DOE/RL-2019-43
Revision 0

Removal Action Work Plan for the PUREX Complex: Hazard Abatement Including White Powder Within the 202A Building

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

P.O. Box 550
Richland, Washington 99352

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Signature Page

Having considered the extent to which the *Removal Action Work Plan for the PUREX Complex: Hazard Abatement Including White Powder Within the 202A Building* could be inconsistent with *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* processes, or could alter schedules set forth in Appendix D of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement), the U.S. Department of Energy approves this document.

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Mark S. French U.S. Department of Energy Richland Operations Office	Signature	Date

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Executive Summary

This removal action work plan describes the activities necessary to complete a portion of the non-time-critical removal action for the Plutonium-Uranium Extraction (PUREX) Complex. The PUREX Complex structures addressed in this removal action include the 202A Building (Canyon, East Annex and West Annex). The portion of the selected removal action to be implemented is to perform hazard abatement, including the removal of white powder from the 202A Building that designated as dangerous waste. This white powder was brought into question during a 2016 Washington State Department of Ecology Non-Financial Records Review inspection of the PUREX Plant and resulted in the issuance of Administrative Order Docket No. 15343 (Ecology letter 17-NWP-113). The extent of white powder removal will be based on Administrative Order No. 15343, Corrective Action 3, as clarified by State of Washington Department of Ecology letter 20-NWP-043, dated February 20, 2020. Removal of white powder in the 202A Building, includes locations identified during the 2016 annual surveillance and maintenance inspection: Tour Paths 3, 4, and 7 (respectively, the Pipe and Operating Gallery, the White Room, and the Aqueous Makeup Unit). The material in all three locations designated as dangerous waste.

The removal action alternatives were identified and evaluated in Department of Energy (DOE)/RL-2016-15, *Engineering Evaluation/Cost Analysis for the PUREX Complex*, with the alternative selection documented and authorized in DOE/RL-2019-34, *Action Memorandum for the PUREX Complex: Hazard Abatement Including White Powder Within the 202A Building*. The selected removal action per the focused AM, DOE/RL-2019-34 is a component of Alternative 4: Hazard Abatement, including removal of white powder. The processes used to implement the removal action for the 202A Building are described herein.

This removal action work plan establishes the following methods and activities required to implement the selected removal action:

- Removal action elements and their implementation, including safety, health, and radiological management and controls.
- Environmental management and controls, including applicable or relevant and appropriate requirements, waste management, airborne emissions, reporting for nonroutine releases, and cultural/ecological resources.
- Project administration.

A sampling and analysis plan (SAP) was prepared and implemented to sample and characterize the white powder, CHPRC-03475, *Sampling and Analysis Plan For PUREX White Powder Investigation* (hereinafter called the White Powder SAP). For future hazard abatement, separate from white powder removal, process knowledge will be used whenever possible to characterize any material generated during hazard abatement activities. When process knowledge cannot be used, sampling and analysis will be conducted in accordance with an approved SAP for the PUREX Complex and is considered part of this RAWP.

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Terms

ALARA	as low as reasonably achievable
AMU	aqueous makeup unit
ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
LLW	low-level waste
MLLW	mixed low-level waste
NRC	National Response Center
NTCRA	non-time-critical removal action
PIV	Positive Infinitely Variable (Room)
PPE	personal protective equipment
PR	Product Removal (Room or Corridor)
PUREX	Plutonium Uranium Extraction (Complex)
QA	quality assurance
RAWP	removal action work plan
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	Record of Decision
RWP	radiological work permit
SAP	sampling and analysis plan
S&M	surveillance and maintenance
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal

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1 Introduction

This removal action work plan (RAWP) provides guidance for implementing the Plutonium-Uranium Extraction (PUREX) Complex removal action work scope concerning hazard abatement which includes removal of white powder within the 202A Building which consists of a canyon and annexes (East Annex and West Annex). This removal action is being conducted under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) *Action Memorandum for the PUREX Complex: Hazard Abatement Including White Powder Within the 202A Building*, DOE/RL-2019-34 (Action Memorandum), which implements the hazard abatement portion of the selected alternative from DOE/RL-2016-15, *Engineering Evaluation/Cost Analysis for the PUREX Complex*.

Implementation of this portion of the PUREX Complex non-time-critical removal action (NTCRA) work plan is designed to mitigate the risk of release and exposure to hazardous substances (e.g., white powder) from the 202A Building while awaiting completion of the CERCLA remedial investigation/feasibility study process and issuance of a future PUREX Canyon Record of Decision (ROD). The white powder was sampled and analyzed in accordance with the White Powder SAP and designated as a dangerous waste. This RAWP outlines actions to be taken to satisfy Administrative Order Docket No. 15343 Corrective Action 3 Remove White Powder and identifies technical requirements of the removal action and details the work elements, performance measurements, project management, oversight, and schedule for implementing the removal action.

The U.S. Department of Energy (DOE) was delegated the authority to conduct removal actions under Section 104, “Response Authorities,” of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) by Executive Order 12580, *Superfund Implementation*. This removal action will be performed in a manner that is consistent with the planned final remedial action under authority of CERCLA and the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989a), also known as the Tri-Party Agreement (TPA).

1.1 Purpose

This RAWP identifies the requirements and establishes the methods to conduct a portion of the removal action, hazard abatement within the 202A Building. This RAWP describes the following:

1. Removal action elements and how they will be implemented, as well as the safety and health management controls
2. Environmental management and controls, including applicable or relevant and appropriate requirements (ARARs), and waste management
3. Project administration.

The intent of this RAWP is to identify the basis and to provide criteria for the preparation of work packages and procedures to conduct removal activities and to meet the removal action objectives. Using the most recent information concerning the conditions for each building or structure, field-level work packages will be developed to direct work activities and instruct workers in the applicable work methods.

This removal action is consistent with the overall Hanford Site cleanup initiative and will, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action, as required by 40 CFR 300.415(d), "National Oil and Hazardous Substances Pollution Contingency Plan," "Removal Action." The following removal action objectives were identified in the PUREX AM for hazard abatement within 202A Building (DOE/RL-2019-34):

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

The DOE, as the lead agency for this removal action, will assign a Removal Action Manager that will oversee the response activities.

1.2 Scope

The PUREX Complex structures addressed in this removal action is the 202A Building (including the east and west annexes). The structures addressed by this NTCRA are chemically and/or radiologically contaminated. The selected removal action scope for the PUREX Complex structures is only hazard abatement for the 202A Building, including white powder removal. The extent of white powder removal, described below, will be based on Administrative Order No. 15343, as clarified by State of Washington Department of Ecology letter 20-NWP-043, dated February 20, 2020:

- For floor areas that are within or visible from Tour Paths 3, 4, and 7, remove all visible white powder in all accessible areas of the floor. Accessible means all areas of the floor that can be safely reached by a person using a vacuum with an extension or using wet methods such as use of mops.
- For equipment or other structures that are within or visible from Tour Paths 3, 4, and 7, remove all visible white powder on all accessible areas of the equipment or other structures, up to 5 ft high. Accessible means all areas of the equipment or other structures that can be safely reached by a person using a vacuum with an extension or using wet methods such as use of mops.

Included in this removal action are characterization activities of remaining hazardous substances to facilitate waste disposal, determine worker controls, as well as to document post removal conditions for future remedial action.

1.3 Site Conditions and Background

The Hanford Site encompasses approximately 580 mi^2 in southeastern Washington State (Figure 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 of the site 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 PUREX Complex is located in the 200 East Area in the central portion of the Hanford Site (Figure 1), and the Columbia River is north-northeast.

