DOE/RL-2005-26
Revision 2

Removal Action Work Plan for 105-KE/105-KW Reactor Facilities and Ancillary Facilities

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

P.O. Box 550
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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Date Published
May 2019

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Assistant Secretary for Environmental Management

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

APPROVED
By Janis D. Aardal at 7:48 am, Jun 04, 2019

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Having considered the extent to which the *Removal Action Work Plan for 105KE/105KW Reactor Facilities and Ancillary Facilities* 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.

Laura Buelow — Print Name
U. S. Environmental Protection Agency

Signature

5/8/19 — Date

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4/30/2019 — Date

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Terms

105KE	105K East
105KW	105K West
ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ALARACT	as low as reasonably achievable control technology
AM	action memorandum
AMP	air monitoring plan
ARAR	applicable or relevant and appropriate requirement
BARCT	best available radionuclide control technology
BFA	building footprint area
CAA	*Clean Air Act of 1977*
Cat I	Category I
Cat II	Category II
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CRR	cultural resource review
CWC	Central Waste Complex
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration and Disposal Facility
ETF	Effluent Treatment Facility
HASP	health and safety plan
HEPA	high-efficiency particulate air
HHE	human health and the environment
HPT	health physics technician
ISS	interim safe storage
MEI	maximally exposed individual

NESHAP	"National Emission Standards for Hazardous Air Pollutants" (40 CFR 61)
NPDES	National Pollutant Discharge Elimination System
NRC	National Response Center
NTCRA	non-time-critical removal action
OU	operable unit
PCB	polychlorinated biphenyl
PCM	periodic confirmatory measurement
PPE	personal protective equipment
PTE	potential to emit
QA	quality assurance
RACM	regulated asbestos containing materials
RAWP	removal action work plan
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	record of decision
RWP	radiological work permit
S&M	surveillance and maintenance
SAP	sampling and analysis plan
SSE	safe storage enclosure
SWDP	State waste discharge permit
TEDE	total effective dose equivalent
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TRUM	transuranic mixed
TSCA	*Toxic Substances Control Act of 1976*
TSD	treatment, storage, and disposal
WIDS	Waste Information Data System
WIPP	Waste Isolation Pilot Plant
WTS	waste treatment system

1 Introduction

This removal action work plan (RAWP) provides guidance for implementing the removal action for the 105K East (105KE) and 105K West (105KW) Reactor Buildings and remaining ancillary facilities[1] at the 100-K Area. The 100-K Area is on the Hanford Site, which is owned and operated by the U.S. Department of Energy (DOE) (Figure 1-1). The RAWP identifies technical requirements of the removal action and details the scope and work elements, project management, oversight, and milestone schedules for implementing this non-time-critical removal action (NTCRA).

105KE, 105KW, and supporting infrastructure were constructed and operated to produce special nuclear materials for national defense. The 100-K Area ancillary facilities supported the 105KE and 105KW Reactors with past operations and current cleanup efforts. Past operations, disposal practices, spills, and unplanned releases have resulted in contamination of the facility structures and underlying soil and groundwater in the 100-K Area. Consequently, in November 1989, the 100 Area (which includes the 100-K Area) was one of four areas of the Hanford Site that were placed on the U.S. Environmental Protection Agency's (EPA) National Priorities List under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). EPA and DOE have determined that hazardous substances[2] in the facilities present a threat of release that may pose a risk to human health and the environment (HHE) to the extent that a removal action[3] is warranted.

DOE was delegated the authority to conduct removal actions under Section 104, "Response Authorities," of CERCLA by Executive Order 12580, *Superfund Implementation*. This removal action will be performed in a manner that is consistent with the anticipated long-term remedial action under authority of CERCLA and the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989), also known as the Tri-Party Agreement, which designates the EPA as the lead regulatory agency for this removal action.

Alternatives for conducting a NTCRA for 27 of the ancillary facilities were evaluated in DOE/RL-2004-43, *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities*. The engineering evaluation/cost analysis (EE/CA) recommended deactivation followed by demolition. The recommendation was approved in an action memorandum (AM), *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities* (EPA 2005). Revision 0 of this document addressed the removal action described in the AM (EPA 2005).

[1] The term "facility" is used generically to encompass all the contaminated structures, buildings, foundations, piping, ducting, etc., associated with the building.

[2] "Hazardous substances" means those substances defined by the CERCLA Section 101(14), and includes both radioactive and chemical substances.

[3] "Remove" or "removal" as defined by CERCLA, Section 101(23), refers to the cleanup or removal of released hazardous substances from the environment; actions if a threat of release of hazardous substances occurs; actions to monitor, assess, and evaluate the release (or threat of release) of hazardous substances; the disposal of removed material; or other actions that may be necessary to prevent, minimize, or mitigate damage to public health or welfare or to the environment, which may otherwise result from a release or threat of release. If a planning period of at least six months exists before onsite actions must be initiated, the removal action is considered non-time-critical and an EE/CA is conducted.

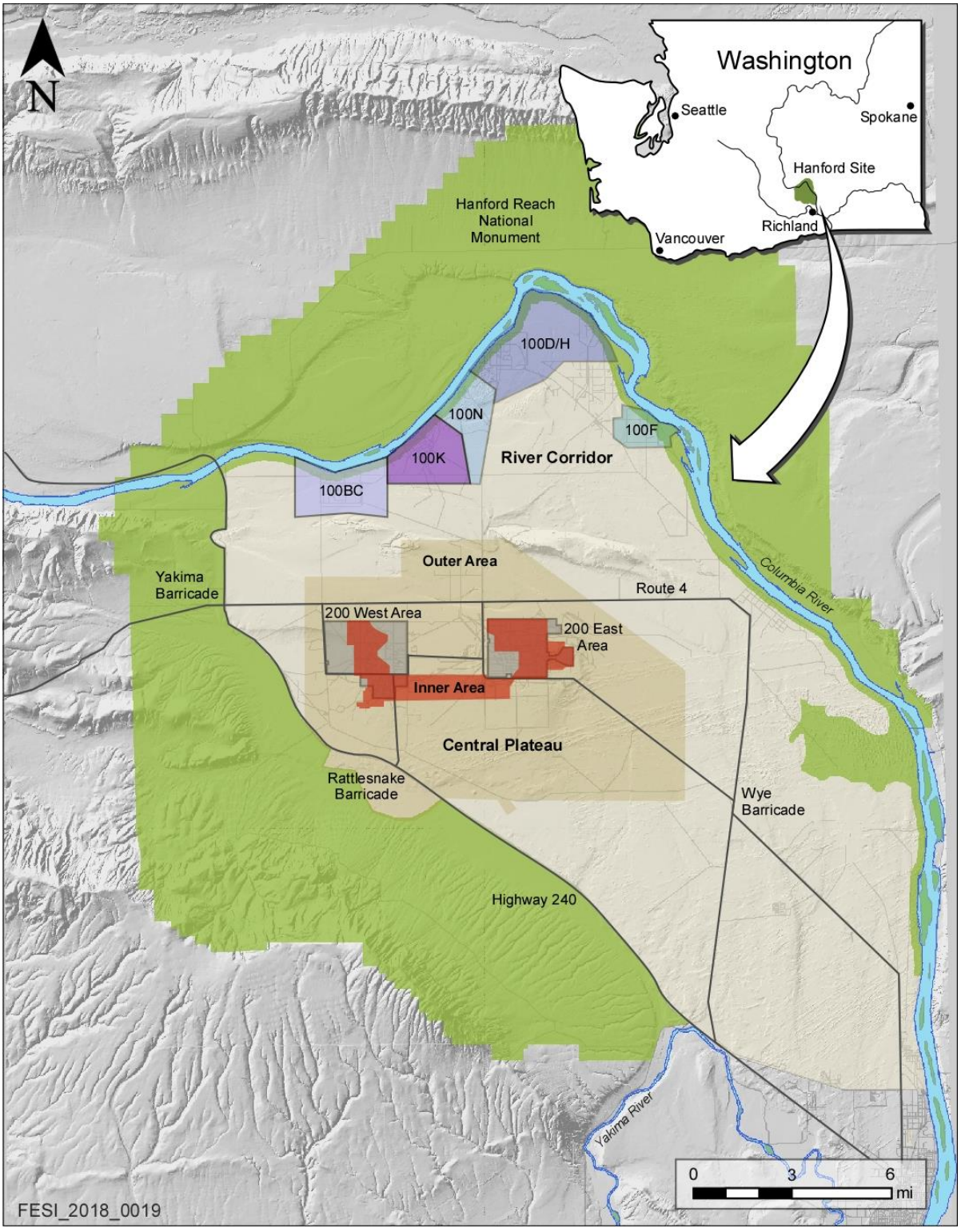


Figure 1-1. Hanford Site Map

Alternatives for conducting a NTCRA of the reactor buildings and remaining ancillary facilities were evaluated in DOE/RL-2005-86, *Engineering Evaluation/Cost Analysis for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*. This EE/CA recommended Interim Safe Storage (ISS) followed by long-term surveillance and maintenance (S&M) of the reactors and deactivation, decontamination, decommissioning, and demolition (D4) of the ancillary facilities and support areas of the 105KE and 105KW Reactor Facilities. The recommendation was approved in *Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities* (EPA 2007). Revision 1 of this RAWP (issued in 2007) added the removal action described in the AM (EPA 2007).

Revision 2 of this RAWP is a complete revision to reflect current D4/ISS practices and planning, while maintaining compliance with the approved AMs (EPA 2005, 2007). This revision:

- Adds ancillary structures that are within the 100-K Area but were not included in previous revisions
- Provides the status of the structures (operating, shutdown, or demolished)
- Incorporates Tri-Party Agreement change notices issued against Revision 1 of the RAWP

Table 1-1 identifies the 100-K Area reactors and structures while Table 1-2 lists the 100-K Area cargo containers, mobile offices, and storage containers. Figure 1-2 depicts the remaining structures listed in Table 1-1 while showing the footprint of previously demolished structures. For clarity, Figure 1-2 does not include the labels on demolished structures listed in Table 1-1, and the cargo containers, mobile offices, and storage containers listed in Table 1-2. Cargo containers, mobile offices, and storage containers in the 100-K Area added after January 2018 can be demolished under this RAWP.

Table 1-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
Remaining Facilities			
105KE	Reactor Building	EPA 2007	Shut down
105KW	Reactor Building	EPA 2007	Shut down
105KW WT	Water Tunnels	EPA 2007	Shut down
111KE	Compressed Gas Storage	[b]	Operating
115KW	Gas Recirculation Building	EPA 2005	Shut down
116KW	Reactor Exhaust Stack	EPA 2005	Shut down
117KW	Exhaust Air Filter Building	EPA 2005	Shut down
119KW	Exhaust Air Sample Building	EPA 2005	Shut down
142K	Cold Vacuum Drying Facility	EPA 2007	Operating
142KA	Cold Vacuum Drying Facility Generator Building	EPA 2007	Shut down
1506K1	Fiber Optics Computer Hut	EPA 2007	Operating
1506K2	Telecommunications	[b]	Operating
151K	Switching Substation	EPA 2007	Shut down
151KE	Substation 230 KV	EPA 2007	Operating

Table 1-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
151KW	Substation 230 KV	EPA 2007	Shut down
152K	Switchgear Control Building	[b]	Operating
165KE	Power Control Building	EPA 2007	Shut down
165KW	Power Control Building	EPA 2007	Shut down
166AKE	Oil Storage Facility Valve House	EPA 2007	Shut down
166KE	Oil Storage Vault	EPA 2005	Shut down
166KW	Oil Storage Vault	EPA 2005	Shut down
167K	Cross Tie Tunnel Building	EPA 2007	Shut down
1705KE	Effluent Water Treatment Pilot Plant	EPA 2007	Shut down
1713KW	Warehouse	EPA 2007	Operating
1714KW	Warehouse	EPA 2007	Operating
1724K	Maintenance Shop	EPA 2007	Shut down
1724KA	Equipment Shed	EPA 2007	Operating
175KE	Survey Tent	[b]	Operating
1803K	Water Treatment Storage Tank	[b]	Operating
189K	Water Treatment Facility	[b]	Operating
1909KW	105KW Effluent Junction Box	[b]	Shut down
296K142	Cold Vacuum Drying Facility Main Stack	EPA 2007	Shut down
Demolished Facilities			
105KE WT	Water Tunnels	EPA 2007	Demolished (2012)
110KE	Gas Storage Facility	EPA 2005	Demolished (2009)
110KW	Gas Storage Facility	EPA 2005	Demolished (2010)
115KE	Gas Recirculation Building	EPA 2005	Demolished (2010)
116KE	Reactor Exhaust Stack	EPA 2005	Demolished (2010)
117KE	Exhaust Air Filter Building	EPA 2005	Demolished (2010)
118KE	Horizontal Control Rod Storage Cave	EPA 2005	Demolished (2009)
118KW	Horizontal Control Rod Storage Cave	EPA 2005	Demolished (2010)
119KE	Exhaust Air Sample Building	EPA 2007	Demolished (2009)
1605K	Guard Towers and Associated Structures	EPA 2007	Demolished (2011)
1614K3	Environmental Monitoring Station	EPA 2005	Demolished (2010)
1701K	Abandoned Guardhouse	EPA 2005	Demolished (2011)
1706KE	Water Studies Semi-Works Building	EPA 2007	Demolished (2009)

Table 1-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
1706KEL	Development Laboratory	EPA 2007	Demolished (2009)
1706KER	Water Studies Recirculation Building	EPA 2007	Demolished (2009)
1713KE	Shop Building	EPA 2007	Demolished (2009)
1713KER	Warehouse	EPA 2007	Demolished (2010)
1714KE	Oil and Paint Storage Shed	EPA 2007	Demolished (2009)
1717AKE	Fan House	EPA 2007	Demolished (2011)
1717K	Maintenance/Transportation Shop	EPA 2007	Demolished (2011)
1720K	Administrative Office Building	EPA 2005	Demolished (2011)
1724KB	Gas Bottle Storage Facility	EPA 2007	Demolished (2010)
181KE	River Pump House	EPA 2007	Demolished (2011)
181KW	River Pump House	EPA 2007	Demolished (2011)
182K	Emergency Water Reservoir Pump House	EPA 2005	Demolished (2010)
183.1KE	Headhouse	EPA 2007	Demolished (2011)
183.1KW	Headhouse	EPA 2005	Demolished (2009)
183.2KE	Sedimentation Basins	EPA 2007	Demolished (2011)
183.2KW	Sedimentation Basins	EPA 2005	Demolished (2010)
183.3KE	Basin/Filters	EPA 2007	Demolished (2011)
183.3KW	Basin/Filters	EPA 2005	Demolished (2010)
183.4KE	Reservoir and Clearwells	EPA 2007	Demolished (2011)
183.4KW	Reservoir and Clearwells	EPA 2005	Demolished (2011)
183.5KE	Lime Feeder Building	EPA 2007	Demolished (2011)
183.5KW	Lime Feeder Building	EPA 2005	Demolished (2010)
183.6KE	Lime Feeder Building	EPA 2007	Demolished (2011)
183.6KW	Lime Feeder Building	EPA 2005	Demolished (2010)
183.7KE	Pipe Tunnel Between 105KE and 165KE (aka 183K)	EPA 2007	Demolished (2012)
183.7KW	Pipe Tunnel Between 105KW and 165KW	EPA 2005	Demolished (2010)
183KE	Chlorine Vault	EPA 2007	Demolished (2011)
183KW	Chlorine Vault	EPA 2005	Demolished (2005)
185K	Potable Water Treatment Plant	EPA 2007	Demolished (2011)
1908KE	Effluent Water Monitoring Station	EPA 2007	Demolished (2011)
1909KE	105KE Effluent Junction Box	EPA 2005	Demolished (2011)
190KE	Main Pump House	EPA 2007	Demolished (2011)

Table 1-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
190KW	Process Water Pump House	EPA 2005	Demolished (2011)

References: EPA 2005, *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities.* EPA 2007, *Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities.*

a. Status as of January 2018 (excluding previously demolished or removed mobile offices).

b. Added to the action memorandum (EPA 2007) via TPA-CN-0834.

Table 1-2. 100-K Area Cargo Containers, Mobile Offices, and Storage Containers

Cargo Containers				
CC0718	CC0744	CC0862	CC0922	CC1116
CC0719	CC0745	CC0863	CC0923	CC1117
CC0720	CC0746	CC0864	CC0924	CC1118
CC0721	CC0747	CC0865	CC0925	CC1119
CC0722	CC0748	CC0866	CC0926	CC1120
CC0723	CC0749	CC0867	CC0927	CC1121
CC0724	CC0750	CC0868	CC0928	CC1122
CC0725	CC0752	CC0869	CC0929	CC1K0036
CC0726	CC0753	CC0870	CC1007	CC1K0037
CC0727	CC0754	CC0871	CC1008	CC1K0236
CC0728	CC0758	CC0873	CC1009	CC1K0510
CC0729	CC0760	CC0892	CC1010	CC1K0511
CC0730	CC0763	CC0898	CC1011	CC1K0512
CC0731	CC0764	CC0910	CC1013	CC1K0513
CC0732	CC0792	CC0911	CC1019	CC1K0514
CC0733	CC0842	CC0912	CC1024	CC1K0516
CC0734	CC0843	CC0913	CC1106	CC1K0517
CC0735	CC0844	CC0914	CC1107	CC1K0518
CC0736	CC0845	CC0915	CC1108	CC1K0522
CC0737	CC0849	CC0916	CC1109	CC1K0523
CC0738	CC0857	CC0917	CC1110	CC2W0300
CC0740	CC0858	CC0918	CC1112	
CC0741	CC0859	CC0919	CC1113	
CC0742	CC0860	CC0920	CC1114	
CC0743	CC0861	CC0921	CC1115	

Table 1-2. 100-K Area Cargo Containers, Mobile Offices, and Storage Containers

Cargo Containers				
Mobile Offices				
MO054	MO1115	MO1304	MO2221	MO2523
MO086	MO1116	MO1305	MO2231	MO500
MO1101	MO1117	MO1306	MO2248	MO506
MO1102	MO1118	MO1307	MO2312	MO507
MO1103	MO1119	MO1308	MO2314	MO917
MO1104	MO1120	MO1309	MO2319	
MO1106	MO1121	MO1502	MO2320	
MO1113	MO1122	MO1503	MO2332	
MO1114	MO1123	MO2151	MO2333	
Storage Containers				
HS0028	HS0080	HS0096		
HS0042	HS0081	HS0097		

Note: The cargo containers, mobile offices, and storage containers in this table are from the list of structures in the 100-K Area as of January 2018. Cargo containers, mobile offices, and storage containers in the 100-K Area added after January 2018 can be demolished under this removal action work plan.

