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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

18-AMRP-0113

JUN 20 2018

Mr. David Einan, Manager
Office of Environmental Cleanup
Site Cleanup Unit 4
U.S. Environmental Protection Agency
825 Jadwin Avenue, Suite 210
Richland, Washington 99352

Dear Mr. Einan:

ACTION MEMORANDUM FOR THE REDUCTION-OXIDATION FACILITY COMPLEX, DOE/RL-2016-52, DRAFT C

This letter transmits the Action Memorandum for the Reduction-Oxidation Facility Complex, DOE/RL-2016-52, Draft C to the U.S. Environmental Protection Agency for review and comment.

Comments are requested within 45 days of receipt.

If you have any questions, please contact me, or your staff may contact, Al Farabee, of my staff, on (509) 376-8089.

Sincerely,

Joe R. Franco, Assistant Manager
for the River and Plateau

AMRP:PGE

Attachment

cc: See page 2

RECEIVED
JUN 21 2018
EDMC

98

cc w/attach:
J. Bell, NPT
R. Buck, Wanapum
S. Hudson, HAB
M. Johnson, CTUIR
R. Longoria, YN
N. M. Menard, Ecology
K. Niles, ODOE
D. Rowland, YN
S. N. Schleif, Ecology
A. K. Smith, Ecology
Administrative Record (REDOX)
Environmental Portal

cc w/o attach:
S. G. Austin, CHPRC
S. L. Brasher, MSA
S. W. Davis, MSA

DOE/RL-2016-52
Draft C

ACTION MEMORANDUM FOR THE REDUCTION-OXIDATION FACILITY COMPLEX

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

U.S. DEPARTMENT OF ENERGY | Richland Operations Office

P.O. Box 550
Richland, Washington 99352

DOE/RL-2016-52
Draft C

ACTION MEMORANDUM FOR THE REDUCTION-OXIDATION FACILITY COMPLEX

Date Published
May 2018

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

U.S. DEPARTMENT OF ENERGY | Richland Operations Office
P.O. Box 550
Richland, Washington 99352

APPROVED
By Julia Raymer at 1:10 pm, May 31, 2018

Release Approval Date

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Signature Page

Having considered the extent to which the *Action Memorandum for the REDOX Complex* 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. Environmental Protection Agency approves pursuant to Section 7.2.4 of the Tri-Party Agreement Action Plan.

Print Name U. S. Environmental Protection Agency	Signature	Date

Print Name U.S. Department of Energy Richland Operations Office	Signature	Date

2

Executive Summary

This action memorandum (AM) documents the selected alternative to perform the non-time-critical removal action (NTCRA) at the Reduction-Oxidation (REDOX) Complex in the 200 West Area of the Hanford Site. The REDOX Complex structures addressed in this AM include the 202S Building (including the Canyon, Silo, and Annex), 276S Hexone Storage Tanks (276S141 and 276S142), and 293S Nitric Acid and Iodine Recovery Building (293S Building). This AM was prepared in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*,[1] as amended by the *Comprehensive Environmental Response, Compensation & Liability Act of 1980* and *Superfund Amendments and Reauthorization Act of 1986*,[2] and 40 CFR 300[3] This AM was also prepared to meet the intent of U.S. Environmental Protection Agency guidance (*Superfund Removal Guidance for Preparing Action Memoranda*).[4] This approach satisfies environmental review requirements and provides for stakeholder involvement, while also providing a framework for selecting the removal action alternative. An Administrative Record has been established to record information used to support the selected alternative and provide documentation of decisions and the progress of the removal action.

An engineering evaluation/cost analysis (EE/CA) was prepared and released for public comment on the evaluation of alternatives to accomplish the REDOX Complex removal action.[5] The removal action consists of a combination of surveillance and maintenance, hazard abatement, demolition, grouting, and demolition preparation activities.

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[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.

[2] *Comprehensive Environmental Response, Compensation & Liability Act of 1980 and Superfund Amendments and Reauthorization Act of 1986*, 42 USC 9601 et seq. Available at: https://www.gpo.gov/fdsys/pkg/USCODE-2011-title42/pdf/USCODE-2011-title42-chap103.pdf.

[3] 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol27/xml/CFR-2010-title40-vol27-part300.xml.

[4] EPA, 2009, *Superfund Removal Guidance for Preparing Action Memoranda*, Office of Emergency Management, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2014-02/documents/superfund_removal_guide_for_preparing_action_memo.pdf.

[5] DOE/RL-2016-16, 2016, *Engineering Evaluation/Cost Analysis for the REDOX Complex*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0073619H.

The removal action is proposed to occur before a remedial action in order to mitigate potential threats to human health and the environment (HHE). The evaluation and comparison of the removal action alternatives are provided in the REDOX EE/CA, with one alternative presented as the recommended alternative. A public comment and review period (from 12/12/16 through 02/03/17) was held for the REDOX EE/CA. All public comments were resolved.

The removal action supports the overall cleanup objectives identified in the *Hanford Federal Facility Agreement and Consent Order*[6] and considers the remedial actions that will be presented in a future REDOX Complex Record of Decision. Without this removal action, contaminated buildings and structures could potentially have an adverse impact to HHE. The buildings/structures addressed by this NTCRA are chemically and radiologically contaminated.

The U.S. Department of Energy and U.S. Environmental Protection Agency considered four removal action alternatives for the contaminated structures at the REDOX Complex under an NTCRA (Table ES-1).

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

Alternative	Removal Action Description
1	No Action
2	• Continued Surveillance and Maintenance of REDOX Complex Structures • Hazard Abatement of the 202S Galleries • Demolition preparation of the 202S Silo Service Area • Demolition of the 293S Building and the 276S Hexone Storage Tanks • Grouting of the Belowgrade Areas of the 293S Building
3	Alternative 2 actions *plus*: • Demolition preparation of the 202S Annex and Canyon Abovegrade
4	Alternative 3 actions *plus*: • Demolition of the 202S Annex

[6] Ecology, EPA, and DOE, 1989a, *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.

Alternative 4 is selected for this NTCRA (Continued Surveillance and Maintenance with Hazard Abatement of 202S Galleries, Demo Prep of 202S Silo Service Area, Demolition of 276S, Demolition and Grouting of 293S, Demo Prep of 202S Annex and Canyon Abovegrade, and Demolition of 202S Annex). Alternative 4 best meets the removal action objectives, stabilizes large amounts of radiological inventory, and supports future remedial decisions and characterization activities. Waste generated during removal action activities may include, but is not limited to, radiologically and/or chemically contaminated equipment and demolition debris. Equipment includes pumps, pipes, tanks, containers, compressors, ductwork, and electrical components. Demolition debris includes wood, metal, roofing, siding, gypsum, and concrete. The Environmental Restoration Disposal Facility will be the preferred disposal location for waste meeting the facility's acceptance criteria in order to facilitate cost-effective, environmentally protective and efficient disposal.

As detailed in this AM, the selected alternative is cost-effective and reduces long-term risk to HHE.

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Contents

Appendices

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Terms

AM	action memorandum
ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
demo prep	demolition preparation
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
HCA	high contamination area
HCP EIS	Hanford Comprehensive Land-Use Plan Environmental Impact Statement
HHE	human health and the environment
HSTF	Hexone Storage and Treatment Facility
IC	institutional control
NCP	National Contingency Plan
NTCRA	non-time-critical removal action
OU	operable unit
PCB	polychlorinated biphenyl
RAO	removal action objective
RAWP	removal action work plan
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction-Oxidation
ROD	Record of Decision
RWP	radiological work permit
S&M	surveillance and maintenance
SAP	sampling and analysis plan
TBC	to-be-considered
TPA	Tri-Party Agreement

Tri-Parties	DOE, EPA, and Ecology
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TSD	treatment, storage, and disposal

1 Purpose

This action memorandum (AM) documents the selected alternative for a non-time-critical removal action (NTCRA) at the Reduction-Oxidation (REDOX) Complex in the 200 West Area of the Hanford Site (Figure 1). The REDOX Complex structures addressed in this removal action include the 202S Building (including the Canyon, Silo, and Annex), the 293S Nitric Acid and Iodine Recovery Building (293S Building), as well as waste management from closure of the *Resource Conservation and Recovery Act of 1976* (RCRA) 276S Hexone Storage Tanks (276S Hexone Storage and Treatment Facility [HSTF]). The selected alternative is Alternative 4 (Continued Surveillance and Maintenance [S&M] with Hazard Abatement of 202S Galleries, Demolition Preparation [Demo Prep] of 202S Silo Service Area, Demolition of 276S, Demolition and Grouting of 293S, Demo Prep of 202S Annex and Canyon Abovegrade, and Demolition of 202S Annex), as recommended in DOE/RL-2016-16, *Engineering Evaluation/Cost Analysis for the Reduction-Oxidation (REDOX) Complex* (hereinafter referred to as the REDOX engineering evaluation/cost analysis [REDOX EE/CA]). The REDOX EE/CA summarized the site characteristics, established the removal action objectives (RAOs), identified the alternatives, and analyzed the alternatives against the established objectives and applicable or relevant and appropriate requirements (ARARs).

This AM was prepared in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986*; Executive Order 12580, *Superfund Implementation*; and 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan" (hereinafter referred to as the National Contingency Plan [NCP]). This removal action supports the overall cleanup objectives specified in Ecology et al., 1989a, *Hanford Federal Facility Agreement and Consent Order* (hereinafter referred to as the Tri-Party Agreement [TPA]), as revised. The AM has also been prepared to meet the intent of EPA, 2009, *Superfund Removal Guidance for Preparing Action Memoranda*. The performance of this removal action will place the buildings/structures into a configuration that is protective of human health and the environment (HHE). Without remediation of these buildings/structures, a potential threat for release of hazardous substances exists; without action, adverse threats to HHE eventually could occur.

This AM provides a concise written record of the selection and approval of the removal action alternative and includes information related to site history, current activities being performed, threats to HHE, details about the removal action, and project costs. Appendix A identifies the ARARs for this removal action, as previously documented in the REDOX EE/CA (DOE/RL-2016-16). A public comment and review period (from 12/12/16 through 02/03/17) was held for the REDOX EE/CA. All public comments were resolved and are attached in Appendix B.

This removal action is designed to mitigate the risk of release and exposure to hazardous substances from the 202S Building, the 293S Building, and the 276S HSTF while awaiting completion of the CERCLA remedial investigation/feasibility study process and issuance of a future REDOX Canyon Record of Decision (ROD). These alternatives were developed with consideration of the eventual disposition of the REDOX Canyon, which is not included in the scope of this removal action.

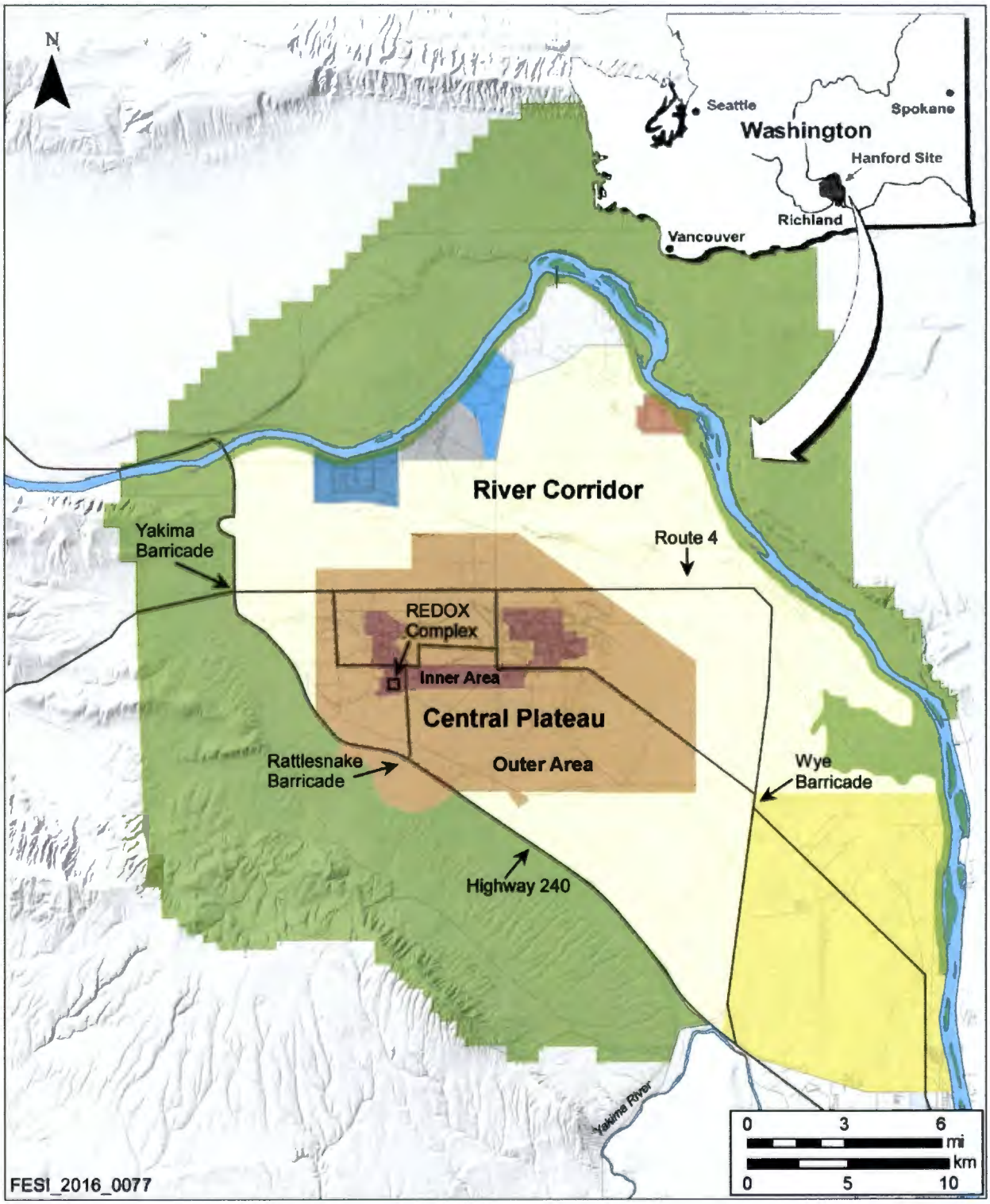

Figure 1. Hanford Site and REDOX Complex Location

2 Facility Description and Background

This chapter provides a brief description of the site, including an overview of the REDOX Complex operational history, a summary of the contaminants, and information regarding the current condition of the 202S Building, 293S Building, and 276S HSTF.

2.1 Facility Description

The Hanford Site encompasses approximately 586 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. Highway 240 is to the southwest of the REDOX Complex, and the Columbia River is north-northeast (Figure 1).

The buildings/structures in the scope of this NTCRA are located within the REDOX Complex in the 200 West Area of the Hanford Site (Figure 2; Table 1). The NTCRA at the 202S Building includes the Crane Cab Gallery, Operating Galleries, Pipe Galleries, Sample Galleries, Storage Gallery, the Canyon Deck, Silo, and Annex. The NTCRA also addresses the 293S Building, as well as waste management from closure of the RCRA 276S HSTF. The closest operational building is the 222S Laboratory and associated support structures; these are not included in the scope of this removal action. Many of the buildings/structures within the REDOX Complex have been, or will be, demolished under DOE/RL-2010-22, *Action Memorandum for General Hanford Site Decommissioning Activities.*

Table 1. REDOX Complex Structures in the Scope of this NTCRA

Structure Identification	Building/Structure Name
202S	REDOX (Including Canyon, Silo, and Annex)
276S141 276S142	276S Hexone Storage Tanks
293S	Nitric Acid and Iodine Recovery Building

2.1.1 202S Building

The 202S Building (REDOX), also known as S Plant within the 200-CR-1 Operable Unit (OU), was constructed between 1950 and 1952 and began operations in 1952. It was the first large-scale, continuous-flow, solvent extraction process plant in the United States. REDOX operations recovered plutonium from irradiated fuel rods. Shutdown activities began in 1967 and were completed in 1969, at which time the REDOX Complex was transferred to long-term S&M.

The 202S Building and support buildings were designed to separate uranium, plutonium, and neptunium as individual product streams from fission products in the irradiated fuel. The building consists of three major substructures: Canyon, Silo, and Annex. The Canyon and Silo are large, heavily shielded metal and concrete structures. The Annex is also a concrete structure and is made up of three subsections: North Annex, Southwest Annex, and East Annex. The building was designed and built with specific containment and confinement features to prevent excessive radiation exposure to workers and the public.

Figure 2. REDOX Complex Buildings and Structures

The 202S Building is composed of nine process cells; Hot Pipe Trench; Wind Tunnel; Crane Cab Gallery; Canyon Deck; and the Operating, Pipe, Sample and Storage Galleries. Figures 3 and 4 provide cross-sectional views of the 202S Building along the west-east and north-south building axes, respectively. S&M activities are performed in accordance with the current S&M plan (DOE/RL-98-19, *Surveillance and Maintenance Plan for the 202-S Reduction Oxidation (REDOX) Facility*). Figures 5 through 8 are plan view illustrations of the building by gallery levels. Major areas of the 202S Building addressed in the NTCRA are described in the following subsections.

