundwater investigations have been conducted in the Central Plateau in the 200 East Area. These previous investigations were not related to the 202A Building. Although not a removal action, deactivation activities, such as flushing of vessels, columns, and tanks, were conducted at the PUREX Complex. The shutdown of operations is discussed further in Section 2.2. No additional investigations or removal actions have been performed on the 202A Building.

Multiple buildings/structures within the PUREX Complex that are not part of this removal action have been removed or are planned to be removed under DOE/RL-2010-33, *Removal Action Work Plan for Central Plateau General Decommissioning Activities*, or DOE/RL-2010-102.

## 2.4 Source, Nature, and Extent of Contamination

Completion of formal deactivation activities at PUREX has established a safer and more environmentally secure configuration suitable for a long-term S&M program. However, not all hazardous materials were removed when the facility was deactivated. Sections 2.4.1 and 2.4.2 discuss the remaining radiological inventories and chemicals at PUREX.

The 202A Building is contaminated with both radioactive and chemical substances that were used or generated during facility operations and deactivation activities. Some hazardous substances were removed during the deactivation period; however, not all hazardous materials were removed at the time. Some of the hazardous substances were removed from the building as a part of routine S&M activities. In addition to radiological and chemical hazards, structural hazards exist due to the degradation in the structural integrity of the building.

The types of waste likely to require disposal under this NTCRA include, but are not limited to, inorganic and organic chemicals, solid waste, low-level radioactive waste, asbestos, radioactively contaminated asbestos waste, beryllium, and polychlorinated biphenyl (PCB) waste. Transuranic (TRU) waste is also anticipated to be present. Resources such as historical information, process knowledge, radiological survey reports, occurrence reports, assessment reports, personnel interviews, characterization reports, vulnerability assessments, inspections, walkdowns, and knowledge of construction and other materials will be used to characterize the remaining hazardous substances (e.g., within equipment and piping/drains) to facilitate removal action activities and associated waste disposal.

To support characterization of the building/structure waste, a sampling and analysis plan (SAP) will be prepared in conjunction with the RAWP. The SAP will be submitted for approval by EPA and, as the lead regulatory agency for this action, Ecology will approve both the SAP and the RAWP.

### 2.4.1 Chemical Hazards

The following chemical hazards may be present within the 202A Building. The 202A Building contains some friable and/or nonfriable asbestos in the form of insulation, ductwork, gasket material, transite siding, and floor tiles, which will be confirmed through process knowledge and/or sampling and analysis. Additional chemical hazards present may include the following materials:

- Inorganic chemicals (e.g., arsenic, beryllium, cadmium, chromium, lead, mercury, nitrate, silver, sodium bicarbonate, uranium, and zinc)
- Organic chemical residues (e.g., lubricants, oils, and PCBs)
- Radioactive sources contained in remaining smoke detectors
- Asbestos and asbestos-containing material
- Refrigerants
- Corrosives (including both acids and caustics)

The locations, types, and estimated quantities of significant nonradioactive substances and materials are included in Table 2-1.

Table 2-1. Nonradioactive Material Inventory

| Building | Chemical | Quantity |
|---|---|---|
| 202A | Cadmium | 335.8 lb |
| | Lead | 52,377 lb |
| | Mercury | 83.6 lb |
| | Nitrates | --* |
| | Chromium | --* |
| | Sodium bicarbonate | --* |
| 202A East and West Annexes | Lead | 363.1 lb |

Reference: HNF-SD-CP-ISB-004, *Plutonium Uranium Extraction (PUREX) End State Basis for Interim Operation (BIO) for Surveillance and Maintenance*.

*Quantities of these chemicals are currently unknown.

### 2.4.2 Radiological Hazards

The primary hazardous substances associated with the 202A Building are radioactive materials. Primary radionuclide contaminants include americium-241, cesium-137, iodine-129, and plutonium-238 through plutonium-242. Radioactive materials are primarily in the form of contaminated equipment and surfaces, debris, and sludge, with some remaining plutonium oxide dust stabilized in gloveboxes. Table 2-2 presents the inventory estimates of the 202A Building (CP-14977, *Plutonium-Uranium Extraction Facility Documented Safety Analysis*). Results from a low-level waste radionuclide characterization performed throughout the PUREX Complex can be found in WHC-SD-CP-PLN-028, *PUREX Low-Level Waste Radionuclide Characterization*.

Table 2-2. Estimated 202A Building Radioactive Material Inventory

| Location | Total Pu (Ci) | Am-241 (Ci) | Sr-90 (Ci) | Cs-137 (Ci) | I-129 (Ci) |
|---|---|---|---|---|---|
| Process Cells | 5,717 | 999 | 8,330 | 10,200 | 0.007 |
| N Cell | 1,113 | 160 | -- | -- | -- |
| White Room | 288 | 43 | -- | -- | -- |
| Product Removal Room | 815 | 120 | -- | -- | -- |
| **Total 202A Building Inventory** | **7,933** | **1,322** | **8,330** | **10,200** | **0.007** |

Am-241 = americium-241
Cs-137 = cesium-137
I-129 = iodine-129
Pu = plutonium
Sr-90 = strontium-90

### 2.4.3 Current Hazard Conditions

Current S&M areas are identified in DOE/RL-98-35. These areas are surveyed annually to identify any changes in the condition of the building. Table 2-3 lists the conditions noted from 2007 through 2017.

Table 2-3. Current Hazard Conditions

| Area | Surveyed Area | Current Condition |
|---|---|---|
| Canyon Deck | No | The Canyon Deck has not been entered since deactivation in 1998. Current conditions on the deck are not known. |
| Aqueous Makeup Unit (West Annex) | Yes | Brown stains and white powders originating from tanks TK-204 and TK-200, respectively, were observed on the floor. The ceiling at the south end of the blower room is degrading. There is a history of animal intrusion and water accumulation, which increases the risk of contamination spreading to other areas. In 2016 and 2017, bird carcasses were removed and peeling paint on floors and walls were observed, as well as white powder and oil stains around pipes and tanks. Asbestos insulation around piping coming loose. |
| East Annex | Yes | The ceiling drywall is falling apart in the east switchgear room and equipment room where water has intruded. Water stains on the walls and peeling paint on the floor have been observed. The rooms were last surveyed in 2017. |

Table 2-3. Current Hazard Conditions

| Area | Surveyed Area | Current Condition |
|---|---|---|
| N Cell | Yes | N Cell is estimated to contain 1,113 Ci of plutonium and 160 Ci of americium. Gloveboxes contain the majority of the inventory. The risk of spread of radiological contamination to other areas is likely because the building air circulates through this cell. Radiological contamination spread from this cell is decontaminated yearly. In 2016, leaks near the second-floor gloveboxes were observed and an airlock became loose, which could affect building ventilation. |
| Storage Gallery | Yes | Elevated beta contamination was measured at an expansion joint near column 38 and on the floor near column 40. The room has a history of reoccurring contamination. There is an estimated 4,131 lb of lead in the room, and the cement ceiling is deteriorating. In 2016 and 2017, the cement ceiling is crumbling to the floor and paint is peeling on the exit door. The gallery is entered on a yearly basis, most recently in 2017. |
| Q Cell | Yes | In 2017, leaking oil was observed near the gloveboxes. |
| Pipe and Operating Gallery | Yes | Elevated beta contamination was measured during S&M near columns 26 and 35 and on the floor between columns 30 through 40, 23 and 24, and 27 through 30. The room has a history of reoccurring contamination. Expansion joints near columns 27 and 36 show structural deterioration and asbestos insulation is coming loose. In 2016 and 2017, wet brown liquids and white powders were observed around valves throughout the gallery and near columns 10, 13, 16, and 24. In addition, a cracked expansion joint was observed. The entire gallery is considered a Beryllium Controlled Area. Water stains have been observed. The room was last surveyed in 2017. |
| Sample Gallery | No | The Sample Gallery is radiologically contaminated. There are high levels of contamination inside hoods. There is an estimated 530 lb of lead in the room. The Sample Gallery has not been entered since deactivation in 1998; therefore, current conditions of the room are not known. |
| White Room | Yes | Surveillance of this room is limited due to a small 2 ft wide path, and the room is not well lit. In 2015, white powder was found at column 5. In 2016 and 2017, white powder and chips were observed on the floor. Ongoing corrosion has been noted, and the room is known to contain internally contaminated equipment and fixed alpha contamination under the lead paint surface. |
| Product Removal Room | Yes | The Product Removal Room gloveboxes are highly contaminated. Alpha contamination levels observed in 2012 from one smear at the L-11 hood exceeded the radiological work permit void limit. |

## 2.5 Risk Evaluation

The 202A Building is contaminated with hazardous substances including radiological contaminants, metals, organic compounds, PCBs, beryllium, and asbestos.

Built in 1956 and unoccupied since the mid-1990s, the 202A Building is deteriorating. A new roof was placed on 202A Canyon to mitigate water intrusion into the building due to structural degradation and, while this issue is now fixed, the rest of the building has continued to degrade over time. The documented amount of radiological contamination and asbestos-containing material present in the deteriorating facilities indicates a sufficient threat of release to the environment. Contaminants could be released directly to the environment through a fire; breach in a utility pipe, containment wall, or roof; or building collapse as the buildings age and deteriorate. While current S&M activities adequately monitors the PUREX Canyon, continued aging of the structure could result in a future unanticipated event.

Radiological and chemical conditions of the 202A Building, as described in Section 2.4 and Table 2-3, indicate that contamination is spreading in locations that are currently surveyed and are known to contain contaminated systems such as gloveboxes and piping. The spread of contamination in these locations indicates that there may be spreading of contamination in other areas that are not entered. Several locations within PUREX are radiologically contaminated and need to be addressed before the occurrence of an unanticipated event that could result in the release of contamination.

In October 2015, the TPA Tentative Agreement for Central Plateau Cleanup was revised. TPA Milestone M-085-80, "Submit Remedial Investigation/Feasibility Study Work Plan for 200-CP-1 to Ecology," is not required until September 2020 (Ecology et al., 1989a). Therefore, the remedial actions are not expected to be implemented for a number of years thereafter. Milestone M-085-84, "Initiate response actions in accordance with the schedule in the approved Remedial/Removal Action Work Plan developed under M-085-82," was also established, with the 2025 due date. The structural deterioration and contamination spread could result in a future unanticipated release. Therefore, the removal action is needed to alleviate this potential risk. Chapter 1 discusses the factors to be considered in determining the appropriateness of a removal action.

The PUREX Canyon is adequately monitored by S&M activities; however, there is limited to no coverage in areas that are highly contaminated. In general, the risk of structure failure due to facility degradation would increase over time, and the risk of an accidental release would also increase the longer the structures await the eventual remedial action for the operable unit. Therefore, current conditions present a sufficient threat of release under a continued S&M scenario to justify an NTCRA.

# 3 Identification of Removal Action Objectives

This chapter discusses the removal objectives developed for the evaluated alternatives to reduce the risks associated with the PUREX Complex. The removal action objectives (RAOs) for this NTCRA are to perform removal actions in a manner that would, to the extent practicable, support the long-term and final cleanup goals for the 200 Area NPL (40 CFR 300, Appendix B) site. The RAOs were developed in conjunction with the reasonable anticipated land use, contaminants of concern, and potential applicable or relevant and appropriate requirements. Threats to be addressed are the remaining radiological inventory and residual hazardous chemical contamination associated with past operations.

RAOs are general descriptions of what the removal action is expected to accomplish. They are defined as specifically as possible and usually address the following variables:

- Media of interest (e.g., structures, contaminated soil, and process and support equipment)
- Types of contaminants (e.g., radionuclides and inorganic and organic chemicals)
- Potential receptors (e.g., humans, animals, and plants)
- Possible exposure pathways (e.g., external radiation and ingestion)

As described in Section 2.2, potential contaminants that may be encountered during this removal action include asbestos, heavy metals, inorganic and organic chemicals, and radionuclides. The radionuclide and/or chemical contamination that may present a risk to HHE is described in Section 2.4. The RAOs identified to reduce potential hazards related to the 202A Building, are defined in the following section.

## 3.1 Removal Action Objectives

The RAOs for this NTCRA are to perform removal actions to address identified risks in a manner that would, to the extent practicable, support the long-term and final cleanup goals for the 200 Area NPL (40 CFR 300, Appendix B) site. The following RAOs were developed to complete this scope:

- **RAO #1**: Reduce the inventory and any potential threat to HHE from an unacceptable exposure to hazardous and radioactive substances.
- **RAO #2**: Minimize the general disruption and adverse impacts to cultural resources and wildlife habitat.
- **RAO #3**: Safely treat, as appropriate, and dispose of waste generated by the removal action.
- **RAO #4**: Be consistent with anticipated remedial actions at the PUREX Complex.
- **RAO #5**: Minimize or eliminate the need for future S&M activities.

## 3.2 Applicable or Relevant and Appropriate Requirements

The NCP states, “Removal actions...shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws” [40 CFR 300.415(j)].

The evaluation of potential ARARs for this proposed NTCRA are provided in Appendix B. This section provides an overview of the ARARs process and a summary of those ARARs that potentially affect the development of RAOs.

Identification of ARARs is a site-specific determination involving a two-part analysis: (1) determine whether a given requirement is applicable; and (2) if it is not applicable, whether it is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the contaminants, remedial action, or place involved at the site. If the jurisdictional prerequisites of the law or regulation are not met, a legal requirement may nonetheless be relevant and appropriate if the circumstances of the site are sufficiently similar to circumstances in which the law otherwise applies, and it is well suited to the conditions of the site.

A requirement must be substantive in order to constitute an ARAR for activities conducted onsite. Procedural or administrative requirements, such as permits and reporting, are not ARARs.

In addition to ARARs, the NCP (40 CFR 300) provides that where ARARs do not exist, agency advisories, criteria, or guidance are to be considered (TBC) "…in helping to determine what is protective at a site or how to carry out certain actions or requirements" (55 FR 8745, "National Oil and Hazardous Substances Pollution Contingency Plan Overview"). The NCP preamble states, however, that provisions in the TBC category "…should not be required as cleanup standards because they are, by definition, generally neither promulgated nor enforceable, so they do not have the same status under CERCLA as do ARARs."

As the lead federal agency, DOE has the primary responsibility to identify federal ARARs at the PUREX Complex. As the lead state agency, Ecology has the responsibility for identifying state ARARs (Appendix B). ARARs are presented in Chapter 5 for each of the alternatives considered. A detailed discussion of all ARARs considered for this EE/CA is provided in Appendix B.

# 4 Identification of Removal Action Alternatives

The removal action alternatives proposed in this EE/CA are consistent with and would support a final disposition similar to those described in EPA et al., 2005, *Record of Decision 221-U Facility (Canyon Disposition Initiative), Hanford Site, Washington*. The 221U Canyon Building remedial action is considered a pilot project for the remediation of other Hanford Site canyon buildings. The 221U Canyon remedial action involved removal of waste from abovegrade level galleries and the Canyon Deck, removal of a tank from the process cells, and grouting of internal spaces below the Canyon Deck. All of these actions have been completed. The 221U Canyon Building ROD specified the final state of U Canyon as removal of roof and wall sections down to deck level and construction of an engineered barrier over the remnants of the canyon. These remedial actions are still ongoing.

The removal action alternatives were developed in consideration of a future PUREX Canyon ROD, which would include evaluation of remedial actions similar to those described in the 221U Canyon Building ROD (EPA et al., 2005). Consistency with expected remedial decisions at the PUREX Complex is addressed in Chapter 5 of this EE/CA. All alternatives will be evaluated against these criteria.

Table 4-1 includes the four removal action alternatives identified for evaluation. Each successive alternative includes all of the actions involved in the previous alternative, with the addition of new actions, as outlined in each of the following alternative subsections.

Table 4-1. Proposed Alternatives for the PUREX Complex Removal Action

| Alternative | Removal Action Description |
|---|---|
| 1 | No Action |
| 2 | • Surveillance and Maintenance of PUREX Complex<br>• Hazard Abatement of the 202A Building |
| 3 | Alternative 2 actions plus:<br>• Demo Prep of the 202A East and West Annexes |
| 4 | Alternative 3 actions plus:<br>• Demolition of the 202A East and West Annexes<br>• Demo Prep of the 202A Canyon Above Deck Areas |

demo prep = demolition preparation
PUREX = Plutonium Uranium Extraction

The removal action activities included in the proposed alternatives are S&M, hazard abatement, demolition preparation (demo prep), and demolition. Descriptions of these activities are provided in this chapter. All activities will be performed in a manner that protects the safety of employees and the general public, minimizes spills and releases to the environment, and meets regulatory requirements. Worker health and safety will be addressed in site-specific work plans.

Waste generated during removal action activities would be characterized and segregated by waste type (e.g., TRU, low-level radioactive, mixed low-level radioactive, hazardous, and nonhazardous). In compliance with WAC 173-303 and the *Atomic Energy Act of 1954*, waste would be dispositioned at approved waste disposal facilities.

ERDF is the preferred disposal location because it is an engineered facility that provides a high degree of protection to HHE. Historically, it has been shown that this disposal location is more cost effective than

other waste disposal sites. Construction of ERDF was authorized using a separate CERCLA ROD (EPA et al., 1995, *Record of Decision U.S. DOE Hanford Environmental Restoration Disposal Facility, Hanford Site Benton County, Washington*). ERDF is engineered to meet appropriate RCRA technological requirements for landfills, including standards for a double liner, leachate collection system, leak detection, monitoring, and a final cover.