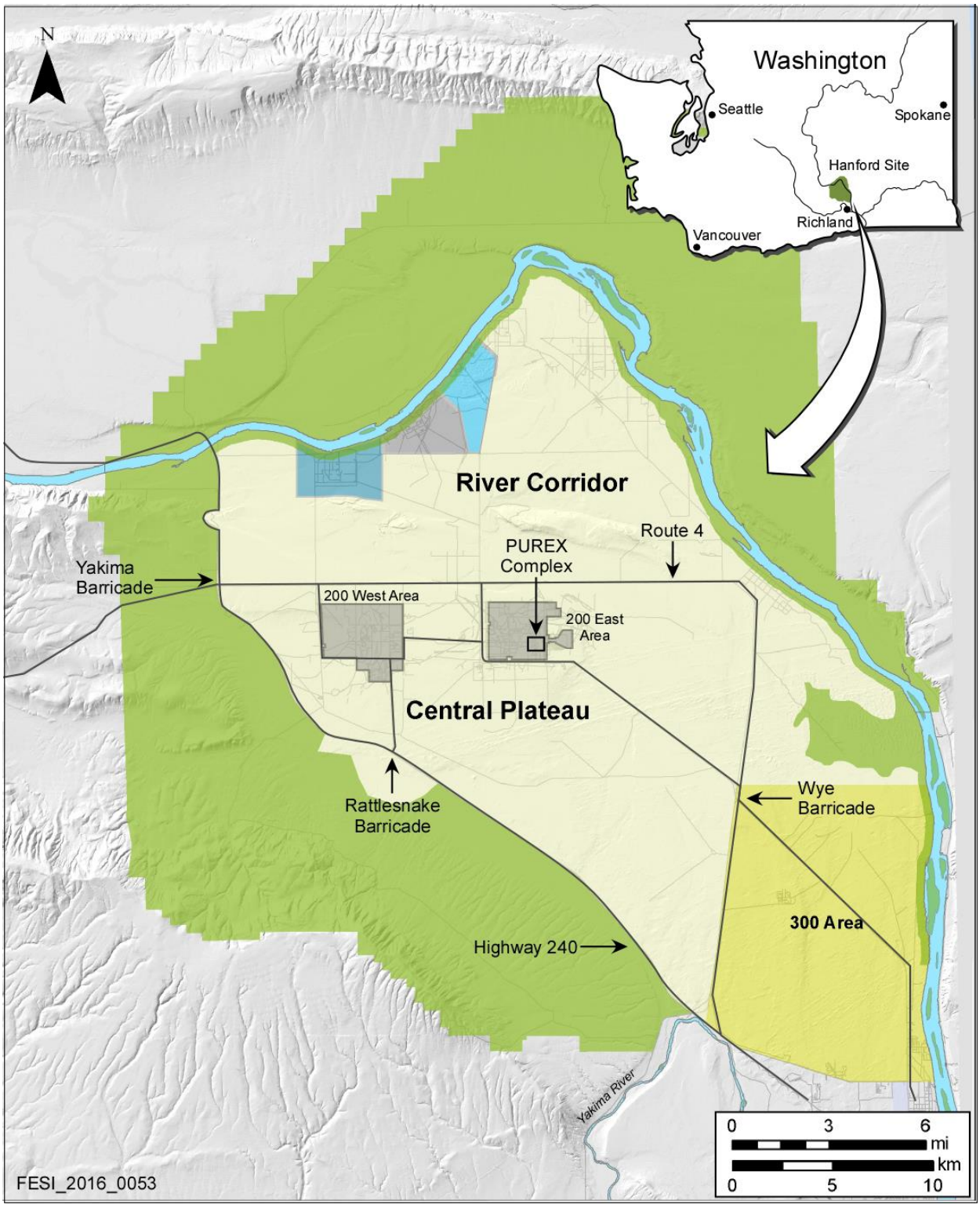

Figure 1. Location of the PUREX Complex within the Hanford Site

Public access to the Hanford Site currently is 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 structures are locked and a 6 ft cyclone fence encloses the immediate area.

The PUREX Complex is within the 200-CP-1 Operable Unit. The 202A Canyon Building, also known as PUREX Plant, 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 the PUREX Plant, 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.

The PUREX Plant 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).

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 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.

The structures in this removal action are located within the PUREX Complex in the 200 East Area of the Hanford Site (Figure 2). The NTCRA covers the 202A Building including the 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 the East Annex and West Annex attached to the north side of the canyon. Multiple 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* and DOE/RL-2016-47, *Removal Action Work Plan for the PUREX Complex Tier 2 Buildings/Structures.*

1.3.1 202A Building

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, Sample, and Storage) are located parallel to, but isolated from, the canyon deck and process cells on the north side of the structure. Each level contains a gallery area of the same name and additional support rooms. Cross sectional and plan views of the 202A Building can be found in Figure 3. S&M activities are being performed in accordance with DOE/RL-98-35, *Surveillance and Maintenance Plan for the Plutonium-Uranium Extraction (PUREX) Facility*.

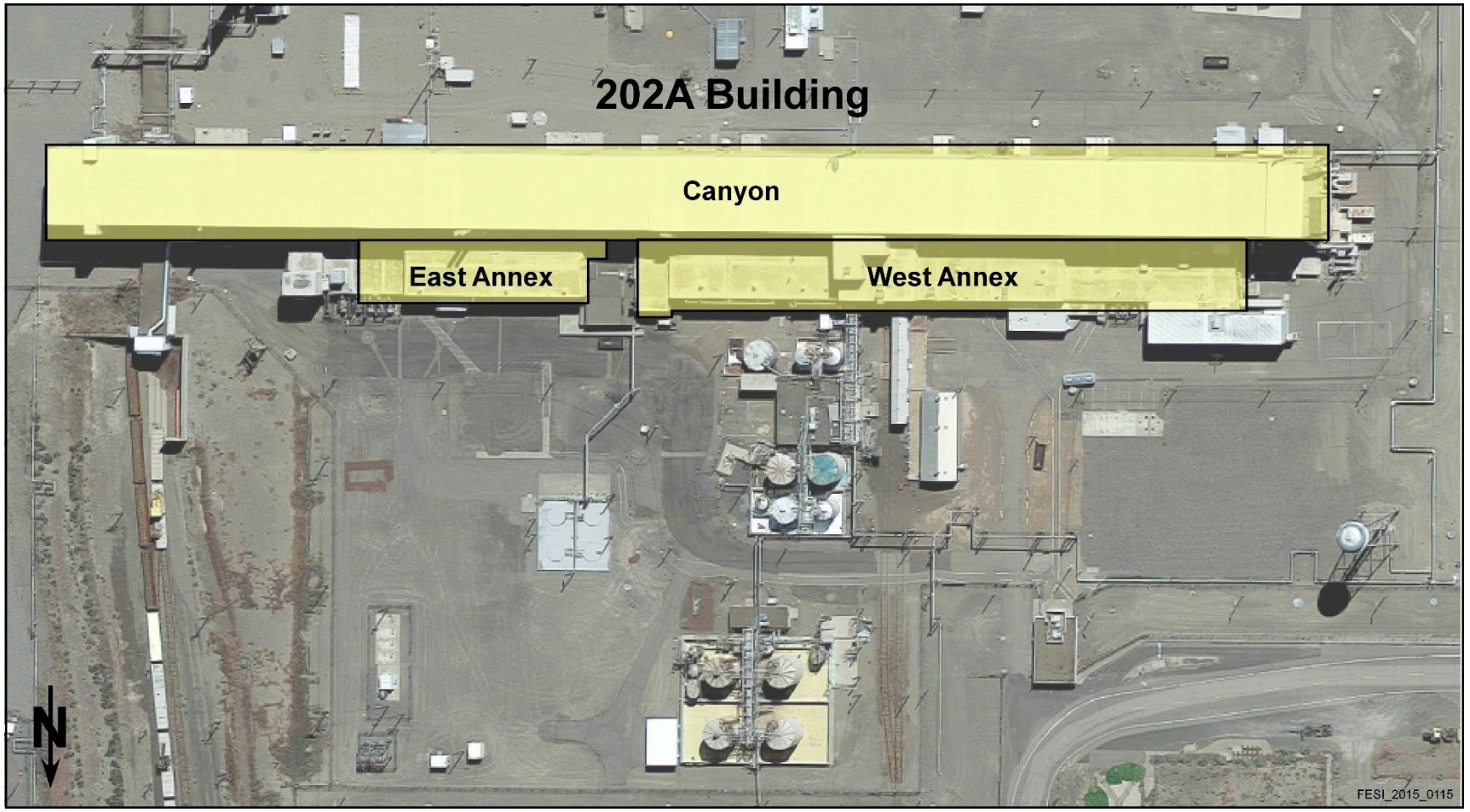

Figure 2. PUREX 202A Building

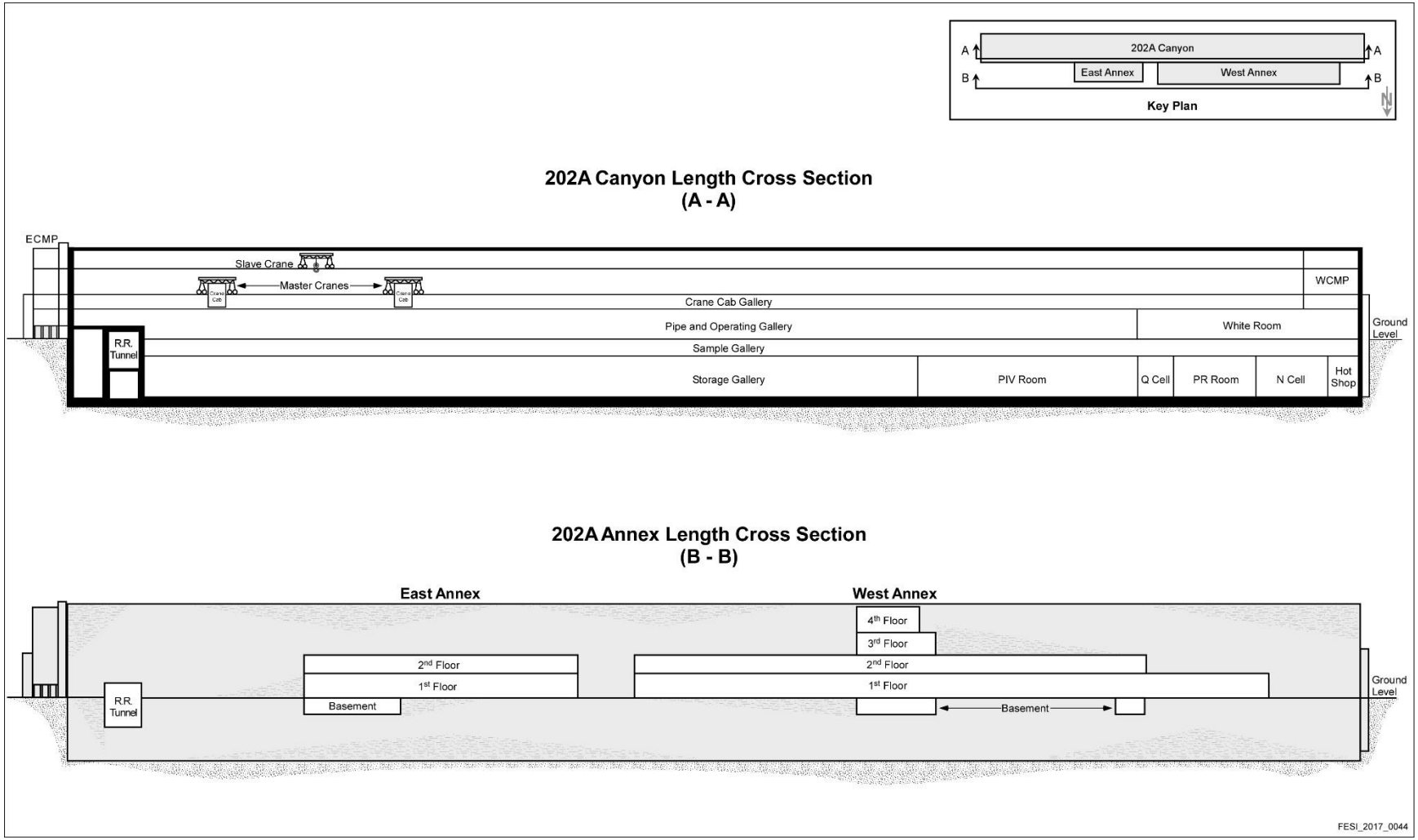

Figure 3. 202A Building Cross Section

1.3.1.1 202A Canyon

The 202A Canyon structure is 1,005 ft long, 119 ft wide, and 100 ft high, with about 40 ft of this height below grade. 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 20 02. 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 grade areas include the canyon deck, Pipe and Operating Gallery, White Room, and above the cells, the concrete shield wall becomes the parapet wall of the shielded crane way (Crane Cab Gallery) for the two master cranes. Approximately one-third of the building is constructed below grade, with processes performed below the canyon deck for shielding purposes (Figure 4). Below grade areas include the Sample Gallery, PIV Room, PR Room, N Cell and the Storage Gallery. The process cells, air tunnel, Q Cell, Hot Shop, and Hot Pipe Trench are below grade and are outside the scope of this removal action.