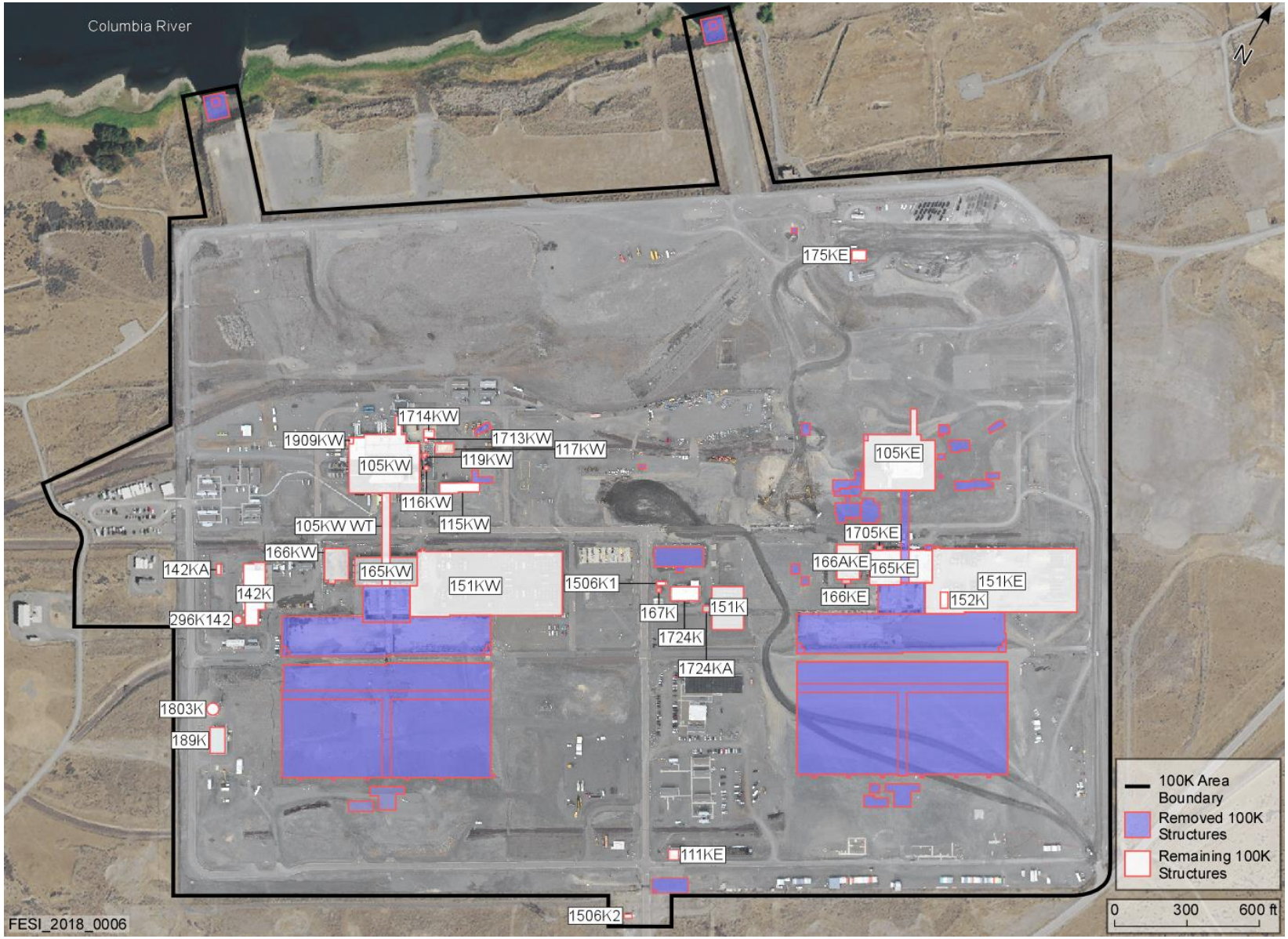


Figure 1-2. Map of the 100-K Area Reactor and Ancillary Facilities

This removal action minimizes the potential for a release of hazardous substances to the environment from the facilities listed in Tables 1-1 and 1-2 that could adversely impact HHE during remediation. In addition, it is protective of personnel and the environment and contributes to the efficient performance of remedial actions, including any future subsurface soil and groundwater remediation and reactor block removal.

1.1 Concurrent Site Cleanup Activities

The 100-K Area is subdivided into three operable units (OUs) to address cleanup of the soil and groundwater contamination that resulted from past operations. The 100-KR-1 and 100-KR-2 source OUs include soil waste sites such as liquid waste disposal sites, solid waste burial grounds, and contaminated buildings and structures. The 100-KR-4 OU addresses groundwater contamination underlying the 100-K Area. Geographically, the facilities addressed in this removal action are collocated with the 100-KR-1 and 100-KR-2 OU waste sites. The AMs (EPA 2005, 2007) identify the OU waste sites located beneath and/or adjacent to facilities in this RAWP.

Waste Site and Soil Cleanup. About 100 waste sites with radioactive and nonradioactive contamination remain in the 100-K Area to be remediated as part of the 100-KR-1 and 100-KR-2 OUs. Remediation of these "potentially-impacted waste sites" is currently being conducted under the following three CERCLA interim action records of decision (RODs):

- The *Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units* (EPA 1995a) and the *Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units* (EPA 1997) address liquid effluent disposal sites, including those in the 100-K Area.

- EPA/ROD/R10-99/039, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-JU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (hereinafter called the Remaining Sites ROD) addresses remediation of additional liquid and miscellaneous waste disposal sites.

- EPA/ROD/R10-00/121, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units Hanford Site (100 Area Burial Grounds), Hanford Site, Benton County, Washington*, addresses remediation of burial grounds.

The selected remedial action specified in these RODs includes removal of contaminated soil and debris, treatment (as necessary to meet disposal facility acceptance criteria), and disposal. This remedial action is commonly referred to as remove, treat, and dispose. The proximity of some waste sites to facilities in the scope of this RAWP may require specific scheduling and coordination between the waste site remediation and facility removal programs.

Some of the facilities are known to have minor soil contamination adjacent to or beneath the facility; therefore, contaminated soil will be removed as part of this removal action. Some facilities are known to be adjacent to or above known waste sites. Those waste sites will be remediated in accordance with the associated ROD. Significant, not previously identified soil contamination may be discovered while performing this removal action. Such a discovery site will be identified as a new waste site and will be remediated in accordance with the Remaining Sites ROD (EPA/ROD/R10-99/039), which provides for the addition of discovery sites.

Groundwater Cleanup. Hexavalent chromium is the primary groundwater contaminant underlying the 100-K Area (100-KR-4 OU). Remediation of the hexavalent chromium is being conducted under the *Interim Action Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units at the Hanford Site, Benton County, Washington* (EPA 1996), and associated explanation of significant differences. As required by this ROD, three pump-and-treat systems were constructed (KR-4, KX, and KW) to remove hexavalent chromium via ion-exchange technology. The treated groundwater is reinjected to the aquifer via groundwater wells. The systems have been operating since 1997. No specific impacts on remediation of 100-K Area facilities are anticipated, other than nominal coordination of field and design activities. Demolition of the pump-and-treat system is not part of this removal action.

100-K Area Fuel Storage Basins. Some of the remaining ancillary facilities are empty, while other facilities are used to support cleanout of the 105KE and 105KW fuel storage basins (K Basins) in the 100-KR-2 OU or groundwater cleanup for the 100-KR-04 OU. The 105KE Basin was removed in 2009. The 105KW building is attached to and supports the KW Basin. Remediation of the KW Basin is not within the scope of this RAWP and will be completed in accordance with EPA/ROD/R10-99/059, *Interim Remedial Action Record of Decision for the 100-KR-2 Operable Unit K Basins, Hanford Site, Benton County, Washington*, and the Remaining Sites ROD (EPA/ROD/R10-99/039). Sludge, water, and debris removal; decontamination and deactivation; and removal of the basins will be completed prior to or in parallel with the work described in this RAWP. Close coordination among these programs will be required to ensure the ISS effort does not preclude or interfere with the efforts to remove the basin structures and associated contaminated soil.

New Facilities. Any other facilities and foundations within the geographical boundary (i.e., man-made items built or placed in the area) of the removal action that are discovered and are not addressed by the 100-KR-1 and 100 KR-2 OU RODs, the previous ancillary facilities removal action (DOE/RL-2004-43), or other soil remediation activity (i.e., the Remaining Sites ROD [EPA/ROD/R10-99/039]) may be "plugged-in" to this removal action as provided in the AM (EPA 2007). The facility can be plugged-in only if it is found to be contaminated with hazardous substances, poses a substantial threat of release to the environment, and is sufficiently similar to the sites addressed by the EE/CA (DOE/RL-2005-86) such that additional analysis of removal alternatives would not be necessary or appropriate. Approvals for implementing this plug-in approach for such facilities and foundations will be obtained from EPA.

1706KE Building RCRA Permitted Facility. One of the ancillary facilities, the 1706KE Building, had a small area called the "1706KE Waste Treatment System," which was regulated as a treatment, storage, and disposal (TSD) unit under the *Resource Conservation and Recovery Act of 1976* (RCRA) and has been clean closed. The closure of the TSD portion of the 1706KE Building was coordinated with the remediation of the associated waste sites under the authority of the Remaining Sites ROD (EPA/ROD/R10-99/039) as provided by the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision* (EPA 2004). The 1706KE TSD unit clean closure certification was submitted to Ecology in September 2009 via 09-AMRC-0210, "Submittal of the Revised Dangerous Waste Closure/Postclosure Plan for the 1706-KE Waste Treatment System (Rev. 2) to the State of Washington Department of Ecology (Ecology) for Approval." and accepted via 18-NWP-004, "Determination on Closure Certification for Closure Unit Group 14, 1706-KE Waste Treatment System (WTS), for the *Hanford Facility Resource Conservation and Recovery Act Permit Dangerous Waste Portion Revision 8C for the Treatment Storage and Disposal of Dangerous Waste* (Sitewide Permit), Part V, WA7890008967."

1.2 Purpose

This RAWP identifies the requirements and establishes the methods to conduct the removal action for the 100-K Area Reactors and Ancillary Facilities. This RAWP addresses the following details:

- Removal action elements and how they will be implemented
- Safety and health management controls
- Environmental management and controls, including applicable or relevant and appropriate requirements (ARARs), waste management, airborne emissions, reporting for non-routine releases, and cultural/ecological resources
- Project administration

This RAWP implements the removal action as established in the AMs (EPA 2005, 2007). Using the most recent information concerning facility conditions, field-level work packages will be developed to direct work activities and instruct workers in the applicable work methods. Existing contractor procedures and specifically developed instructions will be used to perform and control the facility demolition and disposal actions.

The removal action is consistent with the overall Hanford Site cleanup initiative and will, to the extent practicable, contribute to the efficient performance of the anticipated long-term remedial action, as required by 40 CFR 300.415(d), "National Oil and Hazardous Substances Pollution Contingency Plan," "Removal Action." To accomplish this, the following removal action objectives were identified in the AMs (EPA 2005, 2007):

- Protect human receptors from exposure to contaminants above acceptable exposure levels within facility structures
- Control the migration of contaminants from the facilities into the environment
- Facilitate and, to the extent practicable, be consistent with anticipated remedial actions within the 100-K Area OUs
- Prevent adverse impacts to cultural resources and nesting migratory birds
- Achieve ARARs to the fullest extent practicable
- Safely treat, as appropriate, and dispose of waste streams generated by the removal action
- Take no action that will preclude the eventual final disposition of the 105KE and 105KW Reactor blocks.

DOE, as the lead agency for removal action, will assign a Removal Action Manager from the Richland Operations Office (DOE-RL) to oversee the removal activities. In addition to the removal action objectives, the end state of the implemented removal action must be supportive of institutional controls prescribed in the Remaining Sites ROD (EPA/ROD/R10-99/039) for the period between completion of the facility removal actions and initiation of the waste site remedial actions. The criteria for defining when a site meets the applicable cleanup standards are not addressed as part of this removal action; they are discussed in the Remaining Sites ROD.

1.3 Scope

The 100-K Area facilities included in the scope of this RAWP are listed in Tables 1-1 and 1-2. It includes the 105KE/105KW Reactors and a combination of support facilities, storage buildings, shops, and offices located in the 100-K Area. Appendix A provides descriptions of each facility. Any action, other than surveillance, concerning the reactor blocks inside the 105KE and 105KW reactor facilities are excluded from the scope of this RAWP.

This RAWP identifies the requirements and establishes the methods and activities to perform the following functions:

- Complete D4 of the 27 ancillary facilities addressed within the ancillary facilities EE/CA (DOE/RL-2004-43) and the related AM (EPA 2005)
- Modify structures and surrounding soil as necessary and construct a safe storage enclosure (SSE) for ISS of the 105KE and 105KW Reactor Buildings
- Complete D4 of the portions of the 105KE and 105KW facilities located outside the SSE footprint
- Complete D4 of the remaining 100-K Area ancillary facilities addressed by the 105KE and 105KW reactor facilities and ancillary facilities EE/CA (DOE/RL-2005-86) and the related AM (EPA 2007)
- Decommission groundwater wells, in coordination with the Soil and Groundwater Remediation Project, encountered during D4 and ISS of the facilities, if required to facilitate D4 and ISS
- Remediate contaminated soils within the footprint and excavation areas of the facilities or defer to a later remedial action as a new waste site (with approval from EPA)
- Ensure impacted waste sites (e.g., french drains) within the footprint and excavation area of the facilities are adequately defined and/or updated within the Waste Information Data System (WIDS)
- Manage and dispose of all waste generated during these actions

In this RAWP, the 105KE and 105KW reactors are referred to as the 100-K Area ISS Reactor Facilities. The other remaining facilities are the 100-K Area Ancillary Facilities. Together they comprise the 100- Area Facilities. While the removal action in this RAWP includes D4 and ISS of facilities, remediation of underlying soils and waste sites within the footprint of the demolished facilities is performed in accordance with the Remaining Sites ROD (EPA/ROD/R10-99/039).

Figure 1-2 illustrates the geographical boundaries of this action and shows the locations of the reactor facilities and the ancillary facilities within the 100-K Area. Figure 1-3 shows the 100-K Area before the D4 and SSE construction activities were initiated. Figure 1-4 depicts the 100-K Area after the D4 and SSE construction activities are complete.