Hazardous, mixed, low-level, asbestos, and *Toxic Substances Control Act of 1976* waste can be accepted for disposal at ERDF (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*). Demolition debris will be transported to ERDF or other EPA approved facilities, and treated as necessary, to meet applicable land disposal restrictions and waste acceptance criteria prior to disposal. If TRU waste is generated, it would be moved to an EPA approved facility for storage and managed according to applicable waste acceptance criteria prior to disposal at the Waste Isolation Pilot Plant (WIPP) (HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*).

## 4.1 Removal Action Activities

Each alternative, with the exception of Alternative 1, includes the following types of actions: S&M, hazard abatement, demo prep, and demolition. Waste generated from these actions will be treated and disposed. The following subsections describe these action categories.

### 4.1.1 Surveillance and Maintenance

S&M activities will be performed in accordance with the most current S&M plan (DOE/RL-98-35) on a routine and nonroutine basis. Routine S&M activities ensure that structural and passive confinement integrity is maintained and may include access control, periodic monitoring for potential radiological contamination and other hazards, cold weather protection, maintenance, annual roof inspections, identification, and minor repair of friable asbestos, and general visual inspections. Nonroutine activities include major responses to undesirable observations (e.g., a leak in one area spreading radiological contamination to another area). Major maintenance and other facility life extension operations (e.g., roof maintenance) would be performed to ensure that structures remain in a safe condition and that the ongoing deterioration process is minimized to control the potential for accidental release of radioactive materials and hazardous substances. Appropriate surveillance activities will be conducted based upon facility conditions during the removal action.

The objective of S&M is to ensure adequate containment of any contaminants left in place, provide physical safety and security controls, and maintain the facility in a manner that will minimize risk to HHE. In accordance with these objectives, some areas within the scope of this EE/CA are not accessed during the S&M phase according to the current S&M plan.

### 4.1.2 Hazard Abatement

Hazard abatement differs from S&M in that it allows for a proactive response to mitigate or reduce risk before a major response would be required. Hazard abatement activities may range from stabilization to complete removal of equipment and waste (e.g., white powders), as needed, to mitigate hazards. Identification of areas that will receive hazard abatement will be based on S&M activities and observations. This EE/CA assumes that modifications to the ventilation system will be needed to support removal activities at the 202A Building. An engineering evaluation of the ventilation will be performed prior to initiating the removal activity, if needed.

### 4.1.3 Demolition Preparation

Demo prep may include activities such as general housekeeping and removal of equipment and waste. Decontamination, fixing/stabilization of contamination, and isolation of systems may be performed.

Interior portions of the building may be removed, as practical and necessary, to support future access for final disposition activities. Overhead utilities and adjacent concrete and asphalt may be removed, as needed. Fluids will be drained from piping and equipment. Piping entering or exiting a structure may be plugged, blocked, or grouted to prevent potential release pathways to the environment, as appropriate. These activities will be managed in accordance with procedures that address removing, handling, and disposing these materials in a manner that protects the safety of employees and the public, minimizes spills and releases to the environment, and meets regulatory requirements.

### 4.1.4 Demolition

Demolition is preceded by hazard abatement and demo prep activities, including removing hazardous substances, as necessary, from within and around buildings and structures; decontaminating, fixing contamination, and isolating systems; removing equipment; and plugging of piping or drains entering or exiting belowgrade buildings and structures. Demolition of buildings and structures includes removing abovegrade structures. Belowgrade structural components, such as basements, will be left intact (with penetrations secured or blanked) and backfilled or grouted, as appropriate. If warranted, belowgrade structures and/or related equipment may be removed to facilitate other removal action activities surrounding the area, or as deemed necessary by the DOE Richland Operations Office, to support overall cleanup goals and priorities. If evidence of contamination to surrounding soil is encountered that is directly associated with the structure being removed or that resulted directly from the demolition activity, those surrounding soils would be excavated and disposed at ERDF in accordance with ERDF waste acceptance criteria. Characterization will be performed to document any remaining contamination for follow-on S&M activities, creation of a new Waste Information Data System site under the TPA, or addition of information to an existing Waste Information Data System site, and a future remedial action. The area will be stabilized (e.g., backfill, contour, and vegetate), as necessary and appropriate.

## 4.2 Alternative 1 – No Action

CERCLA requires the No Action alternative as a baseline for comparison with other removal action alternatives. Under the No Action alternative, it is assumed that the 202A Building would be abandoned without any further action. No legal restrictions, institutional controls, or active measures are applied to the 202A Building in this alternative. S&M activities would be discontinued, no additional facility stabilization would be performed, and degradation would continue indefinitely. Initial risks to HHE from the No Action alternative would be minimal and barring an unusual event, contaminants are assumed to remain confined within the structures. Risks over time are expected to increase as deterioration progresses and structural integrity is compromised. The possibility of a chemical and/or radiological contamination spread would increase due to lack of monitoring and controls. Physical hazards associated with partial structural collapse would also be anticipated.

Although Alternative 1 would not have an associated implementation cost under this analysis, it is understood that taking no action would ultimately result in a substantial cost in the future. Alternative 1 is not consistent with DOE obligations under federal law to protect HHE; therefore, this alternative cannot be considered viable and is not considered further in this EE/CA. This alternative is used as a baseline for comparison purposes only.

## 4.3 Alternative 2 – Continued S&M/Hazard Abatement 202A

The primary elements of Alternative 2 are as follows:

- Continued S&M of the PUREX Complex

- Hazard Abatement (e.g., white powder removal) of the 202A Canyon (P&O Gallery, White Room, Canyon Lobby & Storage Area, Sample Gallery, Storage Gallery, PIV Room, PR Room, PR Corridor, and N Cell)
- Figures 4-1 and 4-2 provide a general overview of the removal activities that would be implemented under Alternative 2 throughout the 202A Building. Table 4-2 summarizes the removal activities for this alternative.

Under Alternative 2, S&M activities would continue for the entire 202A Building. Hazard abatement would take place in high-priority areas in the 202A Canyon. The scope of each removal activity is described in the following subsections.

### 4.3.1 Surveillance and Maintenance

Under Alternative 2, S&M activities for the PUREX Complex would be performed for 25 years. S&M efforts are expected to increase over time in areas where no additional removal activities will take place due to aging of structures and components. No facility lifecycle upgrades will be performed.

### 4.3.2 Hazard Abatement

Under Alternative 2, the 202A Canyon would undergo hazard abatement. At a minimum, the areas that will receive hazard abatement are the P&O Gallery, White Room, Canyon Lobby & Storage Area, Sample Gallery, Storage Gallery, PIV Room, PR Room, PR Corridor, and N Cell. These areas contain pipes, tanks, and equipment that are chemically and/or radiologically contaminated. Alternative 2 proposes proactive mitigation of risk from used equipment and waste in these areas that poses a threat to HHE. Hazard abatement includes stabilization or, if possible, complete decontamination and removal of the sources of contamination. Hazard abatement also includes complete removal of all piping and equipment, as necessary. If cleanout is not possible, contamination would be stabilized in place. A modification to the active building ventilation system may be necessary to support hazard abatement.

## 4.4 Alternative 3 – Continued S&M/Hazard Abatement 202A/Demo Prep 202A East and West Annexes

The primary elements of Alternative 3 (in italics) are as follows, which include all activities in Alternative 2:

- Continued S&M of the PUREX Complex (Alternative 2)
- Hazard Abatement of the 202A Canyon (Alternative 2)
- *Demo Prep of the 202A East and West Annexes*

Figures 4-3 and 4-4 provide a general overview of the removal activities for Alternative 3. Table 4-2 summarizes the removal activities for this alternative.

This alternative includes all activities included in Alternative 2, with the addition of demo prep in the 202A East and West Annexes. Prior to demo prep of the 202A East and West Annexes, some hazard abatement activities may be performed, if necessary. Rooms in each annex structure would be emptied of wastes, equipment, furniture, and nonstructural utilities, such as plumbing and power supply in preparation for eventual demolition. Asbestos removal would also be performed.