Canyon Deck. One large area extends the entire length of the building with walls separating it from galleries on the north side, and the floor separating it from the process cells and hot pipe trench. The floor of this area is called the canyon deck and consists of removable process cell cover blocks measuring 6 ft thick. The concrete cover blocks are stepped to eliminate the direct path of radiation streaming. The cover blocks are removable by crane to access the process cells located below the canyon deck. Because the crane has been deactivated, the highly contaminated process cells are not currently accessible.

Crane Area. The canyon has three gantry-style maintenance cranes, two master cranes and one slave crane. They are electrically driven and operates on tracks running lengthwise on both sides of the canyon. All three cranes have a 40-ton capacity main hoist. The two master cranes were operated via an attached crane cab, East and West, that hangs below the southern end of the crane and was located behind a shielding wall. The area behind the shielding wall is referred to as the Crane Cab Gallery and is located on the south side of the canyon Pipe and Operating Gallery. These cranes were used to remove the cell cover blocks, charge irradiated fuel into the dissolvers, and move equipment between the canyon deck and process cells.

Process Cells. The process cells contain deactivated processing equipment formerly used in spent fuel separations. Twelve process cells run east and west, are in rows with parallel by a ventilation air tunnel and pipe tunnel through which inter-cell solutions transfers are made. While preparing for shutdown, all process equipment and piping were flushed to remove much of the chemical and radiological contamination. The process cells are estimated to contain the majority of the remaining chemical and radiological inventory in the 202A Canyon (Section 1.4). The hot pipe trench contains a network of transfer piping used to convey product and waste streams between process cells. During operations, the air tunnel provided exhaust ventilation to all process cells. The hot pipe trench and the air tunnel were flushed during shutdown activities to remove and reclaim product and other chemical contaminants.

1.3.1.2 202A Galleries

Storage, Sample, Pipe and Operating, and Crane Cab Galleries are located along the north side of the canyon. A Storage Gallery is located below all the galleries on the south side of the canyon. Figures 5 through 8 provide plan views of the PUREX galleries.