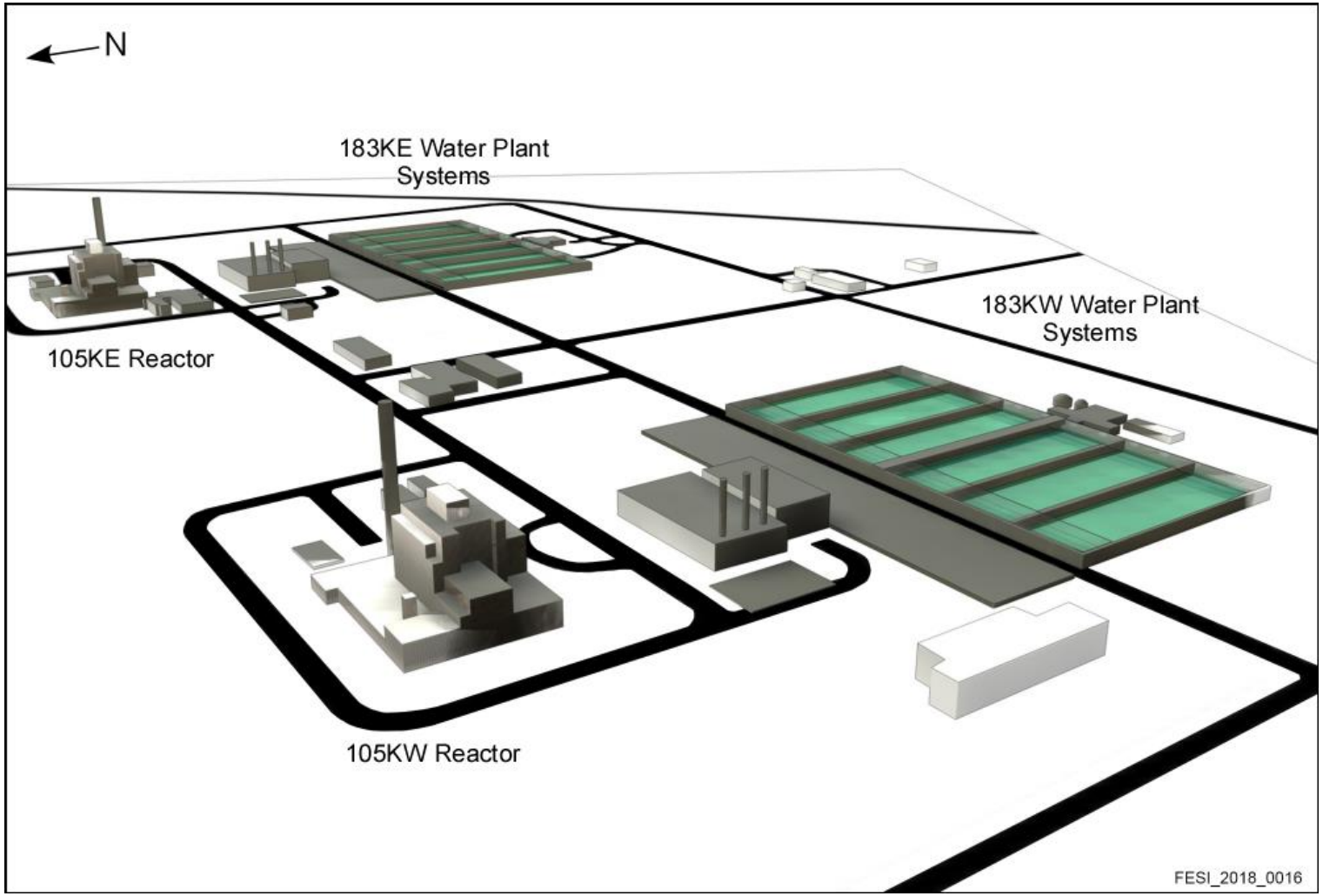
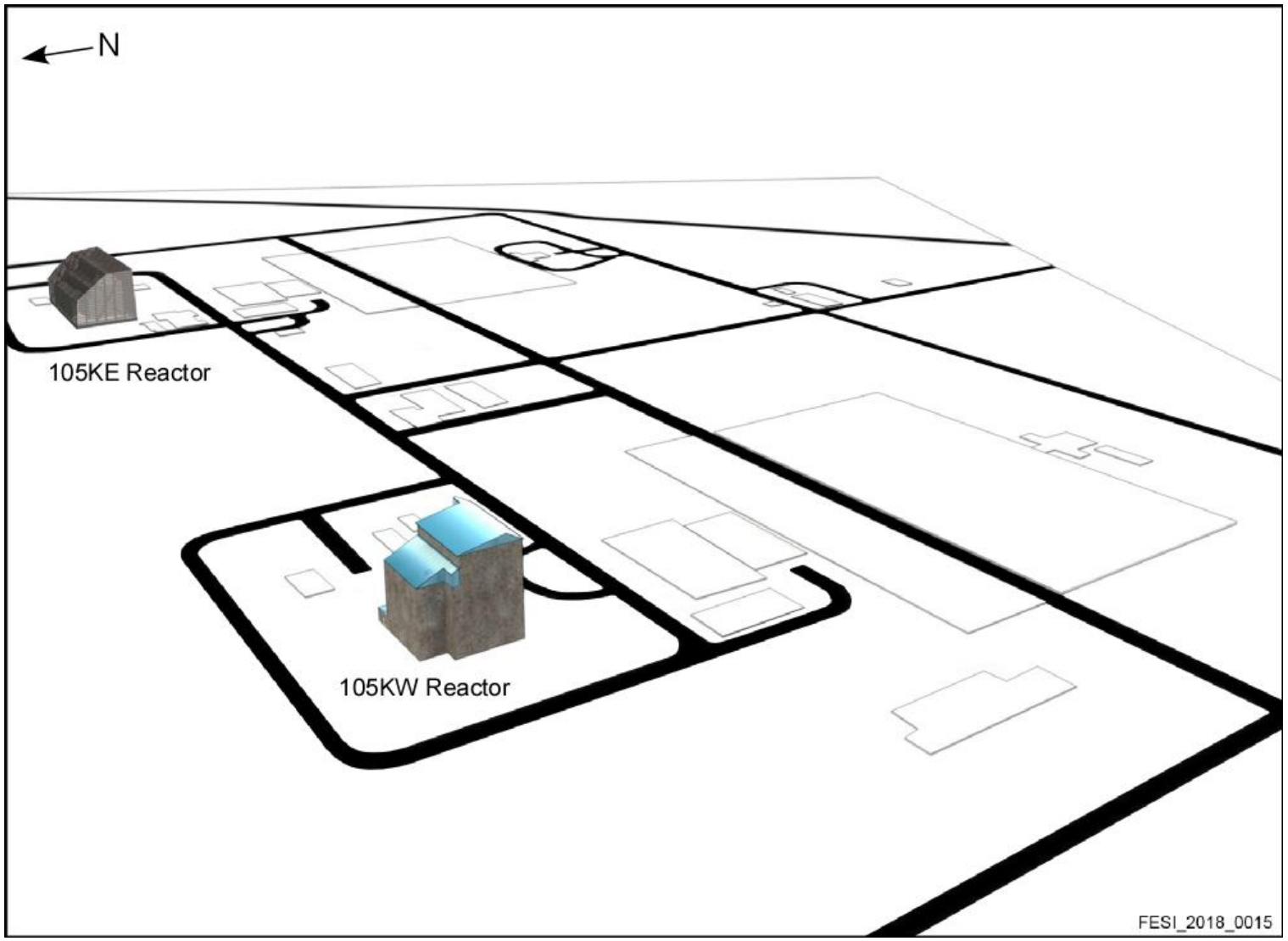


Figure 1-3. 100-K Area Before D4 Activity and SSE Construction



Note: The SSEs depicted here, for illustrative purposes only, are Option A for 105KE and Option B for 105KW (Section 2.2.5). The pump-and-treat system and monitoring wells and some miscellaneous items (fences, power lines, etc.) will also remain, although not shown in the above figure.

Figure 1-4. 100-K Area After D4 Activity and SSE Construction

1.3.1 Removal Action Goals

The goal of this removal action is to reduce the footprint of the 105KE/105KW facilities to within the SSE and perform D4 of the ancillary facilities. Following are the only structures that are expected to remain in place:

- Those physically connected to the 100-K Area ISS Reactor Facilities that cannot be removed without compromising the physical integrity of the SSE
- Those that exhibit contamination levels below the cleanup standards of the Remaining Sites ROD (EPA/ROD/R10-99/039)
- Those approved to remain under Section 1.3.2
- The groundwater pump-and-treat system and monitoring wells

1.3.2 Belowgrade Structures

Belowgrade structures will be removed to a minimum of 3 ft below surrounding grade, and the remaining portion will either be removed or left in place, depending on whether cleanup standards identified in the Remaining Sites ROD (EPA/ROD/R10-99/039) can be achieved. Portions of the remaining belowgrade structures that exhibit contamination levels exceeding the cleanup standards will be removed under this RAWP. The structure may be left in place if it is believed that the removal of the structure could negatively impact a future remedial action. For example, leaving the basement floor in place over a waste site may be more protective to the waste site if removal of the floor would disturb the waste site such that additional stabilization or remediation could be required. Structures in contact with the 105KE or 105KW SSEs may be left in place if removal of the structures would compromise the integrity of the SSE. The decision to leave belowgrade structures below 3 ft shall be made on a case-by-case basis and requires the concurrence of EPA.

At the completion of the removal action, sites will be stabilized in a manner that allows for future remediation or closeout in accordance with the soil cleanup values established in the appropriate ROD.

1.3.3 Waste Sites Located Within the Removal Action Area

Some waste sites may be within the excavation footprint of the subject facilities. If existing WIDS sites are encountered, the WIDS database will be updated to address any waste sites that are impacted, removed, or identified during this removal action. If there is a desire to closeout a WIDS site, the site must meet the cleanup standards of the appropriate ROD.

1.4 Site Conditions and Background

This section provides an overview of the site conditions and background information for the Hanford Site and the 100-K Area. Additional background information for the facilities subject to the removal action is included in Appendix A.

1.4.1 Physical Location

The Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in southeast Washington State. The site, a relatively undeveloped area of shrub-steppe habitat (a drought resistant shrub and grassland ecosystem) containing a rich diversity of plant and animal species, occupies approximately 586 mi^2. The Hanford Site has restricted public access and provides a buffer for areas that were used for nuclear materials production, waste storage, and disposal. The Columbia River flows eastward through the northern part of the site and then turns south, forming part the eastern Hanford Site boundary (Figure 1-1).

The 100-K Area is in the north-central part of the Hanford Site, approximately 25 mi northwest of the city of Richland, Washington. Adjacent and north of the 100-K Area, the Columbia River is accessible to the public for recreational use (e.g., boating and sport fishing). Current access controls include signs along the river, non-continuous fencing, locked access to buildings containing the primary hazards, and routine security patrols.

The 100-K Area perimeter boundary in Figure 1-2 (with some exceptions) generally coincides with the outermost perimeter fences around the 100-K Area (encompassing the reactors and facilities) and the area between the northern perimeter fence and the Columbia River (some of these perimeter fences have since been removed). Within this boundary, there are waste sites that are subject to separate CERCLA response actions (as described in Section 1.1).

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

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

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

Hazardous substances will be managed in accordance with as low as reasonably achievable (ALARA) considerations, the ARARs provided in Section 4.1, and the waste management plan in Section 4.2 of this RAWP. Compliance with hazardous material protection requirements is ensured as described in the contractor's operating procedures.

The facilities in this RAWP are contaminated with CERCLA hazardous substances used or generated during nuclear materials production operations, including radiological contamination that could be spread through transport (e.g., birds, rodents) or facility deterioration. The source of contamination at each facility is dependent on the specific operations conducted at the facility. The ancillary facilities provided treated water, backup power and steam, material storage and distribution, and maintenance support during construction, operation, and deactivation of the reactors. Radiological, hazardous, and biohazard material contamination may be associated with these facilities.

The facilities in this document have not been fully characterized for D4 and ISS activities; therefore, hazardous substances have not been conclusively identified in all the facilities. As described in Section 2.2.2, characterization using EPA-approved sampling and analysis plans (SAPs) will occur to guide waste removal and disposal and site closeout (or deferral).

1.4.2.1 Radiological Contamination

The 100-K Area Facilities are posted as radiologically controlled areas. The radioactive materials in the 100-K Area Facilities are listed in the EE/CAs (DOE/RL-2004-43 and DOE/RL-2005-86). In general, the primary contaminants of concern are the following radionuclides:

- Tritium (Hydrogen-3)
- Carbon-14
- Cobalt-60
- Nickel-59, nickel-63
- Strontium-90
- Technetium-99
- Cesium-137
- Europium-152, europium-154
- Plutonium isotopes
- Thorium isotopes
- Uranium isotopes
- Americium-241

Nuclear safety documents contain records of inventories for the 100-K Area. At most of the facilities, the activities of individual isotopes are not currently known, but may be determined as needed through sampling and analysis prior to disposal.

1.4.2.2 Nonradiological Contamination

The facilities are expected to contain one or more of the nonradioactive hazardous substances known to be present in most Hanford Site facilities as either contaminants resulting from facility operations or as components of construction materials. These may include the following:

- Lead
- Asbestos (friable and nonfriable)
- Biological hazards
- Chromium
- Polychlorinated biphenyls (PCBs)
- Cadmium
- Mercury
- Refrigerants (Freon)
- Petroleum products
- Water treatment chemicals
- Lubricants
- Commercial solvents
- Corrosives
- Residual chemicals
- HEPA filter media
- Sodium-vapor and mercury-vapor lighting

Lead. Lead may exist in surface coatings (e.g., lead-based paint, lead-shielded cables), plumbing, and in other forms (e.g., lead shot, brick, sheet, and cast-lead forms). If waste containing lead above regulatory limits is generated, it will be treated as appropriate prior to disposal.

Asbestos. Asbestos-containing material (ACM) is found in and around the facilities and may exist as vessel or piping insulation, floor tiles, transite wall coverings or panels, sheetrock, electrical wire insulation, and ducting. Section 2.2.4.2 identifies the applicable requirements for removing asbestos. Task-specific requirements will be detailed in the associated work packages.

Biological Hazards. Biological hazards are common to many of the facilities in this RAWP. Examples of biological hazards include bird and rodent carcasses and feces. Such materials will be treated and disposed as appropriate.

Chromium. Chromium, in the form of sodium dichromate, was added to the reactor coolant to inhibit corrosion in the aluminum process tubes and may be present in the 100-K Area soils. This may include hexavalent chromium. If waste containing chromium above regulatory limits is generated, it will be treated as appropriate prior to disposal.

PCBs. PCBs may be found in the facilities and debris (e.g., painted surfaces and waste oils). Materials removed or demolished that contain or may contain PCBs above regulated levels will be removed for disposal consistent with substantive standards of the *Toxic Substances Control Act of 1976* (TSCA).

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

Mercury. Mercury could be present in electrical equipment (including switches and thermostats) or in drain lines and traps. If waste containing mercury above regulatory limits is generated, it will be treated as appropriate prior to disposal.

Refrigerants. Refrigerants are regulated due to their effect on the ozone layer of the atmosphere. Refrigerants will be "recovered" to the extent practicable prior to disposal.

Lubricants. Lubricants may contain hazardous substances. Equipment will be drained of lubricants to the extent practical prior to disposal.

Commercial Solvents. Commercial solvents may be designated as a hazardous waste. Equipment will be drained of commercial solvents and the solvents may require treatment prior to disposal.

Corrosives. Corrosives may be encountered in the buildings/structures. In the State of Washington, corrosive solid and liquid waste above regulatory limits must be treated, as appropriate, prior to disposal.

Residual Chemicals. It is believed that bulk chemical inventories have been disposed or recycled during deactivation of many of the facilities; however, the potential exists for the discovery of old containers of residual chemical constituents (e.g., solvents, greases, hydraulic and fuel oils, and aerosols). If such containers are found, the appropriate Environmental Health and Safety professional will be notified and specific management instructions will be provided to personnel.

HEPA Filter Media. High efficiency particulate air (HEPA) filter media may need to be sampled prior to disposal to determine whether they contain toxic metals above regulatory limits.

Sodium-Vapor and Mercury-Vapor Lighting. Sodium- and mercury-vapor lighting may be dispositioned through the Hanford Site Centralized Consolidated Recycling Center in lieu of disposal. Sodium and mercury above certain concentrations are regulated as dangerous waste.

2 Removal Action Elements

The following sections provide general descriptions of the anticipated 100-K Area activities.

2.1 Removal Action Work Activities

The following subsections provide a general description of how work activities will be performed as part of the D4 and ISS activities at the 100-K Area facilities. The general scope of work involved to implement this removal action includes the following activities:

- Performing S&M activities.
- Performing characterization sampling and analysis.
- Performing site mobilization and preparation activities.
- Removing hazardous substances (chemical, radiological, and biological).
- Performing deactivation activities.
- Removing facility equipment, miscellaneous piping, and asbestos.
- Dismantling various facility structures.
- Preparations for the ISS period and constructing the SSE at 105KE and 105KW.
- Disposing of waste (including waste from S&M activities prior to D4 and ISS activities).
- Maintaining access restrictions until the removal action is completed.
- Documenting remaining conditions and stabilizing the site (if final site closeout is not pursued). Documentation may include sampling and analysis.
- If final closeout is pursued for the site, performing verification sampling and analysis. If verification sampling demonstrates that the site is at or below cleanup standards for structures and soils (as applicable), preparing closeout documentation.
- Demobilization.

2.2 Field Activities

The scope of work will be accomplished by completing the activities described in the following subsections. Existing contractor procedures and specifically developed instructions will be used to perform and control the facility demolition, SSE construction, and disposal actions. These subsections apply to both the reactor and ancillary facilities except for Section 2.2.5, which applies only to the 100-K Area ISS Reactor Facilities.

2.2.1 Surveillance and Maintenance

The goal of the S&M is to sustain a facility in a safe condition. The S&M measures include routine radiological and hazard monitoring of a facility, safety inspections, and maintenance activities necessary to keep the facility in a safe condition. The S&M activities are tailored to the specific conditions of each facility. The S&M activities are performed in accordance with approved work policies and current practices that are revised, as needed, based on changing conditions. Waste generated during this period shall be evaluated for disposal at Environmental Restoration and Disposal Facility (ERDF). It is expected

that most waste generated during S&M activities will meet the waste acceptance criteria for ERDF. Waste generated during the S&M period that is not eligible for disposal at ERDF will be evaluated on a case-by-case basis.

2.2.2 Characterization

Characterization is necessary to support waste disposal activities, to define contaminants present before or after the completion of the removal action, establish worker protection controls, and possibly support site closeout documentation. Two types of characterization are expected to occur for the 100-K Area facilities:

- Waste characterization to support environmental worker protection during removal activities and compliant waste disposal.
- Final characterization for project completion and site closeout documentation.

Waste characterization (also called initial characterization) will be conducted prior to and during D4 and ISS activities. The data quality objectives (DQO) process was used to identify which waste streams are expected to be generated; the initial characterization data needs; and the rationale, strategy, and requirements for the data collection and analysis. Waste characterization data will be used to characterize waste for treatment and disposal, identify hazardous conditions that will be encountered during D4 or ISS of a facility, and specify health and safety requirements. Waste characterization will be performed in accordance with the EPA approved SAP, DOE/RL-2005-33, *100-K Area Interim Safe Storage and D4 Project Waste Sampling and Analysis Plan*, which summarizes the results of the DQO process.[4] Any facilities determined to not be contaminated with CERCLA hazardous substances will be addressed outside of this removal action.

It is anticipated that few sites will achieve closeout as part of this removal action. It is more likely that sites will be characterized to document the condition following the removal of the facility. Characterization will be conducted through collection of radiological surveys (as appropriate), collection of location data, and sampling and analysis to identify the site radiological and chemical constituents that may remain after completion of the D4 activities. Analytical data generated in these efforts will be used to develop information on the soils and structures requiring additional remediation in the future.

It is expected that most (if not all) of the characterization activities conducted to support site closeout will be performed as part of the 100-KR-1 and 100-KR-2 remedial action work. If final characterization or closeout of a site is pursued following the D4 activity, it will be performed in accordance with the Remaining Sites ROD (EPA/ROD/R10-99/039) and DOE/RL-96-22, *100 Area Remedial Action Sampling and Analysis Plan* (100 Area SAP).

2.2.3 Site Mobilization and Preparation Work

Upon initiation of removal action activities, personnel will be mobilized and required equipment and materials will be procured. Supervisor trailers, lunch trailers, change trailers, office trailers, mobile shower trailers, and restroom facilities (if required) will be mobilized as required at the sites to prepare for D4 and ISS activities. Field Support personnel will also terminate or verify termination of the 100-K Area facilities' services and utilities, as appropriate.

[4] DOE/RL-2005-33 was modified by a change notice to address sampling of the 105KE and 105KW reactor cores. That portion of the SAP has not been implemented at 105KW and is not applicable to this removal action.

The removal of electrical systems is typically the last isolation activity performed because power is needed to support the D4 and other remediation activities. However, if the existing electrical systems pose a threat to workers (e.g., underground conduit interfering with an excavation or demolition), the electrical system would be deactivated first and alternate power supplies (e.g., generators) would be used. For supporting ISS of the 105KE/105KW facilities, the mobile temporary power system will be replaced by a permanently installed light and power distribution system that will be powered (when needed) by an externally connected generator for the safe storage period.

Concurrent with these activities, waste storage areas will be set up within the building footprint area (BFA) or within the onsite location outside the BFA to facilitate transportation of the material for recycling or disposal in accordance with this document. Occupational Safety and Health Administration concerns (e.g., fall protection, guarding, and electrical) will be managed as the concerns are identified. A BFA figure will be identified for each facility or group of facilities and included in the project work planning documentation.

2.2.4 Deactivation, Decontamination, Decommissioning, and Demolition Activities

The D4 activities will be conducted within the area needed to excavate soils and demolish structures, which will exceed the size of the structure footprint. The demolition area necessary to excavate soils or demolish structures is part of the BFA. Staging for the D4 activities may occur in an onsite location outside the BFA but within the 100-K Area.