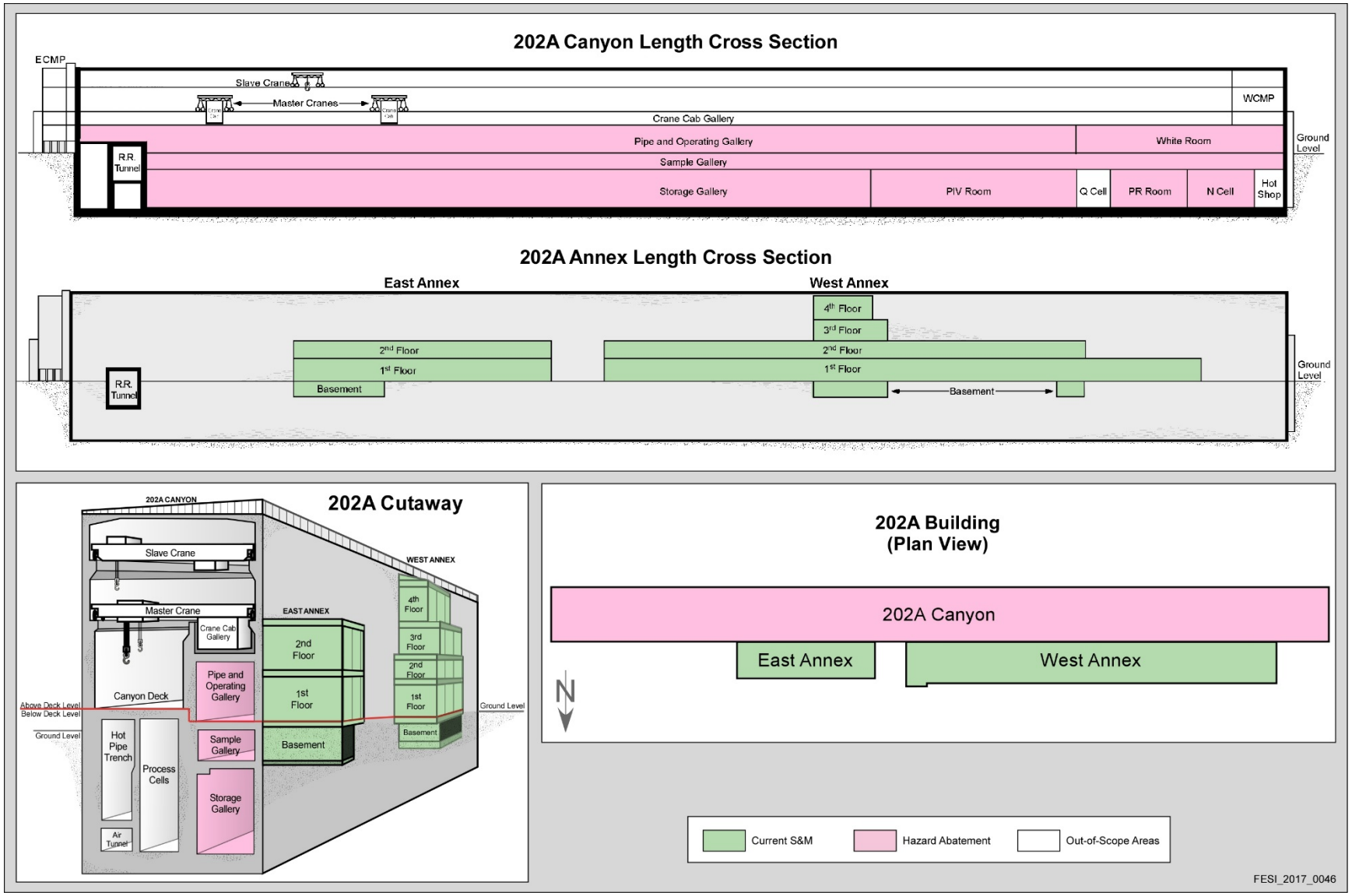


Figure 4-1. Alternative 2 – Proposed Actions

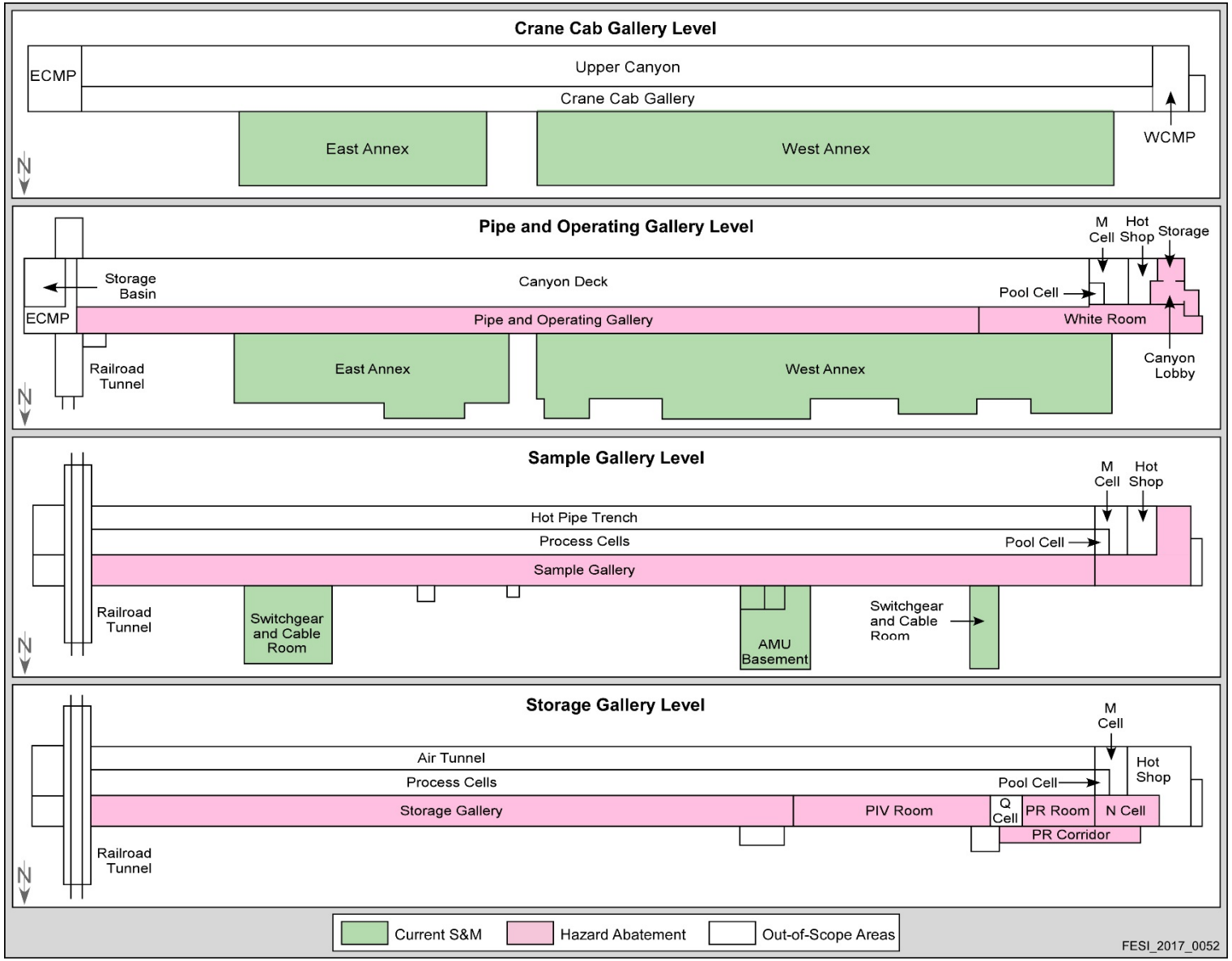


Figure 4-2. Alternative 2 Plan View – Proposed Actions per Level

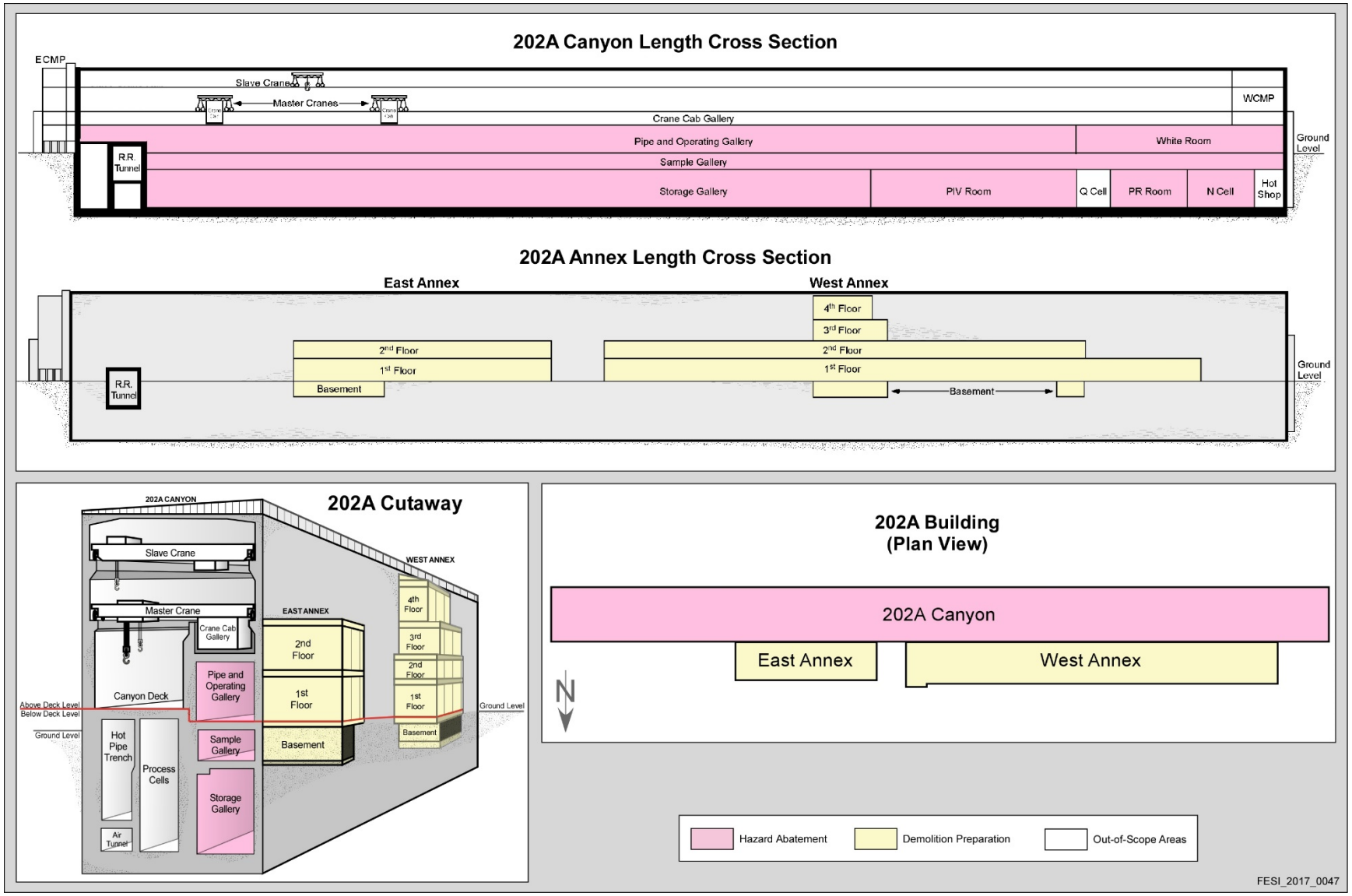


Figure 4-3. Alternative 3 – Proposed Actions

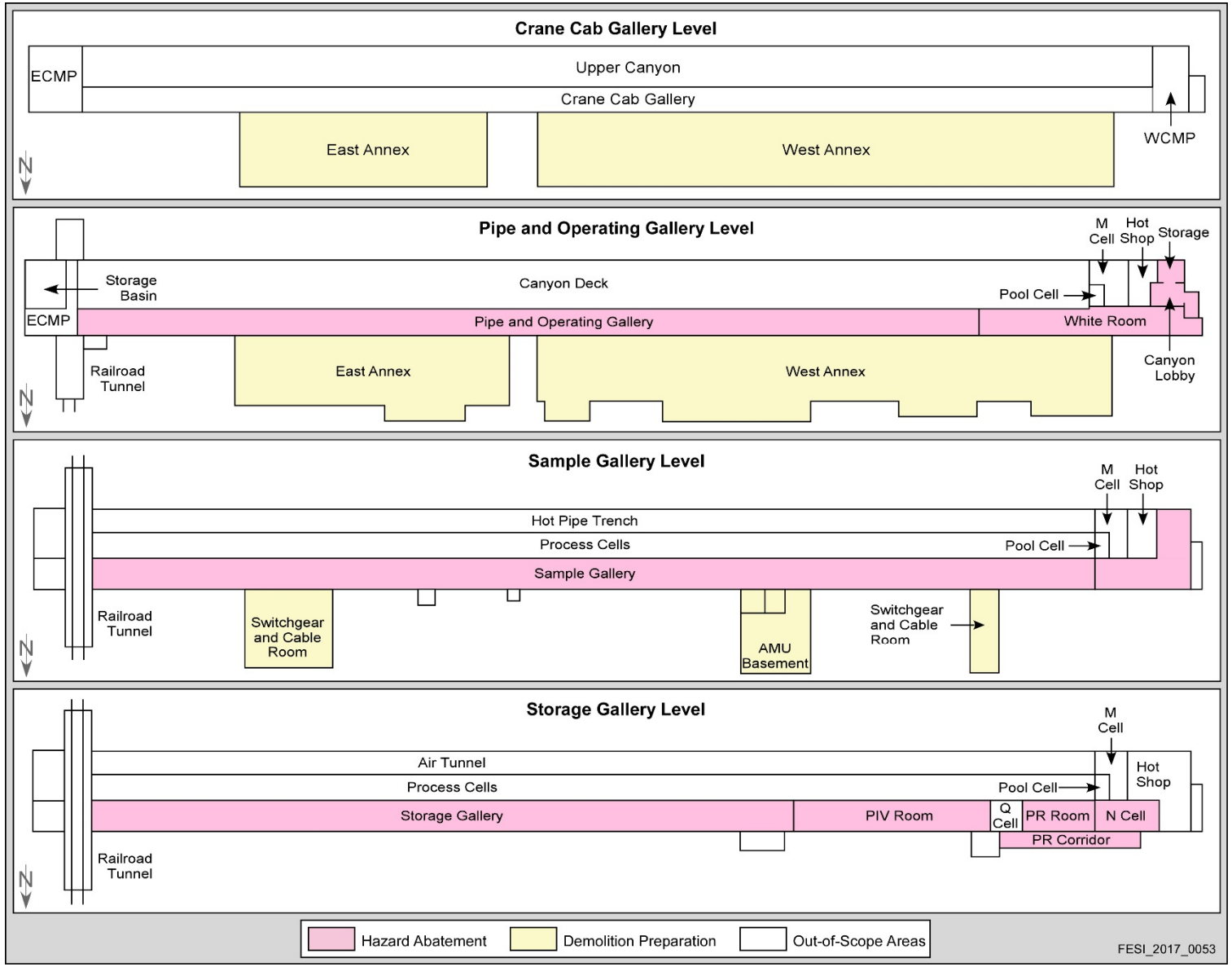


Figure 4-4. Alternative 3 Plan View – Proposed Actions per Level

Table 4-2. Summary of Proposed Alternatives

| Activities | 202A Canyon | | 202A East and West Annexes |
|---|---|---|---|
| | Above Deck Areas | Below Deck Areas | |
| **Alternative 1** | | | |
| No Action | ● | ● | ● |
| **Alternative 2** | | | |
| S&M | ● | ● | ● |
| Hazard Abatement | ● | ● | – |
| Demo Prep | – | – | – |
| Demolition | – | – | – |
| **Alternative 3** | | | |
| S&M | ● | ● | ● |
| Hazard Abatement | ● | ● | – |
| Demo Prep | – | – | ● |
| Demolition | – | – | – |
| **Alternative 4** | | | |
| S&M | ● | ● | ● |
| Hazard Abatement | ● | ● | – |
| Demo Prep | ● | – | ● |
| Demolition | – | – | ● |

● = action is new to this alternative
● = action was part of preceding alternative
demo prep = demolition preparation
S&M = surveillance and maintenance

## 4.5 Alternative 4 – Continued S&M/Hazard Abatement 202A/Demo Prep & Demolition 202A East and West Annexes/Demo Prep 202A Canyon Above Deck Areas

The primary elements of Alternative 4 (in italics) are as follows, which include all activities in Alternative 3:

- Continued S&M of the PUREX Complex (Alternative 2)
- Hazard Abatement of the 202A Canyon (Alternative 2)
- Demo Prep of the 202A East and West Annexes (Alternative 3)
- *Demo Prep of the 202A Canyon Above Deck Areas*
- *Demolition of the 202A East and West Annexes (Includes Disposition of Tank TK-156)*

Figures 4-5 and 4-6 provide a general overview of the removal activities for Alternative 4. Table 4-2 summarizes the removal activities for this alternative.

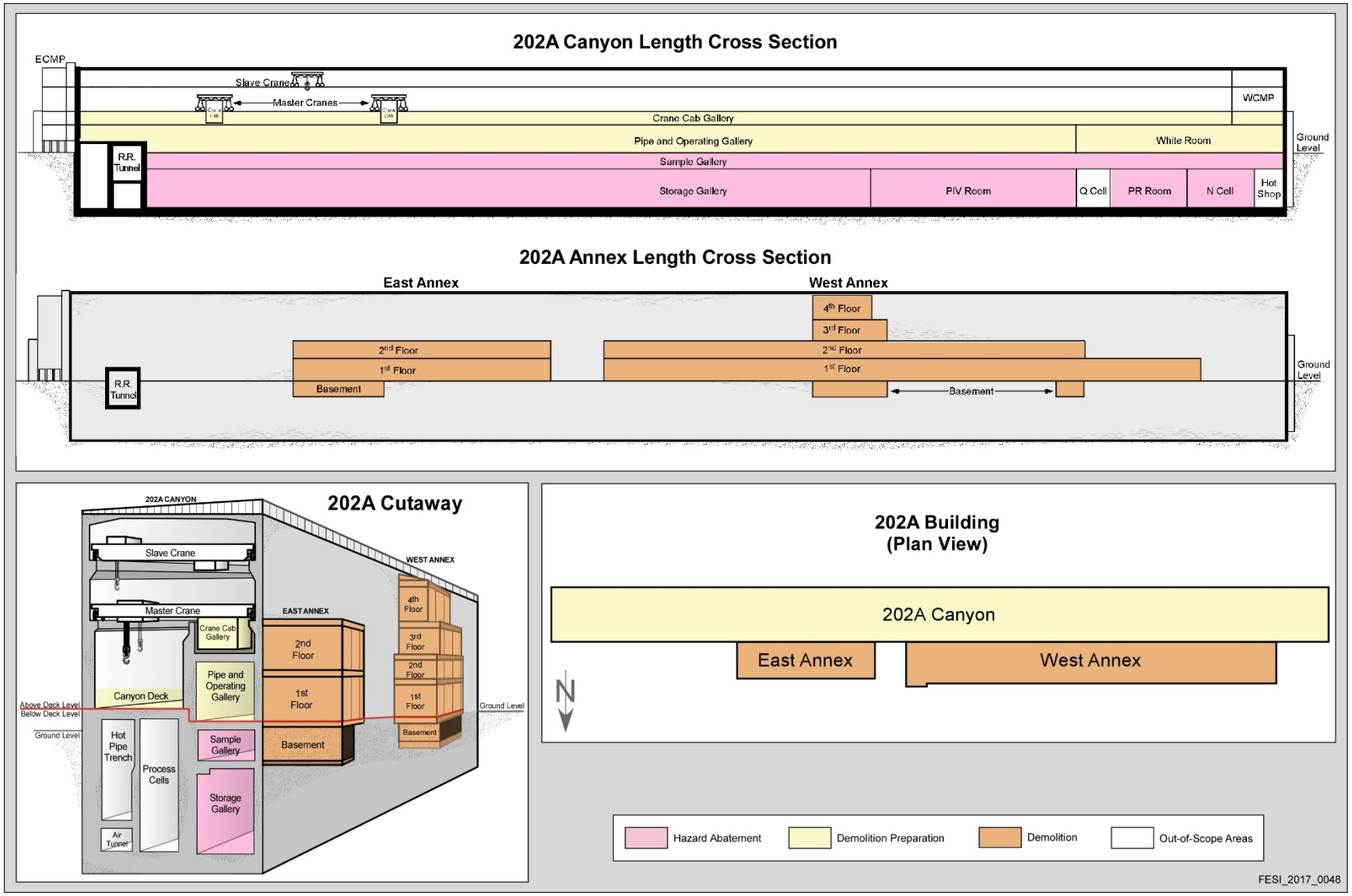


Figure 4-5. Alternative 4 – Proposed Actions

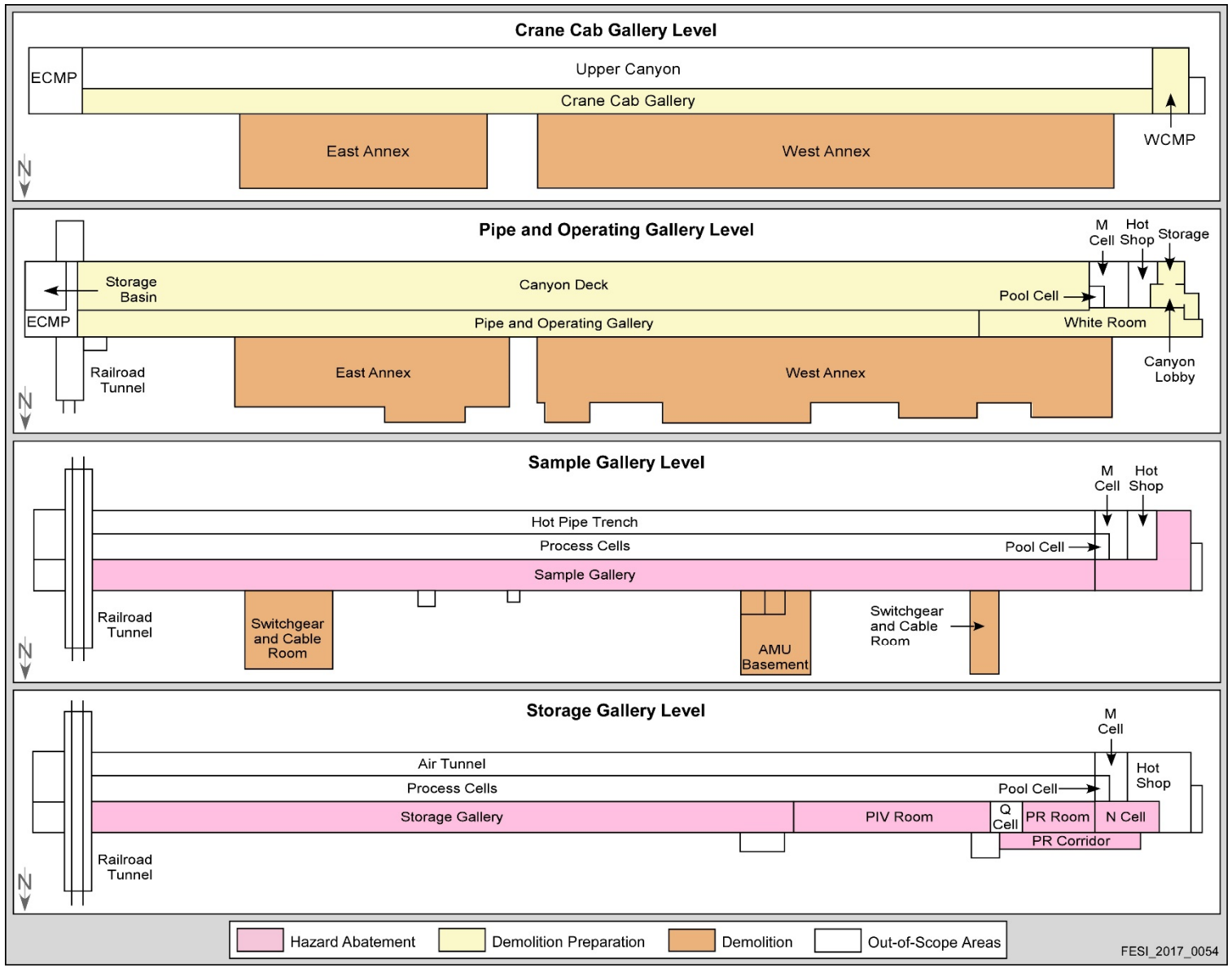


Figure 4-6. Alternative 4 Plan View – Proposed Actions per Level

This alternative includes all activities included in Alternative 3, with the addition of demo prep of the 202A Canyon Above Deck Areas and demolition of the 202A East and West Annexes, including the final disposition of RCRA tank TK-156. The scope of the added removal activities is described in the following subsections.

### 4.5.1 Demolition Preparation

Demo prep activities will be performed in the 202A Building in above deck areas of the canyon, as appropriate. These areas are: the Crane Cab Gallery, West Crane Maintenance Platform, P&O Gallery, White Room, Canyon Lobby & Storage Area, and Canyon Deck. Prior to demo prep, some hazard abatement activities may be performed, if necessary. Demo prep activities would include removal of wastes, equipment, and nonstructural utilities such as plumbing in preparation of eventual demolition or grouting.

### 4.5.2 Demolition

Alternative 4 includes demolition of the 202A East and West Annexes. Demo prep will take place prior to demolition. Under this alternative, the 202A East and West Annexes would be demolished to ground level, and the basement level would be brought to grade with fill material. Removal of transite from the exterior walls will be performed as part of the demolition. If utilities or controls located in the 202A East and West Annexes are needed for future actions, they will be reconfigured and relocated prior to demolition. The closure activity for tank TK-156 (removal and disposal at ERDF) will be conducted concurrently with demolition. Following demolition, any access points to the remaining canyon portion will be isolated or sealed, as appropriate.