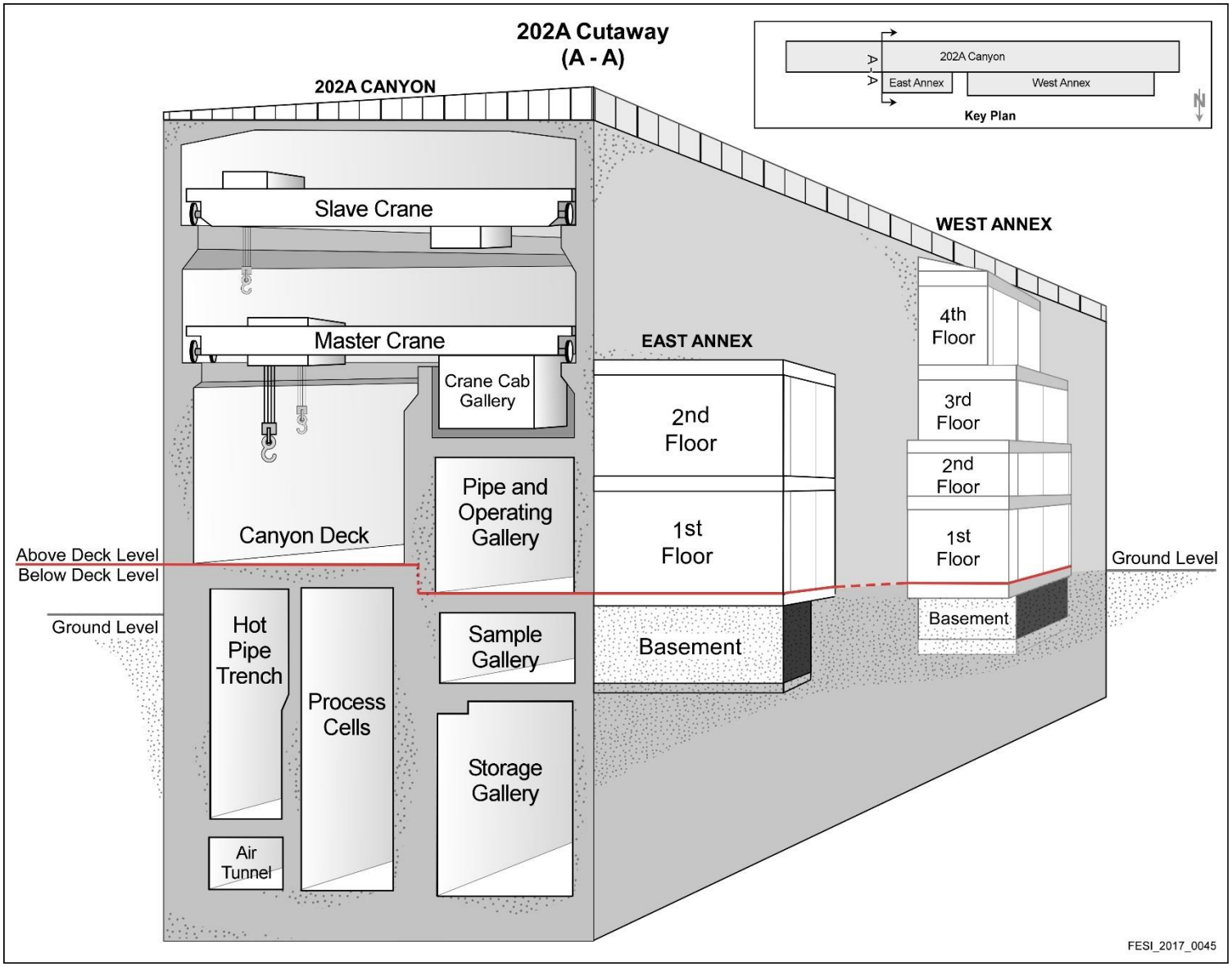

Figure 4. 202A Building Cutaway

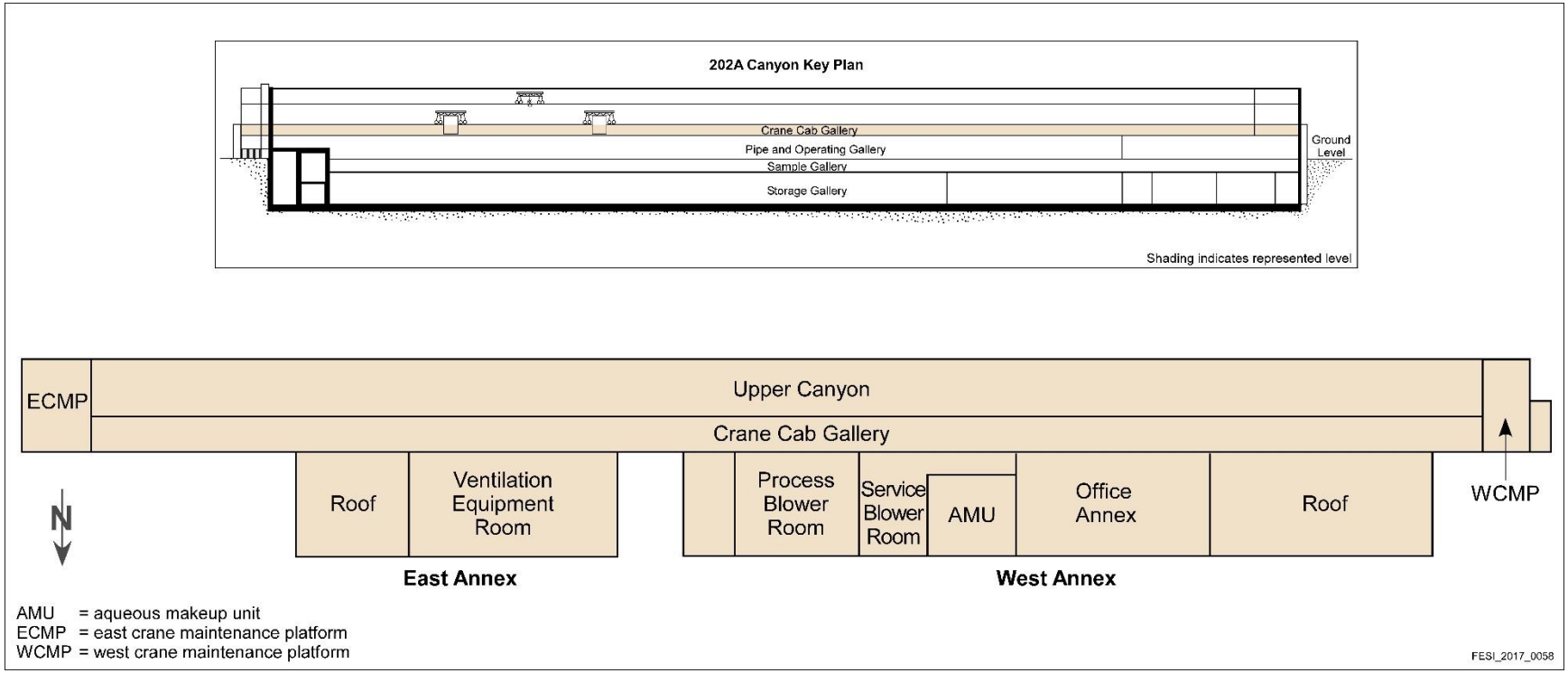

Figure 5. 202A Building Crane Cab Gallery Level Plan View

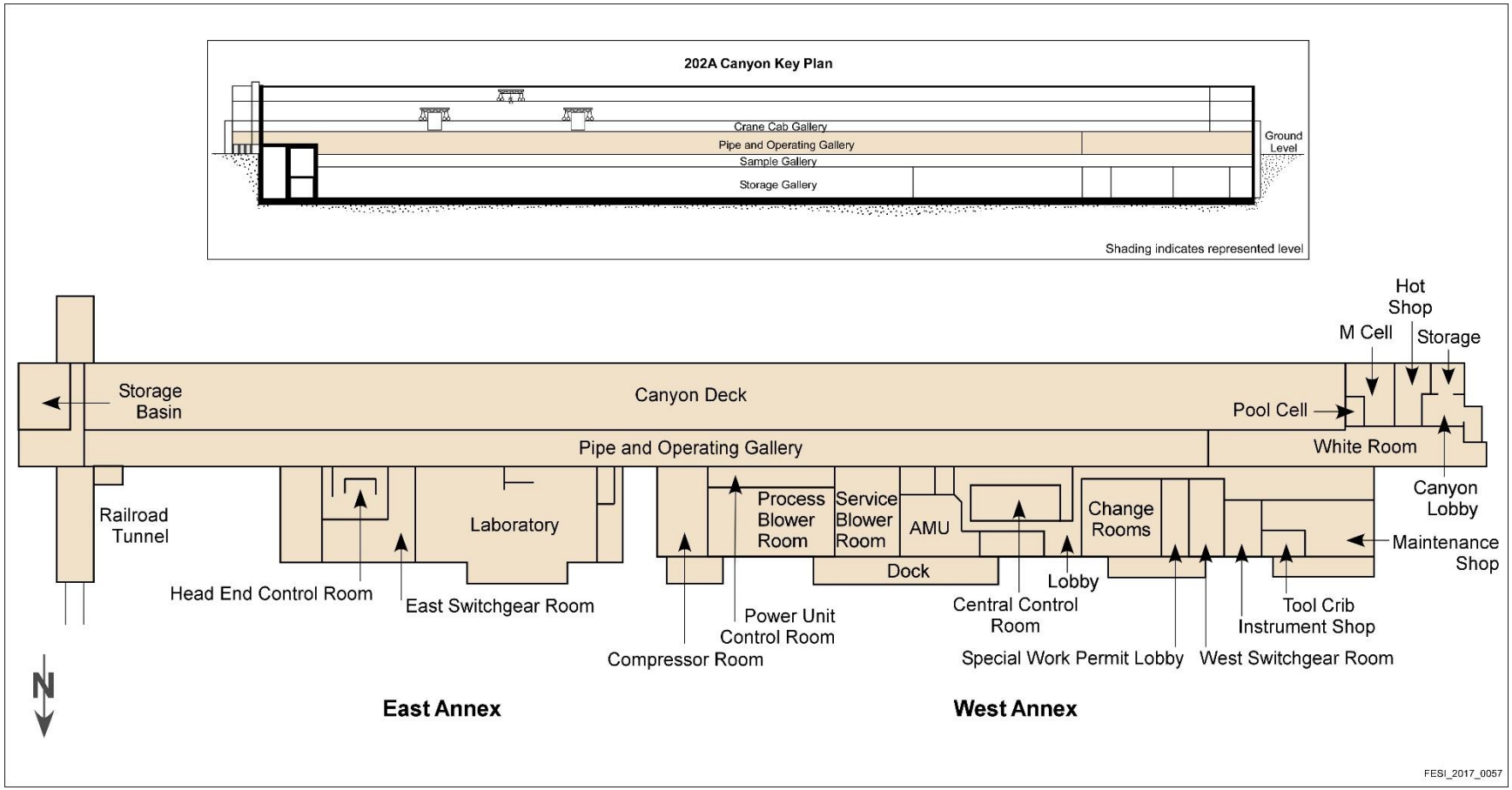

Figure 6. 202A Building P&O Gallery Level Plan View

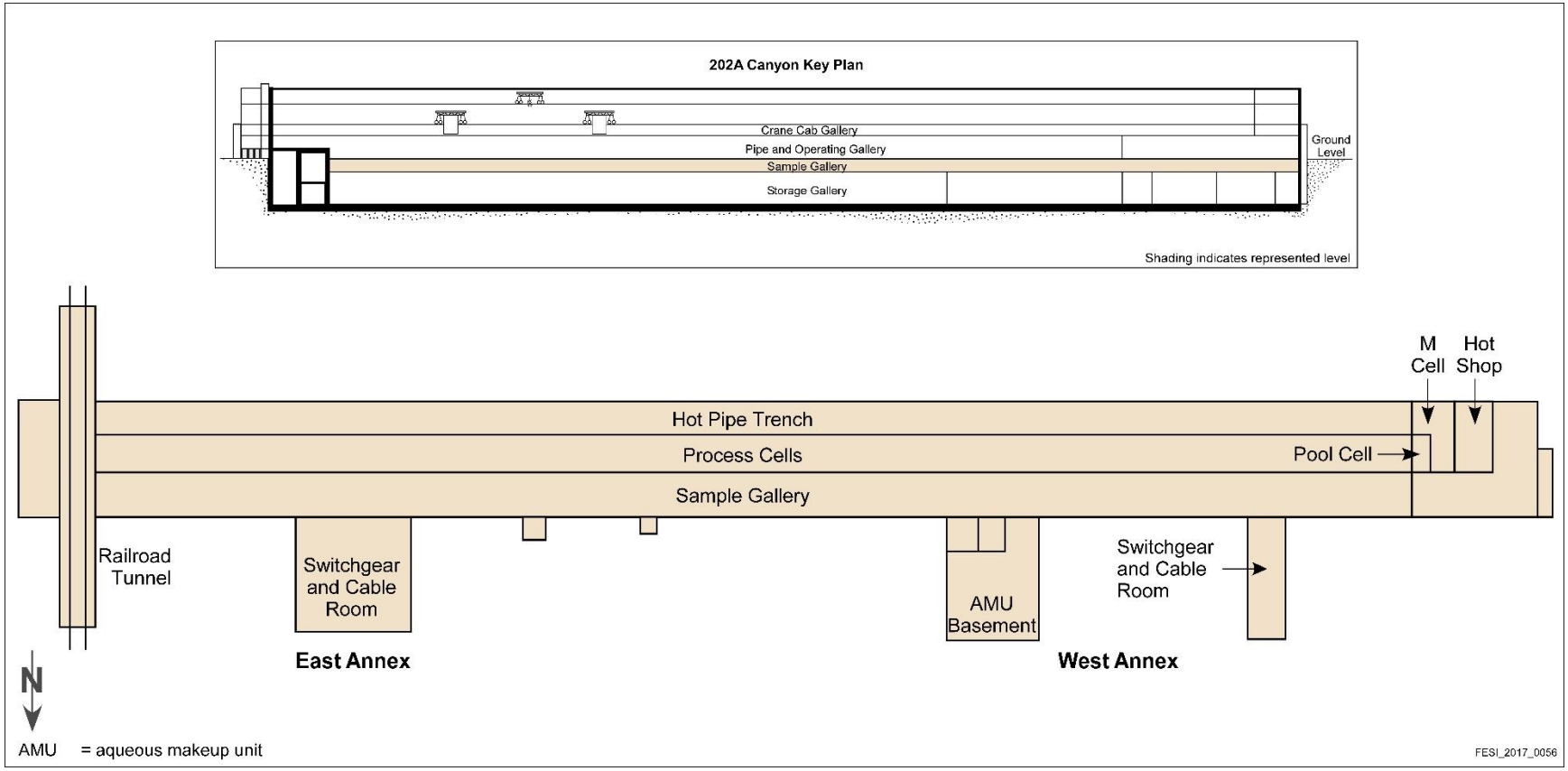

Figure 7. 202A Building Sample Gallery Level Plan View

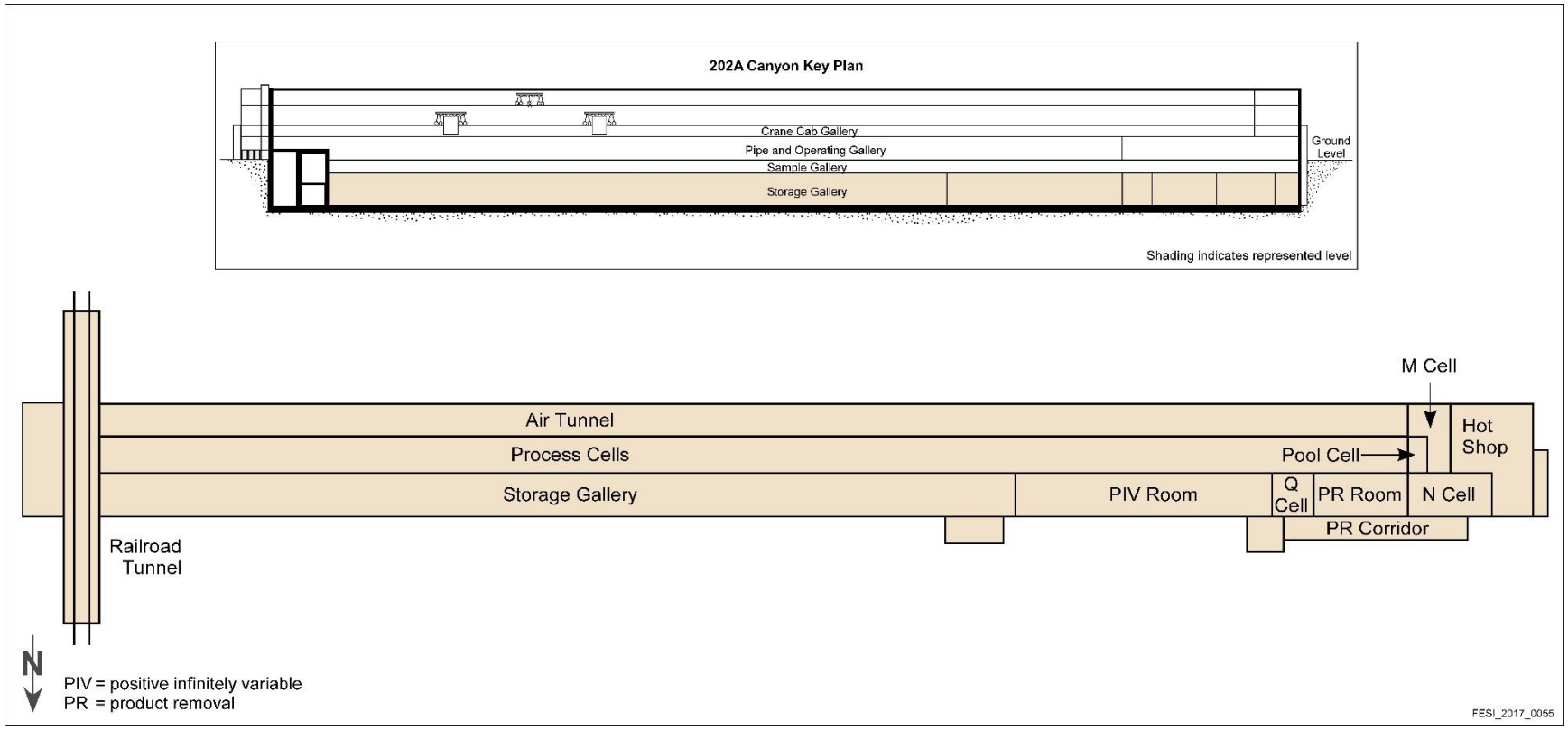

Figure 8. 202A Building Storage Gallery Level Plan View

Storage Gallery. The Storage Gallery is located below the Sample Gallery and is located in the east half of the building. The Storage Gallery was used to store dry chemicals and spare equipment. All of the equipment has been removed.

Sample Gallery. The Sample Gallery is located below the P&O Gallery and extends the entire length of the building. 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.

Pipe and Operating Gallery. 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.

Crane Cab Gallery. The crane cab gallery is located above the P&O Gallery, and is the corridor of travel for the two master crane cabs. The south wall of the gallery shields the cabs and the cab operator from canyon radiation. Crane maintenance platforms are located at both ends of the gallery.

1.3.1.3 202A West End Rooms

The West End Rooms include a maintenance area shop and hot shop located at the West end of the canyon (Figures 5 through 8). In addition the White Room, Pool Cell, M Cell, PIV room, PR Room, PR Corridor, N Cell and Q Cell are all located in the West end. These areas have been deactivated by sealing gloveboxes, removing small process equipment, and removing or stabilizing residual radioactive materials.

Canyon Lobby and Storage Area. The Canyon Lobby & Storage Area is located south of the White Room on the west side of the building.

White Room. 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.

PIV Room. 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.

PR Room. 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, and N Cell.

N 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.

1.3.1.4 202A Annex

The 202A Annex is separated from the main canyon structures by massive concrete wall. Two subannexes comprise the 202A Annex (Figures 2 through 8). These areas contain laboratories, administrative support areas and equipment rooms that are described in the following paragraphs.

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. It contains a two-story analytical and control laboratory 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.

West Annex. The 202A 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. It contains 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. In addition, a five-story aqueous makeup unit (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 dangerous waste management unit (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 removal action. 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. The West Annex is used for access to the 202A Canyon for ongoing S&M Activities.

1.4 Release or Threat of Release into the Environment of Hazardous Substances, Pollutants or Contaminants

The structures identified in this removal action, are, to different degrees, contaminated with both radioactive and chemical substances that were used or generated during facility operations and waste management activities. In addition to radiological and chemical hazards, structural hazards exist due to the degradation in the structural integrity of the buildings and structures. Structural degradation could result in partial loss of radiological material, confinement, and/or worker injury.

Removal activities will be performed in accordance with appropriate procedures that ensure control of hazardous substances. The standards and procedures for managing hazardous substances ensure that personnel removing, handling, and disposing of waste perform work in a manner that achieves the following objectives:

- Protect the safety of employees and the general public
- Minimize spills and releases to the environment
- Meet applicable DOE, federal, state, and local regulatory requirements

Table 1 provides a summary of the current hazard conditions in the 202A Building.

Table 1. Current Hazard Conditions

Area	Documented Conditions
Canyon Deck	The Canyon Deck has not been entered since deactivation in 1998. Conditions on the deck are not known at this time.
Aqueous Makeup Unit (West Annex)	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	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.
N Cell	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	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.
Q Cell	In 2017, leaking oil was observed near the gloveboxes.

Table 1. Current Hazard Conditions

Area	Documented Conditions
Pipe and Operating Gallery	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.
Sample Gallery	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	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	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.

S&M = surveillance and maintenance

1.4.1 Radiological Hazards

The primary hazardous substances associated with the 202A Building (including west and east annex) is radioactive materials. Radionuclide hazardous substances 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. Estimated radiological inventories are shown in Table 1-1.