2.1.1.1 202S Canyon

The 202S Canyon is a large, multi-story, concrete structure with reinforced-concrete walls. The Canyon, which lies on an east-west axis, contains all of the equipment for the radioactive column feeds, solvent distillation, waste concentration and neutralization, and treatment of process gaseous waste. Abovegrade areas include the Canyon Deck, North and South Pipe Galleries, North and South Operating Galleries, and the Crane Cab Gallery. Approximately half of the building is constructed belowgrade, with processes performed below the Canyon Deck for shielding purposes (Figure 4). Belowgrade areas include the North and South Sample Galleries and the Storage Gallery (located on the south side of 202S). The process cells, Wind Tunnel, and Hot Pipe Trench are belowgrade and below the Canyon Deck.

Canyon Deck

One large room, referred to as the Canyon Deck, extends the entire length of the building, with walls separating it from galleries on the north and south sides, and the floor separating it from the process cells and Hot Pipe Trench. The Canyon Deck floor consists of stepped, removable cover blocks used to access the process cells.

Process Cells

The process cells contain deactivated processing equipment formerly used in spent fuel separations. Nine process cells are located in two parallel rows, with a concrete Hot Pipe Trench and Wind Tunnel between the rows. While preparing for shutdown, all process equipment and piping were flushed to remove contamination; however, residual chemicals from past processing are expected to remain. The process cells are estimated to contain the majority of the chemical and radiological inventory remaining in the 202S Canyon.

Crane Area

An overhead bridge crane spans the total internal width of the Canyon and is electrically operated remotely from the cab in the Crane Cab Gallery, located above the South Operating Gallery (Figure 9). The bridge crane has a 60 ton capacity main hoist, a 10 ton rotating auxiliary hook, and two dual-auxiliary hoists of 0.5 and 1 ton capacities. A second crane has a 2 ton capacity, is electrically operated, and is mounted on a monorail running cross-wise at the east end of the Canyon. The second crane is used for servicing the main crane. The cranes have been deactivated.

Hot Pipe Trench

The Hot Pipe Trench contains a network of transfer piping used to convey product and waste streams between process cells during operations. The Hot Pipe Trench was flushed during shutdown activities to remove and reclaim any product; however, residual contamination is expected to remain.

Wind Tunnel

During operations, the Wind Tunnel provided exhaust ventilation to all process cells and the Silo Tower Shaft. Process equipment discharged offgases directly into the Wind Tunnel.

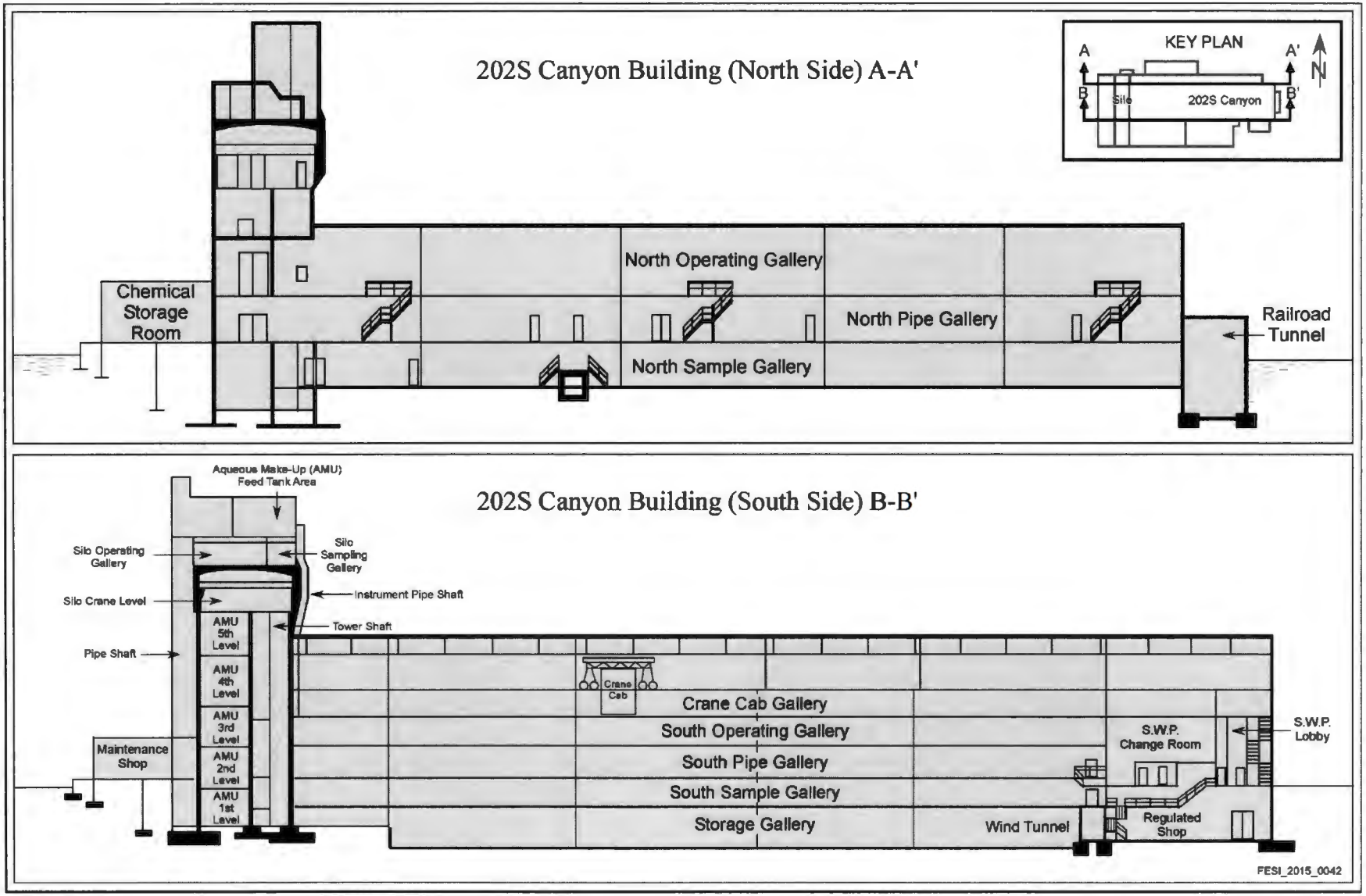

Figure 3. 202S Building Elevation, East to West

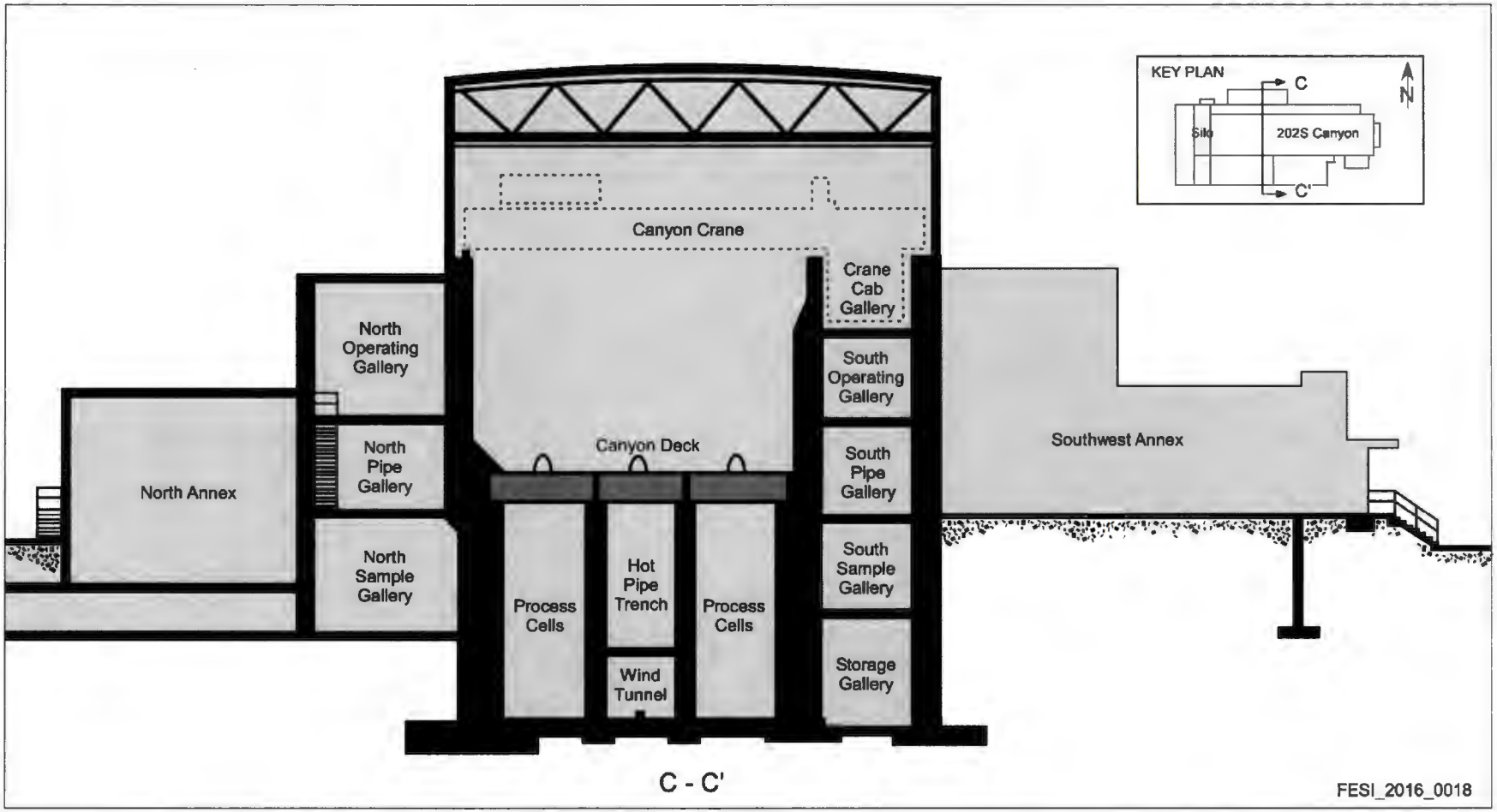

Figure 4. 202S Building Cross Section, North to South (Facing East)