## 4.6 Summary of Alternatives

Figures 4-1 through 4-6 present schematics for the actions performed under Alternatives 2 through 4. Table 4-2 summarizes the four proposed alternatives, showing the actions included as they apply to the 202A Building.

# 5 Analysis of Removal Action Alternatives

In accordance with EPA 540-R-93-057, *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA*, this chapter evaluates the alternatives identified in Chapter 4 with respect to three criteria: effectiveness, implementability, and cost. Table 5-1 outlines the subcriteria used in this evaluation process. This analysis of alternatives considers that the removal activities performed under this EE/CA are short-term interim measures to prevent potential harm to HHE and stabilize structures for future disposition. Long-term treatment or containment activities required for final remediation or disposition of the PUREX Complex will be executed under a future remedial action, as determined by a ROD.

Table 5-1. Alternative Analysis Criteria

| Primary Criteria | Subcriteria for Evaluating Alternatives |
|---|---|
| Effectiveness | 1. Protectiveness<br>• Overall protection of human health and the environment<br>• Compliance with applicable or relevant and appropriate requirements<br>• Long-term effectiveness and permanence<br>• Reduction of toxicity, mobility, or volume through treatment<br>• Short-term effectiveness |
| | 2. Ability to meet removal action objectives |
| Implementability | 3. Technical and administrative feasibility |
| | 4. Availability of equipment, personnel, services, and disposal facilities |
| Cost | 5. No subcriteria; estimated costs include the following:<br>• Capital costs<br>• Operational and maintenance costs |

State and public acceptance will be evaluated after the public have an opportunity to review and comment on this EE/CA. Each criterion is explained briefly in the following sections, as well as a detailed analysis of each alternative relative to each criterion. The actions associated with each alternative are reiterated in Table 5-2.

Table 5-2. Description of Removal Action Alternatives

| Alternative | Removal Action Description |
|---|---|
| 1 | • No Action |
| 2 | • S&M of PUREX Complex<br>• Hazard Abatement of the 202A Building |
| 3 | Alternative 2 actions plus:<br>• Demo Prep of the 202A East and West Annexes |
| 4 | Alternative 3 actions plus:<br>• Demolition of the 202A East and West Annexes<br>• Demo Prep of the 202A Canyon Above Deck Areas |

demo prep = demolition preparation
PUREX = Plutonium Uranium Extraction
S&M = surveillance and maintenance

## 5.1 Effectiveness of Removal Action Alternatives

The two subcriteria for evaluating effectiveness of the NTCRA are protectiveness and the ability to achieve RAOs. The protectiveness analysis determines whether implementation of the removal action alternative and its ability to meet CERCLA thresholds are adequate for the protection of HHE. Overall protection of HHE involves the elimination, reduction, or control of risks posed by likely exposure pathways. Environmental protection also includes avoiding or minimizing impacts to natural, cultural, and historical resources. Compliance with ARARs overlaps with the protectiveness criterion by addressing chemical, location, and action-specific requirements for protection of HHE.

The analysis of long-term effectiveness and permanence considers the protectiveness of each alternative at the conclusion of the proposed removal action after the RAOs have been met. The ability of each removal action alternative to reduce the toxicity, mobility, or volume (TMV) of contamination effectively is also evaluated. The short-term effectiveness criterion addresses protection of workers and HHE during implementation of the proposed action.

The ability of each alternative to meet RAOs is evaluated as part of the analysis of alternatives. The primary focus of this evaluation is the effectiveness of the removal activities and associated controls that may be required to manage risk to protect HHE.

### 5.1.1 Protectiveness

Protectiveness is the primary objective of a removal action and is a threshold criterion that must be met to recommend an alternative. Alternatives were evaluated relative to the protectiveness of workers, the community, and the environment both during implementation of the removal action (short-term) and after the removal objectives have been met as the facility awaits final disposition (long-term).

The removal activities proposed under each alternative demonstrate protectiveness to varying degrees, based on their abilities to reduce or prevent releases of, and subsequent exposure to, hazardous substances.

#### *5.1.1.1 Overall Protection of Human Health and the Environment*

Overall protection of HHE considers the protectiveness of HHE during the removal action and the post-implementation conditions for each alternative.

The No Action alternative (Alternative 1) would fail to provide overall protection of HHE from the 202A Building because contaminated waste would remain in place without any measures to contain or monitor contaminants or control exposure pathways. Alternative 1 will not meet any of the five RAOs outlined in Chapter 3. Because Alternative 1 fails to provide overall protection of HHE, it is not effective; therefore, is no longer considered a viable alternative. This alternative will not be discussed further in the analysis of alternatives.

Alternatives 2, 3, and 4 meet requirements for the overall protection of HHE to varying degrees because waste would be removed, exposure pathways would be eliminated, and active monitoring would be performed to prevent or address deteriorating conditions.

#### *5.1.1.2 Compliance with ARARs*

The ARARs and TBCs identified for the removal action are presented in Appendix B. The removal action activities proposed under all alternatives would be performed and managed in a manner compliant with ARARs, including emissions standards, waste management, and requirements for the protection of natural, cultural, and historical resources.

#### *5.1.1.3 Long-Term Effectiveness and Permanence*

The long-term effectiveness and permanence criterion assesses the risk from waste and residuals remaining at the conclusion of site activities. This criterion also evaluates whether the alternative contributes to future remedial action objectives.

Key considerations for long-term effectiveness and permanence are the physical condition of the 202A Building over time and the amount of management needed to prevent a release of hazardous substances prior to final disposition. As the 202A Building continues to age without active intervention, the potential for a release of and subsequent exposure to hazardous substances could increase.

Alternatives 2, 3, and 4 support future remedial objectives because they provide interim to long-term protectiveness until a final remedial action or inventory removal occurs at a future time.

#### *5.1.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment*

Alternatives 2, 3, and 4 provide reduction in the TMV of contaminants through the treatment or removal of contamination via hazard abatement, demo prep, and demolition. The removal of materials and waste from the 202A Building for disposal at ERDF, or storage at the Central Waste Complex (CWC) pending disposal at WIPP, under all alternatives would transfer long-term impacts of contamination from one area to another to a certain degree, but because ERDF was designed for disposal and has a double leachate liner collection system, disposal at ERDF is more environmentally protective.

#### *5.1.1.5 Short-Term Effectiveness*

The short-term effectiveness criterion refers to any potential adverse effects on HHE (including workers and the public) during the removal action implementation phases.

Short-term risks to workers would be present where hazard abatement, demo prep, and demolition are performed because these actions increase potential near-term exposure to hazardous substances during removal. Physical and industrial risks also exist near-term during active demolition. Personnel would enter the contaminated structures for a focused amount of time and would handle contaminated materials. However, proper worker safety controls, the application of stringent health and safety procedures, as low as reasonably achievable principles, and engineering controls for each alternative would mitigate some short-term risk.

Similarly, performing hazard abatement, demo prep, and demolition would temporarily increase environmental emissions and potential fugitive dust during facility stabilization, demolition, and waste removal. Breaching of containments during hazard abatement, demo prep, demolition, and waste removal would also increase the likelihood of potential release and subsequent exposure to hazardous or radiological substances.

Strict adherence to environmental regulations and work controls would ensure short-term effectiveness in protecting HHE under Alternatives 2 through 4.

### 5.1.2 Ability to Achieve Removal Action Objectives

This section evaluates the effectiveness of each alternative to meet the RAOs. Ability to achieve the RAOs effectively is considered at the end of the removal action. The following RAOs for this NTCRA are as follows:

- **RAO #1**: Reduce the inventory and any potential threat to HHE from an unacceptable exposure to hazardous and radioactive substances.

- **RAO #2**: Minimize the general disruption and adverse impacts to cultural resources and wildlife habitat.
- **RAO #3**: Safely treat, as appropriate, and dispose of waste generated by the removal action.
- **RAO #4**: Be consistent with anticipated remedial actions at the PUREX Complex.
- **RAO #5**: Minimize or eliminate the need for future S&M activities.

Alternatives 2, 3, and 4 achieve all of the RAOs with varying degrees of effectiveness. All of the alternatives reduce potential threat to HHE from an unacceptable exposure to hazardous and radioactive substances (RAO #1). All removal action alternatives have little disruption or impact to cultural resources and wildlife (RAO #2). All waste generated in all removal activities will be managed and disposed in accordance with state and federal regulations (RAO #3). All of the alternatives are consistent with anticipated future remedial actions (RAO #4) and would minimize future S&M needs (RAO #5).

## 5.2 Implementability of the Removal Action Alternatives

The implementability of a removal action is dependent upon the technical and administrative feasibility of the action, including availability of materials and services needed to perform the selected action, as well as state and community acceptance of the action. This section discusses the technical and administrative implementability of the proposed removal action alternatives for the 202A Building.

### 5.2.1 Technical and Administrative Feasibility

Alternatives 2, 3, and 4 are technically and administratively feasible. All proposed removal activities could be performed using existing knowledge and procedures that have proven successful at the Hanford Site. The methods for performing S&M, hazard abatement, demo prep, and demolition are consistent with Hanford Site projects of similar scope (e.g., disposition of the Plutonium Finishing Plant [PFP] and U Plant). Disposal and recycling services are available both on and off the Hanford Site for the types of waste expected to be generated under all alternatives. ERDF and CWC are anticipated to be available to receive most or all of the waste to be generated by the removal action activities. Administratively, all included actions would adhere to applicable laws and permits and would have demonstrated success at the Hanford Site under projects of similar scope.

### 5.2.2 Availability of Equipment, Personnel, and Services

Equipment to support Alternatives 2, 3, and 4 is either available at the Hanford Site or is commercially available. Equipment, personnel, and services required for hazard abatement, demo prep, and demolition are consistent with resources and capabilities used elsewhere on the Hanford Site for similar actions. Front-end loaders and trackhoes with processor end effectors, as well as transport trucks, are available onsite. Cranes capable of heavy lifts are also available onsite or are commercially available. Advanced methods are available for cutting contaminated equipment.

Disposal and recycling services are available on or off the Hanford Site for the types of waste expected to be generated by the actions performed under Alternatives 2, 3, and 4. ERDF and CWC are anticipated to be available for disposal of most or all of the waste generated by the removal action activities. The need for specialized materials, services, treatment technology, or disposal facilities is expected to be minimal for Alternatives 2, 3, and 4.

If performed concurrently with other Hanford Site cleanup activities, trained personnel are available to perform the proposed removal activities under each alternative, including the specialized skills required to work in areas with alpha contamination. If performance of the removal activities is delayed significantly

relative to other Hanford Site cleanup, additional training and remobilization of a qualified work force may be required.

## 5.3 Cost of the Removal Action Alternatives

Cost estimates have been prepared for the removal action alternatives evaluated in this EE/CA. The cost estimates were prepared in accordance with EPA 540-R-00-002, *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study*, and DOE G 430.1-1, *Cost Estimating Guide*. ECE-200E15-00005, *Environmental Cost Estimate for the PUREX Complex*, provides an overview of removal action specific cost inputs, methodology, and results.

Table 5-3 shows the cost estimates for the four alternatives, starting from a present day, nondiscounted cost (i.e., constant dollars). Nondiscounted costs assume that all work is performed today and the costs are not affected by general price inflation (i.e., they represent units of stable purchasing power). Because nondiscounted costs do not reflect the changing value of money over time, presentation of this information under CERCLA is for informational purposes only and is not a factor in the selection of a response action alternative.

Table 5-3. Summary of Cost Estimates for the Alternatives

| Alternative | | Cost | |
|---|---|---|---|
| | | Nondiscounted | Net Present Worth |
| Alternative 1 | No Action | N/A* | N/A* |
| Alternative 2 | Continuous S&M<br>Hazard Abatement of the 202A Building | $193.7 million | $177.9 million |
| Alternative 3 | Alternative 2 actions plus:<br>• Demo Prep of the 202A East and West Annexes | $207.4 million | $190.6 million |
| Alternative 4 | Alternative 3 actions plus:<br>• Demolition of the 202A East and West Annexes<br>• Demo Prep of the 202A Canyon Above Deck Areas | $237.9 million | $217.7 million |

Note: Accuracy range of the cost estimate is expected to be –30% to +50%. No sensitivity analyses were performed, and the following factors could impact the costs: level of contamination, amount and type of equipment in the buildings, and differing structural design.

*Alternative 1 is not consistent with DOE obligations under federal law to protect HHE; therefore, this alternative cannot be considered viable and is not considered further in this EE/CA, but it is included for comparative purposes only. Although Alternative 1 would not have an associated implementation cost under this analysis, it is understood that taking no action would ultimately result in cost to DOE.

demo prep = demolition preparation
N/A = not applicable
PUREX = Plutonium Uranium Extraction
S&M = surveillance and maintenance

### 5.3.1 Cost Estimate Rationale

Consistent with guidance from EPA and the U.S. Office of Management and Budget, present worth analysis is used as the basis for comparing costs of cleanup alternatives under the CERCLA program (OMB Circular No. A-94, “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs”). A discount rate (OMB Circular No. A-94) is applied for cost estimates that span multiple years, making it possible to evaluate expenditures associated with the alternatives that occur during different periods (EPA 540-R-00-002). Because of the time dependent value of money, future expenditures are not considered directly equivalent to current expenditures. The present worth cost method shows the amount required at the initial point in time (e.g., in the current year) to fund activities occurring over the life of the alternative. Present worth analysis assumes that the funding set aside at the

initial point in time increases in value as time goes on (e.g., similar to how money placed in a savings account gains value because of the interest paid on the account). Although the federal government typically does not set aside funds in this manner, the present worth analysis is specified under CERCLA as the approach for establishing a common baseline to evaluate and compare alternatives that have costs occurring at different times, although actual costs could vary. While the funds might not actually be set aside, the present worth costs were considered directly comparable for evaluating the costs of each alternative.

The information in the cost estimate is based on the best available information regarding the anticipated scope of the removal action alternatives. Changes in the cost estimate are likely to occur due to new information collected during preparation and performance of the removal action. Consistent with EPA guidance, this is an order of magnitude engineering cost estimate that was developed to be within -30 percent to +50 percent of actual project cost.

### 5.3.2 Cost Estimate Information for Each Alternative

This section provides the major costs for each alternative. The expected duration before the implementation of the remedial action for all of the alternatives is assumed to be 25 years. S&M is expected to continue throughout the duration of the NTCRA at the current yearly cost. In addition to S&M, all of the alternatives include costs for facility safety upgrades, site preparation, ventilation system modifications, and safety document modification.

Alternative 1 is presented with no cost solely based on the context of no action being taken to mitigate existing hazardous conditions posed by structural deterioration and contamination spread. In reality, if no action was taken, costs would ultimately be incurred in terms of adverse impacts to HHE and could result in costlier actions in the future.

For Alternative 2, significant costs incurred are due to hazard abatement activities within the 202A Building. Hazard abatement will incur costs from waste disposal, demolition labor, characterization sampling, and air monitoring. This activity will remove contaminated equipment from several areas within the 202A Building. Section 4.3 describes the areas and actions addressed in Alternative 2.

Alternative 3 cost increases occur due to demo prep work inside the 202A East and West Annexes. Demo prep activities will incur costs from waste treatment and disposal, demolition labor, characterization sampling, and air monitoring. Section 4.4 describes the areas and actions addressed in Alternative 3.

Alternative 4 cost increases are due to demolition of the 202A East and West Annexes and demo prep of the 202A Canyon above deck areas. Costs associated with demolition activities include evaluation and planning, waste disposal, demolition labor, characterization sampling, air monitoring, removal and disposal of tank TK-156. Demo prep activities will incur costs from waste treatment and disposal, demolition labor, characterization sampling, and air monitoring. Section 4.5 describes the areas and actions addressed in Alternative 4.

## 5.4 Summary of Removal Action Alternative Evaluation

Table 5-4 summarizes the ability of the alternatives to achieve NTCRA CERCLA criteria for effectiveness, implementability, and cost for the removal activities described in Chapter 4.

Table 5-4. Critical Analysis Summary

| Alternative | Effectiveness | | Implementability | | Net Present Worth Cost |
|---|---|---|---|---|---|
| | Protectiveness | RAOs | Technical/ Administrative | Availability | |
| **Alternative 1** | | | | | |
| No Action | No | No | No | No | $0 |
| **Alternative 2** | | | | | |
| Actions:<br>• S&M of PUREX Complex<br>• Hazard Abatement of the 202A Building | Yes | Yes | Yes | Yes | $177.9 million |
| **Alternative 3** | | | | | |
| Alternative 2 actions plus:<br>• Demo Prep of 202A East and West Annexes | Yes | Yes | Yes | Yes | $190.6 million |
| **Alternative 4** | | | | | |
| Alternative 3 actions plus:<br>• Demo Prep of the 202A Canyon Above Deck Areas<br>• Demolition of the 202A East and West Annexes | Yes | Yes | Yes | Yes | $217.7 million |

Note: "Yes" indicates that actions performed under an alternative meet criteria. "No" indicates that actions performed under an alternative do not meet criteria

demo prep = demolition preparation
PUREX = Plutonium Uranium Extraction
RAO = remedial action objective
S&M = surveillance and maintenance

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# 6 Comparative Analysis of Removal Action Alternatives

The removal action alternatives were compared in terms of the criteria and subcriteria for overall protection of HHE, implementability, and cost. The removal activities proposed under each alternative meet overall protectiveness criteria, but their degree of effectiveness and ability to meet RAOs varies based on the magnitude of the actions undertaken. The comparative analysis of effectiveness, implementability, and cost is provided in the following subsections and summarized in Section 6.4.