Table 2. 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**

1.4.2 Nonradiological Contamination

The following subsections provide a brief description of chemical hazards that may be present at the 202A Building.

1.4.2.1 Arsenic

Arsenic may be present in oils, grease, or other chemicals. If waste containing arsenic above regulatory limits is generated, it will be treated as appropriate, prior to disposal.

1.4.2.2 Beryllium

Beryllium epoxy was used in resins at PUREX. Beryllium was also used in PUREX process equipment and piping. The 202A Canyon may contain small quantities of beryllium from the fuel element assemblies.

1.4.2.3 Cadmium

Cadmium is a byproduct of the metal-finishing process and may also be present in electrical equipment. If waste containing cadmium above regulatory limits is generated, it will be treated as appropriate, prior to disposal.

1.4.2.4 Chromium

Chromium was identified as a constituent in the white powder. If waste containing chromium above regulatory limits is generated, it will be treated as appropriate, prior to disposal.

1.4.2.5 Lead

Lead could exist in surface coatings (i.e., lead-based paint) and as shielding or components of plumbing inside the PUREX Complex. In the electrical system, lead was used as contacts and for soldering. Lead bricks for shielding may still be located in the process cells. Lead sheeting was used to seal penetrations (i.e., vents, conduit, piping, and flashing) to roof membrane coverings. If waste containing lead above regulatory limits is generated, it will be treated as appropriate, prior to disposal.

1.4.2.6 Mercury

Mercury may be present in manometers and electrical equipment (including thermostats, switches, and vapor lighting). Waste containing mercury above regulatory limits will require treatment prior to disposal.

1.4.2.7 Nitrate

Nitrates were used as part of the aqueous makeup chemicals for decladding operations.

1.4.2.8 Silver

Silver contacts may be present in the electrical system. At certain levels, silver is regulated as a hazardous waste. If waste containing silver above regulatory limits is generated, it will be treated as appropriate, prior to disposal.

1.4.2.9 Sodium Bicarbonate

Sodium bicarbonate is a degradation product of sodium hydroxide.

1.4.2.10 Uranium

Uranium as uranyl nitrate was part of the recovery process.

1.4.2.11 Zinc

Zinc may be present in galvanized piping used in the electrical and plumbing systems. Zinc was used as soldering in the electrical systems. Zinc may also be present in paints or coatings in the supply air washer assemblies.

1.4.2.12 Asbestos

Asbestos-containing material (ACM) is found in and around the PUREX Complex in the form of insulation (thermal system insulation), ductwork, gasket/packing material, transite siding, and floor tiles/adhesives.

1.4.2.13 Miscellaneous Industrial Chemicals

The potential exists for the discovery of residual, used, or unused chemicals (e.g., solvents, hydraulic and fuel oils, and greases). These materials will be recycled or disposed of in accordance with requirements of the receiving facility.

1.4.2.14 Corrosives

Corrosives (including both acids and caustics) may be encountered. Corrosive solids and liquid waste above the regulatory limits must be treated, as appropriate, prior to disposal.

1.4.2.15 Lubricants/Oils

Lubricants and oils may contain hazardous substances. Equipment will be drained of lubricants/oils to the extent practicable prior to disposal.

1.4.2.16 Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) may be found in and around the PUREX Complex (e.g., painted surfaces, light ballasts, and waste oils). Materials removed or demolished that contain or may contain PCBs will be removed for disposal consistent with substantive standards of the *Toxic Substances Control Act of 1976* (TSCA).

1.4.3 Biological Hazards

Biological hazards such as bird, bat, snake, lizard, and rodent carcasses and feces could be encountered. Such materials, if contaminated with hazardous substances, will be treated and disposed as appropriate.

1.4.4 Industrial Hazards

Industrial hazards may be encountered. Examples include tripping, falling, sharp edges, and lifting (ergonomic) hazards. In addition, demolition with heavy equipment introduces other industrial hazards such as uneven walking surfaces, excessive load noise, moving machinery parts, and falling objects.

2 Removal Action Elements

This chapter provides general descriptions of the anticipated removal activities..

2.1 Removal Action Work Activities

The following list includes (but is not limited to) the general activities to implement this removal action:

- Initial characterization
- Hazard abatement (proactive mitigation by decontamination, stabilization, or equipment removal)
- Waste management and disposal

Section 2.2 and its subsections provide additional detail on these work activities. Using the most recent information concerning field conditions, work packages will be developed in accordance with this RAWP using existing procedures and specifically developed instructions to perform and control the removal and disposal activities.

2.2 Field Activities

The following subsections describe the field activities associated with this removal action.

2.2.1 Mobilization and Site Preparation

Mobilization and site preparation may include: Construct field support facilities, waste container survey and storage areas, and decontamination stations.