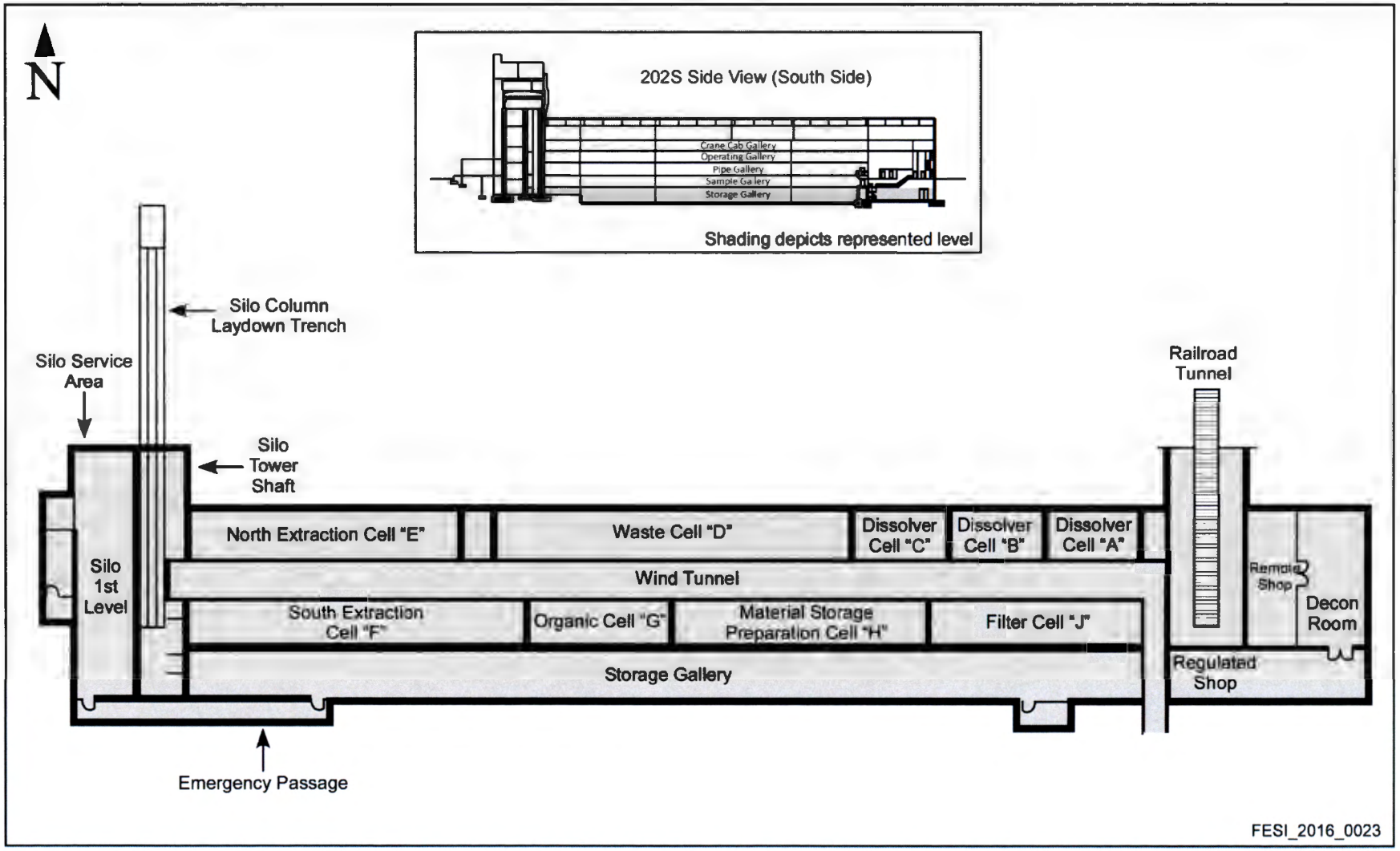

Figure 5. 202S Building Storage Gallery Floor Level

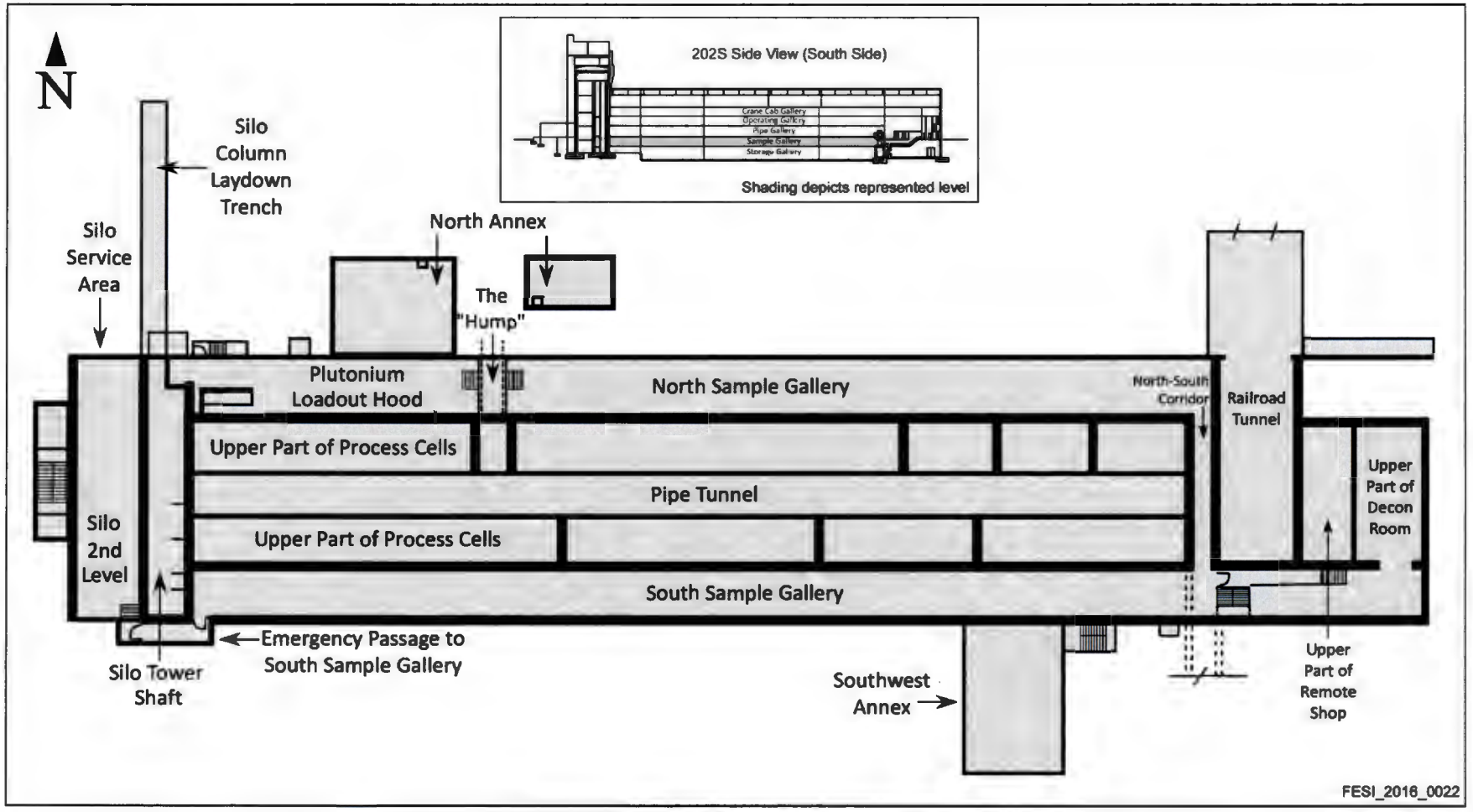

Figure 6. 202S Building Sample Gallery Floor Level

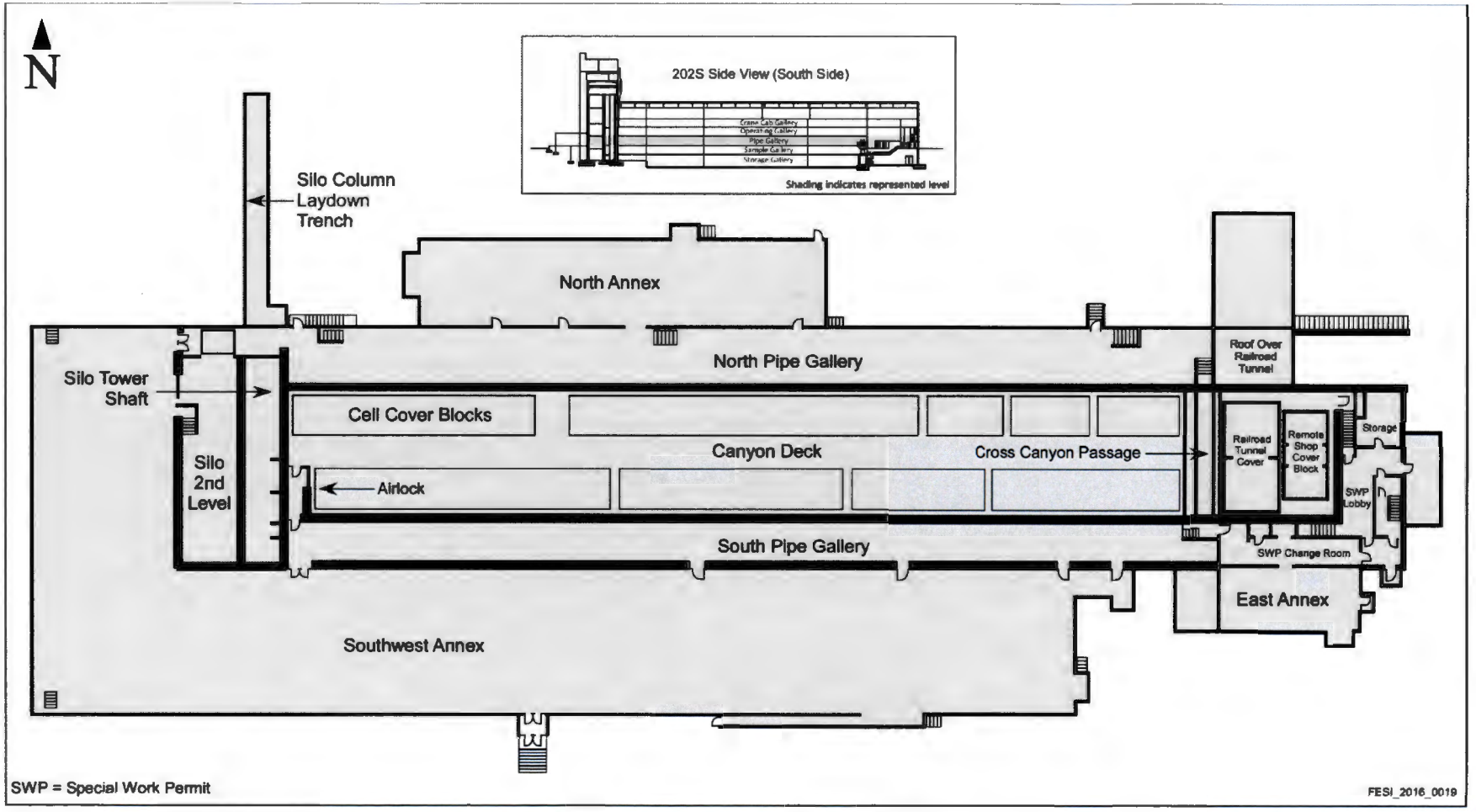

Figure 7. 202S Building Pipe Gallery Floor Level

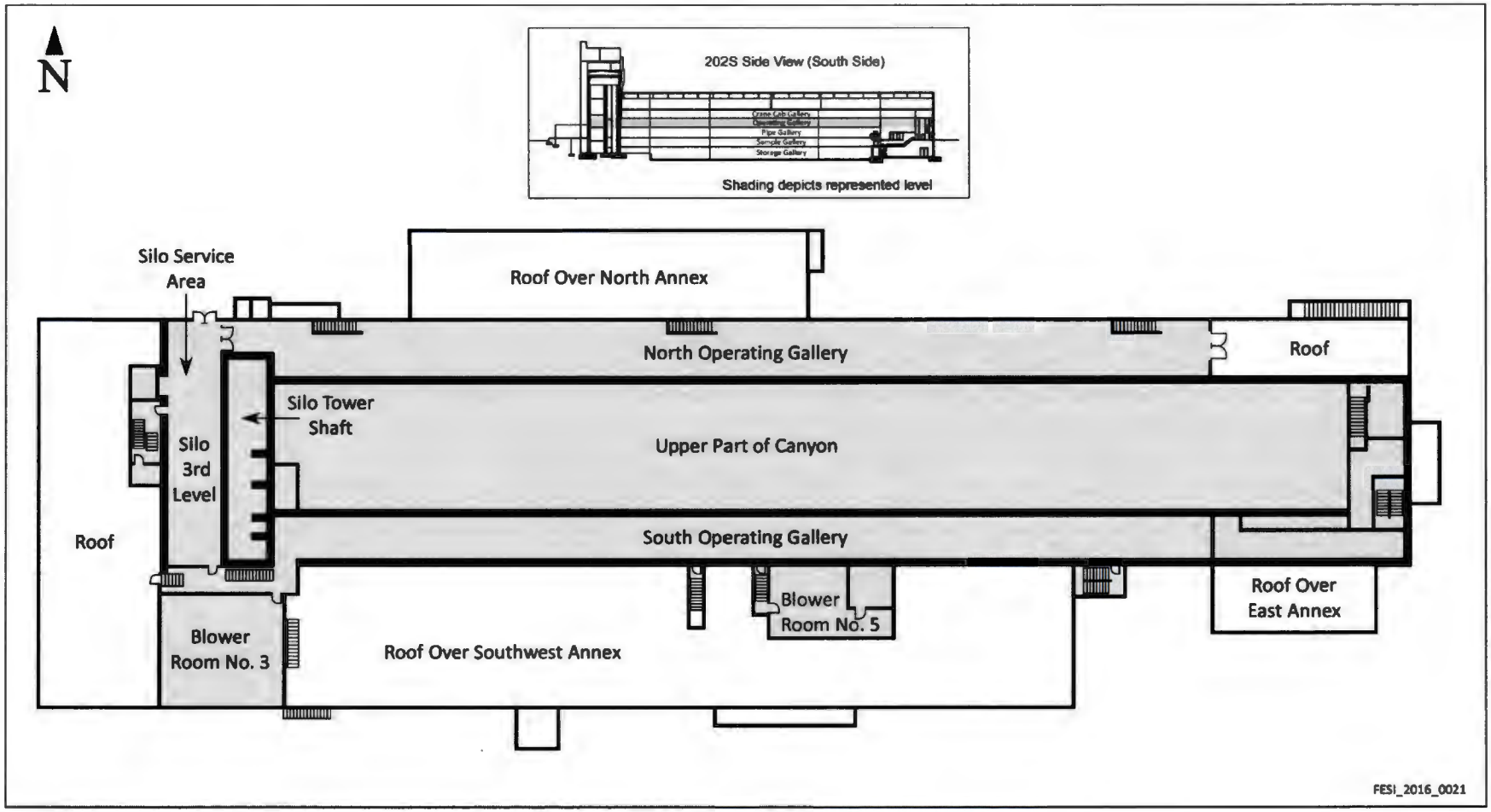

Figure 8. 202S Building Operating Gallery Floor Level

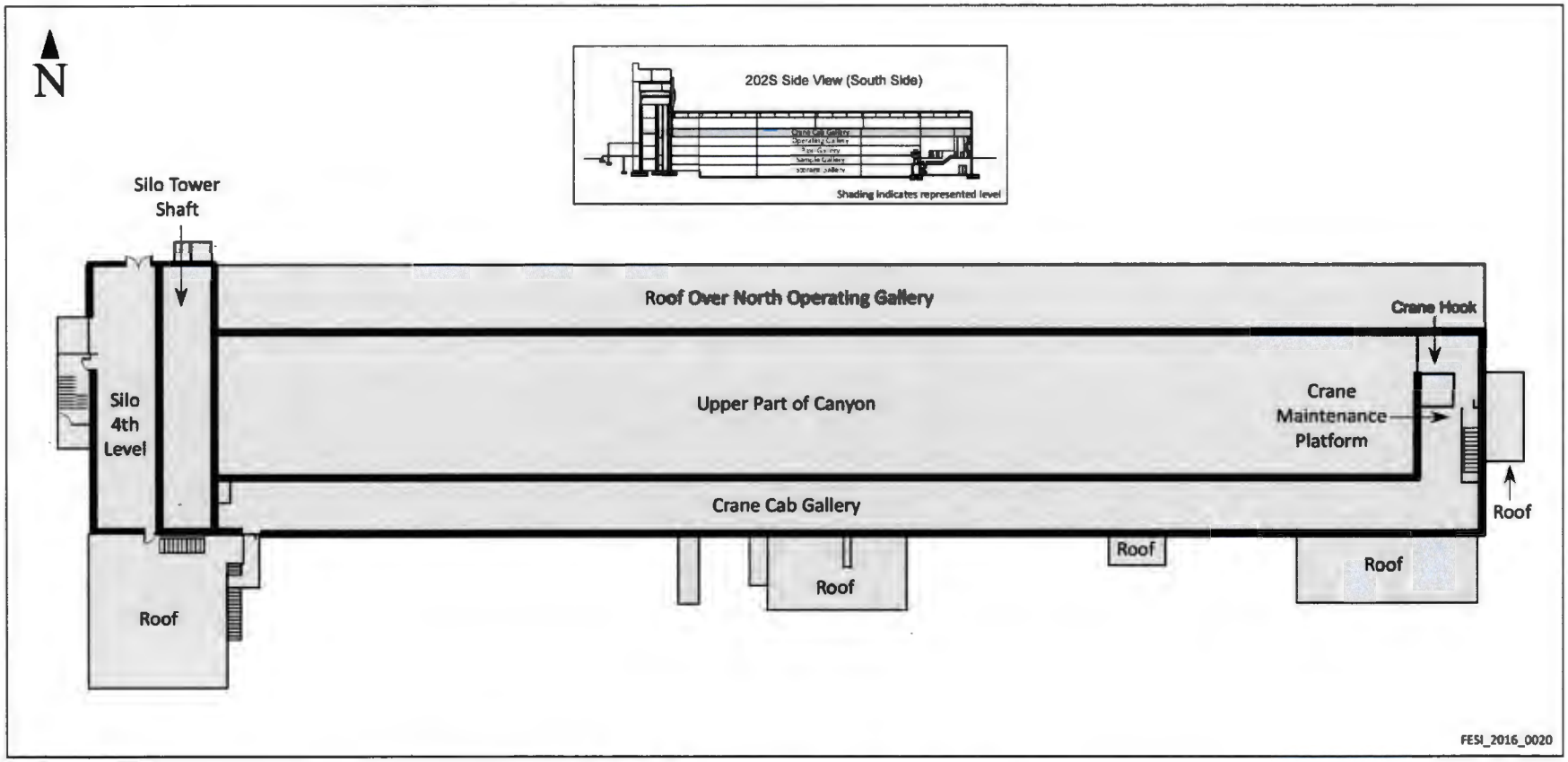

Figure 9. 202S Building Crane Cab Gallery Floor Level

2.1.1.2 Galleries

Sample, operating, and pipe galleries are located along the north and south sides of the Canyon. A Storage Gallery is located below all other galleries on the south side of the Canyon. The galleries contain instrumentation, tanks, and piping that supplied processing areas. Galleries contained water services and supplied air and gases for instrumentation and processes. Figures 5 through 9 are plan view illustrations of the REDOX galleries.

Storage Gallery

The Storage Gallery was used to store support equipment and material. The gallery is located on the south side of the building and is the lowest gallery level (Figure 5).

Sample Galleries

The two sample galleries in the 202S Canyon, the North and South Sample Galleries, are located on the north and south sides of the Canyon (Figure 6). The sample galleries were used to collect radioactive process samples from the process equipment through highly shielded sample boxes on the walls shared between the galleries and the Canyon. Solutions and products were collected using vacuum jets from process streams. The sampling equipment remains in the galleries, and the internal configuration is unknown. In addition to sample boxes, numerous chemical lines run overhead and miscellaneous equipment remains (e.g., carts, tanks, and lead bricks).

North Sample Gallery. On the west end of the North Sample Gallery, a rise with steps known as the Waste Line Tunnel (also called the Hump) runs beneath the gallery. The Hump houses pipelines that diverted waste to the 240S151 Diversion Box north of the 202S Building. The area west of the Hump contains more sample boxes and chemical lines, as well as the Plutonium Loadout Hood.

The Plutonium Loadout Hood, also referred to as the Product Receiver Cage, is located at the west end of the North Sample Gallery (Figure 6). The Plutonium Loadout Hood is an "L"-shaped enclosure for housing equipment that was used for concentrating the plutonium product solution prior to shipment. The Plutonium Loadout Hood is composed of a metal frame supporting a series of stainless-steel and LEXAN™ panels. This enclosure isolates the process vessels and piping inside the hood from the North Sample Gallery. The room is equipped with a stainless-steel-lined floor to support spill recovery.

The Plutonium Loadout Hood operated from 1951 to 1955. Plutonium solutions from separation activities within the 202S Building were piped to the hood for concentration and loadout of the liquid plutonium nitrate product. In 1955, operations in the hood ceased because improved capabilities were provided at the 233S Plutonium Concentration Facility. Upon cessation of operations in the Plutonium Loadout Hood, the system was deactivated. The Plutonium Loadout Hood was historically serviced by a dedicated ventilation system that is no longer active. Ventilation in 202S is currently supplied by the 291S Ventilation System and is exhausted through a sand filter to the atmosphere.

Records and process knowledge indicate that flushing of the piping and vessels in the Plutonium Loadout Hood was performed during the removal of loadout components from the 233S Building. Flushing was accomplished using nitric acid to decontaminate the internals of the hood and ancillary equipment, followed by flushing with water (0200W-US-N0156-02, *Pu Loadout Hood Stabilization*).

™ LEXAN is a trademark of Saudi Arabia Basic Industries Corporation (SABIC) Innovative Plastics, Houston, Texas.

The Plutonium Loadout Hood is radiologically contaminated and was stabilized in 1999 to prevent the spread of contamination during S&M activities (BHI-01255, *Interim Characterization Report for the REDOX Plutonium Loadout Hood*; 0200W-US-N0156-02). Planned activities initiated in 1999 consisted of stabilizing the Plutonium Loadout Hood, decontaminating in the North Sample Gallery, and stabilizing former process and waste lines. The Plutonium Loadout Hood stabilization involved placing absorbent material in the sump, sealing the Plutonium Loadout Hood, and isolating the sampler hoods in the North Sample Gallery from the EF-8 exhaust system.

South Sample Gallery. The South Sample Gallery was used to collect samples from the process cells through highly shielded sample boxes on the walls shared between the galleries and the Canyon (Figure 6). Solutions and products were collected using vacuum jets from process streams. This equipment remains, and the internal configuration is unknown. In addition to sample boxes, numerous chemical lines run overhead, and miscellaneous equipment remains (e.g., carts, tanks, and lead bricks).