## 6.1 Effectiveness of Removal Action Alternatives

The effectiveness of the alternatives considers that the removal activities performed under this EE/CA are short-term interim measures to prevent imminent harm to HHE. Long-term treatment or containment activities required for the permanent disposition of the 202A Building will be executed under a future remedial action, as determined by a final ROD. Alternatives for this NTCRA are evaluated on the basis of protectiveness and their ability to achieve RAOs prior to issuance of the final ROD.

### 6.1.1 Protectiveness

As the 202A Building degrades with age, increasingly aggressive removal activities will be needed to ensure protection of HHE. In this section, each alternative is compared against the others in terms of the level of protectiveness that would be achieved upon completion of the removal activities included in each alternative. This evaluation was made considering the protectiveness afforded by the removal activities as stated below within the context of each alternative.

Among the removal action, S&M activities would prolong monitoring for potential sources of exposure but would be the least effective to reduce the potential to release hazardous substances. Hazard abatement activities would preferentially remove or fix in-place hazardous substances, which would reduce or eliminate the release pathways to the environment to a higher degree, thus reducing the need for S&M. Demo prep provides an even higher degree of interim protectiveness by removing and disposing contamination, equipment, and structural material that may otherwise pose risk or hinder future remedial action. Demolition provides the most effective long-term remedy by permanently removing and disposing of structures. Both demo prep and demolition would mitigate risks of structural failure and accidental release of contamination by stabilizing or demolishing the aging structures.

Of the active alternatives (2, 3, and 4), Alternative 2 offers the least protection for HHE because it provides the least long-term protectiveness through demo prep and demolition compared to Alternatives 3 and 4. Reliance on continued S&M and deferral of demo prep in Alternative 2 could result in increased hazards to workers and HHE from structural degradation.

Alternatives 3 and 4 provide a higher level of protectiveness than Alternative 2. Both alternatives provide greater levels of protectiveness in terms of reducing the interim and long-term chemical, radiological, and physical hazards through direct removal (via hazard abatement and demo prep). Alternative 4 includes demolition of the 202A East and West Annexes, which improves access to the 202A Building.

### 6.1.2 Ability to Achieve Removal Action Objectives

Alternatives 2, 3, and 4 are considered to achieve the RAOs to varying degrees. All of these alternatives reduce TMV of hazardous substances (RAO #1) to some extent.

Alternative 2 achieves all of the RAOs but is considered to be least effective among Alternatives 2, 3, and 4. In comparison to Alternatives 3 and 4, Alternative 2 maintains the highest degree of continued S&M, making it the least effective removal action considered in this EE/CA in terms of reducing future S&M activity (RAOs #4 and #5).

Alternative 3 contains all of the removal activities included in Alternative 2, with the addition of demo prep in the 202A East and West Annexes. Implementation of demo prep in these areas will allow for greater reduction of TMV (RAO #1) compared to Alternative 2. It will also reduce future S&M activity and expedite future remedial actions (RAOs #4 and #5) more effectively than Alternative 2.

Alternative 4 contains all removal activities included in Alternative 3, with the addition of demolition of the 202A East and West Annexes and demo prep of the above deck areas in the 202A Canyon. Demolition of the 202A East and West Annexes and demo prep of the 202A Canyon Above Deck Areas would allow for reduction or elimination of the inventory of hazardous and radioactive substances, which eliminates the potential for release of and exposure to hazardous substances (RAO #1). Waste generated from Alternative 4 will be safely disposed (RAO #3). The actions have minimal impact on cultural resources and wildlife habitat (RAO #2), are consistent with the anticipated remedial action (RAO #4), and result in minimal to no need for future S&M activities in this area (RAO #5).

## 6.2 Implementability

The comparative evaluation of implementability is based on technical and administrative feasibility and availability of equipment, personnel, services, and disposal facilities. Additional factors include state and community acceptance.

Alternatives 2, 3, and 4 are technically feasible. All proposed removal activities could be performed using existing knowledge and procedures proven successful at the Hanford Site. The methods for performing S&M, hazard abatement, demo prep, and demolition are consistent with Hanford Site projects of similar scope (i.e., disposition of PFP and U Plant). Disposal and recycling services are available for the types of waste expected to be generated under all alternatives on or off the Hanford Site. ERDF and CWC are anticipated to be available to receive most or all of the waste to be generated by the activities.

Alternative 4 provides technical and logistical advantages compared to Alternatives 2 and 3 through demolition of the 202A East and West Annexes. Demolition of the 202A East and West Annex structures would improve industrial access for waste stabilization and/or removal in these areas and the 202A Building under the future remedial action. Alternatives 2 through 4 are administratively feasible because all actions would adhere to applicable laws and permits and would have demonstrated success at the Hanford Site under projects of similar scope.

## 6.3 Cost of Alternatives

The cost increases in subsequent alternatives due to the addition of new actions. The estimated cost for each alternative is provided in Section 6.4.

## 6.4 Summary of Comparative Analysis of Alternatives

Table 6-1 compares the effectiveness, implementability, and cost criteria of the removal activities described in Chapter 4. Based on this analysis, an alternative is recommended in Chapter 7.

Table 6-1. Comparison Analysis Summary

| Alternative | Effectiveness | | Implementability | | | Net Present Worth Cost |
|---|---|---|---|---|---|---|
| | Protectiveness | RAOs | Technical | Administrative | Availability | |
| **Alternative 1** | | | | | | |
| No Action | Not protective | N/A* | N/A* | N/A* | N/A* | $0 |
| **Alternative 2** | | | | | | |
| Actions:<br>• S&M of PUREX Complex structures<br>• Hazard Abatement of the 202A Building | ◐ | ◐ | ◐ | ◐ | ◐ | $177.9 million |
| **Alternative 3** | | | | | | |
| Alternative 2 actions plus:<br>• Demo Prep of the 202A East and West Annexes | ◐ | ○ | ◐ | ◐ | ◐ | $190.6 million |
| **Alternative 4** | | | | | | |
| Alternative 3 actions plus:<br>• Demo Prep of the 202A Canyon Above Deck Areas<br>• Demolition of the 202A East and West Annexes | ○ | ○ | ◐ | ◐ | ◐ | $217.7 million |

*Not applicable; the No Action alternative does not meet protectiveness criteria and is not a viable alternative.

demo prep = demolition preparation

PUREX = Plutonium Uranium Extraction

RAO = removal action objective

● = performs less well against the criterion relative to the other alternatives with significant disadvantages or uncertainty

◐ = performs moderately well against the criterion relative to the other alternatives with some disadvantages or uncertainty

○ = performs very well against the criterion relative to the other alternatives with minor disadvantages or uncertainty

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# 7 Recommended Alternative

Based on the comparative analyses of the removal action alternatives provided in Chapter 6, the recommended removal action for the PUREX Complex is Alternative 4:

- Continued S&M of the PUREX Complex
- Hazard Abatement of the 202A Canyon
- Demo Prep of the 202A Canyon Above Deck Areas
- Demolition of the 202A East and West Annexes

Alternative 4 is the best for achieving the RAOs presented in this EE/CA. This alternative is administratively feasible and allows for the greatest reduction of TMV of hazardous substances. Alternative 4 removal activities are technically feasible at present and support implementation of future remedial actions. Alternative 4 achieves the highest degree of interim and long-term protectiveness of HHE by reducing chemical, radiological, and physical hazards through direct removal (via hazard abatement, demo prep, and demolition).

The implementation of Alternative 4 is planned to commence upon issuance of the AM, which is anticipated in 2019. The removal action will be performed based on emergent facility conditions, funding availability, craft/engineering resource availability, and overall interactive site priorities.

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# Appendix A

# PUREX Implementation Area

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# Contents



# Figures



# Table

# Terms

| | |
|---|---|
| CHPRC | CH2M HILL Plateau Remediation Company |
| D&D | decontamination and decommissioning |
| EE/CA | engineering evaluation/cost analysis |
| MSA | Mission Support Alliance |
| PUREX | Plutonium Uranium Extraction |
| RI/FS | remedial investigation/feasibility study |
| WRPS | Washington River Protection Solutions |

# A1 PUREX Implementation Area

The Central Plateau of the Hanford Site is divided into the implementation areas defined in DOE/RL-2012-33, *Central Plateau Remediation Optimization Study*. These areas are configured around major components such as canyon buildings, landfills, and tank farms. Implementation areas were developed as an approach to track cleanup activities by the U.S. Department of Energy on the Hanford Site. Each implementation area has a defined inventory of facilities and waste sites that lie in relatively close proximity to each other to enable effective management of future cleanup actions.

The boundary of the Plutonium Uranium Extraction (PUREX) Implementation Area is shown in Figure A-1. Each building/structure within the PUREX Implementation Area is shown in Figure A-2 and listed in Table A-1. All of the buildings/structures within the PUREX Implementation Area will be considered during the development of the associated operable unit remedial action(s). Prior to the remedial action, removal actions and *Resource Conservation and Recovery Act of 1976* closures will be undertaken within the PUREX Implementation Area. Table A-1 and Figure A-2 provide the documents that are currently in place for each building/structure.

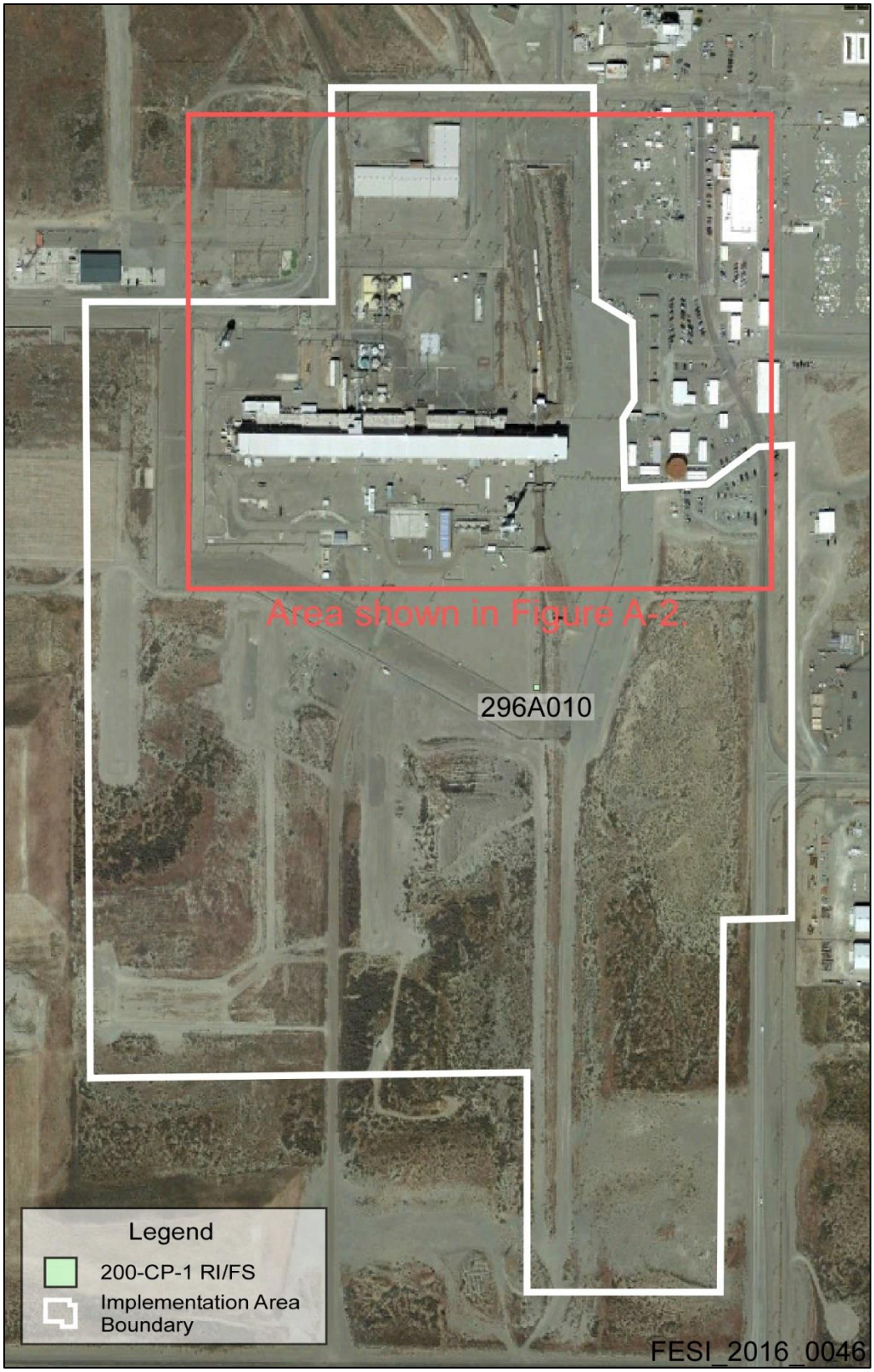


**Figure A-1. PUREX Implementation Area**

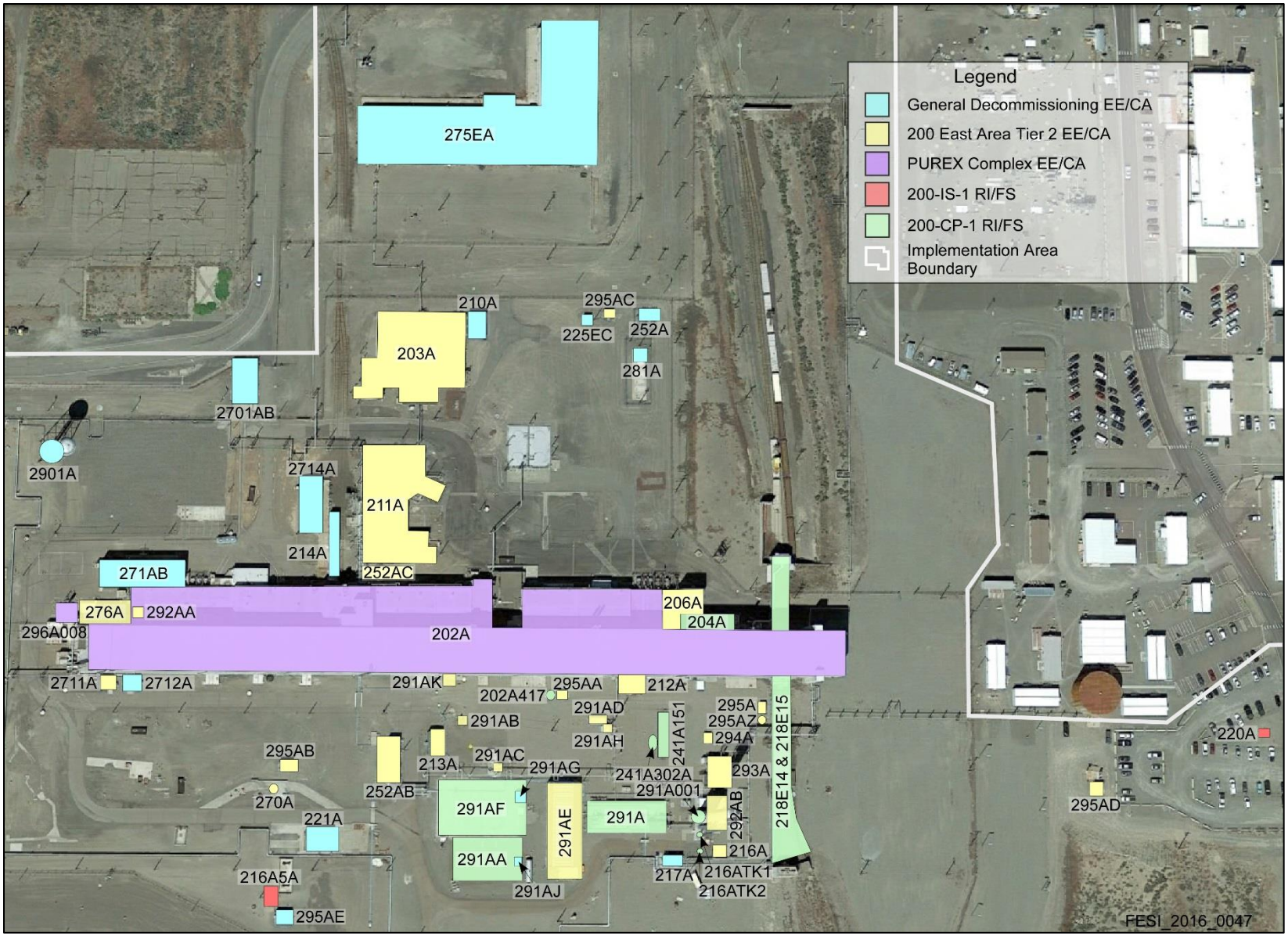


**Figure A-2. Buildings/Structures within the PUREX Implementation Area**

**Table A-1. PUREX Implementation Area Buildings/Structures**

| Official Name | Description | Owner | Operating Status | EE/CA | Action Memorandum | Removal Action Work Plan | Operable Unit RI/FS* |
|---|---|---|---|---|---|---|---|
| 202A | PUREX Canyon and Service Facility | CHPRC | Pending D&D | PUREX Complex | -- | -- | 200-CP-1 |
| 202A417 | Steam Condensate Pump Pit | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |
| 203A | Acid Pump House | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 204A | Acid Storage Vault, U Cell | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |
| 206A | Vacuum Acid Fractionator Building | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 210A | Oil Drum Storage | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 211A | Chemical Makeup Tank Farm and Pump House | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 212A | Fission Product Loadout Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 213A | Fission Product Load-In Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 214A | PUREX Warehouse | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 216A | Valve Control Facility | WRPS | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 216A5A | Proportional Sampler Pit #4 | CHPRC | Pending D&D | -- | -- | -- | 200-IS-1 |
| 216ATK1 | Underground Neutralization Tank, (consolidated with waste site 200-E-189) | WRPS | Pending Disposition under OU 200-CP-1 | -- | -- | -- | 200-CP-1 |
| 216ATK2 | Underground Neutralization Tank (consolidated with waste site 200-E-190) | WRPS | Pending Disposition under OU 200-CP-1 | -- | -- | -- | 200-CP-1 |
| 217A | PUREX Surveillance and Monitoring and Control System Surveillance Controller | CHPRC | Operating | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 218E14 | Storage Tunnel 1 | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |
| 218E15 | Storage Tunnel 2 | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |
| 220A | Proportional Sampler Pit | CHPRC | Pending D&D | -- | -- | -- | 200-IS-1 |