2.2.2 Characterization for Hazard Abatement

Facility-specific historical information (including process knowledge and previous characterization data) will be used to identify expected waste streams and initial characterization data needs. This historical information will also provide input for the rationale, strategy, and requirements for data collection and analysis. Data collection may include field survey and analytical sample data. The initial characterization data will be for the following activities:

- Specify worker health and safety requirements
- Identify radiological and hazardous conditions that will be encountered during removal activities
- Characterize waste for treatment and/or disposal

In some cases, physical sampling and analysis are not needed because process knowledge, historical analytical data, and radiological and chemical screening are sufficient to characterize waste for disposal. Using a phased approach for the removal action, initial characterization will not be completed for the entire scope of the removal action. Initial characterization will be performed on each structure or discrete area (e.g., P&O Gallery, White Room) as it is funded and staffed for removal activities.

Initial characterization activities should focus on information needed for worker protection. Additional sampling to support waste profiling during initial characterization activities will be determined by the removal action project team. Characterization activities to support waste profiling will be performed as waste is generated from the removal activities. Based upon an approved PUREX Complex SAP, additional characterization sampling may also be performed to support a future remedial action, as time and funding allows.

No additional sampling activities are needed for the already identified white powder along Tour Paths 3, 4, and 7. This powder was already sampled and analyzed in accordance with the White Powder SAP, consistent with Administrative Order Docket No 15343. For future hazard abatement, process knowledge will be used whenever possible to characterize any material generated during hazard abatement activities. When process knowledge cannot be used, sampling and analysis will be conducted in accordance with an approved SAP for the PUREX Complex.

2.2.3 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 decontamination or stabilization to complete removal of equipment and waste, as needed, to mitigate hazards. Identification of specific areas or equipment that will receive hazard abatement will be based on S&M activities and current facility inspections. Hazards will be identified, evaluated, and prioritized for mitigation. This includes radiological, chemical, biological, industrial safety, beryllium, and asbestos

hazards. White powder removal will generally be performed using dry methods to the extent possible (e.g., brushing or wiping, and using high-efficiency particulate air [HEPA]-filtered vacuum cleaners with extensions). When the use of wet methods (e.g., wet mopping) is necessary to achieve removal, the associated water will be collected and work will be conducted by trained site workers.

Update Radiological Postings. Currently, many areas throughout the PUREX Complex have conservative radiological postings. As a part of hazard mitigation work, radiological surveys and air monitoring will be performed to establish the correct postings. Postings will be revised, as appropriate, as contributing hazards are mitigated.

Decontamination and Stabilization. Nonradiological hazardous substances will be removed from within and around the buildings/structures as needed to facilitate compliance with the ARARs and to meet waste acceptance criteria for the Environmental Restoration Disposal Facility (ERDF) (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*) or other EPA-approved facilities. Decontamination of equipment or structures, if needed, to support the removal action will generally be performed using dry methods to the extent possible (e.g., brushing or wiping, and using high-efficiency particulate air [HEPA]-filtered vacuum cleaners). When the use of wet methods (e.g., water wash and pressure washers) is necessary to achieve decontamination objectives, the associated water or cleaning solutions will be collected, and work will be conducted by trained site workers in accordance with the following best management practices:

- Decontamination activities will be performed within the area of contamination.
- The amount of water used to clean equipment will be minimized, using raw or potable water.
- Soaps, detergents, or other cleaning agents may be added to wash water as long as there are no regulated levels of constituents present.
- Decontamination fluid/wash water that is collected will be managed in accordance with Section 4.2.2.3.

More aggressive equipment decontamination methods (e.g., grinding or wet grit blasting) may be used if other methods fail. These methods will also be conducted by trained site workers using best management practices to minimize the potential for airborne contamination and waste generation.

Decontaminating or stabilizing process equipment or contaminated ventilation ductwork may involve the use of simple brush, spray, foams, or fixative procedures, or it may require more extensive preparations, including special glovebags, vacuum systems, crawlers, chemicals, and/or other special equipment.

Removing Equipment. Removal of tanks, pumps, and pipes will be evaluated on a case-by-case basis.

The benefit of removal for risk reduction will be determined by the removal action project team.

Equipment being removed will be drained of any free liquids. Pumps will also be drained of any lubricants, oils, hydraulic fluids, or greases. Sampling of the drained liquids will be performed in accordance with an approved PUREX Complex Sampling and Analysis Plan. The liquids will be disposed to the Effluent Treatment Facility (ETF) or other approved facility, or absorbed or solidified for disposal as solid waste at ERDF or other EPA-approved facility.

Egress Pathways. Internal walls in the 202A Building may be partially or fully removed to facilitate emergency egress and removal of equipment for disposal. If needed, an engineering evaluation of the proposed modification will be performed.

2.2.3.1 Hazard Abatement: Removal of White Powder

The scope of the removal of the white powder is described below:

- For floor areas that are within or visible from Tour Paths 3, 4, and 7, remove all visible white powder in all accessible areas of the floor. Accessible means all areas of the floor that can be safely reached by a person using a vacuum with an extension or using wet methods such as use of mops.
- For equipment or other structures that are within or visible from Tour Paths 3, 4, and 7, remove all visible white powder on all accessible areas of the equipment or other structures, up to 5 ft high. Accessible means all areas of the equipment or other structures that can be safely reached by a person using a vacuum with an extension or using wet methods such as use of mops.

2.2.4 Waste Management and Disposal

Several waste streams may be generated from this removal action. It is anticipated that most of the waste will be low-level waste (LLW) and mixed low-level waste (MLLW). Waste will be packaged to meet the applicable waste acceptance criteria of the receiving facilities. Waste will be accumulated, staged, and/or stored within the PUREX area of contamination until such time that the waste is shipped to ERDF or a TSD unit.

Treatment of waste (onsite or offsite) may be necessary prior to disposal at ERDF or other EPA-approved disposal facility. In addition, containerized waste may be returned from offsite segregation or treatment for disposal at ERDF. Liquid waste will be sent to an approved facility, and any treatment residues that meet the waste acceptance criteria may be disposed at ERDF or a TSD unit.

Some materials may be eligible for salvage and recycling, if the appropriate regulatory and project requirements are met and if it is economically feasible for the project to do so.

3 Safety and Health Management and Controls

This chapter describes safety and health management and controls that will be performed for the removal activities.

3.1 Emergency Management

The contractor's Emergency Management Program (including preparedness, planning, and response) contains the administrative responsibilities for compliance with DOE/RL-94-02, *Hanford Emergency Response Plan*, and all applicable DOE Orders. The Emergency Management Program establishes a coordinated emergency response organization capable of planning for, responding to, and recovering from industrial, security, and hazardous substance incidents. Emergency action plans for contractor-managed hazardous facilities identify the capabilities necessary to respond to emergency conditions, provide guidance and instruction for initiating emergency response actions, and serve as a basis for training personnel in emergency actions for each facility.

The emergency response actions within the emergency action plan are provided for recognizing incidents and/or abnormal conditions, initiating protective actions, and making the proper notifications. Emergency response for this project will include required notification to the National Response Center for reportable quantity releases and on-scene coordinator notification for other emergency situations. Notification to the NRC only applies for hazardous substances discovered or released that were not evaluated as part of this CERCLA removal action. Hazardous substances that are subject to this CERCLA removal action are not subject to this reporting requirement because such substances are already subject to CERCLA cleanup authority.

3.2 Safeguards and Security

Access to the Hanford Site is restricted. Unauthorized access to the PUREX Complex is prohibited. The complex buildings are locked, and an approximately 6 ft tall cyclone fence encloses the immediate deactivated area. Access to each removal action area is controlled by the contractor using such items as fences and signs. Access requirements for employees, non-employees, and/or visitors are defined in work planning documentation.

3.3 Safety and Health Program

As the structures in this removal action are contaminated with chemical and/or radiological hazardous substances, a graded approach for health and safety documentation will be used for this action to address chemical, radiological, and physical hazards as described in the following subsections.

3.3.1 Worker Safety Program

The Integrated Safety Management System/Environmental Management System will be incorporated into all work activities. The program includes the following elements:

- Organizational structure specifying the official chain of command and the overall responsibilities of supervisors and employees
- Comprehensive work plan developed before work begins at a site to identify operations and objectives and to address the logistics and resources required to accomplish project goals
- Health and safety documentation will be developed when workers could be exposed to hazardous substances
- Worker training commensurate with individual job duties and work assignments
- Medical surveillance program administered to comply with 29 CFR 1910.120, “Occupational Safety and Health Standards,” “Hazardous Waste Operations and Emergency Response”
- Contractor internal work requirements and processes
- Voluntary protection program

3.3.2 Health and Safety Documentation and Activity Hazards Analysis

Health and safety documentation will be prepared that defines the chemical, radiological, and physical hazards and specifies the controls and requirements for implementing associated hazardous substances cleanup work activities.

Access and work activities are controlled in accordance with approved work packages, as required by established internal work requirements and processes. If deemed necessary, a HASP will address the health and safety hazards of each phase of site operation and include the requirements for hazardous waste operations and/or construction activities, as specified in 29 CFR 1910.120. As part of work package development, a job or activity hazards analysis will be written to identify the hazards associated with specific tasks already not covered under a HASP. The elements included in a HASP are as follows:

- General overview of the hazards associated with the area
- List of employee training assignments
- List of personal protective equipment (PPE) to be used at the work site
- Medical surveillance requirements

- Work site control measures
- Emergency response
- Confined space entry internal work requirements and processes
- Spill containment program

A pre-job briefing will be held with the involved workers. This briefing will include reviews of the hazards that could be encountered and the associated requirements.

3.3.3 Radiological Controls and Protection

The radiological controls and protection program is defined in DOE-approved programs and contractor-approved internal work requirements and processes. The radiological controls and protection program implements the contractor's policy to reduce risks to safety or health to levels that are as low as reasonably achievable (ALARA) and to ensure the adequate protection of workers.[1] The contractor's radiological protection program meets the requirements of 10 CFR 835, "Occupational Radiation Protection." Appropriate dosimetry, PPE, ALARA planning, periodic surveys, and radiological control technical support will also be provided.