Pipe Galleries

Two pipe galleries, the North Pipe Gallery and the South Pipe Gallery, contain piping and junctions that were used to transfer nonradioactive chemicals during plant operations (Figure 7).

Operating Galleries

Two operating galleries, the North Operating Gallery and the South Operating Gallery, are located on the north and south sides of the Canyon and are the highest gallery level (Figure 8). The operating galleries include instrumentation panels, control valves, and tanks that were used during operations.

2.1.1.3 East End Rooms

During REDOX operations, tanks, piping, and other equipment were removed by remote handling to a maintenance area located at the east end of the Canyon (Figure 5). The maintenance area consists of a lobby used as a central staging area and the Hot Shop, Decontamination Room, and Regulated Shop.

Hot Shop

Also known as the Remote Shop, the Hot Shop is two-stories high and is located to the east of the Storage Gallery and the North and South Sample Galleries, directly east of the Railroad Tunnel. The Hot Shop includes a removable ceiling panel (cover block) that provides access into the Canyon process area. Equipment, tools, and other supplies could be transferred between the Canyon Deck and Hot Shop using the overhead crane. The Hot Shop is equipped with a stainless-steel floor and a hot drain where contaminated equipment was flushed and rinsed with decontaminants. The floor of the Hot Shop is known to be contaminated due to the nature of the work conducted in this room. Surface contamination consists of mixed fission products.

Decontamination Room

Equipment and tools delivered to the Hot Shop from the Canyon process area were likely contaminated from processing activities. Equipment requiring repair or modification, as well as any tools used in contaminated areas, was moved to the Decontamination Room to undergo decontamination to reduce or remove contamination. The Decontamination Room contains two hooded sinks equipped with water, steam, and acid service for further decontamination of equipment. Decontamination activities were conducted under a ventilation hood.

Regulated Shop

Following decontamination, equipment would undergo contact maintenance in the Regulated Shop. Maintenance was performed under controlled conditions in the Regulated Shop.

Special Work Permit Lobby

The special work permit lobby is a central staging area that is accessed through an air lock on the South Pipe Gallery level (Figure 7). The SWP lobby provides access to the Health Instrument Storage Room, as well as a stairwell that leads to the Canyon Deck.

2.1.1.4 202S Silo

The Silo is an eight-story structure located at the west end of the main Canyon structure. The Silo is segregated into two parts: Silo Service Area and Silo Tower Shaft (Figure 10).

Silo Service Area

The Silo Service Area has eight levels, the first five of which are aqueous makeup levels. The sixth level is occupied by the Silo crane, and the Silo operating gallery and sample galleries are on the seventh level. The eighth level contains the blower room and feed tank area.

Silo Tower Shaft

The Silo Tower Shaft area is separated from the Silo Service Area by concrete shielding. The tower shaft contains 13 solvent extraction columns and process jumpers. The columns were remotely operated from the overhead crane. Chemicals were gravity fed from the aqueous makeup feed tanks to the columns. The solvent extraction columns were brought into the facility through the Column Laydown Trench, located on the north side of the Silo. The tower shaft is highly contaminated because of the chemicals that were used and the radionuclides that were processed.

Column Laydown Trench

Columns were transferred in and out of the tower shaft through an underground tunnel known as the Column Laydown Trench (Figure 5). The Column Laydown Trench, located beneath the Silo Tower Shaft and extending underground to the north of the 202S Building, was designed to facilitate the replacement of failed columns during processing. The Column Laydown Trench is radioactively contaminated.

2.1.1.5 202S Annex

The 202S Annex is separated from the main Canyon structure by massive concrete shielding. Three sub-annexes comprise the REDOX Annex (Figures 6 through 9). These areas include offices, administrative support areas, and equipment rooms.

North Annex

The north service area contains two switchgear rooms, a wet cell battery room, a blower room, two cable rooms, the former electric shop, and an office.

Southwest Annex

The south and west service areas contain three blower rooms; a cable room; a compressor room; a switchgear room; and the former chemical storage, equipment, shop, and offices.

East Annex

The east-end segment of the Annex contains the former Hot Shop and the Railroad Tunnel access to the Canyon processing area. This area is used to access the 202S Canyon for ongoing S&M activities.

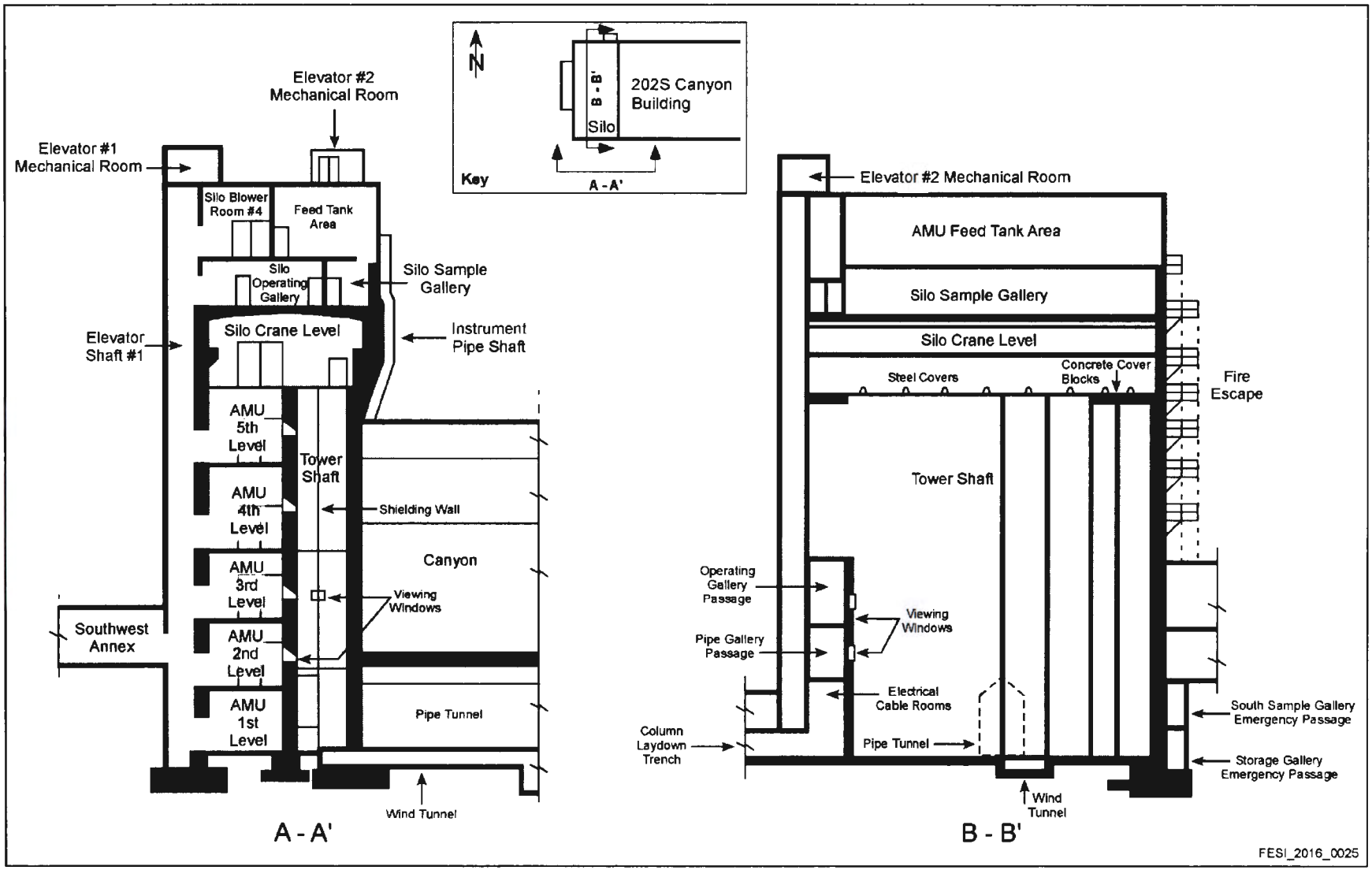

Figure 10. 202S Building Silo Cross Section and Elevation View

2.1.2 276S Hexone Storage Tanks (276S141 and 276S142)

Two hexone tanks (276S141 and 276S142) are buried north of the 276S Building. These single-shell, carbon-steel storage tanks each have a capacity of 24,000 gal and were formerly used to store makeup solvent for the REDOX Complex during operations. From 1990 through 1992, 35,000 gal of the solvent remaining in the tanks were recovered, distilled, and incinerated at an offsite location. The process used to drain and flush the waste solvent is discussed in WHC-EP-0570, *The Distillation and Incineration of 132,000 Liters (35,000 Gallons) of Mixed-Waste Hexone Solvents from Hanford's REDOX Plant.* Residual sludge in the tanks from the distillation process was grouted as an interim closure action in 2002 (HNF-13830, *Documented Safety Analysis for the Reduction-Oxidation Facility*). The tanks are left in place, pending final removal. As specified in DOE/RL-2009-112, *Hexone Storage and Treatment Facility Closure Plan*, the HSTF will be clean-closed by complete removal of the tanks and surrounding contaminated soil. Waste generated from clean closure activities will be disposed under this NTCRA.

2.1.3 293S Nitric Acid and Iodine Recovery Building

The 293S Building is located to the east of the 202S Building, directly south of the 291S Ventilation System. The 293S Building housed the nitric acid and radioactive iodine recovery processes. The recovered nitric acid was stored in an underground, cylindrical, stainless-steel nitric acid storage tank, located directly west of the 293S Building; the tank is currently empty. The acid fumes were captured in a nitric acid absorber, and radioactive iodine was removed using a caustic scrubber system and sent for disposal.

2.1.4 Anticipated Future Land Use

The reasonably anticipated future land use for the portion of the Central Plateau Inner Area where the 200-CR-1 OU is located is designated as industrial.

The U.S. Department of Energy (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. A 1992 report (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 issuance of the Drummond (1992) report, DOE issued DOE/EIS-0222-F, *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 (DOE/EIS-0222-SA-01, *Supplement Analysis: Hanford Comprehensive Land-Use Plan Environmental Impact Statement*) in 2008.

The HCP EIS (DOE/EIS-0222-F) 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 and related activities." The 2008 supplement analysis (DOE/EIS-0222-SA-01) reconfirmed the land-use designations identified in the HCP EIS 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 Drummond (1992) and in the HCP EIS (DOE/EIS-0222-F) is only a portion of the area now commonly known as the Central Plateau. The current 75 mi^2 area of the Central Plateau also encompasses a portion of the land identified in earlier 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, which will be dedicated to permanent waste management and containment of residual contamination.

2.2 Other Actions to Date

This section describes previous and current actions implemented at the REDOX Complex.

2.2.1 Previous Actions

Various soil and groundwater investigations have been conducted in the 200 West Area of the Central Plateau, including at the HSTF and nearby 233S Plutonium Concentration Facility.

The 276S HSTF was permitted under RCRA and the Hanford Facility RCRA Permit (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act of 1976 (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*) modification for waste storage and treatment. In accordance with Section 6.0 of the TPA (Ecology et al., 1989a) and WAC 173-303, "Dangerous Waste Regulations," a closure plan was prepared for the REDOX Complex retired hexone storage tanks (276S141 and 276S142) in 2010 (DOE/RL-2009-112). The closure plan presented the process to close the HSTF, which is a RCRA treatment, storage, and/or disposal (TSD) unit. The closure plan includes a sampling and analysis plan (SAP) (DOE/RL-2009-116, *Sampling and Analysis Plan for the Hexone Storage and Treatment Facility Closure Plan*) that details the sampling and analysis for the HSTF. The Washington State Department of Ecology (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.

Previous activities supporting closure of the 276S HSTF included removing and distilling waste in 1992. A petition was submitted to Ecology to allow for a site-specific variance from land disposal restrictions because a small amount of residual mixed waste was present in the tank at the time of interim stabilization. The waste was observed as a uniform, tar-like layer across the tank bottom, with a dried, cracked surface. In 2002, void space in the tank was grouted to prevent accumulation of flammable vapors.

Portions of the 276S HSTF to be clean-closed under the closure plan include the grouted tanks (276S141 and 276S142), associated centrifugal transfer pumps, approximately 42 ft of underground piping, aboveground vent piping, and underlying soil. The closure plan identifies the clean closure performance standards and the physical closure activities necessary to achieve clean closure.

Clean closure of the 276S HSTF and associated piping will be achieved by removal and disposal, as well as removal of any soil contaminated above numerical clean closure standards. Underground tank piping (200-W-230-PL) and aboveground piping associated with the pumps constitute the tank system ancillary piping within the TSD unit boundary and the scope of closure (DOE/RL-2009-112). Soil beneath the tanks and piping will be clean-closed through visual inspections and soil verification sampling. If releases to soil occur, the contaminated soil will be removed and the soil from the removal area will be sampled in accordance with the approved SAP (DOE/RL-2009-116) to verify achievement of clean closure standards. The 276S HSTF will be clean-closed by demolition and removal, as proposed by the

alternative selected in this AM. Waste generated from this closure activity will be managed as part of this removal action.

Although the 233S Plutonium Concentration Facility is not within the scope of this removal action, the previous investigation and removal action of this structure is provided here for information. The removal action of 233S was warranted per Memorandum 0047268, *Removal Action at the 233-S Plutonium Concentration Facility, United States Department of Energy (USDOE) Hanford Site, Benton County, Washington*. The removal action included removing radioactive material, removing facility equipment and systems, decontaminating facility surfaces, dismantling facility structures, and disposing of waste at the Environmental Restoration Disposal Facility (ERDF). Implementation guidance for the removal activities was provided in DOE/RL-97-08, *Removal Action Report for the 233-S Plutonium Concentration Facility*.

Multiple buildings/structures within the REDOX 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.*

Previous additional investigations or removal actions have not been performed for any other buildings or structures addressed by this NTCRA.

2.2.2 Current Actions

S&M activities are being performed in accordance with the current S&M plan (DOE/RL-98-19).

2.3 U.S. Environmental Protection Agency, State, and Local Roles

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 of Ecology et al., 1989b, *Hanford Federal Facility Agreement and Consent Order Action Plan* (hereinafter referred to as the TPA Action Plan), which cites and is consistent with Executive Order 12580.

In anticipation of the National Priorities List designation (40 CFR 300, Appendix B, "National Priorities List"), DOE, the U.S. Environmental Protection Agency (EPA), and Ecology (also known 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 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.

Appendix J of the TPA Action Plan (Ecology et al., 1989b) lists the 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 of the TPA) to be subject to removal or remedial action under CERCLA. Each facility listed in Appendix J that has undergone evaluation, as required by Section 8.1.4 of the TPA Action Plan and is designated as a Tier 1 facility, Tier 2 facility, or neither. Facilities that have not yet been evaluated as required by Section 8.1.4 of the TPA Action Plan are identified as "To Be

Determined." The buildings/structures listed in the REDOX EE/CA and not included in Appendix J, or those buildings/structures designated as a tier To Be Determined, will be subject to a facility evaluation and, with concurrence from the lead regulatory agency, will be added to Appendix J of the TPA Action Plan.

The REDOX EE/CA constitutes the facility evaluation, as required by Section 8.1.4 of the TPA Action Plan (Ecology et al., 1989b) for the 293S Building. The 293S Building will be included in this removal action as a Tier 1 facility based on the level of contamination contained within this structure. The 276S Building is not in the scope of the REDOX EE/CA, only tanks 276S141 and 276S142 are in-scope. The 202S Building (including the Canyon, Silo, and Annex) is already designated as a Tier 1 facility in Appendix J. Approval of a change to Appendix J (Ecology et al., 1989a) is to be completed in accordance with Section 12.0 ("Changes to the Agreement") of the TPA (Ecology et al., 1989a).

As documented in Appendix J of the TPA Action Plan (Ecology et al., 1989b), DOE and EPA have determined that the ultimate CERCLA response action for the REDOX Complex 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 REDOX Complex. Any removal action undertaken pursuant to this 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 the NCP (40 CFR 300.415(d), "Removal Action"). For contaminated solid waste generated in support of Alternative 4, ERDF is the recommended disposal location for waste meeting ERDF waste acceptance criteria (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria formerly WCH-191 Rev 4*). If transuranic (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 WIPP (HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria).*

3 Threats to Human Health or the Environment

The REDOX Complex buildings/structures are, to different degrees, contaminated with both radioactive and chemical substances that were used or generated during facility operations and waste management activities. 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. A Removal Action Work Plan (RAWP) and a SAP are being prepared to provide removal action guidance and to support the characterization of the building/structure waste. As the lead regulatory agency for this action, the EPA will approve the RAWP and SAP.

Some hazardous substances were removed during the shutdown period; however, not all hazardous materials were removed. During the shutdown period, actions were not taken to characterize or document the remaining hazards and inventory. Some of the hazardous substances were removed from buildings and structures as part of routine S&M activities. In addition to radiological and chemical hazards, structural hazards exist due to structural degradation of the buildings/structures. Degradation of structural integrity could result in partial or total loss of radiological material, confinement, and/or worker injury.