**Table A-1. PUREX Implementation Area Buildings/Structures**

| Official Name | Description | Owner | Operating Status | EE/CA | Action Memorandum | Removal Action Work Plan | Operable Unit RI/FS* |
|---|---|---|---|---|---|---|---|
| 221A | Former Pipefitter Shop | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 225EC | Treated Effluent Disposal Facility Local Control Unit 55C13 | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 241A151 (includes 241A302A) | Diversion Box and Catch Tank (waste site 241-A-151 consolidated with 241-A-302A) | WRPS | Pending disposition under OU 200-CP-1 | -- | -- | -- | 200-CP-1 |
| 252A | Electrical Switching Transformer 13.8 kV | MSA | Operating | -- | -- | -- | 200-CP-1 |
| 252AB | PUREX Electrical Substation | CHPRC | Operating | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 252AC | PUREX Mini Electrical Substation | CHPRC | Operating | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 2701AB | PUREX Badge House | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 2711A | Air Compressor Building | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 2712A | Vacuum Pump House | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 2714A | Dry Chemical Warehouse | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 271AB | PUREX Maintenance Support Facility | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 275EA | Warehouse Essential Materials | CHPRC | Demolished (2016) | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 276A | Cold Solvent Storage, R Cell | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 281A | Backup Generator Facility | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 2901A | Elevated Water Storage Tank | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 291A | PUREX Main Exhaust System | CHPRC | Operating | -- | -- | -- | 200-CP-1 |
| 291A001 | Stack 202A Main PUREX | CHPRC | Operating | -- | -- | -- | 200-CP-1 |
| 291AA | Filter Cell #3 | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |
| 291AB | Exhaust Air Sampler House #1 | CHPRC | Operating | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 291AC | Exhaust Air Sampler House #2 | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |

**Table A-1. PUREX Implementation Area Buildings/Structures**

| Official Name | Description | Owner | Operating Status | EE/CA | Action Memorandum | Removal Action Work Plan | Operable Unit RI/FS* |
|---|---|---|---|---|---|---|---|
| 291AD | Ammonia Off-Gas Building | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 291AE | Filter Cell #4 | CHPRC | Operating | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 291AF | #2 Filter and Drain Tank | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |
| 291AG | Sample Station #2 | CHPRC | Operating | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 291AH | Ammonia Off-Gas Sample Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 291AJ | Sample Station #3 | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |
| 291AK | Tunnel Spray Enclosure and Caissons | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 292AA | Plutonium Recovery Stack Sample House | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 292AB | PUREX Gas Effluent Monitoring Building | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 293A | Off-Gas Treatment Facility | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 294A | Off-Gas Treatment and Monitoring Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 295A (includes 295AZ) | Ammonia Scrubber Discharge Sample Station and Caisson | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 295AA | Steam Condensate Discharge Sample and Pumpout Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 295AB (includes 270A) | Process Distillate Discharge Sample Station and Underground Neutralization Tank | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 295AC | Chemical Sewer Line Sample Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 295AD | Sanitary Water Line Sample Station | CHPRC | Pending D&D | 200 East Tier 2 | 200 East Tier 2 | -- | 200-CP-1 |
| 295AE | Process Distillate Discharge Monitoring Building | CHPRC | Pending D&D | Gen Decom | Gen Decom | Gen Decom | 200-CP-1 |

**Table A-1. PUREX Implementation Area Buildings/Structures**

| Official Name | Description | Owner | Operating Status | EE/CA | Action Memorandum | Removal Action Work Plan | Operable Unit RI/FS* |
|---|---|---|---|---|---|---|---|
| 296A008 | Stack, PUREX Plant Pipe, Operating Gallery, and White Room Exhaust | CHPRC | Pending D&D | PUREX Complex | -- | -- | 200-CP-1 |
| 296A010 | Stack, Storage Tunnel No. 2 | CHPRC | Pending D&D | -- | -- | -- | 200-CP-1 |

References:

DOE/RL-2010-14, *Engineering Evaluation/Cost Analysis for General Hanford Site Decommissioning Activities*.

DOE/RL-2010-22, *Action Memorandum for General Hanford Site Decommissioning Activities*.

DOE/RL-2010-33, *Removal Action Work Plan for Central Plateau General Decommissioning Activities*.

DOE/RL-2010-54, *Engineering Evaluation/Cost Analysis for 200 East Area Tier 2 Buildings/Structures*.

DOE/RL-2010-102, *Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for the 200 East Tier 2 Buildings/Structures*.

DOE/RL-2010-114, *200-IS-1 Operable Unit Pipeline System Waste Sites RFI/CMS/RI/FS Work Plan*, Draft A.

Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order*.

M-085-80, 2015, "Submit Remedial Investigation/Feasibility Study Work Plan for 200-CP-1 to Ecology."

Note: This table is current as of September 6, 2017. The 200-CP-1 RI/FS Work Plan will be developed in accordance with Ecology et al., 1989, Milestone M-085-80, due September 30, 2020.

*Structures are pending incorporation into the specified operable unit RI/FS.

CHPRC = CH2M HILL Plateau Remediation Company
D&D = decontamination and decommissioning
EE/CA = engineering evaluation/cost analysis
Gen Decom = general decommissioning
MSA = Mission Support Alliance
PUREX = Plutonium Uranium Extraction
RI/FS = remedial investigation/feasibility study
WRPS = Washington River Protection Solutions

## A2 References

DOE/RL-2010-14, 2010, *Engineering Evaluation/Cost Analysis for General Hanford Site Decommissioning Activities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0084795.

DOE/RL-2010-22, 2010, *Action Memorandum for General Hanford Site Decommissioning Activities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0084445.

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DOE/RL-2010-54, 2010, *Engineering Evaluation/Cost Analysis for 200 East Area Tier 2 Buildings/ Structures*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0084342.

DOE/RL-2010-102, 2011, *Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Tier 2 Buildings/Structures*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0072140H.

DOE/RL-2010-114, 2011, *200-IS-1 Operable Unit Pipeline System Waste Sites RFI/CMS/RI/FS Work Plan*, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0093547.

DOE/RL-2012-33, 2012, *Central Plateau Remediation Optimization Study*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0068833H.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=81.

*Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq. Available at: https://elr.info/sites/default/files/docs/statutes/full/rcra.pdf.

# Appendix B

# Applicable or Relevant and Appropriate Requirements

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# Contents



# Tables

# Terms

| | |
|---|---|
| ACM | asbestos-containing material |
| ALARA | as low as reasonably achievable |
| ARAR | applicable or relevant and appropriate requirement |
| Cat I | Category I |
| Cat II | Category II |
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| COPC | contaminant of potential concern |
| DOE | U.S. Department of Energy |
| EPA | U.S. Environmental Protection Agency |
| ERDF | Environmental Restoration Disposal Facility |
| HHE | human health and the environment |
| LLW | low-level waste |
| NESHAP | "National Emission Standards for Hazardous Air Pollutants" |
| NRC | U.S. Nuclear Regulatory Commission |
| NTCRA | non-time-critical removal action |
| PCB | polychlorinated biphenyl |
| PUREX | Plutonium Uranium Extraction |
| RACM | regulated asbestos-containing material |
| RACT | reasonably available control technology |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| T-BACT | toxics best available control technology |
| TAP | toxic air pollutant |
| TBC | to be considered |
| TSCA | *Toxic Substances Control Act of 1976* |
| UIC | underground injection control |

# B1 Applicable or Relevant and Appropriate Requirements

For the removal action being considered in this document, implementation of any selected alternative would be designed to comply with the applicable or relevant and appropriate requirements (ARARs) cited in this appendix to the extent practicable. ARARs are defined to include only substantive requirements of environmental standards. ARARs do not include administrative requirements, including requirements to obtain any federal, state, or local permits (40 CFR 300.400(e), "National Oil and Hazardous Substances Pollution Contingency Plan," "General," and *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* [CERCLA], Section 121, "Cleanup Standards").

The ARARs listed in this appendix are the ARARs that the U.S. Department of Energy (DOE) proposes for implementation of the recommended alternative. Selection of these ARARs was based on knowledge regarding the hazardous substances within the Plutonium Uranium Extraction (PUREX) Complex buildings/structures. There are no impacts to groundwater or surface water as a result of this removal action.

Chemical-specific requirements are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a contaminant that may be found in, or discharged to, the ambient environment. Action-specific requirements are usually technology- or activity-based requirements or limitations triggered by the remedial actions performed at the Hanford Site.

The final ARARs will be established within the action memorandum(s). The key ARARs identified for the alternatives considered include waste management standards, standards controlling releases to the environment, standards for protection of natural resources, and safety and health standards.[1] Potentially applicable federal and state ARARs and requirements to be considered (TBC) for the proposed removal action are provided in Tables B-1 and B-2, respectively.

## B1.1 Waste Management Standards

A variety of waste streams would be generated under the proposed removal action alternatives. It is anticipated that the majority of the waste would be determined to be low-level waste (LLW). However, dangerous or mixed waste, polychlorinated biphenyl (PCB) waste, and asbestos-containing material (ACM) could also be generated. The great majority of the waste would be in a solid form. However, some liquid waste might be generated.

Radioactive waste is managed by DOE under the authority of the *Atomic Energy Act of 1954*.

The identification, storage, treatment, and disposal of hazardous waste and the hazardous component of mixed waste are governed by the *Resource Conservation and Recovery Act of 1976* (RCRA). The State of Washington, which implements RCRA requirements under WAC 173-303, "Dangerous Waste Regulations," has been authorized to implement most elements of the RCRA program. The dangerous waste standards for generation and storage would apply to the management of any dangerous or mixed waste generated by removal action activities. Treatment standards for dangerous or mixed waste subject to RCRA land disposal restrictions are specified in WAC 173-303-140, "Land Disposal Restrictions," which incorporates 40 CFR 268, "Land Disposal Restrictions," by reference.

[1] Worker safety and health standards are not environmental standards per se and, therefore, are not potential ARARs. Instead, compliance with applicable safety and health regulations is required external to the CERCLA ARAR process. However, due to the nature and importance of these standards, a discussion of the safety and health requirements is included in this appendix.

The management and disposal of PCB waste are governed by the *Toxic Substances Control Act of 1976* (TSCA), and 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions." TSCA regulations contain specific provisions for PCB waste, including PCB waste that contains a radioactive component. PCBs also are considered underlying hazardous constituents under RCRA and thus could be subject to WAC 173-303 and 40 CFR 268 requirements.

Removal and disposal of asbestos and ACM will be performed in accordance with the substantive provisions of the *Clean Air Act of 1990* (40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" [hereinafter called NESHAP], Subpart M, "National Emission Standard for Asbestos"), which require special precautions to control airborne emissions of asbestos fibers during asbestos removal activities. Asbestos abatement activities will be performed in full compliance with all substantive NESHAP standards that are ARARs for the work. Prior to the commencement of the demolition, a thorough inspection of the affected facility will be performed and documented for the presence of asbestos, including Category I (Cat I) and Category II (Cat II) nonfriable ACM. All Cat II nonfriable ACM will generally be presumed to be potentially friable and will be removed prior to the start of actual demolition activities. If Cat II ACM is identified and allowed to remain in place, a demolition approach will be provided in advance to the U.S. Environmental Protection Agency (EPA). The demolition approach will describe how the Cat II ACM will not become crumbled, pulverized, reduced to powder, or otherwise friable during the demolition. Cat I nonfriable ACM will also be removed prior to the start of actual demolition activities, except in situations where demolition practices will be used that can be or have been demonstrated to the satisfaction of EPA not to render the Cat I ACM friable, consistent with NESHAP standards. Demonstration can be performed using existing EPA or Washington State guidance regarding asbestos abatement under NESHAP. Such Cat I nonfriable ACM must not be in poor condition, and planned demolition activities must not subject the ACM to sanding, grinding, cutting, or abrading. In all cases, ACM that is either friable or cannot be demonstrated to remain nonfriable during demolition will be removed prior to such demolition as required by NESHAP. Asbestos and ACM would be packaged, as appropriate, and disposed in the Environmental Restoration Disposal Facility (ERDF).

Beryllium may be encountered during performance of the non-time-critical removal action (NTCRA). If encountered, beryllium may be subject to the substantive requirements of NESHAP (40 CFR 61.32, "Emission Standard") or WAC 173-460, "Controls for New Sources of Toxic Air Pollutants."

Waste that is determined to be LLW according to ERDF[2] waste acceptance criteria (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*) would preferentially be disposed at ERDF, because ERDF is an engineered facility that provides a high degree of protection to human health and the environment (HHE). Previous engineering evaluations/cost analyses for other Hanford Site work have shown that this disposal option is more cost effective than disposal at other disposal sites. Construction of ERDF was authorized using a CERCLA record of decision (EPA, 1995, *Record of Decision, U.S. DOE Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington*). ERDF is designed, constructed, and operated to meet the ARAR provisions of the minimum technological requirements for a hazardous waste landfill, including standards for double liner, a leachate collection system, leak detection, monitoring, and a final cover. Alternate potential disposal locations may be considered when the NTCRA occurs if a suitable and cost effective location is

[2] CERCLA Section 104(d)(4), "Response Authorities," states that where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the facilities can be treated as one for purposes of CERCLA response actions. Consistent with this, the Hanford buildings/structures and ERDF would be considered to be onsite for purposes of CERCLA Section 104, and waste may be transferred between the facilities without requiring a permit.

identified. Any potential alternate disposal location will be evaluated for appropriate performance standards to ensure that it is adequately protective of HHE. If the alternate location is offsite, it must comply with 40 CFR 300.440, "Procedures for Planning and Implementing Off-Site Response Actions," which applies to offsite transfer of CERCLA waste and requires that such waste must be placed in a disposal facility operating in compliance with applicable federal or state requirements.

Waste designated as dangerous or mixed waste would be treated as appropriate to meet land disposal restrictions and ERDF acceptance criteria, and disposed at ERDF. Applicable packaging and pre-transportation requirements for dangerous or mixed waste generated by the NTCRA would be identified and implemented before movement of any waste outside the CERCLA onsite areas.

Some of the aqueous waste determined to be LLW or designated as dangerous or mixed waste would be transported to Effluent Treatment Facility (ETF) or other acceptable facility for treatment and disposal. ETF is a RCRA-permitted unit authorized to treat aqueous waste streams generated on the Hanford Site and dispose of these streams at a designated state-approved land disposal facility in accordance with applicable requirements.

Waste designated as nonliquid PCB waste likely would be disposed at ERDF, depending on whether it meets the waste acceptance criteria (ERDF-00011). PCB waste that does not meet ERDF waste acceptance criteria would be retained at a PCB storage area meeting the requirements for TSCA storage and would be transported for future disposal at an appropriate disposal facility.

Alternatives 2, 3, and 4, as defined in Table 4-1 in the main text of this document, can be performed in compliance with the waste management ARARs. Waste streams will be evaluated, designated, and managed in compliance with the ARAR requirements. Before disposal, waste would be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

## B1.2 Standards Controlling Emissions to the Environment

The proposed removal action alternatives have the potential to generate both radioactive and nonradioactive airborne emissions.

### B1.2.1 Radiological Air Emissions

The federal *Clean Air Act of 1990* and RCW 70.94, "Washington Clean Air Act," require regulation of radioactive air pollutants. Implementing regulations in 40 CFR 61.92, "Standard," set limits for radionuclide emissions from the DOE Hanford Site, which cannot exceed those amounts that would cause any member of the public to receive an effective does equivalent of 10 mrem/yr. This requirement would be applicable to any aspects of the NTCRA with the potential to emit radionuclides to unrestricted areas. Verification of compliance with this standard is required by the state implementing regulation at WAC 173-480-070, "Ambient Air Quality Standards and Emission Limits for Radionuclides," "Emission Monitoring and Compliance Procedures." Radioactive air emissions are to be controlled through the use of best available radionuclide control technology or as low as reasonably achievable control technology where economically and technologically feasible (WAC 246-247-040(3) and (4), "Radiation Protection—Air Emissions," "General Standards," and associated definitions).