A radiological work permit (RWP) will be prepared, as needed, for work in areas with potential radiological hazards. The RWP extends the radiological protection program to the specific work site or operation. All personnel assigned to the project and all work site visitors must strictly adhere to the provisions identified in the RWP.

The standard contractor's controls for work in radiological areas are adequate to control project activities. These controls will identify the specific conditions and will govern the specific requirements for an activity, periodic radiation and contamination surveys of the work area, and periodic or continuous observation of the work by the radiological controls organization. The ALARA planning process will be used to identify shielding requirements, contamination control requirements, radiation monitoring requirements, and other radiation control requirements for the individual tasks conducted during the projects.

Measures also will be taken to minimize impacts to the environment during work activities. Due to the nature of the hazardous substances and the limited locations, potential impacts to the environment are minimal. Worker exposure will be monitored using approved occupational protection methods.

4 Environmental Management and Controls

The chapter describes the environmental management and controls needed to conduct the removal action.

4.1 Applicable or Relevant and Appropriate Requirement Compliance

Removal activities will be performed in compliance with the substantive portions of the identified ARARs to the extent practicable. Waste streams will be evaluated, designated, and managed in compliance with the ARARs. Before disposal, waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

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

ARARs for the removal action are identified in the White Powder Action Memorandum for PUREX (DOE/RL-2019-34). The key ARARs include compliance with standards for waste management, control of releases to the environment, and protection of cultural and ecological resources.

4.2 Waste Management Plan

Management and disposal of wastes resulting from implementation of this RAWP will be performed in accordance with CERCLA and the ARARs specified in the White Powder Action Memorandum for PUREX (DOE/RL-2019-34). Several waste streams will be generated under this removal action. It is anticipated that much of the waste will be designated as LLW. However, quantities of dangerous waste, MLLW may also be generated. Hazardous substances, including white powder, management activities will be performed in accordance with the following ARARs:

- The *Atomic Energy Act of 1954* for management by DOE of radioactive waste.
- As implemented by 40 CFR 260, "Hazardous Waste Management System: General," through 40 CFR 268, "Land Disposal Restrictions," and WAC 173-303, "Dangerous Waste Regulations," RCRA is used for management of dangerous waste. The identification and TSD of hazardous waste and the hazardous component of mixed waste are also governed by RCRA. The State of Washington, which implements RCRA requirements under WAC 173-303, has been authorized to implement most elements of the RCRA program. The dangerous waste standards for generation and storage will apply to the management of any dangerous or mixed waste generated by removal activities at Hanford Site excess industrial buildings/structures and as a result of debris cleanup activities. Treatment standards for dangerous or mixed waste subject to RCRA land disposal restrictions (LDRs) are specified in WAC 173-303-140, which incorporates 40 CFR 268 by reference.

Hazardous substances, including white powder and solid wastes, generated through implementation of this removal action will be disposed at appropriate EPA-approved facilities in accordance with the waste acceptance criteria of those facilities. The Environmental Restoration Disposal Facility (ERDF) is the preferred waste disposal facility for waste meeting ERDF waste acceptance criteria (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria, formerly WCH-191 Rev 4*). Removal debris will be transported to ERDF or other EPA-approved facilities, and treated as necessary, to meet applicable land disposal restriction requirements and waste acceptance criteria prior to disposal.

Waste management activities that may be addressed in the work packages include waste characterization, designation, staging, packaging, handling, marking, labeling, segregation, storage, transportation, and disposal. These activities are briefly described in the following subsections.

4.2.1 Projected Streams

Projected streams anticipated to be generated under this RAWP are identified as follows:

- LLW and MLLW
- Liquids (e.g., decontamination liquids)
- Miscellaneous solid waste (e.g., PPE, cloth, plastic, wipes, wood, equipment, tools)

4.2.2 Waste Management and Characterization

Waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel. Waste specific storage and packaging requirements will comply with the substantive requirements of WAC 173-303, as specified in the ARARs. Miscellaneous solid waste will be managed, as appropriate, for the nonradiological and radiological contaminants present or suspected to be present. The waste characterization process is discussed briefly in Section 2.1.1.2.

Hazardous substances, including white powder, being managed under this removal action is characterized in accordance with the contractor's procedures and the waste acceptance criteria of the receiving facility. The White Powder SAP was prepared and implemented to sample and characterize the white powder. The characterization criteria identified in an approved PUREX Complex SAP will provide the rationale and strategy for conducting sampling and analysis activities. Characterization is performed using a variety of information that includes, but is not limited to, process knowledge, historical analytical data, sampling and analysis, and radiological and chemical screening. An approved PUREX Complex SAP will contain sampling, analysis, and radiological survey requirements to support waste designation and disposal decisions. Characterization data will be used to prepare waste profile summaries to determine appropriate disposal options.

4.2.2.1 Hazardous/Dangerous Waste, Low-Level Waste, and Mixed Waste

These wastes will be managed in a protective manner to prevent releases to the environment or exposure to personnel. Waste specific storage and packaging requirements will comply with the substantive requirements of WAC 173-303, as specified in the ARARs.

4.2.2.2 Solid Waste

Solid waste (e.g., PPE) will be managed, as appropriate, for the nonradiological and radiological contaminants present or suspected to be present. Miscellaneous solid waste that has contacted suspect dangerous or suspect mixed waste will be managed as such. Field screening will be used to segregate radioactive waste from nonradioactive waste. Containers will be properly marked and labeled. The containers will be segregated, as appropriate, and then stored within a designated waste container storage area within the area of contamination or at ERDF. The area of contamination will be established as part of the work planning process. Miscellaneous solid waste will be dispositioned based on waste characterization information.

4.2.2.3 Decontamination Fluids

Although CERCLA removal actions are exempt from the Hanford Site State Waste Discharge Permit (SWDP), decontamination fluids (water and/or nondangerous cleaning solutions) will be discharged if they meet the substantive provisions of the existing SWDP. If the decontamination fluids do not meet the Hanford Site SWDP, fluids generated from cleaning equipment and tools in the area of contamination may need to be contained, sampled, and as necessary, transported or solidified for disposal at ERDF or another EPA-approved facility.

4.2.2.4 Management of Waste Containers

Prior to disposal, dangerous waste containers will be managed in accordance with the substantive provisions of WAC 173-303-200, "Accumulating Dangerous Waste On-Site," as specified in the ARARs. Waste containers are inspected before use to ensure container integrity. The containers will be stored inside the applicable site-specific waste container storage area or area of contamination. Containers awaiting analytical results will be marked and labeled as appropriate. Temporary storage of containers inside of 202A may be necessary while removal actions are performed to employ effective waste management. If stored within the 202A Building CERCLA waste management area, the temporary storage will not exceed 180 days per container. Weekly and quarterly inspections of containers located outside and inside of 202A building respectively, will be performed to document the integrity, container marking/labeling, physical container placement, storage area boundaries/identification/warning signs and sign of any potential leakage. Containers showing signs of deterioration will be identified and will be over-packed or repackaged, as necessary.

Spills or releases will be reported as stated in Section 4.4. In the event of a spill or release, action will be taken to protect human health and the environment.

4.2.3 Waste Handling, Storage and Packaging

Marking, labeling, segregating and staging waste containers will be performed or directed by the waste specialist. Waste containers will be shipped directly to the disposal site. In the event that waste containers need to be temporarily stored pending final disposition, they will be stored within the CERCLA waste management area. Dangerous or mixed waste may also be accumulated in accordance with the substantive generator requirements of WAC 173-303-200.

Applicable packaging and transportation requirements for dangerous or mixed waste generated by the removal action will be identified and implemented before movement of waste. Before being removed from the area of contamination or site-specific waste storage area, containers released from radiologically controlled areas will meet exterior contamination limits. Other waste type specific handling and packaging requirements may be applicable and will be described in the contractor's work documents, as appropriate.

4.2.3.1 Waste Profile

Waste profiling to establish values for the waste tracking form may take place concurrently with removal action activities. Field screening measurements may be used to adjust the waste tracking form. The waste profile may be adjusted (as necessary) through a combination of in-process field screening data and analytical laboratory analyses.

4.2.3.2 Final Waste Disposal

Dangerous, mixed, and radioactive wastes generated through the removal action will be disposed at ERDF. ERDF is the preferred disposal location for waste meeting the facility waste acceptance criteria (ERDF-00011) because it is engineered to meet appropriate RCRA technological requirements for landfills, as described in EPA, 1995, *Record of Decision, U.S. DOE Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington*. If waste cannot be disposed at ERDF, it may be transferred to an EPA-approved disposal facility.

4.2.3.3 Waste Disposal Records

Original sample reports and a copy of the shipping papers for each waste container will be retained and forwarded to the assigned waste specialist for inclusion in the project file following final waste disposal.

4.2.4 Waste Treatment

Treatment of waste generated from the removal action (e.g., grouting, macroencapsulation, solidification, separation, and size reduction) will be performed, if needed. If treatment is deemed necessary to provide safe transport, such treatment may be conducted at the generating site. If treatment is deemed necessary to meet the disposal facility waste acceptance criteria and/or address land disposal restriction requirements, such treatment may be conducted at the generating site or the receiving site. Treatment will be performed at an EPA-approved facility in accordance with 40 CFR 300.400, "General." Residuals from waste treatment originating from the removal action can be disposed at ERDF if they meet ERDF waste acceptance criteria (ERDF-00011).

4.2.5 Waste Minimization and Recycling

Waste minimization practices will be followed to the extent technically and economically feasible during waste management. Introducing clean materials into a contamination area, as well as contaminating clean materials, will be minimized to the extent practicable. Emphasis will be placed on source reduction to eliminate or minimize the volume of waste generated.