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. TRU waste is also anticipated to be present.

The following chemical hazards may be present within the REDOX Complex. The buildings/structures contain 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, but are not limited to, one or more of the following materials:

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

Table 2 summarizes the hazard conditions noted from 2007 to 2015 during annual surveys of REDOX Complex buildings/structures. The primary hazardous substances associated with the 202S Building and ancillary structures are radioactive materials. Primary radionuclide contaminants include, but are not limited to, uranium-234, uranium-235, uranium-238, plutonium-239/240, americium-241, and mixed fission products such as strontium-90, cesium-137, cobalt-60, europium-152, and europium-155. The majority of contaminants are found in the form of adherent films and residues within the structures. Table 3 presents the inventory estimates for the REDOX Complex, as reported in the REDOX Safety Analysis (HNF-13830).

These substances pose a potential risk of airborne exposure to human and biota receptors if the buildings/structures degrade to a sufficient degree to cause volatilization of hazardous substances contained within the buildings/structures.

Table 2. Current Hazard Conditions

Area	Documented Condition
Canyon Deck	The Canyon Deck has not been entered since 1997. Conditions on the deck are not known at this time. Based on current conditions in areas where surveillance inspections are performed, water accumulation, animal intrusion, structure deterioration, and contamination spread are expected.
Silo (Service Area)	Substantial structural deterioration has been observed in the Silo. Significant water stains, dirt deposits, animal intrusion, and chemical stains are noted on all levels of the Silo. White chemical crystals and powder are found on a number of tanks, flanges, valves, and pipes. Characteristics of all of the chemical residues are not known at this time. Deteriorated asbestos insulation has also been noted on most levels.

Table 2. Current Hazard Conditions

Area	Documented Condition
Plutonium Loadout Hood Area	The Plutonium Loadout Hood contains a large quantity of radiological inventory (140 Ci of plutonium and 840 Ci of strontium-90). Surveillance reports indicate that radiological contamination has been spreading in every entry from 2012 to 2015. In 2012, the surveillance inspection of the west end of the North Sample Gallery was halted because water was observed running down the loadout hood, and the contamination level in the gallery exceeded RWP limits. The HCA boundary was extended to the east. In 2013, high contamination levels were again found outside of the established HCA boundary. The boundary was further extended to the east. This area was not entered since then, but contamination continues to spread. In 2015, the RWP was voided again after nearing the Hump.
North Sample Gallery	Plutonium nitrate residue remains in the H-4 line prior to shut down. Where leaks were expected, two plastic bags were taped to the line to collect the drip. In 2016, these two bags were removed from the pipelines and the leaking flange or valve was sealed to prepare the area for further hazard mitigation activities. HCAs along the sample boxes are spreading, contaminated water intrusions are resulting from the leaking roof, and expansion joints are spalling. The survey route is limited to a walk path.
South Sample Gallery	Expansion joint filler is deteriorated and crumbled on the floor. Water intrusions were evident. Leaking mercury from manometers was noted. The survey route is limited to a walk path.
North Pipe Gallery	Multiple chemical leaks in both liquid and solid form, water intrusions, and degraded asbestos insulation were noted in the surveillance inspection report. Areas of sagging pipe and chemical leaks have been isolated.
South Pipe Gallery	Water stains and white chemical crystals throughout the gallery were reported. In 2015, radiologically contaminated water migrated in the west end of the gallery and resulted in an HCA. Since then, the area was covered with craft paper and downposted to a contamination area.
North Operating Gallery	Multiple chemical leaks, water intrusions, and degraded asbestos insulation were noted in the surveillance inspection report.
South Operating Gallery	Radiological contamination has spread, possibly due to roof leakage or rain seeping through expansion joints. HCAs were established in the gallery. Oily chemical leaks were noted in the surveillance report.
Storage Gallery	Stains due to water intrusion were observed throughout the gallery. In 2014, the surveillance inspection of the Storage Gallery was stopped due to high levels of contamination that exceeded RWP limits. The area was entered again in 2015.

HCA = high contamination area
RWP = radiological work permit

Table 3. Estimated REDOX Complex Radioactive Material Inventories

Location	Type	Inventory
202S Building Canyon (including process cells, equipment and piping, and deck)	Plutonium-239	1,500 Ci alpha (24.5 kg plutonium-239)
	Strontium-90	9,000 Ci beta (64 g strontium-90)
202S Building North Sample Gallery, Plutonium Loadout Hood	Plutonium-239	140 Ci alpha (2,155 g plutonum-239)
	Strontium-90	840 Ci beta (6.0 g strontium-90)
202S Building North Sample Gallery (excluding Plutonium Loadout Hood); South Sample Gallery; North and South Operating, Pipe, and Storage Galleries	Mixed fission products, plutonium, and americium in hoods, ducting, and piping; also present as surface contamination	Residual amounts, included in inventory estimates for the Canyon
202S Building Remote Shop (east end of the Canyon at the cell floor level)	Mixed fission products, plutonium, and americium present as surface contamination	Minor residual amounts, included in inventory estimates for the Canyon
202S Building Silo	Mixed fission products, plutonium, and americium in hoods, ducting, and piping; also present as surface contamination	Included in inventory estimates for the Canyon
293S Building	Mixed fission products, plutonium, and americium present as surface contamination and contamination in equipment	4 Ci beta activity, 1 Ci alpha
276S Hexone Tanks	Mixed fission products, plutonium, and americium; contamination is present in fixed and hardened residue	Assumed to be 250 gal of distillation sludge and 30 gal of hexone-contaminated liquid

4 Endangerment Determination

Security controls, including administrative and physical access controls, are currently in place to limit unauthorized entry to the Hanford Site. Only authorized and trained personnel are allowed entrance into areas with existing hazards. As long as DOE retains control of these areas, existing institutional controls (ICs) will prevent direct contact with and exposure to hazardous substances. However, ICs would not prevent deterioration of the buildings/structures and potential release of contaminants 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/structures age and deteriorate. Contaminants could also be released to the environment indirectly through animal and human intrusions.

As the REDOX Complex buildings/structures continue to age and degrade without active intervention, the likelihood of release of and subsequent exposure to hazardous substances increases. The S&M activities required to confine the hazardous substances may increase the risk of potential exposure to personnel. In some cases, removal of buildings/structures will accommodate access for remediation of

identified waste sites. The potential exposure to HHE, the potential threat of future releases, and the substantial risks associated with the hazardous substances in the buildings/structures addressed by this AM justify use of removal action authority in accordance with the NCP (40 CFR 300.415).

5 Proposed Actions and Estimated Costs

The alternatives evaluated in the EE/CA (DOE/RL-2016-16) are discussed in this chapter in Section 5.3. The purpose of these alternatives is to mitigate the risk of release and exposure to hazardous substances from the 202S Building, the 293S Building, and the 276S HSTF. These alternatives were developed with consideration for eventual disposition of the 202S Building, which is not included in the scope of this NTCRA.

5.1 Selected Removal Action

The selected removal action is Alternative 4: Continued S&M with Hazard Abatement of 202S, Demo Prep of 202S Silo Service Area, Demolition of 276S, Demolition and Grouting of 293S, Demo Prep of 202S Annex and Canyon Abovegrade, and Demolition of 202S Annex. Alternative 4 will ensure that hazardous substances are placed in a protective and safe condition for the foreseeable future. The following activities are included in the selected removal action:

- S&M activities would continue at the REDOX Complex in accordance with the most current S&M plan (DOE/RL-98-19). The S&M plan may be revised to reflect the current facility conditions and identify appropriate surveillance requirements, as needed.
- Hazard abatement activities in high-priority areas to mitigate hazards in the 202S Canyon will be performed, which may range from stabilization to complete removal of equipment and waste, as needed. 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.
- Demo prep of the Silo Service Area, the 202S Annex, and abovegrade areas of the 202S Canyon will occur, including activities such as general housekeeping and removing equipment and waste. Decontamination, fixing/stabilization of contamination, and isolation of systems may be performed.
- Demolition of buildings and structures associated with the 293S Building, the 276S HSTF, and the 202S Annex. The areas will be stabilized (e.g., backfilled, contoured, and vegetated) as necessary and appropriate. Demo prep will take place prior to all demolition activities. Demolition will be performed in a manner that is protective of HHE and that reduces or eliminates the need for ongoing S&M activities.
- Grouting of belowgrade structures associated with the 293S Building will be performed to reduce the mobility, solubility, and/or toxicity of the structures and support final disposition. Structures and systems including piping, utility systems, and structural steel may be abandoned in place and grouted. Residual radioactive materials in proposed grouted areas will remain in place and will be managed in accordance with DOE/RL-2001-41, Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions and RCRA Corrective Actions. Void spaces will be grouted as necessary and/or backfilled as appropriate and practicable. A controlled density fill material (e.g., grout or other similar material) may be installed to stabilize the void space, provide shielding, and facilitate demolition and/or future removal or remedial actions.

Removal action alternatives for mitigating the risk of release and exposure to hazardous substances from the 202S Building, the 293S Building, and 276S HSTF were identified and evaluated in the REDOX EE/CA (DOE/RL-2016-16) for effectiveness, implementability, and cost. The selected removal action is

the most cost-effective alternative that reduces long-term risk to HHE and is consistent with and a contributor to the efficient performance of Hanford Site long-term remedial actions. The REDOX EE/CA is available in the Administrative Record.

5.2 Contribution to Remedial Performance

The removal action alternatives were developed in consideration of a future REDOX Canyon ROD, which would include evaluation of remedial actions similar to those described in the 221U Canyon Building ROD (EPA et al., 2005, *Record of Decision, 221-U Facility (Canyon Disposition Initiative), Hanford Site, Washington*). The selected removal action is consistent with and would support a final disposition similar to that described in the 221U Canyon Building ROD. 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 removing waste from abovegrade-level galleries and the Canyon Deck and also grouting the internal spaces below the Canyon Deck level. Both 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 actions are still ongoing.

5.3 Alternatives Evaluated in the Engineering Evaluation/Cost Analysis

DOE and EPA considered four removal action alternatives to mitigate the risk of release and exposure to hazardous substances from the 202S Building, 293S Building, and 276S HSTF, as shown in Table 4. The REDOX EE/CA (DOE/RL-2016-16) identified and evaluated each of these alternatives. The removal action recommended in the REDOX EE/CA is Alternative 4.

Table 4. Proposed Alternatives for the REDOX Complex Removal Action

Alternative	Removal Action Description
1	No Action
2	• Continued Surveillance and Maintenance of REDOX Complex Structures • Hazard Abatement of the 202S Galleries • Demo Prep of the 202S Silo Service Area • Demolition of the 293S Building and the 276S Hexone Storage Tanks • Grouting of the Belowgrade Areas of the 293S Building
3	Alternative 2 actions *plus*: • Demo Prep of the 202S Annex and Canyon Abovegrade
4	Alternative 3 actions *plus*: • Demolition of the 202S Annex

5.3.1 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 202S Building, the 293S Building, and the 276S HSTF would be abandoned without any further action. No legal restrictions, ICs, or active measures are applied to these buildings/structures 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 buildings/structures. Risks over time are expected to increase, as deterioration progresses and structural integrity is compromised. The possibility of chemical and/or radiological contamination spreading would increase due to lack of monitoring and controls. Physical hazards associated with partial structural collapse would also be anticipated.

Alternative 1 is not consistent with DOE obligations under federal law to protect HHE; therefore, this alternative cannot be considered viable.

5.3.2 Alternative 2 – Continued S&M/Hazard Abatement 202S/Demo Prep Silo Service Area/Demolition 276S/Demolition and Grouting of 293S

Under Alternative 2, S&M activities would continue for the entire REDOX Complex. Hazard abatement would take place in high-priority areas in the 202S Galleries. The Silo Service Area would undergo demo prep, and the 276S HSTF (276S141 and 276S142) and 293S Building would undergo demolition (Figure 11).

The high-risk 202S Canyon areas that will receive hazard abatement are, at a minimum, the North Sample Gallery including the Plutonium Loadout Hood, South Operating Gallery, South Sample Gallery, South Pipe Gallery, and Storage Gallery. The Canyon Deck and areas below the cover blocks will not be included in hazard abatement activities.

Demo prep in the Silo Service Area includes levels one through five, seven, and eight. Level six, which includes the crane and crane cover blocks, is not considered in the cost estimate for this activity. Demo prep will not occur in the Silo Tower Shaft and the Column Laydown Trench.

The 276S HSTF, associated pumps, piping, and soil beneath the pumps will be clean-closed by removal and disposal in accordance with the existing RCRA closure plan (DOE/RL-2009-112). If possible, the tanks will be removed intact and transferred to ERDF. If intact disposal is not feasible due to the weight of the tanks or field conditions, the tanks will be demolished onsite, and the debris will be placed in a double lined, roll off container and transported to ERDF for disposal. The removal area soil will be sampled in accordance with an approved SAP to verify achievement of clean closure standards.

Demolition of the 293S Building includes removing all abovegrade and belowgrade process equipment and tanks. The building would be demolished to slab on grade in order to minimize precipitation infiltrating to the underlying soils. Following demolition and removal of the abovegrade structure and equipment, belowgrade areas of the 293S Building will be grouted. The slab and subsurface will become a waste site within the 200-CR-1 OU and will be considered during the data quality objectives process for the future remedial action.

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. Alternative 2 achieves all of the RAOs but is considered to be least effective among the three viable alternatives.

5.3.3 Alternative 3 – Continued S&M/Hazard Abatement 202S/Demo Prep Silo Service Area/Demolition 276S/Demolition and Grouting 293S/Demo Prep Annex and Abovegrade 202S

Under Alternative 3, S&M activities would continue for the entire REDOX Complex. Hazard abatement would take place in high-priority areas in the 202S Canyon. The Silo Service Area would undergo demo prep, and the 276S HSTF (276S141 and 276S142) and 293S Building would undergo demolition. Demo prep would also be performed in the 202S Annex and abovegrade areas of the 202S Canyon (Figure 12).