To address the substantive aspect of these potential requirements, best or reasonably achieved control technology could be accomplished by ensuring that applicable emission control technologies (those successfully operated in similar applications) would be used when economically and technologically feasible (i.e., based on cost/benefit). If it is determined that there are substantive aspects of the requirement for control of radioactive airborne emissions once ARARs are finalized, then controls will be administered as appropriate using the best methods from among those that are reasonable and effective. Administrative requirements, like air licensing and permitting, will be discontinued once this CERCLA removal action has been approved, the removal action work plan has been issued, and the removal action is initiated. Existing air permits/licenses will be modified to reflect this removal action decision.

### B1.2.2 Criteria/Toxic Air Emissions

WAC 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460 establish requirements for emissions criteria and toxic air pollutants (TAPs). The primary nonradioactive source of emissions resulting from this NTCRA will be fugitive particulate matter. In accordance with WAC 173-400-040, "General Standards for Maximum Emissions," reasonable precautions must be taken to prevent the release of air contaminants associated with fugitive emissions resulting from demolition, materials handling, or other operations and prevent fugitive dust from becoming airborne from fugitive sources of emissions.

The use of treatment technologies that would result in emissions of TAPs that would be subject to the substantive applicable requirements of WAC 173-460 are not anticipated to be a part of this NTCRA.

Treatment of some waste encountered during the NTCRA may be required to meet ERDF waste acceptance criteria (ERDF-00011). In most cases, the type of treatment anticipated would consist of solidification/stabilization techniques such as macroencapsulation or grouting, and WAC 173-460 would not be considered an ARAR because it would not result in the emission of TAPs. If more aggressive treatment is required that would result in the emission of regulated air pollutants above *de minimis* emission values in WAC 173-460-150, "Table of ASIL, SQER and de Minimis Emission Values," substantive requirements of WAC 173-400-113(2), "Requirements for New Sources in Attainment or Unclassifiable Areas," and WAC 173-460-060, "Control Technology Requirements," would be evaluated to determine applicability and satisfied if determined to be ARAR.

Emissions to the air will be minimized during implementation of the NTCRA through use of standard industry practices as needed, such as the application of water sprays and fixatives. These techniques are considered to be reasonable precautions to control fugitive emissions as required by regulatory standards.

## B1.3 Standards for the Protection of Cultural and Ecological Resources

The *National Historic Preservation Act of 1966* (implemented in regulation via 36 CFR 800, "Protection of Historic Properties") requires federal agencies to consider the effect of an activity on any significant cultural resource, including properties listed on or eligible for inclusion on the National Register of Historic Places. The *Native American Graves Protection and Repatriation Act of 1990* establishes statutory provisions for the treatment of inadvertent discoveries of Native American remains and cultural objects. The *Archeological and Historical Preservation Act of 1974* requires action to recover and preserve archaeological or historic data in areas where activity may cause irreparable harm, loss, or destruction of significant data.

The *Endangered Species Act of 1973* (implemented via 50 CFR 402, "Interagency Cooperation-Endangered Species Act of 1973, as amended," and WAC 232-12-297, "Permanent Regulations," "Endangered, Threatened, and Sensitive Wildlife Species Classification") prohibits activities that threaten the continued existence of listed species or destroy critical habitat. The *Migratory Bird Treaty Act of 1918* makes it illegal to take, capture, or kill any migratory bird or any part, nest, or egg of any such bird.

Hanford Site buildings/structures have been evaluated for their National Register of Historic Places eligibility as part of DOE/RL-97-56, *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan*. Some buildings/structures have been determined to be contributing properties to the Manhattan Project/Cold War Era Historic District with mitigation in the form of documentation required. DOE/RL-97-56 also requires that walkthroughs be completed of these buildings/structures to identify artifacts that are of educational and interpretive value. The 202A Canyon Building was determined not to be a contributing property and was not recommended for individual documentation.

The area around the PUREX Complex has already been extensively disturbed. The annual ecological review of the facility indicates that three species of birds protected under the *Migratory Bird Treaty Act of 1918* may nest on or near the building. Care will be required with any of the alternatives to ensure completion of pre-job surveys and the development of mitigative measures should cultural or natural resources be encountered at the facility and at borrow areas.

**Table B-1. Identification of Potential Federal Applicable or Relevant and Appropriate Requirements and Requirements To Be Considered for the Removal Action**

| Regulatory Citation | ARAR Category | Description of Regulatory Requirement | Rationale for Consideration |
|---|---|---|---|
| ***Clean Air Act of 1990*, as amended, 42 USC 7401 et seq.** | | | |
| 40 CFR 60, "Standards of Performance for New Stationary Sources"<br>40 CFR 60, Subpart IIII, "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines"<br>40 CFR 60, Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engine"<br>40 CFR 63, "National Emission Standards for Hazardous Air Pollutants for Source Categories"<br>40 CFR 63, Subpart ZZZZ, "National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" | ARAR | The requirements for stationary engines changed on May 3, 2013 to include timers, maintenance plans, and meeting monitoring requirements. | This applies to all stationary engines used during this NTCRA. This requirement is action-specific. |
| 40 CFR 61.140, "Applicability"<br>40 CFR 61.145, "Standard for Demolition and Renovation"<br>Specific subsections:<br>40 CFR 61.145(a)(1), (a)(2), and (a)(5)<br>40 CFR 61.145(c) | ARAR | These standards apply to demolition activities, including the removal of RACM.<br>The standards of 40 CFR 61.145(a)(1), (a)(2), and (a)(5), are used to determine when the requirements of 40 CFR 61.145(c) apply to demolition activities. | Some buildings/structures addressed under the NTCRA could contain asbestos. The substantive provisions of 40 CFR 61.145(c) would be complied in accordance with 40 CFR 61.145(a)(1), (a)(2), and (a)(5) for the material that contains RACM under this PUREX NTCRA. This requirement is chemical-specific. |
| 40 CFR 61.150(a) through (c), "Standard for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation, and Spraying Operations" | ARAR | The standards of 40 CFR 61.150(a) through (c) are used to control asbestos emissions during collection, processing, packaging, and transport of any asbestos-containing waste material. | The substantive provisions of 40 CFR 61.150(a) through (c) would be met during activities that involve collection, processing, packaging, and transport of asbestos-containing waste material under the PUREX NTCRA. This requirement is chemical-specific. |

## Table B-1. Identification of Potential Federal Applicable or Relevant and Appropriate Requirements and Requirements To Be Considered for the Removal Action

| Regulatory Citation | ARAR Category | Description of Regulatory Requirement | Rationale for Consideration |
|---|---|---|---|
| ***Archeological and Historic Preservation Act of 1974* (Public Law 93-291, as amended; 16 USC 469a-1 through 469a-2(d))** | | | |
| "Applicant Requirements"<br>16 USC 469a-1 through 469a-2(d) | ARAR | Requires that the removal action at the PUREX Complex does not cause the loss of any archaeological or historic data. This act mandates preservation of the data and does not require protection of the actual historical sites. | Archeological and historic sites have been identified within the 200 Areas; therefore, the substantive requirements of this act are applicable to removal actions that might disturb these sites. This requirement is action-specific. |
| ***National Historic Preservation Act of 1966*, 16 USC 470, Section 106** | | | |
| 36 CFR 800, "Protection of Historic Properties" | ARAR | Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation and mitigation processes. | Based on past identification of cultural and historic sites at the Hanford Site, these types of sites could be encountered during PUREX NTCRA activities. The substantive requirements of this act are potentially applicable to and would be complied with for actions that might disturb these types of sites. This requirement is location-specific. |
| ***Native American Graves Protection and Repatriation Act of 1990*** | | | |
| 43 CFR 10, "Native American Graves Protection and Repatriation Regulations" | ARAR | These provisions establish federal agency responsibility for discovery of human remains, associated and unassociated funerary objects, sacred objects, and items of cultural patrimony. Requires consultation with area tribes in the event of discovery. | Based on Hanford Site history, these types of sites could be encountered during the PUREX NTCRA. Substantive requirements of this act are potentially applicable if remains and sacred objects are found during NTCRA activities. This requirement is location-specific. |
| ***Endangered Species Act of 1973*, 16 USC 1531 et seq., Subsection 16 USC 1536(c)** | | | |
| *"Endangered Species Act of 1973"*, as Amended 16 U.S.C. §§ 1531-1544, specifically Sections 7 and 9(a).<br>50 CFR 17 | ARAR | Prohibits actions by federal agencies that are likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of habitat critical to them. Also prohibits the taking of any endangered species. | Substantive requirements of this act are applicable if threatened or endangered species are identified in areas where the removal action will occur. This requirement is location-specific. |

## Table B-1. Identification of Potential Federal Applicable or Relevant and Appropriate Requirements and Requirements To Be Considered for the Removal Action

| Regulatory Citation | ARAR Category | Description of Regulatory Requirement | Rationale for Consideration |
|---|---|---|---|
| ***Migratory Bird Treaty Act of 1918*, 16 USC 703 et seq.** | | | |
| *Migratory Bird Treaty Act of 1918*<br>(16 USC 703-712) 50 CFR Parts 10 and 21 | ARAR | Protects all migratory bird species and prevents "take" of protected migratory birds, their young, or their eggs."<br>Federal agencies are required to avoid or minimize impacts to migratory bird resources, restore or enhance their habitat and prevent or abate its detrimental alteration. | Three species of bird protected under the migratory bird treaty act may nest on or near the PUREX Complex. If these bird species are impacted by the selected remedy, this act will be applicable. It is also applicable to endangered or threatened species that may be identified near borrow sites. This requirement is location-specific. |
| ***Toxic Substances Control Act of 1976*; 40 CFR 761, "Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions"** | | | |
| 40 CFR 761.50(b)1, 2, 3, 4, and 7, "Applicability," "PCB Waste"<br>40 CFR 761.50(c), "Storage for Disposal"<br>40 CFR 761.60(b), "PCB Articles"<br>40 CFR 761.60(c), "PCB Containers"<br>40 CFR 761.61, "PCB Remediation Waste"<br>40 CFR 761.62, "Disposal of PCB Bulk Product Waste"<br>40 CFR 761.79, "Decontamination Standards and Procedures" | ARAR | These regulations apply to the storage and disposal of PCB waste including liquid PCB waste, PCB items, PCB remediation waste, PCB bulk product waste, and PCB/radioactive waste at concentrations equal to or greater than 50 parts per million.<br>These regulations also provide options for decontamination of materials contaminated with PCBs. | Some buildings/structures addressed under the NTCRA could include various forms of PCB waste, including, but not limited to, PCB items, PCB liquids, and PCB articles, and/or containers that would be managed in accordance with the substantive requirements of these standards if encountered and or generated during the NTCRA. This requirement is chemical-specific. |

## Table B-1. Identification of Potential Federal Applicable or Relevant and Appropriate Requirements and Requirements To Be Considered for the Removal Action

| Regulatory Citation | ARAR Category | Description of Regulatory Requirement | Rationale for Consideration |
|---|---|---|---|
| **Radiological Dose and Cleanup (To Be Considered)** | | | |
| Luftig and Weinstock, 1997, "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination"<br>Luftig and Page, 1999, "Distribution of OSWER Radiation Risk Assessment Q&A's Final Guidance" | TBC | This memorandum presents clarification for establishing protective cleanup levels in media for radioactive contamination at CERCLA sites. EPA has determined that the dose limits established by the NRC in 62 FR 39058, "Radiological Criteria for License Termination" (25 mrem/yr, which is equivalent to $5 \times 10^{-4}$ increase lifetime risk), will not provide a protective basis for establishing preliminary remediation goals under CERCLA. A dose of 15 mrem/yr effective dose (approximately equivalent to $3 \times 10^{-4}$ increase in lifetime risk) is preferred as the maximum dose limit for humans.<br>In the final guidance, EPA further clarifies that 15 mrem/yr is not a presumptive cleanup level under CERCLA. Rather, site decision makers should continue to use the CERCLA risk range when ARARs are not used to set cleanup levels. This is for several reasons, as using dose based guidance would result in unnecessary inconsistency regarding how radiological and nonradiological (chemical) contaminants are addressed at CERCLA sites. | Soil and debris in the PUREX Complex may contain radioactive contaminants that, if not removed, could pose unacceptable risk to human health. |
| EPA/540-R-00-007, *Soil Screening Guidance for Radionuclides: User's Guide* (OSWER Directive 9355.4-16A) | TBC | This soil screening guidance is a tool developed by EPA to help standardize and accelerate the evaluation and cleanup of radioactively contaminated soil sites on the National Priorities List (40 CFR 300, Appendix B) where future residential land use is anticipated. The guidance provides a simple step-by-step methodology for environmental science/engineering professionals to calculated risk-based, site-specific soil screening levels for radionuclides in soil that may be used to identify areas needing further investigation at National Priorities List sites. | This TBC guidance is pertinent to the PUREX NTCRA alternatives that will leave radiological contaminants in place following removal. |

## Table B-1. Identification of Potential Federal Applicable or Relevant and Appropriate Requirements and Requirements To Be Considered for the Removal Action

| Regulatory Citation | ARAR Category | Description of Regulatory Requirement | Rationale for Consideration |
|---|---|---|---|
| **Radiological Dose and Cleanup (To Be Considered)** | | | |
| OSWER Directive 9285.7-55, *Guidance for Developing Ecological Soil Screening Levels* | TBC | Provides a set of risk-based (ecological) soil screening levels for several soil contaminants that are of ecological concern for terrestrial plants and animals at hazardous waste sites. Also describes the process used to derive these levels and provides guidance for their use. | Soil in the PUREX Complex may contain contaminants that require removal. Comparison to soil screening levels may be appropriate for defining potential COPCs or to default to an ecological soil screening level for COPCs that lacks corresponding published state cleanup criteria. |
| EPA/540/R/99/006, *Radiation Risk Assessment At CERCLA Sites: Q & A* (OSWER Directive 9200.4-31P) | TBC | This directive provides guidance on radiological cleanup levels at CERCLA sites and states that a cleanup level is protective of HHE when dose limits generally achieve risk levels in the $1 \times 10^{-4}$ to $1 \times 10^{-6}$ risk range. | The $1 \times 10^{-4}$ to $1 \times 10^{-6}$ risk range identified in this memorandum, although a TBC is considered to be protective in lieu of NRC standards; therefore, it must be considered in the planning for 200 Area remedial actions. |

ARAR = applicable or relevant and appropriate requirement
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
HHE = human health and the environment
NRC = U.S. Nuclear Regulatory Commission
NTCRA = non-time-critical removal action
PCB = polychlorinated biphenyl
PUREX = plutonium-uranium extraction
RACM = regulated asbestos-containing material
TBC = to be considered

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **WAC 173-218, "Underground Injection Control Program"** | | | |
| WAC 173-218-120(3)(b), "Decommissioning a UIC Well," "Decommissioning Standards for Allowed UICs" | ARAR | This regulation provides the standards for decommissioning underground injection wells that are not in contact with the aquifer. | There is a potential to encounter UICs associated with buildings/structures during the NTCRA. While these UICs are not expected to be decontaminated, they do need to be decommissioned to the substantive requirements of this regulation. This requirement is action-specific. |
| **Regulations Pursuant to the *Hazardous Waste Management Act* (RCW 70.105, "Hazardous Waste Management")** | | | |
| WAC 173-303-016, "Identifying Solid Waste"<br><br>WAC 173-303-017, "Recycling Processes Involving Solid Waste" | ARAR | This regulation applies for determining which materials are and are not solid waste. This determination is used to establish which waste are subject to the designation procedures of WAC 173-303-070(3). | Solid waste will be generated during the NTCRA. Substantive requirements of these regulations are potentially applicable because they define how to determine which materials are subject to the designation regulations. Specifically, materials that are generated for removal from the CERCLA site during the NTCRA would be evaluated using the procedures for identifying solid waste to ensure proper management. This requirement is action-specific. |
| WAC 173-303-070(3), "Designation of Dangerous Waste" | ARAR | This regulation applies for the evaluation of solid waste to determine if such waste is designated as dangerous or mixed waste. Solid waste that designates as dangerous or mixed waste are subject to management and disposal standards of WAC 173-303. | There is potential for generating solid waste during the NTCRA that would designate as dangerous or mixed waste. Substantive requirements of these regulations are potentially applicable to such solid waste if generated or encountered during the NTCRA. Specifically, solid waste generated for removal from the CERCLA site during this NTCRA would be evaluated using the dangerous waste designation procedures to ensure proper management. This requirement is action-specific. |
| WAC 173-303-071, "Excluded Categories of Waste" | ARAR | This regulation lists waste categories that are excluded from management in accordance with the requirements of WAC 173-303. | There is potential for generating waste during the NTCRA that would qualify for management under the substantive provisions of these regulations, which would be used as appropriate during the NTCRA. This requirement is action-specific. |
| WAC 173-303-073, "Conditional Exclusion of Special Wastes" | ARAR | This regulation provides for management of waste that pose a relatively low hazard to HHE. The standards provide for management of special waste with a level of protection that is intermediate between dangerous and nondangerous solid waste. | There is potential for generating waste during the NTCRA that would qualify for management under the substantive provisions of these regulations, which would be used as appropriate during the NTCRA. This requirement is action-specific. |