Prior to starting D4 activities, the presence of waste sites within the footprint of a facility (i.e., 5 ft from the facility's foundation) or within the expected excavation area will be identified and documented. Work activities for D4 will begin by developing a baseline of the facility conditions. Biological cleanup, general housekeeping, and removal of hazardous materials may also be necessary. Fluids will be drained from piping and equipment. Contaminated materials will be fixed in place or removed as needed to support open air demolition. The facility connections with site infrastructure systems or adjacent buildings (e.g., water, sewer, air, electrical, gas) will be isolated or air gapped and documented. The final activity will include the demolition of the structure along with compliant disposal of the debris.

Prior to demolition activities, soil remediation activities, or excavation of pipelines, all known discharge conveyances will be evaluated for compliance with the National Pollutant Discharge Elimination System (NPDES) permit for the 100-K Area and isolated as necessary. Section 4.3.6 provides additional details.

2.2.4.1 Decontamination

The preferable way to control loose, accessible radiological contamination is to fix it in place and rely on radiological controls and practices. Removal of loose contamination will be performed only to achieve ALARA radiological levels and ensure adequacy of radiological controls during demolition. Removal of contamination is generally performed using nonaggressive means (e.g., wet wiping or using decontamination solutions). Aggressive methods of decontamination (e.g., grinding or other abrasive/mechanical means) are used only as necessary to maintain ALARA radiological levels.

Nonradiological hazardous substances will be removed from surfaces within and around the buildings/structures, as needed, prior to demolition, to facilitate compliance with the ARARs and to meet waste acceptance criteria for ERDF (ERDF-00011) or an offsite facility deemed suitable by the EPA regional office. Nonradiological decontamination of equipment or structures, if needed, to support the removal action will generally be performed using dry methods (e.g., brushing, wiping, and using HEPA-filtered vacuum cleaners) to the extent possible. When the use of wet methods (e.g., water wash and pressure washers) is required to achieve decontamination objectives, the associated water or cleaning

solutions will be collected, and work will be conducted by trained site workers in accordance with the following best management practices:

- Decontamination activities will be performed within the area of contamination.
- The amount of water used to clean equipment will be minimized, using raw or potable water.
- Collected decontamination solutions will be disposed of to an EPA-approved disposal facility (e.g., ERDF).
- Soaps, detergents, or other cleaning agents may be added to wash water as long as there are no regulated levels of constituents present.

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

The project may also perform other equipment washing and/or decontamination methods. Section 2.2.4.7 provides further discussion of this scope.

2.2.4.2 Asbestos Removal

ACM could be found in and around the buildings/structures. ACM typically consists of insulation for piping, floor tiles, and cement asbestos board. Insulation on piping and vessels will be removed as Class I asbestos work, and nearly all other ACM in the facilities will be removed as Class II (e.g., floor tiles and cement asbestos board). Removal and disposal of ACM will be performed in accordance with the substantive provisions of the *Clean Air Act of 1977* (CAA) and Amendments (40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" [NESHAP], Subpart M, "National Emission Standard for Asbestos") as identified in the AMs (EPA 2005, 2007), which requires special precautions to control airborne emissions of asbestos fibers during asbestos removal activities. Section 2.2.5 discusses how ACM will be managed within the reactor SSEs prior to and during the ISS period to meet the removal action objectives identified in the AM (EPA 2007).

Asbestos abatement activities will be performed in full compliance with all substantive NESHAP standards (40 CFR 61) that are ARARs for the work. Before demolition begins, a thorough inspection of the affected facility will be performed 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 potentially friable and will be removed before actual demolition activities begin. If DOE identifies any Cat II ACM that should be allowed to remain in place during demolition based on knowledge that the demolition will not render it friable, information identifying the planned demolition approach and describing how the Cat II ACM will not become crumbled, pulverized, or reduced to powder by the forces expected to act on it during the demolition or otherwise become friable, will be provided in advance to EPA for approval. 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 (40 CFR 61). 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.

2.2.4.3 PCB Removal

PCBs may be found in buildings/structures (e.g., painted surfaces and waste oils). Materials removed or demolished that contain or may contain PCBs will be removed for disposal consistent with the substantive provisions of the TSCA, which is implemented by 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions."

Known liquid PCBs will be removed from buildings/structures prior to demolition and disposed in accordance with ARARs and the waste acceptance criteria for ERDF (ERDF-00011, *Environmental Restoration Disposal Facility Waste Acceptance Criteria, formerly WCH-191 Rev 4*). Other PCBs will only be removed, as needed, prior to demolition to facilitate proper disposal in accordance with ARARs and the waste acceptance criteria for ERDF or another EPA approved facility. PCB surface coatings and PCB spills (e.g., dried paints or adhesives) on concrete and other materials (porous and nonporous materials) may be stabilized or fixed in place prior to demolition, and the resulting demolition debris may be disposed as PCB bulk product waste or PCB remediation waste. Minor quantities of PCBs (in the form of inaccessible and de-energized light ballasts and transformer varnishes) will remain within the SSE prior to and during the ISS period.

2.2.4.4 Other Hazardous Substances Removal

Hazardous substances, such as refrigerants, lubricants, solvents, greases, hydraulic oils, fuel oils, aerosols, corrosive liquids, and chemical residues, will be drained and recycled or disposed, as appropriate. Unattached, not-in-use, and accessible lead bricks and sheeting, equipment containing mercury (primarily in lighting components and switches), and lights containing sodium- or mercury-vapor will be removed and recycled or disposed per the requirements of the receiving facility.

Other hazardous substances on surfaces or embedded in structural materials (e.g., lead paint, heavy metals such as cadmium and arsenic, and creosote) may be fixed in place prior to demolition, and the resulting structural materials would be disposed as solid, hazardous, or mixed waste, as appropriate, depending on the levels of contamination and waste characterization results.

Following the ISS period, the final demolition of the 105KE and 105KW reactors and reactor core removal will occur, under a future remedial action for the reactors. The removal of hazardous materials at 105KE and 105KW under this RAWP (i.e., limited demolition preparation) is designed to place the facilities in a safe and stable condition (e.g., reduce hazards and dose rates) to future workers. Some hazardous substances (e.g., chemical residues, oils, grease, and lead shielding, bricks, and sheeting) will remain within the SSE during the ISS period for disposition under the future reactor remedial action. The removal of hazardous substances prior to the ISS period will be balanced against worker safety requirements for current site and construction workers, future SSE inspectors, and future demolition workers.

2.2.4.5 Demolition

The facilities will be demolished using standard open-air demolition techniques (e.g., excavator with a hoe-ram, a hydraulic shear with steel shear jaws, concrete pulverizer jaws or breaker jaws, a crane with wrecking ball, or controlled explosives). Demolition methods will be selected based on the structural elements to be demolished, remaining contamination, location, and integrity of the structure. Steel will be segregated for salvage if economically feasible and if meeting DOE criteria for free release from radiological controls. The abovegrade structures of the 100-K Area Ancillary Facilities will be demolished and disposed. In general, belowgrade structures (e.g., slab, basement, and foundation) will be demolished and removed unless they meet the cleanup standards and can remain in place as described in

Section 2.2.4.6. Belowgrade structures will be removed and disposed in the same fashion as abovegrade structures.

Water, fogging devices, or fixatives may be used to control dust generated from demolition activities. The amount of water used will be minimized to reduce ponding and runoff. Controls will be described in work controlling documents (e.g., work packages) and could include removing asphalt to allow water to infiltrate into the ground. Uncontaminated water (e.g., nonradioactive and nonhazardous) will be used for dust suppression.

2.2.4.5.1 Reactor Demolition

Initially, the 100-K Area ISS Reactor Facilities would involve D4 of the reactor support structures and any associated foundations outside the reactor shield walls, whether at grade or subsurface. Belowgrade structures would be removed to a minimum of 3 ft below surrounding grade. Prior to SSE construction, some additional demolition would involve removing selected equipment, materials, and structural components from inside the reactor shield walls to prepare for the SSE, and will vary significantly, based on the final SSE design.

2.2.4.5.2 Ancillary Facilities Demolition

Removal of the facilities and their systems would be completed to a minimum depth of 3 ft below surrounding grade. At this excavation depth, additional characterization will be conducted to determine the contamination levels of the remaining belowgrade structure (Section 2.2.4.6). Soil excavated during the removal of belowgrade structures will be designated and disposed, as appropriate.

Structures without on-grade slabs or belowgrade foundations (e.g., conex box, mobile office) may not require soil excavation. Excavation would be necessary if radiological surveys of the structure's footprint indicate contamination is present or there is evidence of visible soil staining. Soils would be removed to a minimum of 3 ft below surrounding grade, designated, and disposed, as appropriate. The remaining footprint will be evaluated for new waste site applicability.

2.2.4.6 Belowgrade Structures Evaluation

Belowgrade structures will be addressed depending on the condition of the structures, how the physical integrity of adjacent structures is affected, and if any waste site(s) or groundwater monitoring well(s) are affected by the D4 or ISS activities. It is expected that belowgrade items (french drains, valve pits, etc.) adjacent to facilities may be removed during the D4 activities. Integration with waste sites is discussed in Section 2.2.6.

The portions of the belowgrade areas of the 100-K Area Facilities below 3 ft that exhibit contamination levels below the cleanup standards and that do not interfere with future remediation efforts may be left in place, void spaces backfilled and brought to grade (see Sections 2.2.9 and 5.7). Portions of the belowgrade structures and soils that are contaminated above the cleanup standards will be removed. If the removal of belowgrade structure could affect the physical integrity of adjacent structures (e.g., the 105KE or 105KW SSE), then that belowgrade structure may, with approval of EPA, be left in place and removal/remediation deferred. If contamination of belowgrade structures or soil is extensive, it may be left in place for future remediation with the approval of EPA. Safety concerns and access issues may necessitate backfilling in and around the facilities prior to the site achieving closeout. In this circumstance, the remaining contamination will be documented in the WIDS database so the information is available when the site undergoes final remediation.

If large volumes of contaminated soil are encountered, other soil contamination sites are adversely affected by D4 or ISS activities, utilities of active facilities are impacted, or removal of contaminated soil inhibits D4 or ISS activities, the removal of contaminated soils or structures (i.e., slab, belowgrade

structure) may be deferred to future remedial action with approval of EPA. The sites will be stabilized in a manner that will not hinder future remediation. Future cleanup efforts of the facility (if necessary) or transfer of the removal action scope to later remedial action will be coordinated with and approved by EPA. Future cleanup efforts of these waste sites are addressed under the Remaining Sites ROD (EPA/ROD/R10-99/039).

2.2.4.7 Equipment Decontamination

Decontamination that is necessary to allow removal of demolition equipment from contamination areas will be accomplished using standard industry and best management practices. More than one area may be established within the BFA or in the onsite area at a location that may or may not have been previously contaminated to conduct additional or final decontamination. The location of the decontamination area or areas will be documented.

Gross equipment decontamination methods will be employed to remove loose contamination within a contamination area. Best management practices for gross cleaning and decontamination of heavy equipment and vehicles consist of using wipes and nonhazardous materials to remove loose contamination. Water may be used to clean equipment in the decontamination area; however, the use of large volumes of water will be minimized. Soaps, detergents, or other cleaning agents may be added to the water used in the high-pressure washer. Pressure washing (if required) will normally be performed using cold water. However, hot water may be used to avoid icing. Wet grit blasting, grinding, or steam cleaning will be used only after other decontamination methods prove to be ineffective.

Spent decontamination water and associated contamination from the decontamination of equipment (e.g., trackhoe excavators, front-end loaders) will be discharged to the ground within the decontamination area. EPA and DOE-RL will agree on a case-by-case basis whether (or not) closeout of a decontamination area shall be at the end of D4 and ISS preparation activities or whether the final cleanup can be deferred to a later remedial action. Closeout of decontamination areas will be performed in accordance with the Remaining Sites ROD (EPA/ROD/R10-99/039) prior to closeout of the 100K closure project. Decontamination activities (practices and locations) will be documented in the field superintendent's or craft supervisor's (as appropriate) daily logbook.

2.2.5 Safe Storage Enclosure Construction

The 100-K Area ISS Reactor Facilities will each be enclosed in an SSE, either by construction of an independent metal structure (Option A) or by using the existing secondary shield walls as the primary enclosure with construction of a new roof (Option B). Either option may be used for either reactor. Figure 2-1 through Figure 2-3 depict the reactor "before" and "after" SSE completion.

Option A would remove select components from inside the SSE and construct an independent metal structure around the reactor that would enclose the reactor to grade. After D4 of the surrounding reactor support areas up to the secondary shield wall, a reinforced concrete foundation would be built that is supported entirely by the adjacent soil. The foundation would be a continuous grade beam resting on compacted backfill soils with no connections to the existing reactor building. Above this foundation, a steel-framed metal sided building with metal roof decking would be constructed to entirely enclose the reactor(s).

BEFORE

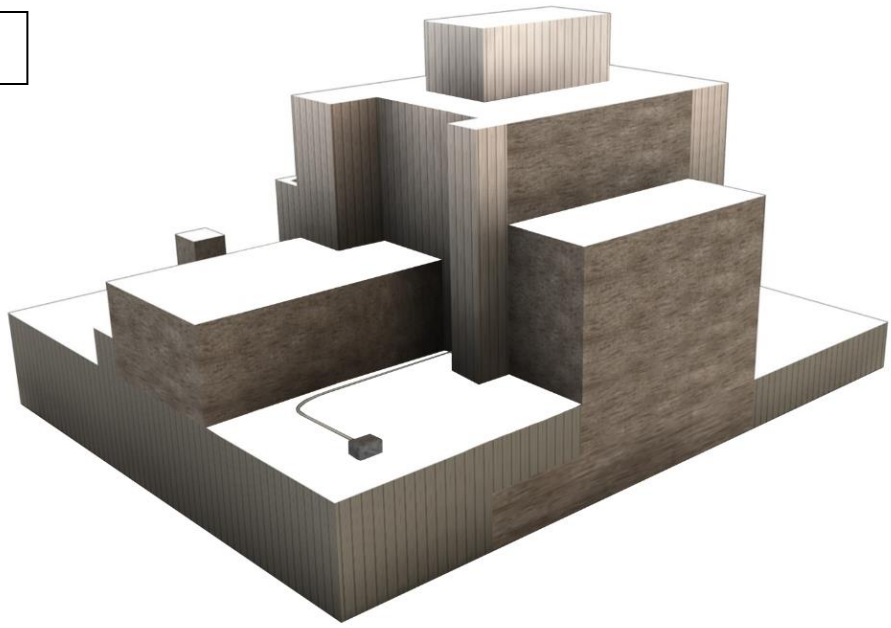


Figure 2-1. 105KE/105KW Building (Before Any Demolition)

AFTER – OPTION A

Exterior enclosure walls are shown as transparent for illustrative purposes only.

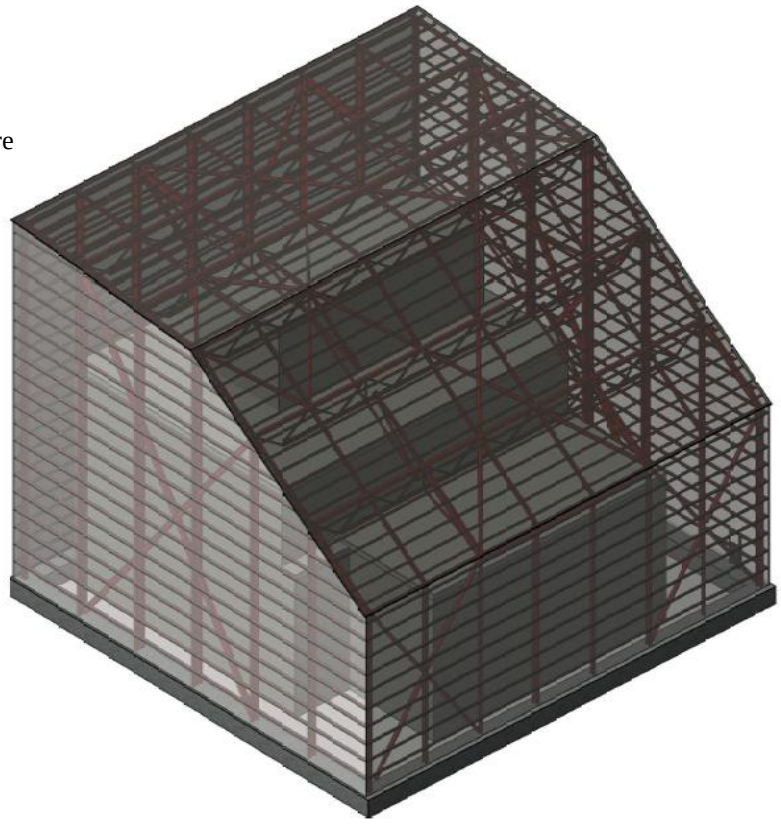


Figure 2-2. 105KE/105KW Safe Storage Enclosure (After – Option A)

AFTER – OPTION B

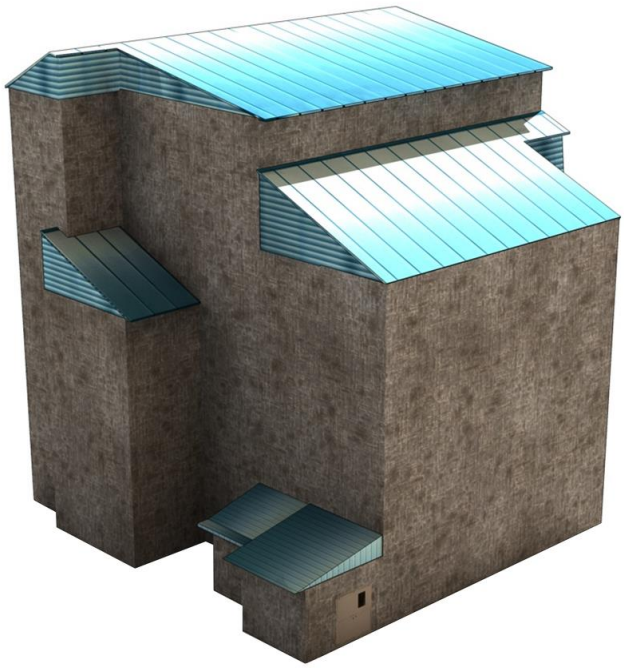


Figure 2-3. 105KE/105KW Safe Storage Enclosure (After – Option B)

Under Option B, the existing reactor secondary shield walls would be used as the primary enclosure for safe storage. Option B includes removal of select components from inside the SSE and D4 of the reactor support areas surrounding the secondary shield wall, and the construction of a roof (as required) to enclose the top of the reactor block and adjacent rooms. The roof would consist of structural steel and metal roof decking. The shield walls have supported the roof in SSE structures for other reactors, and the 105KE and 105KW designs are expected to be similar if Option B is used. Openings between the new roof and top of the shield walls would be closed with wall panel siding like that of the new roof. Openings and penetrations within the shield walls would be closed (i.e., large and small openings or penetrations would be sealed by concrete pourbacks or steel plates, as appropriate).