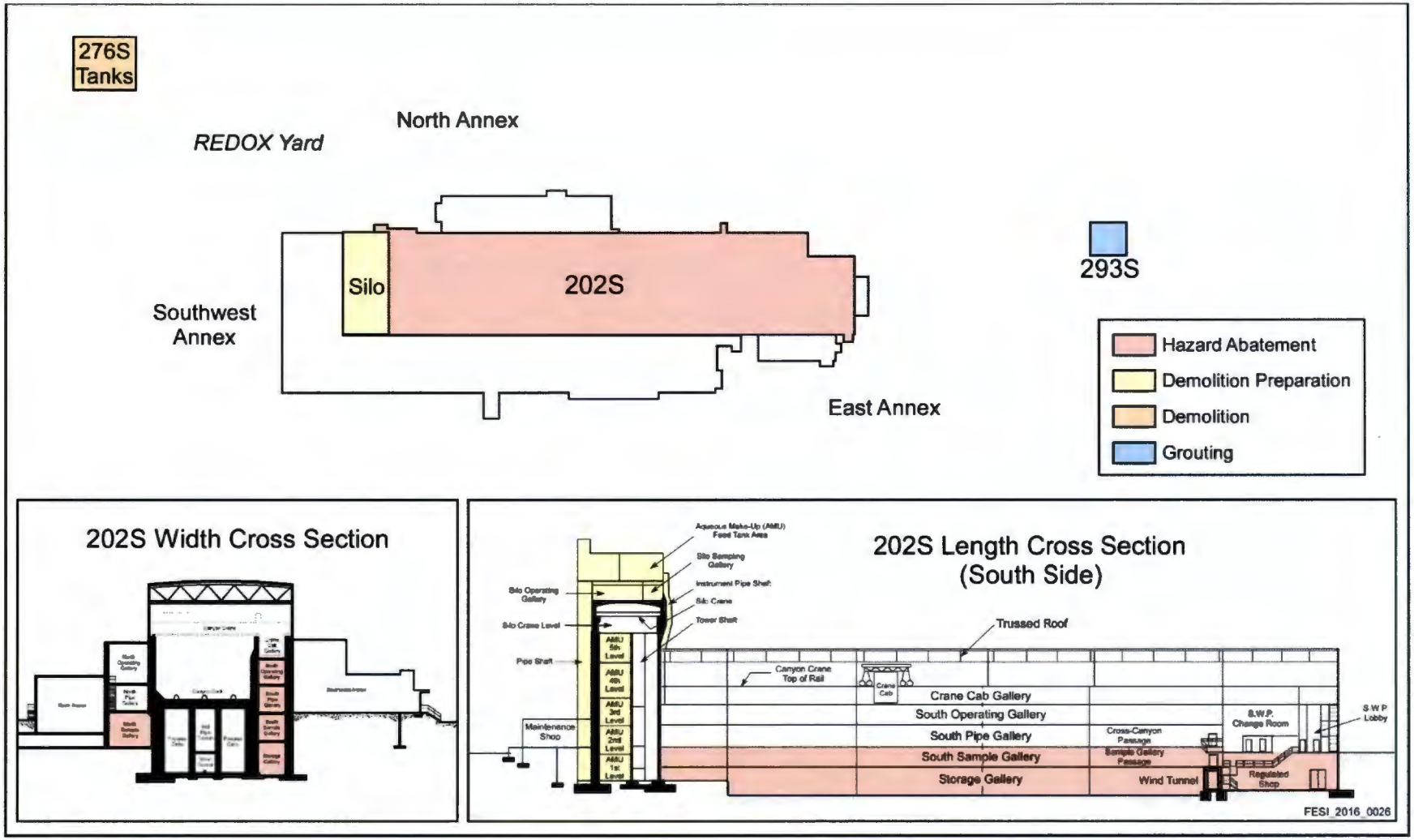

Figure 11. Alternative 2 – Proposed Actions

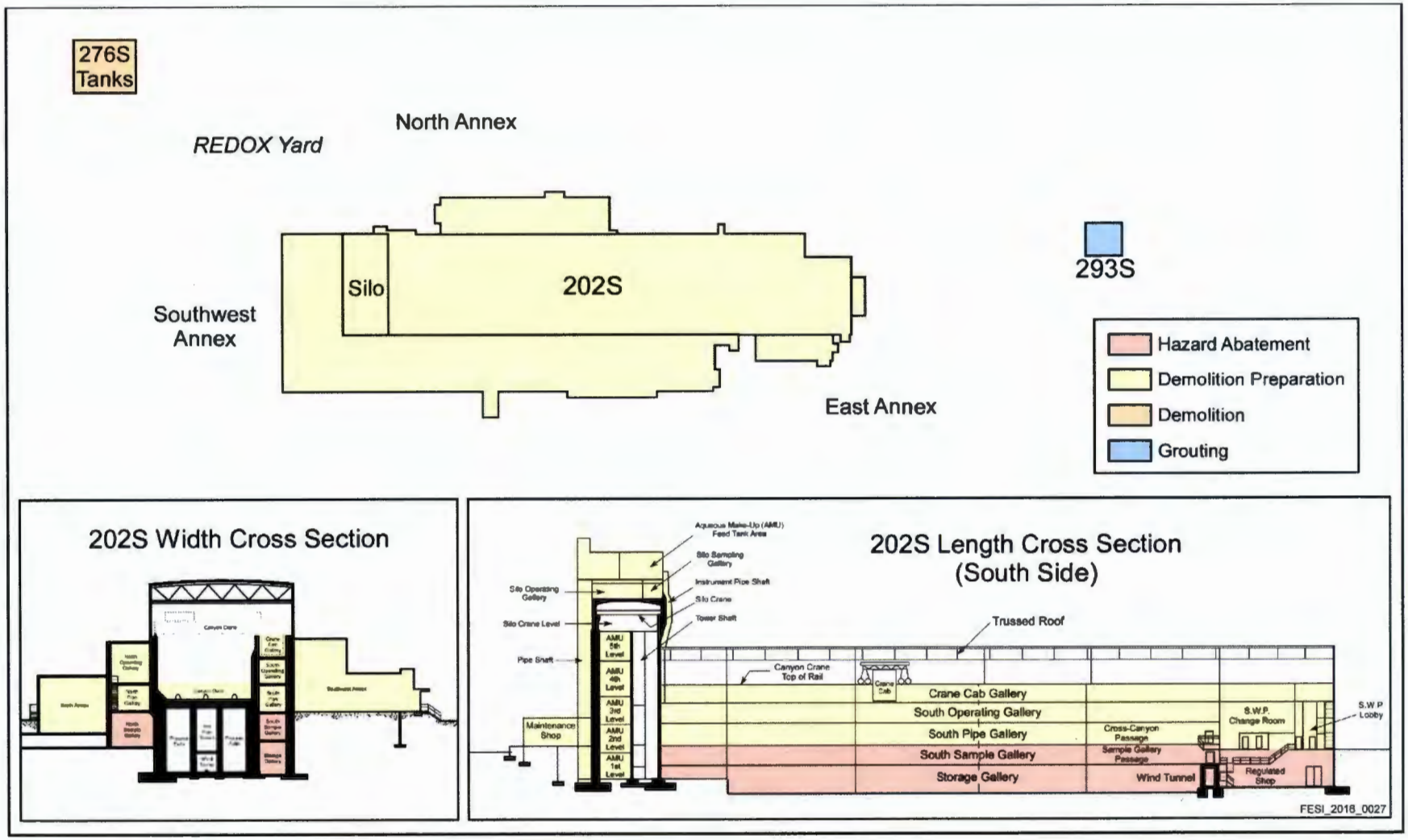

Figure 12. Alternative 3 – Proposed Actions

Demo prep would occur in the 202S Annex and all 202S Canyon abovegrade areas. Prior to demo prep of the 202S Annex, some hazard abatement activities may be performed, if necessary. The abovegrade 202S Canyon areas include the Canyon Deck, North Pipe Gallery, South Pipe Gallery, North Operating Gallery, South Operating Gallery, and Crane Cab Gallery. Each area would be emptied of waste, equipment, and nonstructural utilities, as appropriate. The crane will not be activated or removed. Activities such as general housekeeping, fixing/stabilizing contamination, decontaminating, draining fluid from piping and equipment, and removing equipment and waste may be performed in each area.

The sample and storage galleries are not included in demo prep because it is likely that a close-in-place cleanup approach will be selected as the final disposition of the REDOX Canyon based on the U Canyon remedial decision. The close-in-place cleanup approach will include grouting these galleries. Hazard abatement will address and/or prevent future hazards prior to final disposition as necessary.

Alternative 3 can achieve the RAOs and provides a higher level of protectiveness than Alternative 2. It provides nearly identical levels of protectiveness (compared to Alternative 4) in terms of using direct removal (via hazard abatement and demo prep) to reduce the interim and long-term chemical, radiological, and physical hazards. The addition of demo prep in the 202S Canyon and Annex will allow for greater reduction of toxicity, mobility, or volume of contamination (RAO #1) than Alternative 2. It will also reduce future S&M activity and expedite future remedial actions (RAOs #4 and #5) more effectively than Alternative 2. Demo prep of the 202S Annex and abovegrade areas of the 202S Canyon would improve industrial access for waste stabilization and removal in these areas under the future remedial action.

5.3.4 Alternative 4 – Continued S&M/Hazard Abatement 202S/Demo Prep Silo Service Area/Demolition 276S/Demolition and Grouting 293S/Demo Prep Annex and Abovegrade 202S/Demolition Annex

Under Alternative 4, S&M activities would continue for the entire REDOX Complex. Hazard abatement would take place in high-priority areas in the 202S Canyon. The Silo Service Area would undergo demo prep, and the 276S HSTF (276S141 and 276S142) and 293S Building would undergo demolition. Demo prep would also be performed in the 202S Annex and abovegrade areas of the 202S Canyon, followed by demolition of the 202S Annex (Figure 13).

Alternative 4 adds demolition of the 202S Annex. Currently, the North and East Annexes are service support areas. Demo prep will take place prior to all demolition activities. The 202S Annex would be demolished down to ground level and fill material would bring the basement level to grade. Following demolition, any access points to the remaining Canyon portion will be isolated or sealed, as appropriate.

Demolition of the Annex structures, which surround the Canyon and Silo area, would improve access for waste stabilization and removal in these areas under the future remedial action, thus increasing future technical and administrative feasibility. Since the Annex structure is largely uncontaminated, demolition would be easily executed. Demolition of the Annex would increase the amount of physical disturbance near the 222S Laboratory; however, engineering barriers and administrative controls would be used to minimize disruption and protect the health and safety of 222S Laboratory personnel.

Alternatives 4 can achieve the RAOs. Demolition of the 202S Annex eliminates more potential for release of and exposure to hazardous substances (RAO #1) than Alternatives 2 or 3. Demolition of the Annex may cause temporary disruption to the 222S Laboratory than Alternatives 2 and 3 (RAO #2). Waste generated from Alternative 4 will be safely disposed of (RAO #3). The actions 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).

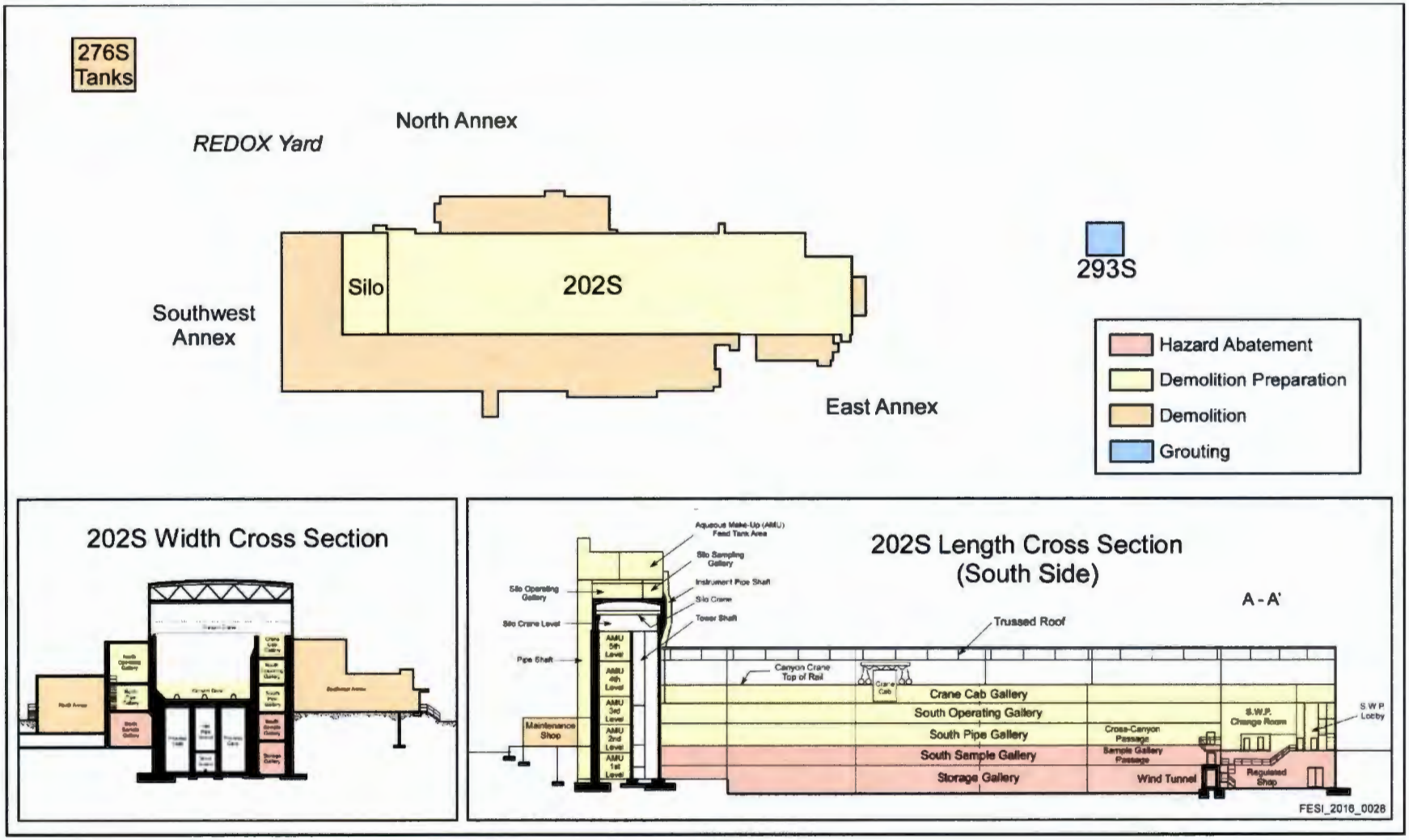

Figure 13. Alternative 4 – Proposed Actions

Alternative 4 provides increasing levels of protectiveness by reducing the interim and long-term chemical, radiological, and physical hazards through direct removal via hazard abatement, demo prep, and demolition. The primary risks to workers with each alternative are waste handling and contaminated materials. Alternative 4 includes implementing approaches and additional activities not addressed in the current S&M program, which will remove many of the identified risks. Implementing the actions in Alternative 4 would place the buildings in a more stable condition than Alternatives 2 and 3 and would minimize hazards, to the extent possible, to workers and the environment.

5.4 Applicable or Relevant and Appropriate Requirements and Other Criteria, Advisories, or Guidance to-be-Considered

This section discusses the controlling regulations, advisories, and guidance to-be-considered (TBC) for implementing the selected removal action.

5.4.1 Environmental Regulations

CERCLA Section 121, "Cleanup Standards," requires the responsible CERCLA implementing agency to ensure that the substantive standards of RCW 70.105, "Hazardous Waste Management," RCRA, and other applicable laws will be incorporated into the federal agency's design and operation of its long-term remedial actions; and, to the extent practicable, into its more immediate removal actions. DOE is the implementing agency for this NTCRA. EPA concurs that this NTCRA is warranted to protect HHE.

This NTCRA does not have socioeconomic impacts to offsite populations. Archeological, cultural, and ecological impacts are not expected because the proposed action is conducted in existing structures, located on previously disturbed soil at existing locations.

5.4.2 Applicable or Relevant and Appropriate Requirements

The NCP (40 CFR 300) requires that the removal action described in this AM complies with ARARs to the extent practicable. The ARARs are substantive requirements of environmental standards incorporated in promulgated regulations that have been evaluated and determined to be pertinent to the removal action. Appendix A identifies and describes specific regulatory requirements that are ARARs for this removal action. TBC information is also included in Appendix A for this removal action. TBC information includes nonpromulgated advisories or guidance issued by federal or state governments; TBC information is not binding legally and does not have the status of ARARs.

5.4.3 Compliance with Disposal Facility Waste Acceptance Criteria

For all actions, waste generated during removal action activities may include, but is not limited to, radiologically and/or chemically contaminated equipment and demolition debris. Equipment includes pumps, pipes, tanks, containers, compressors, ductwork, and electrical components. Demolition debris includes wood, metal, roofing, siding, gypsum, and concrete. ERDF is the preferred location for disposal of this waste.

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, 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). 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 WIPP (HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*).

The 276S HSTF is a permitted TSD unit. In accordance with Section 6.0 of the TPA (Ecology et al., 1989a) and WAC 173-303, a closure plan was prepared for REDOX Complex Hexone Storage Tanks 276S141 and 276S142 in 2010 (DOE/RL-2009-112). The closure plan presented the process for 276S HSTF closure in accordance with WAC 173-303-610, "Closure and Post-Closure." 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. Waste generated from the closure activities at this TSD unit will be disposed at ERDF as part of this removal action.

5.4.4 Non-Time-Critical Removal Action Objectives

Overall protection of HHE is the primary objective of the removal action. The following RAOs for this NTCRA address the identified risks in a manner that would, to the extent practicable, support the long-term and final cleanup goals for the 200 Areas National Priorities List site (40 CFR 300, Appendix B):

- **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 REDOX Complex.
- **RAO #5:** Minimize or eliminate the need for future S&M activities.

5.5 Project Costs

Cost estimates were prepared for the alternatives evaluated in the REDOX EE/CA (DOE/RL-2016-16). The estimates were prepared in accordance with EPA 540-R-00-002, *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, as well as DOE G 430.1-1, *Cost Estimating Guide*. ECE-200W15-00006, *Environmental Cost Estimate for the REDOX Complex*, provides an overview of removal action-specific cost inputs, methodology, and results. The information in the cost estimate summary is based on the best available information regarding the anticipated scope of the selected alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design and performance of the removal action. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50% of actual project cost.

The expected duration before the remedial action will be implemented for each 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. Table 5 provides the cost estimates for the removal action alternatives associated with each structure. The costs that are not specific to one building/structure, but apply to all, are provided as a sum in the "All Structures" category. The costs in the "All Structures" category include S&M, facility upgrades, site preparation, ventilation system modifications, and safety document modification.

Alternative 1 is presented with no cost solely in 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 possibly costlier actions in the future.

Table 5. Comparison of Total Cost of Removal Action Alternatives in Present Value

Structure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
202S	$0	$42.2 million	$70.5 million	$74.7 million
276S	$0	$6.2 million	$6.2 million	$6.2 million
293S	$0	$3.5 million	$3.5 million	$3.5 million
All Structures	$0	$96.2 million	$96.2 million	$96.2 million
Total Cost	**$0**	**$148.1 million**	**$176.5 million**	**$180.7 million**

Note: Alternative totals may differ slightly from the displayed values due to rounding.