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **Regulations Pursuant to the *Hazardous Waste Management Act* (RCW 70.105, "Hazardous Waste Management")** | | | |
| WAC 173-303-077, "Requirements for Universal Waste" | ARAR | This regulation provides alternate reduced standards for certain solid waste (that is, batteries, mercury-containing equipment, and lamps) as described in WAC 173-303-573, "Standards for Universal Waste Management." | There is potential for generating waste during the NTCRA that would qualify for management under the substantive provisions of these regulations, which would be used as appropriate during the NTCRA. This requirement is action-specific. |
| WAC 173-303-120, "Recycled, Reclaimed, and Recovered Wastes" | ARAR | This regulation describes requirements for recycling materials that are solid waste and dangerous. | There is potential for generating solid waste during the NTCRA that will designate as dangerous that may be recycled. |
| WAC 173-303-140(4), "Land Disposal Restrictions" | ARAR | This regulation establishes state standards for land disposal of dangerous waste and incorporates by reference the federal land disposal restrictions of 40 CFR 268 that are applicable to solid waste designated as dangerous or mixed waste in accordance with WAC 173-303-070(3). | There is potential for generating solid waste during the NTCRA that would designate as dangerous or mixed waste and further require treatment prior to land disposal. The substantive requirements of this regulation are potentially applicable to dangerous and/or mixed waste that is generated or encountered during the NTCRA. Specifically, dangerous and/or mixed waste generated and removed from the CERCLA site during the NTCRA for land disposal (for example, at ERDF or other approved disposal facility) would be evaluated for determination of applicable land disposal restrictions at the point of waste generation. This requirement is action-specific. |
| WAC 173-303-170(3), "Requirements for Generators of Dangerous Waste." | ARAR | This regulation establishes standards for the temporary management of waste that designates as dangerous or mixed waste. | There may be waste generated during the NTCRA that needs to be temporarily accumulated or stored. Substantive requirements of these regulations would be used for management of materials generated and/or encountered during the NTCRA. WAC 173-303-170(3) includes by reference the substantive provisions of both the satellite accumulation standards of WAC 173-303-200, "Accumulating Dangerous Waste On-Site," and the standards for management in containers under WAC 173-303-630, "Use and Management of Containers," and tanks under WAC 173-303-640, "Tank Systems." This requirement is action-specific. |

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **Regulations Pursuant to RCW 70.95, "Solid Waste Management—Reduction and Recycling"** | | | |
| WAC 173-350-300(2), "Solid Waste Handling Standards," "On-Site Storage, Collection, and Transportation Standards" | ARAR | This regulation describes requirements for management of nondangerous, nonradioactive solid waste. | There is potential for generating nondangerous, nonradioactive solid waste during the NTCRA. This requirement is action-specific. |
| **RCW 70.105D, "Hazardous Waste Cleanup—Model Toxics Control Act"** | | | |
| WAC 173-340-745(5), "Soil Cleanup Standards for Industrial Properties"<br><br>WAC 173-340-745(6), "Soil Cleanup Standards for Industrial Properties, Adjustments" | ARAR | Rules set standards for degree of cleanup required by a remedial action where industrial land use represents the reasonable maximum exposure under both current and future site use conditions. Total excess cancer risk may not exceed $1 \times 10^{-5}$ or a noncancer hazard index of 1 for chemical contaminants. | The selected NTCRA will comply through removal, treatment, and disposal of contaminants generated from the NTCRA that exceed the standards. This requirement is a chemical-specific. |
| WAC 173-340-747(3) through (8), "Deriving Soil Concentrations for Groundwater Protection" | ARAR | Establishes soil concentrations that will not cause contamination of groundwater at levels that exceed the groundwater cleanup levels established under WAC 173-340-720, "Groundwater Cleanup Standards." Provides an overview of the methods for deriving these soil concentrations to meet relevant criteria. Certain methods are tailored for particular types of hazardous substances or sites and certain methods are more complex than others and/or require the use of site-specific data. | Soil in the PUREX Complex may contain contaminants that require removal. The requirements corresponding to soil cleanup levels may be used to calculate cleanup levels to ensure protection of groundwater. Although groundwater is not currently used for drinking water, it is a potential drinking water source. This is a chemical-specific requirement. |

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **RCW 70.105D, "Hazardous Waste Cleanup—Model Toxics Control Act"** | | | |
| WAC 173-340-7490, "Terrestrial Ecological Evaluation Procedures"<br>WAC 173-340-7493, "Site-Specific Terrestrial Ecological Evaluation Procedures"<br>WAC 173-340-7494, "Priority Contaminants of Ecological Concern" | TBC | Defines goals and procedures for determining whether a release of hazardous substances to soil may pose a threat to the terrestrial environment. Characterizes existing or potential threats to terrestrial plants or animals exposed to hazardous substances in soil; establishes site-specific cleanup standards for the protection of terrestrial plants and animals.<br>WAC 173-340-7494 provides for numeric concentrations of hazardous substances determined to persist, bioaccumulate, or be highly toxic to terrestrial ecological receptors. | Soil in PUREX Complex may contain contaminants that require evaluation to determine if ecological exposures have the potential to cause significant adverse effects. This is a chemical-specific action. |
| **Regulations Pursuant to *Washington Clean Air Act of 1967* (RCW 70.94, "Washington Clean Air Act") and RCW 43.21A, "Department of Ecology"** | | | |
| WAC 173-400, "General Regulations for Air Pollution"<br>Specific subsection:<br>WAC 173-400-040(3), "General Standards for Maximum Emission"<br>WAC 173-400-040(8) | ARAR | These laws and regulations require all sources of air contaminants to meet standards for visible emissions, fallout, fugitive emissions, odors, emissions detrimental to persons or property, sulfur dioxide, concealment and masking, and fugitive dust. Requires use of RACT. | There is potential for fugitive emissions during the NTCRA activities. Substantive requirements of the general standards for control of fugitive emissions would be applied as appropriate to minimize the generation of fugitive dust during NTCRA activities. These requirements are action-specific. |
| WAC 173-400-113, "Requirements for New Sources in Attainment or Unclassifiable Areas" | ARAR | This regulation applies to new and modified sources and requires controls to minimize the release of associated criteria and toxic air emissions. Emissions are to be minimized through application of best available control technology. | It is unlikely that the substantive provisions in this regulation would be triggered during the NTCRA. However, substantive requirements of this regulation potentially would be applicable to removal actions performed at the site if a treatment technology that emits regulated air emissions were necessary during the implementation of the NTCRA. This requirement is action-specific. |

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **Regulations Pursuant to *Washington Clean Air Act of 1967* (RCW 70.94, "Washington Clean Air Act") and RCW 43.21A, "Department of Ecology"** | | | |
| WAC 173-460, "Controls for New Sources of Toxic Air Pollutants" (adopts, by reference, 40 CFR 61.32, "Emission Standard")<br>Specific subsections:<br>WAC 173-460-060, "Control Technology Requirements"<br>WAC 173-460-070, "Ambient Impact Requirement"<br>WAC 173-460-150, "Table of ASIL, SQER and de Minimis Emission Values" | ARAR | These regulations apply for determination of *de minimis* emission values and for establishment of control technology as appropriate for new or modified TAP sources likely to increase TAP emission. Requires T-BACT for regulated emissions of TAPs and demonstration that emissions of TAP will not endanger human health or safety. | Beryllium is listed as a TAP and may be encountered during performance of the NTCRA. It is not expected that work done under the NTCRA will trigger standards for T-BACT. However, substantive requirements of these regulations potentially would be applicable to removal actions performed at the site, if a treatment technology that emits toxic air emissions were necessary during the implementation of the NTCRA. These requirements are action-specific. |
| **RCW 70.98, "Nuclear Energy and Radiation"** | | | |
| WAC 246-247-035, (1)(a)(i), "National Standards Adopted by Reference for Sources of Radionuclide Emissions" (adopts, by reference, 40 CFR 61.05, "Prohibited Activities") | ARAR | Identifies prohibition of any owner or operator of any stationary source subject to a national emission standard for hazardous air pollutants from constructing or operating the new or existing source in violation of any such standard. | Substantive requirements of this standard are applicable because the PUREX NTCRA may be subject to NESHAP, and resultant requirements have the potential to be detected in, and potentially emitted from, structures, components, debris, soil, or groundwater involved in the NTCRA. This requirement is action-specific |
| WAC 246-247-035 (1)(a)(i) (adopts, by reference, 40 CFR 61.12, "Compliance with Standards and Maintenance Requirements") | ARAR | Requires the owner or operator of each stationary source of hazardous air pollutants subject to a national emission standard for a hazardous air pollutant to determine compliance with numerical emission limits in accordance with emission tests established in NESHAP (40 CFR 61.13, "Emission Tests and Waiver of Emission Tests") or as otherwise specified in an individual subpart. Compliance with design, equipment, work practice, or operational standards shall be determined as specified in the individual subpart. Also, maintain and operate the source, including associated equipment for air pollution control, in a manner consistent with good air pollution control practice for minimizing emissions. | Hazardous contaminants that would be subject to NESHAP and resultant requirements have the potential to be detected in, and potentially emitted from, structures, components, debris, soil, or groundwater involved in the PUREX NTCRA. Associated design, equipment, work practice, or equipment for air pollution control may also be maintained and operated. This requirement is action-specific. |

**Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action**

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **RCW 70.98, "Nuclear Energy and Radiation"** | | | |
| WAC 246-247-035 (1)(a)(i), "National Standards Adopted by Reference for Sources of Radionuclide Emissions" (adopts, by reference, 40 CFR 61.14, "Monitoring Requirements") | ARAR | Requires the owner or operator to maintain and operate each monitoring system as specified in the applicable subpart, and in a manner consistent with good air pollution control practice for minimizing emissions. Approvals of alternatives to any monitoring requirements or procedures are obtained from the regulatory agency | Hazardous contaminants that would be subject to NESHAP Air Pollutant Standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the PUREX NTCRA. The hazardous contaminants will be monitored as identified under each applicable NESHAP subpart. This requirement is action-specific |
| WAC 246-247-035 (1)(a)(ii), "National Standards Adopted by Reference for Sources of Radionuclide Emissions" (adopts, by reference, 40 CFR 61.92, "Standard") | ARAR | Establishes emission standards for radionuclides equivalent to NESHAP (40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities"), by reference. DOE Hanford Site radionuclide airborne emissions shall be controlled so as not to exceed amounts that would cause an exposure to any member of the public of greater than 10 mrem/yr effective dose equivalent. | Hazardous radionuclide contaminants that would be subject to NESHAP; Radionuclide Air Pollutant Standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil or groundwater involved in the NTCRA. This requirement is chemical-specific action. |
| WAC 246-247-035 (1)(a)(ii), "National Standards Adopted by Reference for Sources of Radionuclide Emissions" (adopts, by reference, 40 CFR 61.93, "Emission Monitoring and Test Procedures") | ARAR | Specifies that radionuclide emissions shall be determined and effective dose equivalent values to members of the public calculated to determine compliance with the 10 mrem/yr effective dose equivalent standard. Radionuclide emissions shall be collected and measured using approved methods. A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114. Measurement by methods specified in the paragraph (b) shall be made at all release points that have the potential to discharge radionuclides to the air in quantities that cause an effective dose equivalent in excess of 1 percent of the 10 mrem/yr standard. For other release points that have a potential to release radionuclides into the air, periodic confirmatory measurements shall be made to verify the low emissions. | Hazardous radionuclide contaminants that would be subject to NESHAP; Radionuclide Air Pollutant Standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the PUREX NTCRA. The hazardous contaminants will be monitored as identified under each applicable NESHAP subpart. This requirement is action-specific report. |

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **RCW 70.98, "Nuclear Energy and Radiation"** | | | |
| WAC 246-247-040(3), "General Standards"<br>WAC 246-247-040(4), "General Standards" | ARAR | Requires that emissions be controlled to ensure ALARA-based and best available controls standards are not exceeded. | Hazardous contaminants that would be subject to radionuclide air emission standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the PUREX NTCRA. This requirement is action-specific. |
| WAC 246-247-075, "Monitoring, Testing and Quality Assurance" | ARAR | Establishes the monitoring, testing, and quality assurance requirements for radioactive air emissions.<br>Emissions from nonpoint and fugitive sources of airborne radioactive material will be measured. Measurement techniques may include but are not limited to sampling, calculation, smears, or other reasonable method for identifying emissions as determined by the lead agency. | Hazardous contaminants at either the PUREX Complex or generated from the NTCRA would be subject to radionuclide air emission standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the removal action. This requirement is action-specific. |
| **WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides"** | | | |
| WAC 173-480-040, "Ambient Standard" | ARAR | Requires that emissions of radionuclides in the air shall not cause a maximum effective dose equivalent of more than 10 mrem/y to the whole body to any member of the public. | The buildings/structures to be addressed under this NTCRA will contain radioactive constituents. Potential emissions from the NTCRA would be performed in accordance with this standard. This requirement is action-specific. |
| WAC 173-480-050(1), "General Standards for Maximum Permissible Emissions" | ARAR | This regulation establishes general standards for all radionuclide emission units and requires emission units to meet WAC 246-247 requiring every reasonable effort to maintain radioactive materials in effluents to unrestricted areas, ALARA. The regulation indicates that control equipment of sites operating under ALARA shall be defined as RACT and ALARA control technology. | The potential for fugitive and diffuse emissions due to demolition and excavation and related activities potentially will require efforts to minimize those emissions by meeting WAC 246-247. This requirement is action-specific. |
| WAC 173-480-060, "Emission Standards for New and Modified Emission Units" | ARAR | Requires that construction, installation, or establishment of a new air emission unit shall use best available radionuclide control technology. | The potential for fugitive and diffuse emissions due to demolition and excavation and related activities potentially will require efforts to minimize those emissions by meeting WAC 246-247. This requirement is action-specific. |

## Table B-2. Identification of Potential State Applicable or Relevant and Appropriate Requirements for the Removal Action

| ARAR Citation | ARAR | Requirement | Rationale for Consideration |
|---|---|---|---|
| **WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides"** | | | |
| WAC 173-480-070(2), "Emission Monitoring and Compliance Procedures" | ARAR | Requires that procedures specified in WAC 246-247 or approved specifically by the regulatory agency shall be used to determine compliance with the 10 mrem/yr standard for dose to any member of the public. Compliance is determined by calculating the dose to members of the public at the point of maximum annual air concentration in an unrestricted area where any member of the public may be located. | The potential for radionuclide emissions from some NTCRAs, such as fugitive and diffuse emissions during demolition and excavation and related activities, would be performed in compliance with the public dose standard. This requirement is action-specific. |

ALARA = as low as reasonably achievable
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE = U.S. Department of Energy
ERDF = Environmental Restoration Disposal Facility
HHE = human health and the environment
NESHAP = "National Emissions Standards for Hazardous Air Pollutants"
NTCRA = non-time-critical removal action
RACT = reasonably available control technology
TAP = toxic air pollutant
T-BACT = toxics best available control technology
TBC = to be considered
UIC = underground injection control

## B2 References

36 CFR 800, "Protection of Historic Properties," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=43&SID=452e7906992e9a9d307ebd2ef0531227&ty=HTML&h=L&mc=true&n=pt36.3.800&r=PART.

40 CFR 60, "Standards of Performance for New Stationary Sources." *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr60_main_02.tpl.

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Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines."

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr61_main_02.tpl.

61.05, "Prohibited Activities."

61.12, "Compliance with Standards and Maintenance Requirements."

61.13, "Emission Tests and Waiver of Emission Tests."

61.14, "Monitoring Requirements."

61.32, "Emission Standard."

61.92, "Standard."

61.93, "Emission Monitoring and Test Procedures"

61.140, "Applicability."

61.145, "Standard for Demolition and Renovation."

61.150, "Standard for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation, and Spraying Operations."

Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities."

Subpart M, "National Emission Standard for Asbestos."

40 CFR 63, "National Emission Standards for Hazardous Air Pollutants for Source Categories," *Code of Federal Regulations*. Available at:https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr63_main_02.tpl.

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40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr268_main_02.tpl.

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan." Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr300_main_02.tpl.

300.400, "General."

300.440, "Procedures for Planning and Implementing Off-Site Response Actions."

Appendix B, "National Priorities List."

40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr761_main_02.tpl.

761.50, "Applicability."

761.60, "Disposal Requirements."

761.61, "PCB Remediation Waste."

761.62, "Disposal of PCB Bulk Product Waste."

761.79, "Decontamination Standards and Procedures."

43 CFR 10, "Native American Graves Protection and Repatriation Regulations," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=43:1.1.1.1.10.

50 CFR, "Wildlife and Fisheries," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?SID=b1ad72566f7cde3545fb74c3d7dc9658&mc=true&tpl=/ecfrbrowse/Title50/50tab_02.tpl.

50 CFR 10, "General Provisions."

50 CFR 17, "Endangered and Threatened Wildlife and Plants."

50 CFR 21, "Migratory Bird Permits."

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