In either option, belowgrade pourbacks installed to cover penetrations in the reactor outer shielding walls have the potential to damage the grade beam supporting soils of the independent structure or allow an entry path or subsidence adjacent to the SSE. These pourbacks would be designed to meet seismic criteria. Large and small openings or penetrations would be sealed by concrete pourbacks or other suitable engineered material as appropriate to address the hazard of failure.

A single-entry door into each SSE will be provided to limit and control access and will have the capability of being welded shut. Necessary ventilation ducting would be installed for the SSE that could be connected to an external portable exhauster unit. The external portable exhauster unit would be connected for use prior to entry for specific maintenance activities, as needed. Some hazardous wastes will remain within the SSE during the ISS period for disposition under a future remedial action for the reactors.

ACM Management within the SSE. This CERCLA response action for the 105KE and 105KW Reactor buildings will be a lengthy process due to the unique nature of the reactor buildings. Previous evaluations have determined that a long period is needed to allow for the reactor core to decay to safe levels for eventual disposal. During this period, the reactor buildings are to be maintained in a safe condition within the SSE and receive periodic inspections per an EPA-approved S&M plan.

Under this CERCLA removal action, before the ISS storage period can begin, accessible ACM that may reasonably cause a risk of exposure to the workers, public, or environment in the future will be removed, as described below. NESHAP only requires removal of regulated asbestos containing materials (RACM) as defined by 40 CFR 61.141, "Definitions," prior to performing building demolition or renovation (40 CFR 61.145, "Standard for Demolition and Renovation"). The decisions as to where and what materials may be removed or left in place (in a stable condition within the SSE) is based on reliance of professional judgment and inspection history from other Hanford reactors already in ISS. In general, materials that are unlikely to present a hazard to future inspection team members during ISS, or where the removal would cause a greater safety issue for current workers, would be left behind for removal during reactor building demolition preparation activities after the ISS period has concluded. These materials and their locations will be documented within the S&M plan for ISS for information during future entries.

The dislodged pieces of transite currently staged on the upper floors of 105KE will be removed prior to completing construction of the SSE. Damaged thermal system insulation within approximately 10 ft of walking surfaces accessible to SSE inspection teams will be removed or encapsulated. Any work that will result in altering facility components in any way, including the stripping or removal of RACM, will be performed in accordance with applicable substantive 40 CFR 61, Subpart M requirements for renovation.

Except as noted above, all the remaining interior and exterior transite wall panels, transite roofing panels, and thermal system insulation in 105KE and 105KW will remain in place during the ISS period unless DOE determines that removal is necessary for protectiveness, as determined through future periodic facility walkdowns. ACM located in inaccessible subgrade areas will also be left in place during the ISS period. Removal of asbestos at heights can be achieved more efficiently and safely during building demolition preparation activities when larger equipment is available for use inside and outside the reactor buildings. After the ISS period has ended and prior to demolition of the reactor buildings, any remaining friable and non-friable RACM will be managed as outlined in Section 2.2.4.2.

Key elements of the SSE design are as follows:

- Provide isolation of the reactor core and remaining 105KE and KW areas within a structure that will provide weather protection, limit spread of contamination, and prevent unauthorized human or significant insect/pest intrusion for the ISS period through:
  - Construction of a free-standing enclosure structure over the reactor building (Option A), or
  - Use existing 105KE and 105KW secondary shield walls as the basis for establishing the SSE footprint and as prime components of the structure (Option B)
- Demolish exterior reactor building structure, floors, and decking up to the minimal achievable distance of the remaining shield walls to maintain integrity of the remaining structure.
- Plug large and small openings and penetrations (e.g., concrete or sheet steel) in the abovegrade secondary shield wall to eliminate human entrance and minimize intrusion by birds and pests, and meet appropriate seismic or wind criteria (Option B).
- Provide limited, non-routine access into the SSE and accessible portions of the remaining 105KE/105KW buildings, for S&M activities during the ISS period that are designed to confirm the ongoing reliability of the enclosure structure.
- Identify and enclose/seal all belowgrade tunnels and pipes (and other penetrations through the secondary shield wall) to prevent water or pest intrusion and as isolation of the SSE from the environment.

2.2.6 Waste Site Integration

The D4 and ISS activities will be integrated with the remediation of 100-KR-1 and 100-KR-2 OU waste sites such that there are minimal impacts between the two efforts. Existing waste sites located in the building footprint or excavation area may be completely remediated during this removal action. Remediation of these waste sites would include verification of meeting the cleanup standards of the applicable ROD. Wells located near or within the footprint of the structures undergoing D4 and ISS activities may be decommissioned if needed to facilitate D4 and ISS.

Other contaminated underground structures (including french drains, pipelines, pipe tunnels, and pipe trenches) may be exposed or affected by removing the belowgrade facility structures. The condition of these sites will be documented as part of the D4 and ISS process. The documentation will include location of pipelines/pipe tunnels/pipe trenches (as appropriate) that intersect the site as an aid to future remediation.

If the D4 or ISS work results in the effective remediation of a site (e.g., removal of a french drain within the excavation area next to a structure), the closeout of that site will be integrated with remedial action closeout processes, and the appropriate database will be updated to reflect the closeout. Achieving closeout of a waste site will be done in accordance with the Remaining Sites ROD (EPA/ROD/R10-99/039). Additional remediation of contaminated soil and/or underground structures beyond the excavation site will be evaluated on a case-by-case basis to determine the practicality of removing the structure as part of the D4 or ISS work scope or deferring removal to a later remedial action.

2.2.7 Waste Management and Disposal

Waste will be generated from both S&M and D4/ISS activities. All waste management activities will be performed in accordance with waste management ARARs identified in the AMs (EPA 2005, 2007). Some materials maybe eligible for salvage and recycling if it is economically feasible and the regulatory requirements are met. It is assumed that nearly all the CERCLA waste from the removal action will be disposed at ERDF.[5]

Treatment of waste may be necessary prior to disposal at ERDF. The treatment may occur at the 100-K Area, at ERDF, or, for liquids, at the Effluent Treatment Facility (ETF), as approved by EPA (see Section 4.2.4). Liquid waste will either be sent to the Hanford Site's ETF or treated to meet the acceptance criteria of the receiving facility. Liquid waste sent to the ETF may be treated and any treatment residues may be disposed at ERDF if they meet ERDF waste acceptance criteria (ERDF-00011).

If generated, transuranic (TRU) waste or mixed waste that cannot be sent to ERDF will be stored for eventual disposition at the Central Waste Complex (CWC). Waste sent to CWC must meet the CWC acceptance criteria (HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*).

2.2.8 Site Stabilization

Following all facility demolitions, the building footprint and excavation area will be placed in a safe and stable configuration after site radiological surveys, visual inspections, sampling, or as follows. If a site does not meet the 100-KR-1/100-KR-2 OU cleanup standards following completion of the D4 or ISS

[5] 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.

activities, the site will be stabilized in a manner that will not hinder future remediation (e.g., covered with a cap of clean borrow soil). Stormwater run-on and runoff issues may need to be addressed. S&M requirements will be established for the site consistent with those established for the 100 Areas until remedial action in the 100-KR-1 and 100-KR-2 OUs. Characterization information for the area will be generated to document the site conditions at the end of this project and the WIDS database will be updated. Final site restoration will be coordinated with the remedial actions. Additional data may be included in the individual site deferral documents. EPA will be provided documentation describing the environmental conditions at the end of the D4 or ISS activity.

2.2.9 Site Restoration

If final closeout is pursued, field sampling to support closeout decisions will occur in accordance with the Remaining Sites ROD (EPA/ROD/R10-99/039) and the 100 Area SAP (DOE/RL-96-22). If verification sampling of the site indicates that cleanup standards for both soils and any remaining belowgrade structures (if present) have been met, the belowgrade void spaces will be backfilled with inert nonrecyclable material (e.g., concrete rubble qualifying as inert waste under WAC 173-350-990, "Solid Waste Handling Standards," "Criteria for inert waste") and clean soil. Approximately the top 2 to 3 ft will be backfilled with clean soil to facilitate future revegetation of the site. The final grade of the site will match the surrounding terrain. Existing borrow pits will be used to obtain the backfill material. Because of safety concerns and access issues during D4 and ISS activities, backfilling in and around the facilities may occur after sample collection, but prior to the preparation of site closeout documentation, if backfill concurrence is obtained from EPA.

If in-process measurements or final characterization sampling indicate that the cleanup standards have not been met, an evaluation will be performed (e.g., location, site access, contaminants of concern) to determine how much, if any, of the site will be backfilled. If it is determined that cleanup actions must stop, the site will be stabilized in a manner that will not hinder future remediation. Site restoration will be coordinated with remedial actions and 100-K Area restoration actions. Characterization and status information for this area will be documented at the end of the project. Decisions of whether to proceed with soil cleanup or transfer the scope of work to a later remedial action will be approved by EPA.

2.2.10 Demobilization

At the completion of D4 and ISS activities, equipment, portable trailers, cargo containers, and storage containers may be identified for reuse elsewhere on the Hanford Site; otherwise, they will be demolished under this RAWP and sent to ERDF for disposal in accordance with the ERDF waste acceptance criteria (ERDF-00011).

3 Safety and Health Management and Controls

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

3.1 Emergency Management

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

A new emergency response plan will be written or an existing plan modified and in place before the D4 and ISS activities of the 100-K Area facilities begin. The emergency response actions within the emergency action plan are provided for recognizing incidents and abnormal conditions, initiating protective actions, and making the proper notifications. Emergency response for this project will require notification to the National Response Center (NRC) for reportable quantity releases. The DOE-RL On-Scene Coordinator will be notified for other emergency situations (Section 4.5).

3.2 Safeguards and Security

Access to the Hanford Site is restricted. Access to the 100-K Area is controlled via postings (warning signs), noncontinuous fencing, and security patrols. Authorized entry and keys to 100-K Area facilities are controlled by the contractor. The removal action area is posted and fenced, as needed to control entry. Access requirements for employees, nonemployees, and visitors are defined in a project health and safety plan (HASP).

3.3 Safety and Health Program

Potential industrial and environmental hazards are generally associated with nonroutine D4 and ISS activities. Buildings/structures that are the subject of this removal action were used for a variety of purposes in the past. Therefore, they may be contaminated with hazardous substances, as described in Section 1.4.2.

Because of the potential for these buildings/structures to be contaminated with chemical and radiological hazardous substances, the HASP prepared will address chemical, radiological, and physical hazards as described in the following subsections. The HASP will specify the physical and administrative controls and requirements for work activities for the protection of personnel and the environment.

3.3.1 Worker Safety Program

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

- Organizational structure specifying the official chain of command and the overall responsibilities of supervisors and employees
- Comprehensive work plan development before work begins at a site to identify operations and objectives and address the logistics and resources required to accomplish project goals

- HASP developed when workers could be exposed to hazardous substances
- Worker training commensurate with individual job duties and work assignments
- Medical surveillance program administered to comply with 29 CFR 1910.120, "Occupational Safety and Health Standards," "Hazardous Waste Operations and Emergency Response"
- Contractor internal work requirements and processes
- Voluntary protection program
- Stop work authority for all workers if a threat to human health or the environment is identified or perceived

3.3.2 Health and Safety Plan and Activity Hazards Analysis

A HASP will be prepared that defines the chemical, radiological, and physical hazards and specifies the controls and requirements for work activities. Access and work activities are controlled in accordance with approved work packages, as required by established internal work requirements and processes. A HASP addresses the health and safety hazards of each phase of site operation and includes the requirements for hazardous waste operations and construction activities, as specified in 29 CFR 1910.120. Depending on the specific hazards present, one or more HASPs will be written for D4 and ISS of the facilities. As part of work package development, a job or activity hazards analysis will be written to identify the hazards associated with specific tasks not already covered under a HASP. The following elements are included in a HASP:

- General overview of the hazards associated with the area
- List of employee training assignments
- List of personal protective equipment (PPE) to be used at the work site
- Medical surveillance requirements
- Work site control measures
- Emergency response
- Confined space entry internal work requirements and processes
- Spill containment program

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

3.3.3 Radiological Controls and Protection

The radiological controls and protection program are defined in approved DOE programs and contractor internal work documents and procedures. The radiological controls and protection program implements the contractor policy for reducing risks to worker safety or health to ALARA levels and ensuring adequate protection of workers. The radiological protection program of the contractor meets the requirements of 10 CFR 835, "Occupational Radiation Protection." Appropriate dosimetry, PPE, ALARA planning, periodic surveys, and health physics technician (HPT) support will also be provided.

In addition to a HASP, a radiological work permit (RWP) will be prepared, as needed, for work in areas with potential radiological hazards. The RWP extends the Radiological Protection Program to the specific work site or operation. All personnel assigned to the project and all work site visitors must strictly adhere to the provisions identified in the HASP and RWP.

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

Measures will be taken to minimize impacts to the environment during work activities. Section 4.3 and the air monitoring plan (AMP) (DD-62526, *Air Monitoring Plan for 105-KE/KW Interim Safe Storage and D4 of 100-K Ancillary Buildings*) address the controls to be used to address the potential release of radionuclides to the environment but not to the exclusion of 10 CFR 835 requirements.

Radiological worker exposure will be monitored using approved occupational radiological protection methods.

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4 Environmental Management and Controls

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

4.1 Applicable or Relevant and Appropriate Requirement Compliance

The ARARs for this removal action were identified in the two AMs (EPA 2005, 2007). The key ARARs include standards for waste management; control of releases to the environment; site closeout; protection of cultural and ecological resources; and worker safety and health standards.[6]

Removal actions will be performed in compliance with the substantive portions of the identified ARARs to the extent practicable. Waste streams will be evaluated, designated, and managed in compliance with the ARARs. Before disposal, waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel. A discussion of how the removal action will comply with these ARARs is provided in the following subsections.

4.2 Waste Management Plan

Several waste streams will be generated under this removal action. It is anticipated that most of the waste will be low-level waste. A small volume of dangerous waste, mixed waste, PCB waste, and asbestos and ACM could be generated. The potential for TRU and transuranic mixed (TRUM) generated waste also exists. Most waste will be in a solid form; however, some liquid wastes may be generated. The following is a list of laws and regulations in which the ARARs have been developed (ARARs are identified in the AMs [EPA 2005, 2007]):

- The RCRA, as implemented by 40 CFR 260, "Hazardous Waste Management System: General," through 40 CFR 268, "Land Disposal Restrictions," and WAC 173-303, "Dangerous Waste Regulations," for management of dangerous waste. The identification and TSD of hazardous waste and the hazardous component of mixed waste are governed by RCRA. The State of Washington, which implements RCRA requirements under WAC 173-303, has been authorized by EPA to implement most elements of the RCRA program. The dangerous waste standards for generation and storage will apply to the management of any dangerous or mixed waste generated during ISS and D4 activities at Hanford Site excess industrial buildings/structures and because of debris cleanup activities. Treatment standards for dangerous or mixed waste subject to RCRA land disposal restrictions are in WAC 173-303-140, "Land Disposal Restrictions," which includes 40 CFR 268 by reference.
- The TSCA includes standards for managing PCB waste. PCB waste disposal is governed by the rules of 40 CFR 761. PCB wastes generated during D4, ISS, and debris cleanup activities will be disposed at ERDF or another EPA approved disposal facility in accordance with the substantive provisions of 40 CFR 761. PCBs may be considered underlying hazardous constituents under RCRA for waste that designates as dangerous or mixed waste and could require treatment to meet WAC 173-303 and 40 CFR 268 requirements.

[6] Worker safety and health standards are not potential ARARs under CERCLA and are not enforceable environmental regulations under the AMs. These standards, however, must be followed in accordance with DOE requirements during the removal action. Due to the nature and importance of these standards, a discussion of the safety and health requirements are included in this RAWP.

- The CAA, as implemented by 40 CFR 61, Subpart M, regulates removal and disposal of asbestos and ACM. These regulations provide for special precautions to control environmental releases or exposure to personnel due to airborne emissions of asbestos fibers during removal activities.

Wastes generated through implementation of this removal action will be disposed at appropriate EPA approved facilities, in accordance with the waste acceptance criteria of those facilities. ERDF is the preferred waste disposal facility for waste meeting ERDF waste acceptance criteria (ERDF-00011). Demolition debris will be transported to ERDF or other EPA approved facilities, and treated as necessary, to meet applicable land disposal restriction requirements and waste acceptance criteria prior to disposal.

Waste that is characterized as either contact-handled or remote-handled TRU/TRUM waste will be staged at CWC or another EPA approved facility. This material will be packaged for eventual shipment to the Waste Isolation Pilot Plant (WIPP) in accordance with WIPP waste acceptance criteria.

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

4.2.1 Projected Waste Streams

Waste will be generated from S&M, D4, and ISS activities. One or all of the following solid waste streams are anticipated to be generated during the removal action and may fall into any combination of categories (nondangerous/nonradioactive, radioactive, mixed, hazardous, dangerous, suspect radioactive, TRU/TRUM, suspect dangerous, and suspect mixed):

- D4 debris (e.g., structural materials, concrete, wood, rebar, metal/plastic pipes, wire, equipment, pumps, ductwork, and electrical components)
- Low-level waste and low-level mixed waste
- TRU and TRUM waste
- Liquids (e.g., decontamination liquids)
- Spent/excess chemicals/reagents and used oils/greases
- Refrigerants (ozone-depleting substances)
- Miscellaneous solid waste (e.g., rubber, glass, paper, PPE, cloth, plastic, wipes, wood, equipment, tools, pumps, wire, metal casing, plastic piping, and sample returns)
- PCB waste
- Asbestos and ACM
- Lead waste
- Soils

4.2.2 Waste Management and Characterization

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

suspected to be present. The waste characterization process is discussed briefly in Section 2.2.2 and in the waste characterization SAP (DOE/RL-2005-33).