For Alternative 2, the significant costs incurred are due to modification of the ventilation system, site preparation activities across the REDOX Complex, and hazard abatement activities within the 202S Galleries. The REDOX EE/CA (DOE/RL-2016-16) assumed that the existing 291S Ventilation System will be modified to support removal activities. The hazard abatement action will incur costs from waste disposal, demolition labor, characterization sampling, and air monitoring. This activity will remove contaminated equipment from several areas within 202S Building, including a complete cleanout of the Silo Service Areas and complete removal of the Plutonium Loadout Hood from the North Sample Gallery. Additional activities in Alternative 2 include demolition and removal of the 276S HSTF and 293S Nitric Acid and Iodine Recovery Building. The belowgrade areas of the 293S Building will be filled with grout.

Alternative 3 adds additional costs due to demo prep work inside the 202S Annex and the 202S Canyon abovegrade areas. Demo prep activities will incur costs from waste treatment and disposal, demolition labor, characterization sampling, and air monitoring.

Alternative 4 cost increases are due to demolition of the 202S Annex. Costs associated with demolition activities include evaluation and planning, waste disposal, demolition labor, characterization sampling, and air monitoring.

5.6 Project Schedule

A RAWP and SAP are being prepared to support this removal action. Following approval of this AM, the RAWP and the SAP will be submitted to EPA, the lead regulatory agency. The RAWP will provide technical guidance and an implementation schedule for conducting this NTCRA. The SAP will identify building/structure waste for final disposition and to support clean closure.

6 Expected Change in the Situation Should Action Be Delayed or Not Taken

The REDOX Complex buildings/structures addressed by this NTCRA are contaminated with hazardous substances including radiological contaminants, metals, organic chemicals, PCBs, beryllium, and asbestos. The buildings/structures were used for radiological and/or chemical processing activities and contain significant inventories of hazardous substances that could present an increased threat to HHE if not addressed.

The REDOX Complex buildings/structures addressed by the REDOX EE/CA (DOE/RL-2016-16) were built in the 1950s, have been unoccupied since the mid-1980s, and are structurally deteriorating. Contamination could further spread throughout the building or to the environment as the buildings/structures continue to deteriorate. 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.

Radiological and chemical conditions in the 202S Building (as described in Chapter 3) indicate that contamination is spreading in locations that are currently being surveyed. Contamination spreading in these locations indicates that contamination may be spreading in other areas that are not entered. Several locations are radiologically contaminated and need to be addressed before the occurrence of an unpredictable event that could pose a threat to HHE.

Because TPA (Ecology et al., 1989a) Milestone M-085-90, "Submit Remedial Investigation/Feasibility Study Work Plan for 200-CR-1 to EPA," is not required until September 30, 2021, the remedial actions are not expected to be implemented for a number of years thereafter. In general, the risk of an accidental release (e.g., from a structure failure) increases the longer the buildings/structures await the eventual remedial action activities for the OU. If near-term hazard mitigation actions are not performed, the structural deterioration and contamination spread could result in an unacceptable release to HHE; therefore, the removal action is needed to alleviate this potential future risk. Radiological and chemical contamination in the REDOX Complex present a sufficient threat of release to HHE to justify an NTCRA.

7 Outstanding Policy Issues

There are no outstanding policy issues associated with this NTCRA.

8 Enforcement

DOE is conducting this removal action as the lead agency under the authority of Executive Order 12580, affirmed by 40 CFR 300.5, "Definitions," and 40 CFR 300.415(b)(1).

9 Recommendations

This AM documents the intent to implement the selected removal action for the REDOX Complex in the 200 West Area of the Hanford Site. This decision document has been developed in accordance with CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986*, and is consistent

with the NCP. Conditions at the site meet NCP (40 CFR 300.415(b)(2)) criteria for a removal action. This decision is based on the alternatives evaluated in the REDOX EE/CA (DOE/RL-2016-16), which is available in the Administrative Record.

The recommended removal action alternative identified in the REDOX EE/CA is Alternative 4: Continued S&M with Hazard Abatement of 202S, Demo Prep of 202S Silo Service Area, Demolition of 276S, Demolition and Grouting of 293S, Demo Prep of 202S Annex and Canyon Abovegrade, and Demolition of 202S Annex. This alternative has been selected for implementation because it is the most cost-effective alternative that reduces long-term risk to HHE. This alternative is consistent with and contributes to the efficient performance of Hanford Site long-term remedial actions.

At the completion of the NTCRA, a completion report will be issued that provides summary information, including the building/structure names, waste generation and disposal information, and the end state.

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Appendix A

Applicable or Relevant and Appropriate Requirements

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Contents

Tables

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Terms

ACM	asbestos-containing material
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*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
HHE	human health and the environment
LLW	low-level waste
NESHAP	"National Emission Standards for Hazardous Air Pollutants"
NTCRA	non-time-critical removal action
PCB	polychlorinated biphenyl
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction-Oxidation
TSCA	*Toxic Substances Control Act of 1976*

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A1 Compliance with Applicable or Relevant and Appropriate Requirements

For the removal action being considered for the proposed non-time-critical removal action (NTCRA) alternatives at the Reduction-Oxidation (REDOX) Complex in the Hanford Site 200 West Area, 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 present within the REDOX Complex buildings/structures.

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 removal actions performed at the site.

The final ARARs are established in the action memorandum, which is provided in the main text of this document. 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 selected removal action are provided in Tables A-1 and A-2, respectively.

[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.

Table A-1. Identification of Potential Federal ARARs 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" 40 CFR 60, Subpart IIII, "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" 40 CFR 60, Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines" 40 CFR 63, "National Emission Standards for Hazardous Air Pollutants for Source Categories" 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 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" 40 CFR 61.145, "Standard for Demolition and Renovation" Specific subsections: 40 CFR 61.145(a)(1), (a)(2), (a)(5), and (c)	ARAR	These standards apply to demolition activities, including the removal of RACM. 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 REDOX Complex 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 REDOX Complex NTCRA. This requirement is chemical-specific.

Table A-1. Identification of Potential Federal ARARs 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" 16 USC 469a-1 through 469a-2(d)	ARAR	Requires that the removal action at the REDOX 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 REDOX Complex 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 REDOX Complex 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). 50 CFR Part 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 A-1. Identification of Potential Federal ARARs 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 (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." 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 REDOX 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* (TSCA); 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" 40 CFR 761.50(c), "Storage for Disposal" 40 CFR 761.60(b), "PCB Articles" 40 CFR 761.60(c), "PCB Containers" 40 CFR 761.61, "PCB Remediation Waste" 40 CFR 761.62, "Disposal of PCB Bulk Product Waste" 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. 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 A-1. Identification of Potential Federal ARARs for the Removal Action

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Consideration
Radiological Dose and Cleanup (TBC)			
Luftig and Weinstock, 1997, "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination" 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 5×10^{-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 3×10^{-4} increase in lifetime risk) is preferred as the maximum dose limit for humans. 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 REDOX Complex may contain radioactive contaminants that, if not removed, could pose unacceptable risk to human health.

Table A-1. Identification of Potential Federal ARARs for the Removal Action

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Consideration
Radiological Dose and Cleanup (TBC)			
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, "National Priorities List.") 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.
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 1×10^{-4} to 1×10^{-6} risk range.	The 1×10^{-4} to 1×10^{-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.

Table A-1. Identification of Potential Federal ARARs for the Removal Action

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Consideration
Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (DOE/EIS-0222-F) *Supplement Analysis: Hanford Comprehensive Land-Use Environmental Impact Statement* (DOE/EIS-0220-SA-01)	TBC	Establishes the future land use projections for the Hanford Site.	Land use, as stated in the Hanford Comprehensive Land Use Plan, is industrial exclusive for the Central Plateau conservation/mining for this area.

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
NTCRA = non-time-critical removal action
NRC = U.S. Nuclear Regulatory Commission
PCB = polychlorinated biphenyl
RACM = regulated asbestos-containing material
REDOX = Reduction-Oxidation
TBC = to-be-considered

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	Requirement	Rationale for Consideration
WAC 173-218, "Underground Injection Control Program"			
WAC 173-218-120(3)(b), "Decommissioning a UIC Well"	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.
RCW 70.95, "Solid Waste Management—Reduction and Recycling" (Regulations Pursuant to the *Solid Waste Management Recovery and Recycling Act of 1969*)			
WAC 173-303-016, "Identifying Solid Waste" 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.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	Requirement	Rationale for Consideration
RCW 70.95, "Solid Waste Management—Reduction and Recycling" (Regulations Pursuant to the *Solid Waste Management Recovery and Recycling Act of 1969*)			
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.
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, "Land Disposal Restrictions," 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 (e.g., at Environmental Restoration Disposal Facility 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.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	Requirement	Rationale for Consideration
RCW 70.95, "Solid Waste Management—Reduction and Recycling" (Regulations Pursuant to the *Solid Waste Management Recovery and Recycling Act of 1969*)			
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.
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) and (6), "Soil Cleanup Standards for Industrial Properties"	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 1×10^{-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.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	Requirement	Rationale for Consideration
RCW 70.105D, "Hazardous Waste Cleanup—Model Toxics Control Act"			
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 REDOX 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.
WAC 173-340-7490, "Terrestrial Ecological Evaluation Procedures" WAC 173-340-7493, "Site-Specific Terrestrial Ecological Evaluation Procedures" 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. 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 the REDOX 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" Specific subsection: WAC 173-400-040(3) and (8), "General Standards for Maximum Emission"	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.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	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 173-400-113, "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 was necessary during the implementation of the NTCRA. This requirement is action-specific.
WAC 173-460, "Controls for New Sources of Toxic Air Pollutants" (adopts, by reference, 40 CFR 61.32, "Emission Standard") Specific subsections: WAC 173-460-060, "Control Technology Requirements" WAC 173-460-070, "Ambient Impact Requirement" 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 performed under the NTCRA will trigger standards for T-BACT. However, substantive requirements of these regulations would potentially 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.
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 REDOX Complex 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.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	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 246-247-035 (1)(a)(i), "National Standards Adopted by Reference for Sources of Radionuclide Emissions" (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 REDOX Complex NTCRA. Associated design, equipment, work practice, or equipment for air pollution control may also be maintained and operated. This requirement is action-specific.
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 REDOX Complex NTCRA. The hazardous contaminants will be monitored as identified under each applicable NESHAP subpart. This requirement is action-specific.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	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 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. 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% 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 REDOX Complex NTCRA. The hazardous contaminants will be monitored as identified under each applicable NESHAP subpart. This requirement is action-specific report.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	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 246-247-040(3) and (4), "General Standards"	ARAR	Requires that emissions be controlled to ensure that 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 REDOX Complex 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. 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 REDOX 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/yr 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.

Table A-2. Identification of Potential State ARARs for the Removal Action

ARAR Citation	ARAR Category	Requirement	Rationale for Consideration
WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides"			
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.
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
ARAR = applicable or relevant and appropriate requirement
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
NESHAP = "National Emission Standards for Hazardous Air Pollutants"
NTCRA = non-time-critical removal action
RACT = reasonably available control technology
REDOX = Reduction-Oxidation
TAP = toxic air pollutant
TBC = to be considered
T-BACT = toxics best available control technology
UIC = underground injection control

A1.1 Waste Management Standards

A variety of waste streams would be generated under the selected removal action alternative. 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 may be generated.

Radioactive waste is managed by DOE under the authority of the *Atomic Energy Act of 1954* and in accordance with DOE O 435.1 Chg 1, *Radioactive Waste Management*.

The identification, storage, treatment, and disposal of hazardous waste and the hazardous components 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.

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 the requirements of WAC 173-303 and 40 CFR 268.

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" [hereafter 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 beginning 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, or 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 at the Environmental Restoration Disposal Facility (ERDF).

Beryllium may be encountered during performance of the 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 and meets ERDF[2] waste acceptance criteria (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria, formerly WCH-191 Rev 4*) would preferentially be disposed at ERDF because it is an engineered facility that provides a high degree of protection to human health and the environment. Previous engineering evaluations/cost analyses for other Hanford Site work have shown that disposal at ERDF 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 a 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 identified. Any potential alternate disposal location will be evaluated for appropriate performance standards to ensure that it is adequately protective of human health and the environment. If the alternate location is offsite, the location must comply with the requirements of 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 waste acceptance criteria (ERDF-00011) and then disposed at ERDF. Applicable packaging and pretransportation requirements for dangerous or mixed waste generated by the NTCRA would be identified and implemented before movement of any waste outside of 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 or other acceptable facility for treatment and disposal. The Effluent Treatment Facility is a RCRA-permitted unit authorized to treat aqueous waste streams generated on the Hanford Site and to dispose these streams at a designated state-approved land disposal facility in accordance with applicable requirements.

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

Alternatives 2, 3, and 4 can be performed in compliance with the waste management ARARs. Waste streams will be evaluated, designated, and managed in compliance with the ARARs. Before disposal, waste would be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

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[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 Site 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.

A1.2 Standards Controlling Emissions to the Environment

The selected removal action alternative has the potential to generate both radioactive and nonradioactive airborne emissions.

A1.2.1 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 dose 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 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 achieved 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 (e.g., air licensing and permitting) will be discontinued after 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.

A1.2.2 Criteria/Toxic Air Emissions

WAC 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460 establish the requirements for emissions criteria and toxic air pollutants. The primary nonradioactive source of emissions resulting from this NTCRA is anticipated to be fugitive particulate matter. If waste characterization reveals the presence of potential air toxic precursors, they will be evaluated against the requirements of WAC 173-460 to determine what, if any, controls would be required. 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 also prevent fugitive dust from becoming airborne from fugitive sources of emissions.

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 (e.g., macroencapsulation or grouting), and WAC 173-460 would not be considered an ARAR because it would not result in the emission of toxic air pollutants. 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.

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

A1.3 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" (36 CFR 60). 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 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 202S Building was determined not to be a contributing property and was not recommended for individual documentation.

The area around the REDOX Complex has previously 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 prejob surveys and the development of mitigative measures if cultural or natural resources are encountered at the facility and borrow areas.

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Appendix B

Public Review Comments:

DOE/RL-2016-16, *Engineering Evaluation/Cost Analysis for the REDOX Complex*

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Public Review Comments: DOE/RL-2016-16, *Engineering Evaluation/Cost Analysis for the REDOX Complex*

December 12, 2016 through February 3, 2017

Commenter 1: Oregon Department of Energy (Salem, OR)

Dear Mr. Buel:

The State of Oregon appreciates the opportunity to review and provide comments on the *Engineering Evaluation/Cost Analysis (EE/CA) for the REDOX Complex (DOE/RL-2016-16, Rev 0).*

Like many others, we have a growing concern with the degradation of facilities and infrastructure at Hanford, and the potential hazards it poses. This EE/CA highlights a number of concerns with facilities within the REDOX complex, such as severe structural degradation and radiological and chemical hazards, including the spread of contamination throughout the buildings. These hazards will only increase with time as the facilities continues to age and degrade.

Oregon agrees that action is necessary within the REDOX complex to mitigate potential threats to human health and the environment.

While the EE/CA proposes a mostly reasonable approach for dealing with the degrading facilities at REDOX – and we do support the preferred alternative – we do see where adding some additional work could further reduce risk. Yet we are concerned that planned funding is not sufficient now to conduct the work identified in the preferred alternative, let alone add additional work scope.

The additional work that we suggest be considered is related to the approximately 24.5 kg of plutonium in the 202S Canyon, including process cells, equipment and piping, and the Canyon Deck. This plutonium waste is not presently planned to be removed as part of this action. This plutonium presents a potential criticality hazard and a worker and human health and environmental hazard that should not be deferred. We encourage additional analyses to examine the costs and work needed to safely remove part or all of this waste from the 202S Canyon and prepare it for eventual disposal at the Waste Isolation Pilot Plant.

Response: Thank you for your comment. The radiological inventory in the process cells is currently in a safe configuration. Disposition of process cells waste would be a major undertaking that is currently not feasible. Therefore, disposition of process cell waste is not considered in this EE/CA. The process cells will be addressed in the future remedial investigation/feasibility study.

At the same time, we question whether an expenditure of $2-3 million per year – for what is estimated to be a $180 million project – will be sufficient to make a meaningful impact in reducing the risks from REDOX. Experience at Hanford has demonstrated that working in heavily contaminated facilities is costly. While we agree that it is important to begin the process, we are concerned that not much will be done for this $2-3 million a year. If the EE/CA is necessary to allow some work to begin, then by all means we support its completion. However, realistic cleanup expectations should be appropriately conveyed to the public.

We are concerned that public information materials related to this action – including the fact sheet posted on the web – are misleading. The fact sheet points out that "If not timely addressed, the condition could present a threat to human health and the environment." It also explains that the proposed removal actions are "immediate, short-term responses intended to protect people from immediate threats posed by hazards

waste sites." In essence, the fact sheet implies that there are immediate threats that will be addressed in a timely manner, when that is not likely the case.

While the work at REDOX is important and necessary, we would not elevate it in priority above other critical work that is underway – such as demolition of the Plutonium Finishing Plant, moving sludge from the K-West Basin, moving the cesium and strontium capsules to dry storage, and expanding groundwater treatment. Important waste site investigation and characterization must also go forward without further delay.