4.3 Standards Controlling Releases to the Environment

Airborne emissions associated with the hazard abatement portion of this removal action will be minimized through appropriate work controls in accordance with DOE radiation control and substantive air pollution control standards, to keep Hanford Site air pollutant emissions at ALARA levels. The current existing PUREX Plant air abatement system will continue to be utilized until such time that the PUREX Complex air monitoring plan is approved and issued.

4.4 Reporting Requirements for Nonroutine Releases

The following reporting requirements apply for hazardous substances that could be released during removal activities:

- 40 CFR 302, "Designation, Reportable Quantities, and Notification," requires immediate notification to the NRC on discovery of a release of a hazardous substance into the environment in excess of a reportable quantity.
- 40 CFR 355, "Emergency Planning and Notification," requires immediate notification to the community emergency coordinator for the local emergency planning committee and to the State Emergency Response Commission for a release of a reportable quantity of an extremely hazardous substance, a comprehensive release of a reportable quantity of an extremely hazardous substance, or a CERCLA hazardous substance.
- Emergency response for this project will include required notification to the NRC for reportable quantity releases and On-Scene Coordinator notification for other emergency situations. Notification to the NRC only applies for hazardous substances discovered or released that were not evaluated as part of this CERCLA removal action. Hazardous substances that are subject to this CERCLA removal action are not subject to this reporting requirement because such substances are already subject to CERCLA cleanup authority. Such hazardous substances will be addressed, as required, by the PUREX AM (DOE/RL-2016-53).

4.5 Cultural/Ecological Resources

Cultural and ecological resource reviews will be performed, as appropriate, before starting removal activities. These reviews will be conducted in accordance with DOE requirements. If potential impacts are identified, mitigation action plans will be developed and implemented. The following subsections provide further detail for these reviews.

4.5.1 Cultural

Cultural resource reviews will follow the substantive requirements of the *National Historic Preservation Act of 1966,* Section 106. The removal activities would be performed in areas that have been extensively disturbed by past construction activities.

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 structures have been determined to be contributing properties to the Manhattan Project/Cold War Era Historic District, and they require mitigation through documentation (e.g., completed inventory forms). DOE/RL-97-56 also requires walkthroughs to identify artifacts that are of educational and interpretive value.

Before field activity begins, each structure requiring documentation would be evaluated for the type of documentation required (Historic Property Inventory Form or Expanded Historic Property Inventory Form) and the status of that documentation. Walkthroughs of the structures would be conducted before demolition to finalize all mitigation requirements. Cultural resource review documentation for any specific structure would be finalized before removal activities begin. If able to be removed, tagged artifacts would be collected for long-term curation. At the time of removal, assessments would be made regarding options and the feasibility of long-term curation of tagged artifacts. Tagged artifacts that cannot be removed would be photographed or documented.

Impacts on cultural resources near the removal action will be mitigated in accordance with DOE/RL-98-10, *Hanford Cultural Resources Management Plan*.

4.5.2 Ecological

Ecological reviews will be completed before work begins in areas where there is potential for adverse effects to sensitive or rare biological resources, consistent with existing routine procedures (DOE/RL-95-11, *Ecological Compliance Assessment Management Plan*). Project engineers will consult with the ecological compliance staff in advance of planned activities to allow for sufficient ecological surveys.

If nesting migratory birds are observed, removal activities would be delayed until after the end of the nesting season. Prior to commencing removal activities for 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 plants or animals listed as threatened, endangered, or candidate species under the federal *Endangered Species Act of 1973* are known to be near the structures slated to undergo removal activities. Very little native or natural habitat is present near the structures slated to undergo removal activities. However, care will be taken to avoid or minimize damage to any vegetation, especially shrubs that are near the structures.

Workers will avoid wildlife that may be found in and around the buildings/structures. Appropriate ecological surveys of debris cleanup sites also will be conducted before field activities begin. Procedures to avoid or mitigate damage to sensitive areas identified during ecological reviews will be established before work begins.

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

5 Project Administration

The following sections describe the management approach for implementation of the removal action, including schedule summary information, project team descriptions, training and qualifications, quality assurance and post-removal action activities.

5.1 Cost Summary

The projected cost, as identified in the Action Memorandum, is identified in Table 3.

Table 3. Summary of Present-Worth Cost Estimate

Alternative	Present-Worth Cost
Hazard Abatement portion of Alternative 4: Hazardous substance waste management and disposal.	$2,500,000

Note: Accuracy range of the cost estimate is -30% to +50%.

5.2 Schedule

This removal action will begin following issuance of this RAWP and the removal (i.e. recovery and management) of the white powder associated with Administrative Order (AO) Docket No. 15343 Corrective Action #3 will be completed by the end of April 2021. The remaining schedule for all hazard abatement activities in this removal action, including recovering and managing the remainder of the white powder and removal of the source of the white powder, will be coordinated and addressed in the DOE/RL-2020-04, *Removal Action Work Plan for the Plutonium Uranium Extraction Complex,* which is expected to be issued in FY2021.

This removal action, excluding the AO Docket No. 15343 Corrective Action #3 recover and manage white powder, will be executed using a phased approach based on emergent facility conditions, funding availability, craft/engineering resources availability, and overall interactive site priorities. The removal action work will continue until the issuance of a remedial action record of decision expected in the 2033 timeframe. DOE-RL will be actively planning for potential future PUREX Complex milestones that will establish a schedule for remaining removal actions based on risk.

5.3 Project Team

The project team includes the individuals working to accomplish the removal action. Accordingly, the project team includes the lead regulatory agency (Ecology), lead agency (DOE), DOE-RL Removal Action Manager, contractor removal action organization, site project organization, QA organization, radiological control organization, health and safety organization, sample and data management organization, environmental compliance officer, waste management lead, and other contractor and subcontractor staff.

5.4 Change Management

If a fundamental change to the selected removal action that is not within the scope of work is identified, another engineering evaluation/cost analysis (EE/CA) or an EE/CA addendum and supporting documentation will be prepared to allow DOE to consider a revised removal action.

Established configuration/change control processes ensure that proposed changes are reviewed in relation to the specified commitments. If a breach of these commitments is discovered, work ceases so stabilization and/or recovery actions may be identified and implemented as appropriate. Change management will comply with the appropriate contractor’s procedures.

Determining the significance of the change is the responsibility of DOE. Contractor management is responsible for tracking changes and obtaining appropriate reviews by contractor staff. Contractor management will discuss the change with DOE, and DOE will then discuss the type of change that is necessary with EPA and Ecology. Appropriate documentation will follow.

5.5 Personnel Training and Qualifications

Staff experience and capabilities are important in maintaining worker and environmental safety. Knowledge of ongoing operations, understanding of conditions encountered, and lessons learned will ensure continued safe operations.

Training requirements will ensure that personnel are able to work safely in and around radiological areas and maintain ALARA radiation exposures. Safety courses, training materials, site-specific information, and available technologies will be presented to provide adequate training for workers. Records of required training will be maintained in accessible personnel files.

Health physics workers are required to be current in HPT qualification training. These courses require passing examinations to demonstrate their understanding of theoretical and applied classroom materials.

Specialized training will be provided, as needed, to instruct workers in the use of nonstandard equipment, in the performance of abnormal operations, and in the hazards of specific activities. Specialized training could be provided through on-the-job training activities, classroom instruction and testing, or prejob briefings. The depth of training in any discipline will be commensurate with the degree of the hazard(s) involved and the knowledge required for task performance. Some activities will require the acquisition of expert services as opposed to project staff training.

The contractor training program will provide workers with the knowledge and skills necessary to execute assigned duties safely. A graded approach will be used to ensure that workers receive a level of training commensurate with their responsibility and that complies with applicable requirements. Specialized employee training will include prejob safety briefings, plan-of-the-day meetings, and facility/work site orientations. Training and qualifications will be determined as required by job assignment for specific work activities.

The RWP and activity hazards analysis will include specific requirements for project activities being conducted, which will include personal protective equipment and required training for project personnel.

5.6 Quality Assurance Program

Overall QA for the RAWP will be planned and implemented in accordance with 10 CFR 830, Subpart A, “Quality Assurance Requirements”; EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5; and EPA SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update V*. The QA activities will use a graded approach based on the potential environment, safety, health, reliability, and continuity of operation impacts. Other specific activities will include QA implementation, responsibilities and authority, document control, QA records, and audits.

6 References

10 CFR 830, Subpart A, "Quality Assurance Requirements," *Code of Federal Regulations*. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div6&view=text&node=10:4.0.2.5.26.1&idno=10

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title10-vol4/xml/CFR-2010-title10-vol4-part835.xml.

29 CFR 1910.120, "Occupational Safety and Health Standards," "Hazardous Waste Operations and Emergency Response," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title29-vol5/xml/CFR-2010-title29-vol5-sec1910-120.xml.

40 CFR 260, "Hazardous Waste Management System: General," *Code of Federal Regulations*. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f11ec333d6f059bc4460e6b1e81716f9&rgn=div5&view=text&node=40:25.0.1.1.1&idno=40

40 CFR 261, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations.* Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f11ec333d6f059bc4460e6b1e81716f9&rgn=div5&view=text&node=40:25.0.1.1.2&idno=40

40 CFR 262, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations.* Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f11ec333d6f059bc4460e6b1e81716f9&rgn=div5&view=text&node=40:25.0.1.1.3&idno=40

40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste," *Code of Federal Regulations.* Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f11ec333d6f059bc4460e6b1e81716f9&rgn=div5&view=text&node=40:25.0.1.1.4&idno=40

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr268_main_02.tpl

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*. Available at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?type=simple;c=ecfr;cc=ecfr;sid=953c6c09cceef0ce0a4734624a3bc2c4;region=DIV1;q1=40%20CFR%20300;rgn=div5;view=text;idno=40;node=40%3A27.0.1.1.1.

40 CFR 302, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*. Available at http://homer.ornl.gov/rq/302.pdf.

40 CFR 355, "Emergency Planning and Notification," *Code of Federal Regulations*. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr355_main_02.tpl

Atomic Energy Act of 1954, 42 USC 2011 et seq. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0980/ml022200075-vol1.pdf#pagemode=bookmarks&page=14.

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