Waste generated through the removal action will be characterized in accordance with the SAP (DOE/RL-2005-33) and the waste acceptance criteria of the receiving facility (e.g., ERDF). Characterization is performed using a variety of information including process knowledge, historical analytical data, new sampling and analysis data, and radiological and chemical field screening. Characterization data will be used to prepare waste profile summaries to determine appropriate disposal options.

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

Hazardous, dangerous, low-level, and low-level mixed waste may be generated from this removal action. This waste will likely be solid; however, there could be residual liquid from decontamination activities or process-related systems. These wastes will be disposed at ERDF. If any waste does not meet the ERDF waste acceptance criteria, it will be transferred to an offsite disposal facility that has been deemed suitable by the EPA regional office.

4.2.2.2 Transuranic and Transuranic Mixed Waste

TRU waste may be generated from this removal action. TRUM waste may exist in the form of lead shielding and equipment. This waste will likely be solid; however, there could be residual liquid from decontamination activities or process-related systems.

4.2.2.3 Solid Waste

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

4.2.2.4 Asbestos and ACM Waste

Removing, handling, packaging, and disposing of asbestos and ACM will be performed in accordance with the substantive provisions of 40 CFR 61.145(a) and (c) and 40 CFR 61.150, “Standard for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation, and Spraying Operations.” Additional information about asbestos and ACM waste generated from the D4 and ISS activities will be specified in the field work packages and procedures, as necessary.

4.2.2.5 PCB Waste

The management and disposal of PCB wastes is governed by the TSCA under 40 CFR 761. The TSCA regulations contain specific provisions for PCB waste, including PCB waste that contains a radioactive component. PCBs are also considered underlying hazardous constituents under RCRA and may be subject to WAC 173-303-140 and 40 CFR 268 requirements. Any PCB waste that does not meet ERDF waste acceptance criteria would be retained and managed at a PCB storage area meeting the requirements of TSCA storage until disposed at an appropriate disposal facility. Additional information about PCB waste generated from the D4 and ISS activities will be specified in the field work packages and procedures, as necessary.

4.2.2.6 Ozone-Depleting Substances

40 CFR 82, Subpart F ("Protection of Stratospheric Ozone," "Recycling and Emissions Reduction"), establishes requirements for the recovery, recycling, and reclamation of ozone-depleting substances from refrigeration equipment that may be present within the facilities addressed by the removal action.

4.2.2.7 Returned Sample Waste

Screening and analysis of both solids and liquids may be conducted at the project site, at laboratories on or off the Hanford Site, or at a radiological counting facility. Samples analyzed at Hanford Site laboratories may be returned to the original waste location or to ERDF for disposition with other CERCLA waste. Unused samples and associated waste generated at offsite laboratories will be dispositioned in accordance with contract specifications.

The 100-K Area radiological counting facility in 105KW and the Central Radiological Count Facility located in the 600 Area at MO6110 will be used to support the counting of radiological samples. Both noncontiguous counting facilities are considered onsite per CERCLA Section 104(d)(4). Samples and associated sample waste may be returned to 100K for disposition or sent to ERDF for disposal if it meets the ERDF waste acceptance criteria (ERDF-00011).

4.2.2.8 Decontamination Fluids

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

4.2.2.9 D4 Equipment Waste

Equipment used to support the removal action that is chemically or radiologically contaminated will be decontaminated as described in Section 2.2.4.7. If the equipment cannot be decontaminated, the equipment will be disposed at ERDF or another Hanford Site TSD unit.

4.2.2.10 Management of Bulk Waste

Bulk waste will be placed in ERDF cans for eventual disposal at ERDF or other Hanford Site TSD unit, and treated as necessary to meet applicable land disposal restriction requirements and waste acceptance criteria prior to disposal. Waste will be stored in the area of contamination or at a site-specific storage area at ERDF, as appropriate. Bulk containers will be covered when waste is not being added or removed. Lightweight material (e.g., plastic and paper) will be bagged, if appropriate, prior to placement in the bulk container to eliminate the potential for materials blowing out of the bulk container or truck. Applicable packaging and pre-transportation requirements for dangerous or mixed waste generated by the removal action will be identified and implemented before the waste container is moved. Additionally, a fixative will be applied, as needed, to the demolition site and any loose soil to control dust that may contain radiological and nonradiological contaminants.

4.2.2.11 Management of Waste Containers

Prior to disposal, dangerous waste containers will be managed in accordance with the substantive provisions of WAC 173-303-200, "Accumulating Dangerous Waste on Site," as specified in the ARARs. Waste containers, including ERDF roll-on/roll-off containers, are inspected before use to ensure container integrity. The containers will be stored inside the applicable site-specific waste container storage area or area of contamination. Containers awaiting analytical results will be marked and labeled, as appropriate.

Inspections of the containers will be performed to document the integrity, container marking/labeling, physical container placement, storage area boundaries/identification/warning signs, and sign of any potential leakage. Containers showing signs of deterioration will be over packed or repackaged, as necessary.

Spills or releases will be reported, as stated in Section 4.5. In the event of a spill or release, action will be taken to protect HHE.

4.2.3 Waste Handling, Storage, and Packaging

Marking, labeling, segregating, and staging waste containers will be performed or directed by the waste specialist. Waste containers will be shipped directly to the disposal site. If waste containers need to be temporarily stored pending final disposition, they will be stored at an EPA-approved facility. Dangerous or mixed waste may also be accumulated in accordance with the substantive requirements of WAC 173-303-200.

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

The BFA will include the individual building/structure footprint and the surrounding area needed to support D4 of buildings/structures and excavations. The BFA will be established as part of the work planning process. For waste management inside the BFA, safe and effective management practices will be established to ensure protection of HHE during performance of demolition and related work.

As an alternative to management within the BFA, waste that is not immediately transported to ERDF or other EPA-approved disposal facility may be stored in staging piles. Staging piles used for management of dangerous waste will be operated in accordance with substantive provisions of standards and design criteria prescribed in 40 CFR 264.554, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Staging Piles," paragraphs (d) through (k) as follows:

- Staging piles will be used only as part of this removal action for temporary storage at a facility and must be located within the contiguous property where the waste to be managed in the staging piles is oriented.
- The staging pile will be designed to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment and minimize or adequately control cross-media transfer. To protect HHE, this may include installation of berms, dust control practices, or using plastic liners or covers, as appropriate.
- The staging pile must not operate more than 2 years (measured from the first time remediation waste is placed in the pile), except when EPA grants an operating term extension. A record of the date when remediation waste was first placed in the staging pile must be maintained until final closeout of the site is achieved.
- Ignitable or reactive waste will not be placed in a staging pile unless it has been treated or mixed before being placed in the pile so that the waste no longer meets the definition of ignitable or reactive waste, or the waste is managed to protect it from exposure to any material or condition that may cause it to ignite.

- Incompatible wastes will not be placed in the same staging pile, unless the requirements in 40 CFR 264.17(b), "General Requirements for Ignitable, Reactive, or Incompatible Wastes," have been met. Staging pile waste that is incompatible with any waste or material stored nearby must be separated or protected from the incompatible material by using a dike, berm, wall, or other device. Waste will not be piled on the same base where incompatible wastes or materials were previously piled unless the base has been decontaminated sufficiently to comply with 40 CFR 264.17(b).

Approval of this RAWP by EPA constitutes general authorization to operate staging piles during execution of this removal action. Specific staging pile locations will be identified in the BFA figure and project drawings and approved by EPA. Field operations of staging piles will be accomplished, as described in the preceding list.

Once the waste has been removed, to close out the staging pile, characterization of the residual soil will be performed as appropriate. In cases where staging piles for industrial waste sites are in an uncontaminated area, the observational approach may be used. In situations where sampling is appropriate and results indicate presence of residual contamination, efforts will be made to remove such contamination.

4.2.3.1 Waste Profile

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

4.2.3.2 Final Waste Disposal

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

TRU/TRUM waste generated as part of this removal action will be sent to CWC or an offsite disposal facility that has been deemed suitable by the EPA regional office. TRU/TRUM waste will be treated, as necessary, certified, and disposed at WIPP.

4.2.3.3 Waste Disposal Records

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

4.2.4 Waste Treatment

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

4.2.5 Waste Minimization and Recycling

Waste minimization practices will be followed to the extent technically and economically feasible. Waste materials will be recycled, reused, or reclaimed when feasible. To be suitable for recycling or reuse, the materials in question must (1) be needed or in demand; (2) be able to meet DOE and Hanford Site free release criteria and (3) not result in an excessive cost to the government. The decision on the materials meeting the criteria will be made by contractor management with input from technical personnel.

Introducing clean materials into a contamination area, as well as contaminating clean materials, will be minimized to the extent practicable. Emphasis will be placed on source reduction to eliminate or minimize the volume of waste generated. Uncontaminated water (e.g., nonradioactive and nonhazardous) could be used for dust suppression. Non-regulated products will be used to the extent practicable.

All materials released offsite for disposal/recycle must be certified free of radiological contamination in accordance with the contractor's material release procedures. Materials with less than de minimis levels of 100-K Area CERCLA hazardous substances (including nonradionuclide hazardous substances) are not considered CERCLA waste and, therefore, cannot be disposed at ERDF and are not subject to the 40 CFR 300.440, "Procedures for Planning and Implementing Off-Site Response Actions," offsite acceptability determination.

4.3 Standards Controlling Releases to the Environment

Airborne emissions associated with the removal action will be minimized through appropriate work controls, in accordance with DOE radiation control and substantive air pollution control standards, to keep Hanford Site air pollutant emissions at ALARA levels. The CAA and the "Washington Clean Air Act" (RCW 70.94) regulate both criteria, toxic and radioactive airborne emissions. The AMP (DD-62526) addresses removal action activities consistent with the activities addressed by this RAWP.

4.3.1 Radiological Air Emissions

Radionuclide contamination may be encountered during ISS and D4 activities under this NTCRA. Federal and state regulations and requirements for radiological air emissions are identified in the AMs (EPA 2005, 2007). Substantive requirements of these standards are applicable to activities that will involve fugitive emissions of radionuclides to the ambient air from demolition and excavation of radioactively contaminated structures or soils performed during the NTCRA.

Radiological contaminants of concern are quantified from hazard identification data, radiological survey reports, historical documentation, buildings with similar process histories, and other project documents. Annual possession quantities, appropriate release fractions, the potential-to-emit (PTE), and total effective dose equivalent (TEDE) are then calculated. Hypothetical offsite and onsite Hanford maximally exposed individuals (MEIs) are then evaluated. TEDE to the MEIs are calculated using the CAP-88 PC (Version 4).[7] Results from the TEDE calculation (ECF-HANFORD-18-0052, *Total Effective Dose Equivalent Calculation for 105-KE/KW ISS and KE Ancillary Building D4*) are documented in the AMP (DD-62526).

[7] The CAP-88 (which stands for Clean Air Act Assessment Package-1988) computer model is a set of computer programs, databases, and associated utility programs for estimation of dose and risk from radionuclide emissions to air. CAP-88 is a regulatory compliance tool under NESHAP (40 CFR 61). CAP88-PC (Version 4.0) allows modeling on a personal computer and is the most recent version of the code.

Airborne emissions control and monitoring requirements for radiological air emissions will be identified, as needed, based on the calculated/modeled value of the potential emissions and resultant public exposure and is included in the AMP (DD-62526) and submitted for regulatory review and approval, separate from this document. Air emission controls and monitoring requirements will be flowed down to applicable project implementing documents as required by the DOE-approved contractors' Radiation Protection Program and Work Management processes.

Near-facility ambient air monitoring station data will be used to track and trend, on a historical basis, any diffuse and fugitive emissions created by the removal activities. The near facility ambient air monitoring stations are identified in the AMP. The Hanford Site protocol established for the Near-Facility Monitoring Program ambient air stations will be followed for station repairs, retirement, data collection, sampling frequencies, sample analysis, and data reporting (DOE/RL-91-50, *Hanford Site Environmental Monitoring Plan*). These stations may be relocated or alternate stations may be used to track and trend diffuse and fugitive emissions should contamination boundaries expand beyond their present location.

4.3.2 Nonradiological Air Emissions

Section 1.4.2.2 discusses the nonradiological contamination present within the buildings. The primary source of emissions resulting from the removal action will be fugitive particulate matter. In accordance with WAC 173-400-040(3) and (8), "General Regulations for Air Pollution Sources," "General Standards for Maximum Emissions," reasonable precautions will be taken to prevent the release of air contaminants associated with fugitive emissions due to demolition, materials handling, or other operations and prevent fugitive dust from becoming airborne from fugitive emission sources.

Operating trucks and other diesel-powered equipment during the removal activities would be expected, in the short term, to introduce quantities of sulfur dioxide, nitrogen dioxide, particulates, and other pollutants to the atmosphere, typical of similar sized construction projects. These releases would not be expected to exceed air quality standards. Dust generated during removal activities would be minimized by applying water or other dust control measures (e.g., fixatives). Vehicular and equipment emissions will be controlled and mitigated in compliance with the substantive standards for air quality protection that apply to the Hanford Site. These techniques are considered reasonable precautions to control fugitive emissions, as required by the substantive requirements.

Toxic air emissions may be subject to the substantive applicable requirements of WAC 173-460, "Controls for New Sources of Toxic Air Pollutants." Airborne emissions control and monitoring requirements for toxic air pollutants will be identified, as needed, based on the calculated value of the potential emissions and resultant public exposure. This information will be provided in subsequent implementing documents/work packages, as necessary.

Some waste encountered during the removal action may require treatment to meet ERDF waste acceptance criteria (ERDF-00011). In most cases, the type of treatment anticipated will consist of solidification or stabilization techniques, such as macroencapsulation or grouting, and WAC 173-460 will not be considered an ARAR because the work will not result in toxic air pollutant emissions at regulated levels. If more aggressive treatment is required that would result in the emission of toxic air pollutants, the substantive requirements of WAC 173-460-030, "Applicability;" WAC 173-460-060, "Control Technology Requirements;" and WAC 173-460-070, "Ambient Impact Requirement" would be evaluated to determine if the requirements are applicable.

4.3.3 Asbestos Emissions

Removal and disposal of asbestos and ACM are regulated under the CAA and NESHAP (40 CFR 61). The substantive provisions of these regulations provide for special precautions to prevent environmental releases or personnel exposure to airborne emissions of asbestos fibers during the removal action.

4.3.4 Emission Controls

The removal action activities have the potential to release radioactive emissions to the atmosphere. Implementing best available radionuclide control technology (BARCT)/as low as reasonably achievable control technology (ALARACT) for these radioactive emissions has been identified as an applicable or relevant and appropriate requirement.

Examples of Controls: The use of wiping or applying fixatives is an ALARA control that has been accepted as BARCT/ALARACT for fugitive particulate radionuclide air emissions, particularly when the potential offsite dose is low. Glovebags may also be used to reduce potential emissions. For vacuuming and the use of portable ventilation units, HEPA filters are used to collect generated dust. The use of HEPA filters has been generally accepted as BARCT/ALARACT. Because structure demolition may be a source of radioactive fugitive emissions, dust suppressants (e.g., water and fixatives) will be used and are considered BARCT/ALARACT for demolition. When using water, quantities used will be minimized to prevent water accumulation, puddles, and runoff within the area where the water is being used. Radiological control methodologies will follow the DOE-approved contractors' Radiation Protection Program requirements.

Expected Controls: Emission controls will primarily consist of HEPA filtration and application of dust suppressants (e.g., water, water mist/fog, soil binders, fixatives, stabilizers, conditioners, and crusting agents) or other methods determined during radiological planning.

Specific emission controls for these activities are discussed in detail in the AMP (DD-62526).

4.3.5 Monitoring Requirements

In lieu of monitoring, periodic confirmatory measurement (PCM) to verify low emissions will be provided, as required by WAC-246-247-075(3) and (8), "Radiation Protection—Air Emissions," "Monitoring, Testing and Quality Assurance," for all facilities. Ambient air monitoring and radiological surveys for the radionuclides of concern associated with the removal action will be provided to meet the PCM requirement as outlined in the AMP (DD-62526).

4.3.6 Liquid Effluents

Liquid effluents may be generated during the removal activities (e.g., decontamination solutions, water sprays for dust suppression). Although CERCLA removal actions are exempt from Hanford Site SWDP, liquid effluents will be discharged if they meet the substantive provisions of existing Hanford Site SWDP. If the liquid effluents do not meet Hanford Site SWDP, effluents may need to be contained, sampled, and as necessary, transported and discharged into the ETF, or solidified for disposal at ERDF or another EPA approved facility. Water spray for dust suppression will be used in a manner that minimizes the potential for ponding or runoff that could result in the spread of contamination.

The 100K Reactor area has a stormwater collection system that discharges to the Columbia River via an NPDES permit under authority of Section 402 of the *Clean Water Act*, as implemented through regulations under 40 CFR 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System." In accordance with EPA/540/G-89/006, *CERCLA Compliance with Other Laws Manual*, and the *Clean Water Act*, such offsite stormwater discharges, are subject to the NPDES permit.

Because CERCLA ARARs are for onsite activities, the laws and regulations that apply to this stormwater discharge are not applicable for this removal action.

4.3.7 Standards for Floodplains and Wetlands

The "Compliance with Floodplain/Wetlands Environmental Review Requirements" (10 CFR 1022), an ARAR for this removal action, mandates that actions performed within a floodplain be conducted in a manner that avoids adverse effects, minimizes potential harm, and restores and preserves natural and beneficial uses. Some of the buildings in the 100-K Area are located within the Columbia River floodplain and must be managed in accordance with these requirements.

4.4 Site Closeout

As stated in Section 2.2.2, it is anticipated that very few sites meet the cleanup standards in the Remaining Sites ROD (EPA/ROD/R10-99/039) as part of this removal action. It is more likely that sites will be characterized to document the as-left condition following the removal of the facility or structure.

If final characterization or closeout of the soils at a site is pursued following the D4 or ISS activities, it will be performed in accordance with the requirements of the Remaining Sites ROD (EPA/ROD/R10-99/039).