Response: Thank you for your comment. DOE is working closely with WDOE and EPA to ensure that the environmental clean-up at Hanford is properly prioritized and funded.

This is not the first time that buildings slated for eventual demolition required interim measures to keep them safe. Nor is it likely to be the last time.

We believe that the U.S. Department of Energy needs to craft a more compelling argument as to why these types of problems justify an increase in funding.

As we have previously commented, we believe the annual Lifecycle Scope, Schedule and Cost Report is deficient in that it fails to identify additional costs that occur because of delays caused by insufficient funding. These additional costs need to be more clearly defined and articulated.

When funds are insufficient to move forward with demolition of unneeded facilities, there is a continuing need for "safe and compliant" or "min-safe" costs until that facility/structure is gone. For some of Hanford's facilities, those costs are tens of millions of dollars annually. These costs are not readily available in the Lifecycle Report.

In addition, funds spent to repair or upgrade unneeded facilities to keep them safe until they can be demolished – such as what is being proposed at REDOX – is essentially wasted money. If funding was available for demolition, many of these upgrades – new roofs, ventilation systems and other improvements – would not be needed. These costs are also not apparent in the Lifecycle Report.

Without this specific information, DOE is hindered in its ability to make a compelling case for additional funding.

Response: The 2016 Hanford Lifecycle Scope, Schedule and Cost Report identifies the dispositioning of REDOX Canyon Building/Associated Waste Sites. To support this and other environmental clean-up efforts, DOE will continue to work closely with WDOE and EPA to ensure that the safe and compliant cleanup of Hanford is properly prioritized and funded.

We have two additional, unrelated comments:

- We encourage the Tri-Parties to not bias the final disposal decisions for the technetium and iodine wastes in the 293S subgrade through grouting. We do not object to grouting if that is appropriate for stabilization and will not preclude removal and clean closure. However, we would remind the agencies of the problems encountered with the low-activity waste grout vaults and technetium mobility through the grout, and the relative inability to ensure the adequate mixing of grout with sludge and residues in tanks.

  Response: Thank you for your comment. The current plan is to remove all waste from the subgrade area of 293S prior to grouting/backfilling. This action will address your concern.

- Section 2.2.1.1.2 provides limited details of the two cranes in the REDOX canyon, yet no explanation of their condition. Given the repeated breakdowns of the crane in the Plutonium Reclamation Facility, DOE should not assume the REDOX cranes will reliably operate when needed. DOE should further investigate the condition of the cranes and plan to replace them if necessary.

  Response: Thank you for your comment. The cranes were not addressed in this EE/CA because the cranes will not be needed for the proposed action. If the cranes are needed to support the future remedial action, they will be properly evaluated.

Commenter 2: Jane Civiletti

Agreed with alternative 4.

Jane Civiletti

Response: Thank you for your comment.

Commenter 3: Lucy Schneid

Alternative 4 is the best mode of action because it seems the complete way to go. Half-way measures will not do the job when it comes to radiation. The United States did not go half-way when it was fighting the threats posed when this facility was built; it cannot go half-way in this clean-up either. Alternative 4 finishes the job to the best of our technological ability, anything less is cheating ourselves and all impacted by this facility now. We're not the bad guys. Clean it up completely.

Response: Thank you for your comment

Commenter 4: J. A. Bates (Pasco, WA)

Regarding DOE/RL-2016-16
Revision 0,
Engineering Evaluation/Cost Analysis for the REDOX Complex

1. Executive Summary, 4th paragraph, and in Section 2.5: The statement is made that the listed REDOX buildings/ structures (including the "202S Building (which includes the Canyon, Silo, and Annex), 276S Hexone Storage Tanks (276-S-141 and 276-S-142), and 293S Nitric Acid and Iodine Recovery Building") have been "unoccupied since the mid-1960s". This is grossly incorrect. The ARHCO and RHO contractors had dozens of full-time employees assigned to some of the structures well into the 1980's! I can provide the names of many of these employees if need be. This commenter was assigned to offices and workspaces in the Annex and silo from 1977 through the early 1980's. As one example, I and a co-worker handled/packaged radioactive split-tube soil core samples of soil on one of the upper levels of the silo. We used the old elevator

in the silo routinely. We would take a detour through portions of the first floor pipe gallery when walking from one end of the annex to the other (between our assigned offices). Please check the radiation protection records which will document several incidents of contamination spread involving contamination of employees personal clothing, decontamination responses, as well as fairly routine loss of ventilation controls in employee workspaces during the periods mentioned.

Response: Thank you for your comment. The REDOX EE/CA was written primarily to encompass the production years. The sentence will be modified in the AM to say that the buildings/structures have been unoccupied since the mid-1980s. Additional research on historical records, including radiological protection, will be performed during the work planning period to determine appropriate work controls. The EE/CA anticipates that the ventilation system will be modified as part of this removal action.

2. Section 2.1: The statement is made, "The 222S Laboratory and its support facilities are not included in the scope of this EE/CA." This is fine, but there should be an emphasis on protecting employees and visitors to the 222S Lab and its support facilities during the remedial actions due to the close proximity to the 202-S complex.

   Response: Thank you for your comment. DOE emphasizes worker safety on all projects and routinely briefs the 222S Lab on activities at REDOX.

3. Section 2.1.1 and Section 2.4: At some point in this section or elsewhere in the document, there should be mention that the 202-S was the KNOWN source of some of the largest accidental releases of contamination to the air and soil documented during the history of the Hanford Site. This is public information now, but was not for many years. These releases left residual contamination in the ventilation ductwork, stack, etc., and piping and soils which to some extent still remains and will affect the remedial actions.

   Response: Thank you for your comment. Information on releases from 202S will be evaluated during the work planning process. In addition, contaminated soils, structures, and systems will be evaluated in the future remedial action.

4. Section 2.1.6: Please note that in the late 1970's, there were observations of endangered/threatened pygmy cottontail rabbits living just outside the 202-S Annex. Please include an assessment as to whether they still inhabit the immediate area.

   Response: Thank you for your comment. An ecological evaluation will be performed for all threatened and endangered species.

5. Section 2.2.1.2.2: There is mention of the 291S Ventilation System drawing air from the North Sample Gallery and then exhausting through a replaceable filter to the atmosphere. Isn't the 291S still serviced by a sand filter, which is not considered a replaceable filter? See your Table B-1 which lists the sand filter as "operating".

   Response: Thank you for your comment. 291S is still serviced by the sand filter, which is not replaceable. The sentence will be modified in the AM to say "sand filter" instead of "replaceable filter." The ventilation system configuration will be verified and considered during the planning process.

6. Section 2.2.1.6: The Annex area is described as "nonradiologically contaminated." This statement needs to be corrected. Based upon known past history of this Annex, it is known to contain some radiological contamination.

   Response: Thank you for your comment. There are areas in the Annex that have minor radiological contamination, but the Annex areas are generally not radiologically contaminated. The sentence will be revised in the AM to state: "These ~~nonradiologically contaminated~~ areas include offices, administrative support areas, and equipment rooms."

7. Section 2.3: In mentioning the 233-S history, it must be mentioned that the accidental fire and release from the 233-S building in the 1960's contaminated soil and surfaces on the north side of the 202-S facility. There were subsequent attempts to stabilize the released contamination, but considerable amounts still remain on the north side of 202-S, covered with soil or fixative but not permanently taken care of.

   Response: Thank you for your comment. Information on releases from 233S will be evaluated in the future remedial action.

8. Table 2-2 or 2-3 and related text: There should be included some description of the estimated contamination associated with the 202-S stack(s) and associated ventilation ductwork and filters (including sand filter). These system absorbed much contamination during routine and off-normal operations.

   Response: Thank you for your comment. These systems are active and are therefore not part of this removal action. The ventilation system will be addressed in the future remedial action.

9. Section 2.5, last paragraph: The risks described are fully supported by this commenter's experience with the facility and its history. In this case, it should be reviewed to be sure the severity and likelihood of impacts/risks are adequately described.

   Response: Thank you for your comment.

10. Section 2.4.2, Section 2.5, and elsewhere in the document: Because of its contaminated condition, residual inventory, and connection with the heavily contaminated ventilation and filtration systems, the 291-S stack and connections should be addressed for their own separate hazards. Since they will be subject to continued, powered, ventilation flow, any loss of containment or degradation of containment will immediately have an impact in the way of a release. Near-term replacement of the 291-S system with a smaller updated system should be evaluated as part of this document. Replacement is merited by the subsequent reduction in risk. In fact, this replacement is much more important than removal of the Annex area. The Annex area should be preserved because it provides a good buffer area allowing controlled entry/exit, will provide a good entry/exit/decon option during eventual cleanup of the canyon, etc., and helps shield workers from penetrating radiation in the Canyon and other related structures.

    Response: Thank you for your comment. The 291S ventilation system is anticipated to be upgraded as part of this EE/CA action. Specific decisions on upgrades and replacement will be thoroughly evaluated. Contamination in the Annex, structural degradation, and improved egress support removal of the structure as part of the removal action. If removed, DOE would install additional buffer areas to facilitate the removal activities in the 202S Building. Removal of the annex and installation of the new buffer areas will provide additional safety for workers.

11. This commenter supports the Removal Action 3, with the added action of replacing the 291-S ventilation and monitoring system with a modernized version.

    Response: Thank you for your comment. Removal Action 4 best accomplishes the RAOs at this time. Alternative 4 contains all actions in Alternative 3, including modifying the 291S ventilation system with a modernized version. In addition, Alternative 4 provides a higher degree of worker safety by improving egress.

12. Section 3.2, final paragraph: Please be sure to include the Washington Department of Health, Radiation Protection in the review of ARARs. They represent significant and pertinent ARARs in the way of radioactive air emission controls and monitoring/sampling.

    Response: Thank you for your comment. Department of Health is involved in DOE projects, when appropriate.

13. Regarding the ventilation system for the Canyon and related, heavily contaminated structures, the DOE's own criteria call for not only sampling of the effluent, but real-time monitoring of the effluent, to allow for timely response to a potential and significant release. Sampling alone, due to the delays incurred during laboratory analysis of the samples, would not allow for timely response, in fact allowing for a significant release to occur for weeks or months before being observed. This was found to be the case recently at the PUREX facility, where complete loss of the installed sampling equipment was not discovered for weeks or more, and corrective action had to be addressed with the Washington Department of Health, Radiation Protection.

    Response: Thank you for your comment. Modifications to the 291S system were anticipated as part of this EE/CA, and may include real time monitoring, if appropriate.

14. Section 4.1.2: The statement is made therein, "This EE/CA assumes that modifications to the 291S Ventilation System will be needed to support removal activities at the REDOX Complex. An engineering evaluation of the ventilation system will be performed prior to initiating the removal activity, if needed." Because of the critical need for the 291S Vent System function required regardless of which Removal Action is chosen, and because of the contamination and hazard associated with the 291S and related equipment in and of itself, the quoted statement provides too much of an open-ended commitment to addressing this Vent System. It should be committed that an engineering evaluation of the ventilation system will be performed prior to ~~initiating~~ choosing the removal activity.

    Response: Thank you for your comment. An engineering evaluation of the ventilation system will be performed prior to initiating the removal activity, and if needed, the modifications will be completed.

Commenter 5: Judy Pigott

Having read through the DOE-RL proposal to address hazards at the REDOX Complex, I am concerned and discouraged. Delay has followed delay, and this plan lists many more.

Immediate remedial plans are not included, and option 4 is far less than optimal.

Long term decontamination and the prevention of future problems would be cost saving and wise to begin immediately.

Ongoing stalling is what I observe and I object to this continuing through this proposal.

Respectfully – Judy

Response: Thank you for your comment.

Commenter 6: Tom Carpenter (Seattle, WA)

Dear Mr. Buel,

We intend to file a comment on the "Engineering Evaluation/Cost Analysis for the REDOX Complex" and the deadline for that comment period is set to expire on January 20, 2017. We respectfully request an extension of 30 days for receipt of these comments due to the fact that much of the comment period occurred over the holiday period, and the need for technical consultation to help us prepare our comments.

Please let me know as soon as possible whether you will grant this extension request, and thank you for considering this request.

Tom Carpenter, Executive Director
Hanford Challenge
Seattle, WA 98112

Response: Thank you for your comment. Public comments are accepted from December 12, 2016 through February 3, 2017.

Commenter 7: Scott Kiffer, PE VA

Mr. Buel et al,

I just saw the Tri-City Herald article (link below) about upcoming work for REDOX Complex. It stated DOE is holding a public comment period through 1/20 for the proposed work.

I did a quick internet search, but did not find any details regarding the proposed activities / scope of work. Has that been decided / is there any other information available? Can you send me any links and/or additional info for the project?

Regards,

Scott D. Kiffer, PE VA

http://www.tri-cityherald.com/news/local/hanford/article124127169.html

Response: This information was provided to Mr. Kiffer.

Commenter 8: Karen Casanova

TO CLEAN IT UP OR NOT TO CLEAN IT UP? REDOX, Reduction-Oxidation Complex, one of Hanford's huge nuclear processing plants is highly contaminated, after processing eight times more fuel per day than earlier processing plants, and the problem will escalate as the plant, unused since the 1960s, continues to deteriorate. REDOX was used from 1952-67 to process about 24,000 tons of irradiated uranium fuel rods to remove plutonium for the nation's nuclear weapons program and also to recover uranium to reuse in new fuel rods. [and believe it or not]: "Plastic bags were taped on one processing line to catch any drips of residual plutonium nitrate in places where leaks were anticipated. Two of the bags hold significant amounts of plutonium nitrate" and "based on current conditions in areas where surveillance inspections are performed, water accumulation, animal intrusion, structure deterioration and contamination spread are expected," ... INSANITY! ... we are witnessing this government, the DOD, DOE, NRC etc. and entire nuclear industry dumping a huge legacy of toxic radioactive contamination across the country, and in their destructive wake literally making a killing all the way to the bank! .... CRIMINAL! ECOCIDE! GENOCIDE! CRIMES AGAINST HUMANITY!

Response: Thank you for your comment.

Commenter 9: Karen P. Graham

I can go along with the Alternative #4 proposal, just as long as it gets done within a reasonable amount of time. I have been following the cleanup of the Hanford site for a couple of years, and it seems that it is taking longer than was first anticipated for the overall cleanup work to get done. I realize that with radioactive contamination, special precautions are needed, but the longer nothing is done, the worse the impact on the environment and people living in the area is going to be.

Sincerely, Karen P. Graham

Response: Thank you for your comment.

Commenter 10: Dave K. Patterson (Ramona, CA)

I believe that the Hanford cleanup must be of highest priority. The toxins are already leaking into the air, groundwater and the Columbia river. The long term ramifications are immense regarding life in the area and into the ocean.

Please redirect all your efforts and make clear to State and Federal legislators how dire this situation is.

Cordially

David K. Patterson
Ramona, CA 92065

Response: Thank you for your comment.

Commenter 11: Jeannie Marshall

Please make this a top priority ASAP. I fear that our incoming EPA and Energy Secretaries could make budget cuts and reorder priorities that will make this more difficult. There is too much at stake to draw this out and risk environmental and public health catastrophes.

J. Marshall

Response: Thank you for your comment.

Commenter 12: Bill Johns (Cheney, WA)

COMMENTS: REDOX 200W Area

TO: Rich Buel USDOE, REDOXEECA2016@rl.gov

1. The 3 action alternatives are too close, showing only an add on for 3 and 4. An alternative with just the timely and very essential items would be a better starting place.

   Response: Thank you for your comment. Current surveillance and maintenance, which addresses only essential items, is currently ongoing at REDOX. This proposal evaluates new alternatives.

2. 2032 is not that far away considering the buildings are metal and concrete, Some maintenance items could be done without total removal.

   Response: Thank you for your comment. This EE/CA does include maintenance items and does not include total removal.

3. An estimate of -30% to +50% is not acceptable.

   Response: Thank you for your comment. CERCLA guidance documents require this range of estimate. Additional cost estimation will be performed during work planning.

4. "…target maintaining a skilled work force at the Hanford site" is not a sufficient reason for spending on a project.

   Response: Thank you for your comment. Maintaining a trained workforce to work with a complex variety of cleanup projects is important for safe and timely implementation of actions.

5. The statement "…can be accomplished with available funds identified through efficiency or with new funding." is not very specific as ANY project could be done with "new funding"

   Response: Thank you for your comment.

Bill Johns
Cheney, Washington 99004

Commenter 13: Dirk Dunning (Salem, OR)

Hi Rich,

Where can I find the details of the 293S building and the tanks and vessels in the subgrade areas and the analysis of their residuals?

Thanks

Dirk Dunning
Oregon Department of Energy
Nuclear Safety and Energy Emergency Preparedness Division
Salem, Oregon 97301

Response: This information was provided to Mr. Dunning.