4.5 Reporting Requirements for Nonroutine Releases

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

- 40 CFR 302, "Designation, Reportable Quantities, and Notification," requires immediate notification to the NRC on discovery of a release of a hazardous substance into the environment in excess of a reportable quantity.
- 40 CFR 355, "Emergency Planning and Notification," requires immediate notification to the community emergency coordinator for the local emergency planning committee and to the State Emergency Response Commission for a release of a reportable quantity of an extremely hazardous substance, a comprehensive release of a reportable quantity of an extremely hazardous substance, or a CERCLA hazardous substance.
- Emergency response for this project will include required notification to the NRC for reportable quantity releases and On-Scene Coordinator notification for other emergency situations.

4.6 Cultural and Ecological Resources

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

4.6.1 Cultural

The *Archeological and Historic Preservation Act of 1974* provides for the preservation of historical and archeological data (including artifacts) that might be irreparably lost or destroyed as the result of a proposed action. Although the removal action will occur in previously disturbed areas and the discovery of artifacts is unlikely, this law would be applicable to any significant artifacts that may be discovered.

The *Native American Graves Protection and Repatriation Act of 1990* (as implemented by 43 CFR 10, "Native American Graves Protection and Repatriation Regulations") requires agencies to consult and notify culturally affiliated tribes when Native American human remains are inadvertently discovered during project activities. It is unlikely that work proposed in this removal action would inadvertently uncover human remains. If human remains were encountered, the procedures documented in DOE/RL-98-10, *Hanford Cultural Resources Management Plan*, would be followed to satisfy substantive requirements.

A *National Historic Preservation Act of 1966* (as implemented by 36 CFR 800, "Protection of Historic Properties"), Section 106, cultural resource review (CRR) will be conducted to address demolishing the buildings/structures addresses in this removal action. These buildings/structures are in areas that have been extensively disturbed by past construction activities, and most buildings/structures have been evaluated for their National Register of Historic Places eligibility as part of DOE/RL-97-56, *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan*. Some buildings/structures are contributing properties to the Manhattan Project/Cold War Era Historic District, and they require mitigation through documentation (e.g., completed inventory forms). DOE/RL-97-56 also requires walkthroughs to identify artifacts of educational and interpretive value. Before field activity begins, each building/structure requiring documentation will be evaluated for the following information:

- Type of documentation required for each building/structure (Historic Property Inventory Form or Expanded Historic Property Inventory Form)
- Status of the documentation

Walkthroughs of the buildings/structures, if necessary, will be conducted before demolition to finalize all mitigation requirements. CRR documentation requirements for any specific facility will be identified/completed before demolition activities begin.

With respect to historic properties, DOE/RL-97-56 documents that six of the facilities included in the scope of the removal action are eligible for listing as contributing properties within the Hanford Site Manhattan Project and Cold War Era Historic District (105KW, 181KW, 1706KE, 1706KER, 1717K, and 1908KE). Under this treatment plan, the operational history or significant engineering achievements of these eligible properties was documented on either Expanded Historic Property Inventory Forms or standard Historic Property Inventory Forms. The contribution these structures made to the Cold War is described in Section 3 ("Reactor Operations") of Chapter 2 of DOE/RL-97-1047, *History of the Plutonium Production Facilities at the Hanford Site Historic District, 1943-1990*. Also in compliance with the treatment plan, walkthroughs to identify artifacts that may have interpretive or educational value as exhibits within local, state, or national museums have been conducted for these structures. Seven artifacts were located within 105KW and nine were in 1706KE/KER. Five of these artifacts have been retrieved and transferred to the Columbia River Exhibition of History, Science, and Technology (curator for the DOE Hanford Site Manhattan Project and Cold War Era Collection); eight have been photographed and documented in place; and the remaining three were re-evaluated and deleted from consideration for retention or photo-documentation. Therefore, all physical effects to these eligible properties, up to and including demolition, have been mitigated. No additional actions are required.

CRR(s) will also be conducted to address debris cleanup. A graded CRR could be developed to address debris cleanup that has been identified to date, as well as cleanup identified in the future, to ensure that adverse effects on potential archeological sites are avoided. CRR documentation requirements, including site-specific field evaluations, will be identified/completed before debris cleanup begins.

Impacts on cultural resources near the removal action will be mitigated in accordance with DOE/RL-98-10.

4.6.2 Ecological

Ecological reviews will be completed before work begins in areas where there is potential for adverse effects to sensitive or rare biological resources, consistent with existing routine procedures (DOE/RL-95-11, *Ecological Compliance Assessment Management Plan*). Since all buildings/structures could support ecological resources (e.g., nesting birds or bat roosts), surveys must be conducted prior to decommissioning. Project engineers will consult with the ecological compliance staff in advance of planned activities to allow for sufficient ecological surveys.

If nesting migratory birds are observed, decommissioning will be delayed until after the end of the nesting season. Prior to D4 of a structure, a facility walkdown/survey will be performed during daylight hours to document any evidence that could indicate high numbers of bats that could suggest possible roosting site(s). In the event such evidence is discovered, DOE will be consulted for further recommendations.

The *Endangered Species Act of 1973* requires the conservation of critical habitat on which endangered or threatened species depend and prohibit activities that threaten the continued existence of listed species or destruction of critical habitat. The *Migratory Bird Treaty Act of 1918* makes it illegal to remove, capture, or kill any migratory bird or any part of nests or the eggs of any such birds. Although threatened, endangered, and migratory species are known to be present in the areas surrounding the 100-K Area (PNNL-6415, *Hanford Site National Environmental Policy Act (NEPA) Characterization*), no adverse impacts on protected species or critical habitat resulting from implementation of the removal action would be anticipated because it would be limited to areas highly disturbed from past and present industrial operations. The potential for impacts to biological resources is typically greater at borrow sites because they are in otherwise undisturbed areas.

Workers will avoid wildlife that may be found in and around the buildings/structures. Appropriate ecological surveys of debris cleanup sites also will be conducted before field activities begin. Procedures to avoid or mitigate damage to sensitive areas identified during ecological reviews will be established before work begins, including activities on the Hanford Reach National Monument. For example, it is expected that many of the buildings, structures, and debris cleanup sites will have relatively small collections of debris that could be removed without disturbing the surrounding areas. However, debris cleanup requiring vehicles off maintained roadways or the use of heavy equipment or excavation will require site-specific evaluations and reviews of the ecological resources when the work is scheduled. If off-road travel is necessary during cleanup, additional disturbance will be minimized to the extent possible, and travel will be planned to avoid sensitive ecological resources identified within the area.

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

5 Project Management and Organization

This chapter describes the management approach for implementing the removal action, including schedule summary information, project team descriptions, training and qualifications, quality assurance (QA), and post-removal action activities.

5.1 Cost Summary

Table 5-1 presents the costs identified in the two EE/CAs: DOE/RL-2004-43 and DOE/RL-2005-86. Nondiscounted costs are present day costs that are not affected by general price inflation (i.e., they represent units of stable purchasing power). The nondiscounted cost assumes that the work is performed today. Costs for the added ancillary facilities can be estimated from costs for comparable facilities in the EE/CAs.

Table 5-1. Projected Costs

Structure	Nondiscounted Costs
27 Ancillary Facilities (DOE/RL-2004-43)	$27,700,000 (2004 dollars)
105KE/KW Reactor Facilities and Ancillary Facilities (DOE/RL-2005-86)	$80,502,612 (2005 dollars)

References:
DOE/RL-2004-43, *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities*.
DOE/RL-2005-86, *Engineering Evaluation/Cost Analysis for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*.

5.2 Schedule

The 100-K Area removal action began in 2007 with completion of the removal action scheduled by September 30, 2024, as governed by the associated Tri-Party Agreement (Ecology et al., 1989) milestones shown in Table 5-2. The milestone status in Table 5-2 is as of January 2018. A more detailed schedule, including assumptions, resources, and activity breakdown, will be developed and submitted with the detailed work plans for each fiscal year. The schedule included in this document is also subject to change to be compliant with the River Corridor Project strategy and funding of continued work in the 100-K Area.

Table 5-2. Tri-Party Agreement Milestones for the 100-K Area ISS and Ancillary D4 Removal Action

Milestone	Description	Due Date
M-016-00	Complete remedial actions for all nontank farm and noncanyon operable units in accordance with schedules established in approved RD/RA work plans	09/30/2042
M-016-00C	Complete all response actions for the 100-K Area	09/30/2024
M-016-52	Initiate response actions for the remaining waste sites for the 100-K Area including closure of the 1706KE waste treatment system in accordance with Section 5.5 of the Agreement Action Plan	07/31/2009 (Complete)

Table 5-2. Tri-Party Agreement Milestones for the 100-K Area ISS and Ancillary D4 Removal Action

Milestone	Description	Due Date
M-016-53	Complete the interim response actions for the 100-K Area within the perimeter boundary and to the river for Phase 1 actions	12/31/2012 (Complete)
M-016-143	Complete the interim response actions for the 100-K Area within the perimeter boundary and to the river for Phase 2 actions	09/30/2024
M-093-00	Complete final disposition of all 100 Area Surplus Production Reactor Buildings (including 105KE and 105KW)	To be determined
M-093-27	Complete 105KE and 105KW Reactor ISS in accordance with the Removal Action Work Plan	09/30/2024
M-093-28	Submit a change package for proposed interim milestones for 105KE and 105KW Reactor ISS	12/31/2019

D4 = deactivation, decontamination, decommissioning, and demolition
ISS = interim safe storage
KE = K East
KW = K West
RD/RA = remedial design/remedial action
TPA = *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989a)

Work at the 100-K Area Facilities was divided into three phases and will be completed on the dates provided in Table 5-3. Phase 1 activities are complete as documented by letter 13-AMRP-0058, "Completion of Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) Milestone M-016-53, Complete the Interim Response Actions for the 100-K Area Within the Perimeter Boundary and to the River for Phase 1 Actions."

Table 5-3. Phases of Work at the 100-K Area

Phase 1 M-016-53 Completed: December 31, 2012			
110KE	*1706KE*	*181KE*	*183.4KE*
110KW	*1706KEL*	*183.1KW*	*183.5KE*
115KE	*1706KER*	*183.2KW*	*183.6KE*
116KE	*1713KE*	*183.3KW*	*MO048*
117KE	*1714KE*	*183.4KW*	*MO060*
118KE	*1717K*	*183.7KW*	*MO969*
119KE	*1717AKE*	*183.1KE*	
1605KE	*1720K*	*183.3KE*	

Table 5-3. Phases of Work at the 100-K Area

Phase 2 M-016-143 Due Date: September 30, 2024			
118KW	*183.6KW*	*MO236*	*MO907*
1713KER	*183.2KE*	*MO237*	*MO928*
1724KB	*183.7KE*	*MO323*	*MO955*
181KW	*MO101*	*MO382*	
182K	*MO102*	*MO401*	
183.5KW	*MO214*	*MO402*	
Phase 3 M-016-00C Due Date: September 30, 2024			
105KE Water Tunnel	*1605KW*	1714KW	MO054
105KW Water Tunnel	165KE	1724K	*MO442*
142K	165KW	1724KA	MO500
142KA	166AKE	*183KE*	MO506
115KW	166KE	*185K*	MO507
116KW	166KW	*190KE*	MO917
117KW	167K	*190KW*	
119KW	1705KE	1908K*	
1506K1	1713KW	*1908KE*	

Note: Building numbers shown in *italics* have been demolished as of January 2018.

*1908K will be demolished during remediation of the 116-K-3 waste site (outside the scope of this document).

5.3 Project Team

The project team includes the individuals working to accomplish the removal action. Accordingly, the project team includes the lead regulatory agency (EPA); lead agency (DOE); contractor removal action organization, site project organization, QA organization, radiological control organization, health and safety organization, sample and data management organization, Environmental Compliance Officer, Waste Management Lead, DOE-RL Removal Action Manager; and other contractor and subcontractor staff. The HASP identifies the key project team member names, their roles and responsibilities, and their respective organizations.

5.4 Change Management

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

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

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

5.5 Personnel Training and Qualifications

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

Training requirements will ensure that personnel are able to work safely in and around radiological areas and maintain ALARA radiation exposures. Safety courses, training materials, site-specific information, and available technologies will be presented to provide adequate training for workers. Records of required training will be maintained in readily accessible personnel files. Health physics workers are required to be current in HPT qualification training. These courses require passing examinations to demonstrate their understanding of theoretical and applied classroom materials.

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

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

The HASP, RWP, and activity hazards analysis will include specific requirements for project activities conducted, which include PPE and required training for project personnel.

5.6 Quality Assurance Requirements

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

5.7 Post-Removal Action Activities

The WIDS database will be updated to remove waste sites that were remediated and achieved the cleanup standards during the removal action. The WIDS database will also be updated to document as-left conditions for those sites where remediation is deferred to the 100-KR-1 and 100-KR-2 OU remedial action program. The deferral of waste site remediation to the 100-KR-1 and 100-KR-2 OUs will be approved by EPA.

After the SSEs are constructed, the reactor facilities will be turned over to an S&M or Long-Term Stewardship program where they will be managed during the ISS period. Additional information on ISS period activities will be contained within an S&M plan.

Documentation (i.e., removal action reports) to support the completion of the removal action will be prepared. Reports will be prepared for those structures identified in Table 1-1. The documentation may include several facilities as opposed to an individual document for each facility. The reports will summarize the scope of the removal action, the removal activities that were completed (including any affected waste sites), the characterization data collected, the waste types and volumes removed, the assessment of the underlying soil, and the as-left conditions. This documentation will support the future remedial actions.

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6 References

09-AMRC-0210, 2009, "Submittal of the Revised Dangerous Waste Closure/Postclosure Plan for the 1706-KE Waste Treatment System (Rev. 2) to the State of Washington Department of Ecology (Ecology) for Approval," (letter to J.A. Hedges, Washington State Department of Ecology, from T.K. Teynor), U.S. Department of Energy, Richland Operations Office, Richland, Washington, September 30. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095444.

10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements," *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title10/10cfr830_main_02.tpl.

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title10/10cfr835_main_02.tpl.

10 CFR 1022, "Compliance with Floodplain and Wetland Environmental Review Requirements," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title10-vol4/xml/CFR-2010-title10-vol4-part1022.xml.

13-AMRP-0058, 2012, "Completion of Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) Milestone M-016-53, Complete the Interim Response Actions for the 100-K Area Within the Perimeter Boundary and to the River for Phase 1 Actions," (letter to D. A. Faulk, U.S. Environmental Protection Agency, from J. A. Dowell), U.S. Department of Energy, Richland Operations Office, Richland, Washington, November 29. Available at: https://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0090845.

18-NWP-004, 2018, "Determination on Closure Certification for Closure Unit Group 14, 1706-KE Waste Treatment System (WTS), for the *Hanford Facility Resource Conservation and Recovery Act Permit Dangerous Waste Portion Revision 8C for the Treatment Storage and Disposal of Dangerous Waste* (Site-wide Permit), Part V, WA7890008967," (letter to D.S. Shoop, U.S. Department of Energy, Richland Operations Office, from S. Dahl, Dangerous Waste Permit Manager), Washington State Department of Ecology, Richland, Washington, January 11. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0066795H.

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

36 CFR 800, "Protection of Historic Properties," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title36-vol3/xml/CFR-2010-title36-vol3-part800.xml.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations*. Available at: https://www.gpo.gov/fdsys/pkg/CFR-2009-title40-vol1/content-detail.html.

61.141, "Definitions."

61.145, "Standard for Demolition and Renovation."

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

Subpart M, "National Emission Standard for Asbestos."

40 CFR 82, "Protection of Stratospheric Ozone," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol17/xml/CFR-2010-title40-vol17-part82.xml.

Subpart F, "Recycling and Emissions Reduction."

40 CFR 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr122_main_02.tpl.

40 CFR 260, "Hazardous Waste Management System: General," *Code of Federal Regulations*. Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=d1942f7836418ae38dd06846c0d0ca9f&mc=true&node=pt40.26.260&rgn=div5.

40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol25/xml/CFR-2010-title40-vol25-part264.xml.

264.17, "General Requirements for Ignitable, Reactive, or Incompatible Wastes."

264.554, "Staging Piles."

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

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

300.415, "Removal Action."

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

40 CFR 302, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr302_main_02.tpl.

40 CFR 355, "Emergency Planning and Notification," *Code of Federal Regulations*. Available at: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr355_main_02.tpl.

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

761.79, "Decontamination Standards and Procedures."

43 CFR 10, "Native American Graves Protection and Repatriation Regulations," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title43-vol1/xml/CFR-2010-title43-vol1-part10.xml.

Archeological and Historic Preservation Act of 1974, 16 USC 469 – 469c-2. Available at: http://www.nps.gov/history/local-law/fhpl_archhistpres.pdf.

Clean Air Act of 1977, 42 USC 7401, et seq. Available at: http://www.epa.gov/air/caa/.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: https://nctc.fws.gov/resources/course-resources/pesticides/Pesticide%20Regulations%20and%20Policies/cercla.pdf

Section 104, "Response Authorities."

DD-62526, 2018, *Air Monitoring Plan for 105-KE/KW Interim Safe Storage and D4 of 100-K Ancillary Buildings*, Rev. 0 Draft, CH2M HILL Plateau Remediation Company, Richland, Washington.

DOE/RL-91-50, 2015, *Hanford Site Environmental Monitoring Plan*, Rev. 7, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/files.cfm/DOE-RL-91-50-Rev-7.pdf.

DOE/RL-94-02, 2010, *Hanford Emergency Management Plan*, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://www.emcbc.doe.gov/SEB/HMESC/Documents/Document%20Library/Plans/Hanford%20Emergency%20Management%20Plan_DOE_RL-94-02_REV._6.pdf

DOE/RL-95-11, 2006, *Ecological Compliance Assessment Management Plan*, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084174.

DOE/RL-96-22, 2009, *100 Area Remedial Action Sampling and Analysis Plan*, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095436.

DOE/RL-96-32, 2017, *Hanford Site Biological Resources Management Plan*, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/files.cfm/DOE-RL-96-32-01.pdf.

DOE/RL-97-56, 1998, *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081103H.

DOE/RL-97-1047, 2002, *History of the Plutonium Production Facilities at the Hanford Site Historic District, 1943-1990*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081396H.

DOE/RL-98-10, 2003, *Hanford Cultural Resources Management Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088380.

DOE/RL-2004-43, 2004, *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D6309063.

DOE/RL-2005-26, 2005, *Removal Action Work Plan for the 100-K Area Ancillary Facilities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA695988.

DOE/RL-2005-26, 2007, *Removal Action Work Plan for the 100-K Area Ancillary Facilities*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04508807.

DOE/RL-2005-33, 2006, *100-K Area Interim Safe Storage and D4 Project Waste Sampling and Analysis Plan*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04084569.

DOE/RL-2005-86, 2006, *Engineering Evaluation/Cost Analysis for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA02850332.

ECF-HANFORD-18-0052, 2018, *Total Effective Dose Equivalent Calculation for 105-KE/KW ISS and KE Ancillary Building D4*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington.

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

Endangered Species Act of 1973, Pub. L. 93-205, as amended, 7 USC 136, 16 USC 1531, et seq. Available at: http://www.nmfs.noaa.gov/pr/pdfs/laws/esa.pdf.

EPA/240/B-01/003, 2001, *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5, Office of Environmental Information, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://semspub.epa.gov/work/06/166419.pdf.

EPA/540/G-89/006, 1988, *CERCLA Compliance with Other Laws Manual: Interim Final*, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=10001VMG.PDF.

EPA/ROD/R10-00/121, 2000, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units Hanford Site (100 Area Burial Grounds)*, Hanford Site, Benton County, Washington, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8453142.

EPA/ROD/R10-99/039, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199153689.

EPA/ROD/R10-99/059, 1999, *Interim Remedial Action Record of Decision for the 100-KR-2 Operable Unit K Basins, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://www.epa.gov/superfund/sites/rods/fulltext/r1099059.pdf.

EPA, 1995a, *Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D195066674.

EPA, 1995b, *Record of Decision, U.S. DOE Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, U.S. Department of Energy, and Washington State Department of Ecology. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196041064.

EPA, 1996, *Interim Action Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units at the Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196097243.

EPA, 1997, *Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D197225332.

EPA, 2004, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D4855290.

EPA, 2005, *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA01291736.

EPA, 2007, *Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04316914.

ERDF-00011, 2016, *Environmental Restoration Disposal Facility Waste Acceptance Criteria, formerly WCH-191 Rev 4*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0068234H.

Executive Order 12580, 1987, *Superfund Implementation*, Ronald W. Reagan, January 23. Available at: http://www.archives.gov/federal-register/codification/executive-order/12580.html.

HNF-EP-0063, 2011, *Hanford Site Solid Waste Acceptance Criteria*, Rev. 16, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: http://www.hanford.gov/files.cfm/HNF-EP-0063_Rev16_041111_Website.pdf.

Migratory Bird Treaty Act of 1918, 16 USC 703-712, Ch. 128, July 13, 1918, 40 Stat. 755, as amended. Available at: http://www.animallaw.info/statutes/stusmba.htm.

National Historic Preservation Act of 1966, Pub. L. 89-665, as amended, 16 USC 470, et seq. Available at: http://www.achp.gov/docs/nhpa%202008-final.pdf.

Native American Graves Protection and Repatriation Act of 1990, Pub. L. 101-601, as amended, 25 USC 3001, et seq. Available at: http://www.nps.gov/history/local-law/FHPL_NAGPRA.pdf.

PNNL-6415, 2007, *Hanford Site National Environmental Policy Act (NEPA) Characterization*, Rev. 18, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-6415Rev18.pdf.

RCW 70.94, "Washington Clean Air Act," *Revised Code of Washington*, Olympia, Washington. Available at: http://apps.leg.wa.gov/RCW/default.aspx?cite=70.94.

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

SW-846, 2015, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update V*, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm.

Toxic Substances Control Act of 1976, Pub. L. 107-377, as amended, 15 USC 2601, et seq. Available at: https://www.gpo.gov/fdsys/pkg/STATUTE-90/pdf/STATUTE-90-Pg2003.pdf.

Hanford Facility Resource Conservation and Recovery Act Permit Dangerous Waste Portion Revision 8C for the Treatment Storage and Disposal of Dangerous Waste (Sitewide Permit), Part V, WA7890008967

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

303-140, "Land Disposal Restrictions."

303-200, "Accumulating Dangerous Waste On-Site."

303-610, "Closure and Post-Closure."

WAC 173-340, "Model Toxics Control Act—Cleanup," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340.

WAC 173-350, "Solid Waste Handling Standards," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-350.

350-990, "Criteria for inert waste."

WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-400.

400-040, "General Standards for Maximum Emissions,"

400-113, "Requirements for New Sources in Attainment or Unclassifiable Areas,"

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460.

460-030, "Applicability."

460-060, "Control Technology Requirements."

460-070, "Ambient Impact Requirement."

WAC 246-247, "Radiation Protection—Air Emissions," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=246-247.

247-075, "Monitoring, Testing and Quality Assurance."

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Appendix A

100-K Area Facility Descriptions

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Terms

AM	action memorandum
CVDF	Cold Vacuum Drying Facility
RAWP	removal action work plan
RCRA	*Resource Conservation and Recovery Act of 1976*
TSD	treatment, storage, and disposal

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A1 Introduction

This appendix provides descriptions of structures within the scope of this removal action work plan (RAWP). This RAWP includes all the structures identified in the two action memorandum (AM): *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities* (EPA 2005) and *Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities* (EPA 2007). It also includes ancillary structures added to the AM (EPA 2007) via TPA-CN-0834.

All cargo containers, mobile offices, and storage containers in the 100-K Area as of January 2018 are also within the scope of this RAWP. Cargo containers, mobile offices, and storage units in the 100-K Area added after January 2018 can be demolished under this RAWP.

Structures within the scope of this RAWP are listed in Table A-1 and described in Section A2. Cargo containers, mobile offices, and storage containers are listed in Table A-2. Tables A-1 and A-2 are current as of January 2018. Figure A-1 shows the locations of the structures in the scope of this RAWP that are listed in Table A-1. Figure A-2 displays the remaining 100KE structures while Figure A-3 shows the remaining 100KW structures. For clarity, these three figures do not include the structures in Table A-2.

Table A-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
Remaining Facilities			
105KE	Reactor Building	EPA 2007	Shut down
105KW	Reactor Building	EPA 2007	Shut down
105KW WT	Water Tunnels	EPA 2007	Shut down
111KE	Compressed Gas Storage	[b]	Operating
115KW	Gas Recirculation Building	EPA 2005	Shut down
116KW	Reactor Exhaust Stack	EPA 2005	Shut down
117KW	Exhaust Air Filter Building	EPA 2005	Shut down
119KW	Exhaust Air Sample Building	EPA 2005	Shut down
142K	Cold Vacuum Drying Facility	EPA 2007	Operating
142KA	Cold Vacuum Drying Facility Generator Building	EPA 2007	Shut down
1506K1	Fiber Optics Computer Hut	EPA 2007	Operating
1506K2	Telecommunications	[b]	Operating
151K	Switching Substation	EPA 2007	Shut down
151KE	Substation 230 KV	EPA 2007	Operating
151KW	Substation 230 KV	EPA 2007	Shut down
152K	Switchgear Control Building	[b]	Operating

Table A-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
165KE	Power Control Building	EPA 2007	Shut down
165KW	Power Control Building	EPA 2007	Shut down
166AKE	Oil Storage Facility Valve House	EPA 2007	Shut down
166KE	Oil Storage Vault	EPA 2005	Shut down
166KW	Oil Storage Vault	EPA 2005	Shut down
167K	Cross Tie Tunnel Building	EPA 2007	Shut down
1705KE	Effluent Water Treatment Pilot Plant	EPA 2007	Shut down
1713KW	Warehouse	EPA 2007	Operating
1714KW	Warehouse	EPA 2007	Operating
1724K	Maintenance Shop	EPA 2007	Shut down
1724KA	Equipment Shed	EPA 2007	Operating
175KE	Survey Tent	[b]	Operating
1803K	Water Treatment Storage Tank	[b]	Operating
189K	Water Treatment Facility	[b]	Operating
1909KW	105KW Effluent Junction Box	[b]	Shut down
296K142	Cold Vacuum Drying Facility Main Stack	EPA 2007	Shut down
Demolished Facilities			
105KE WT	Water Tunnels	EPA 2007	Demolished (2012)
110KE	Gas Storage Facility	EPA 2005	Demolished (2009)
110KW	Gas Storage Facility	EPA 2005	Demolished (2010)
115KE	Gas Recirculation Building	EPA 2005	Demolished (2010)
116KE	Reactor Exhaust Stack	EPA 2005	Demolished (2010)
117KE	Exhaust Air Filter Building	EPA 2005	Demolished (2010)
118KE	Horizontal Control Rod Storage Cave	EPA 2005	Demolished (2009)
118KW	Horizontal Control Rod Storage Cave	EPA 2005	Demolished (2010)
119KE	Exhaust Air Sample Building	EPA 2007	Demolished (2009)
1605K	Guard Towers and Associated Structures	EPA 2007	Demolished (2011)
1614K3	Environmental Monitoring Station	EPA 2005	Demolished (2010)
1701K	Abandoned Guardhouse	EPA 2005	Demolished (2011)
1706KE	Water Studies Semi-Works Building	EPA 2007	Demolished (2009)
1706KEL	Development Laboratory	EPA 2007	Demolished (2009)
1706KER	Water Studies Recirculation Building	EPA 2007	Demolished (2009)

Table A-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
1713KE	Shop Building	EPA 2007	Demolished (2009)
1713KER	Warehouse	EPA 2007	Demolished (2010)
1714KE	Oil and Paint Storage Shed	EPA 2007	Demolished (2009)
1717AKE	Fan House	EPA 2007	Demolished (2011)
1717K	Maintenance/Transportation Shop	EPA 2007	Demolished (2011)
1720K	Administrative Office Building	EPA 2005	Demolished (2011)
1724KB	Gas Bottle Storage Facility	EPA 2007	Demolished (2010)
181KE	River Pump House	EPA 2007	Demolished (2011)
181KW	River Pump House	EPA 2007	Demolished (2011)
182K	Emergency Water Reservoir Pump House	EPA 2005	Demolished (2010)
183.1KE	Headhouse	EPA 2007	Demolished (2011)
183.1KW	Headhouse	EPA 2005	Demolished (2009)
183.2KE	Sedimentation Basins	EPA 2007	Demolished (2011)
183.2KW	Sedimentation Basins	EPA 2005	Demolished (2010)
183.3KE	Basin/Filters	EPA 2007	Demolished (2011)
183.3KW	Basin/Filters	EPA 2005	Demolished (2010)
183.4KE	Reservoir and Clearwells	EPA 2007	Demolished (2011)
183.4KW	Reservoir and Clearwells	EPA 2005	Demolished (2011)
183.5KE	Lime Feeder Building	EPA 2007	Demolished (2011)
183.5KW	Lime Feeder Building	EPA 2005	Demolished (2010)
183.6KE	Lime Feeder Building	EPA 2007	Demolished (2011)
183.6KW	Lime Feeder Building	EPA 2005	Demolished (2010)
183.7KE	Pipe Tunnel Between 105KE and 165KE (aka 183K)	EPA 2007	Demolished (2012)
183.7KW	Pipe Tunnel Between 105KW and 165KW	EPA 2005	Demolished (2010)
183KE	Chlorine Vault	EPA 2007	Demolished (2011)
183KW	Chlorine Vault	EPA 2005	Demolished (2005)
185K	Potable Water Treatment Plant	EPA 2007	Demolished (2011)
1908KE	Effluent Water Monitoring Station	EPA 2007	Demolished (2011)
1909KE	105KE Effluent Junction Box	EPA 2005	Demolished (2011)

Table A-1. 100-K Area Reactor and Ancillary Facilities

Structure Number	Structure Name	CERCLA Decision Document	Status[a]
190KE	Main Pump House	EPA 2007	Demolished (2011)
190KW	Process Water Pump House	EPA 2005	Demolished (2011)

References: EPA 2005, *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities*. EPA 2007, *Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*.

a. Status as of January 2018 (excluding previously demolished or removed mobile offices).

b. Added to the action memorandum (EPA 2007) via TPA-CN-0834.

Table A-2. Cargo Containers, Mobile Offices, and Storage Containers

Cargo Containers				
CC0718	CC0744	CC0862	CC0922	CC1116
CC0719	CC0745	CC0863	CC0923	CC1117
CC0720	CC0746	CC0864	CC0924	CC1118
CC0721	CC0747	CC0865	CC0925	CC1119
CC0722	CC0748	CC0866	CC0926	CC1120
CC0723	CC0749	CC0867	CC0927	CC1121
CC0724	CC0750	CC0868	CC0928	CC1122
CC0725	CC0752	CC0869	CC0929	CC1K0036
CC0726	CC0753	CC0870	CC1007	CC1K0037
CC0727	CC0754	CC0871	CC1008	CC1K0236
CC0728	CC0758	CC0873	CC1009	CC1K0510
CC0729	CC0760	CC0892	CC1010	CC1K0511
CC0730	CC0763	CC0898	CC1011	CC1K0512
CC0731	CC0764	CC0910	CC1013	CC1K0513
CC0732	CC0792	CC0911	CC1019	CC1K0514
CC0733	CC0842	CC0912	CC1024	CC1K0516
CC0734	CC0843	CC0913	CC1106	CC1K0517
CC0735	CC0844	CC0914	CC1107	CC1K0518
CC0736	CC0845	CC0915	CC1108	CC1K0522
CC0737	CC0849	CC0916	CC1109	CC1K0523
CC0738	CC0857	CC0917	CC1110	CC2W0300
CC0740	CC0858	CC0918	CC1112	
CC0741	CC0859	CC0919	CC1113	
CC0742	CC0860	CC0920	CC1114	
CC0743	CC0861	CC0921	CC1115	

Table A-2. Cargo Containers, Mobile Offices, and Storage Containers

Mobile Offices				
MO054	MO1115	MO1304	MO2221	MO2523
MO086	MO1116	MO1305	MO2231	MO500
MO1101	MO1117	MO1306	MO2248	MO506
MO1102	MO1118	MO1307	MO2312	MO507
MO1103	MO1119	MO1308	MO2314	MO917
MO1104	MO1120	MO1309	MO2319	
MO1106	MO1121	MO1502	MO2320	
MO1113	MO1122	MO1503	MO2332	
MO1114	MO1123	MO2151	MO2333	
Storage Containers				
HS0028	HS0080	HS0096		
HS0042	HS0081	HS0097		

Note: The cargo containers, mobile offices, and storage containers in this table are from the list of structures in the 100-K Area as of January 2018. Cargo containers, mobile offices, and storage containers in the 100-K Area added after January 2018 can be demolished under this removal action work plan.

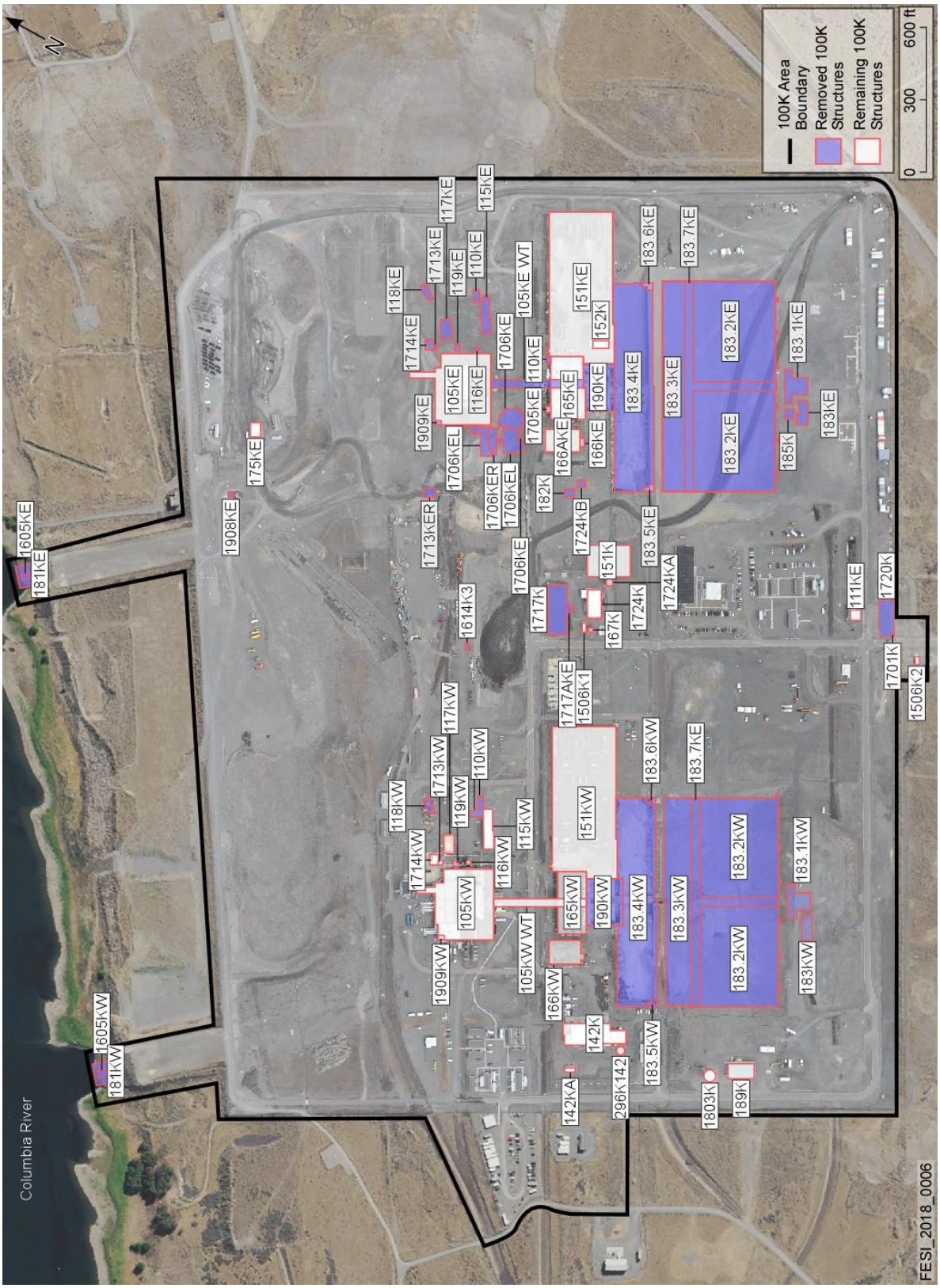

Figure A-1. Structures within the 100-K Area

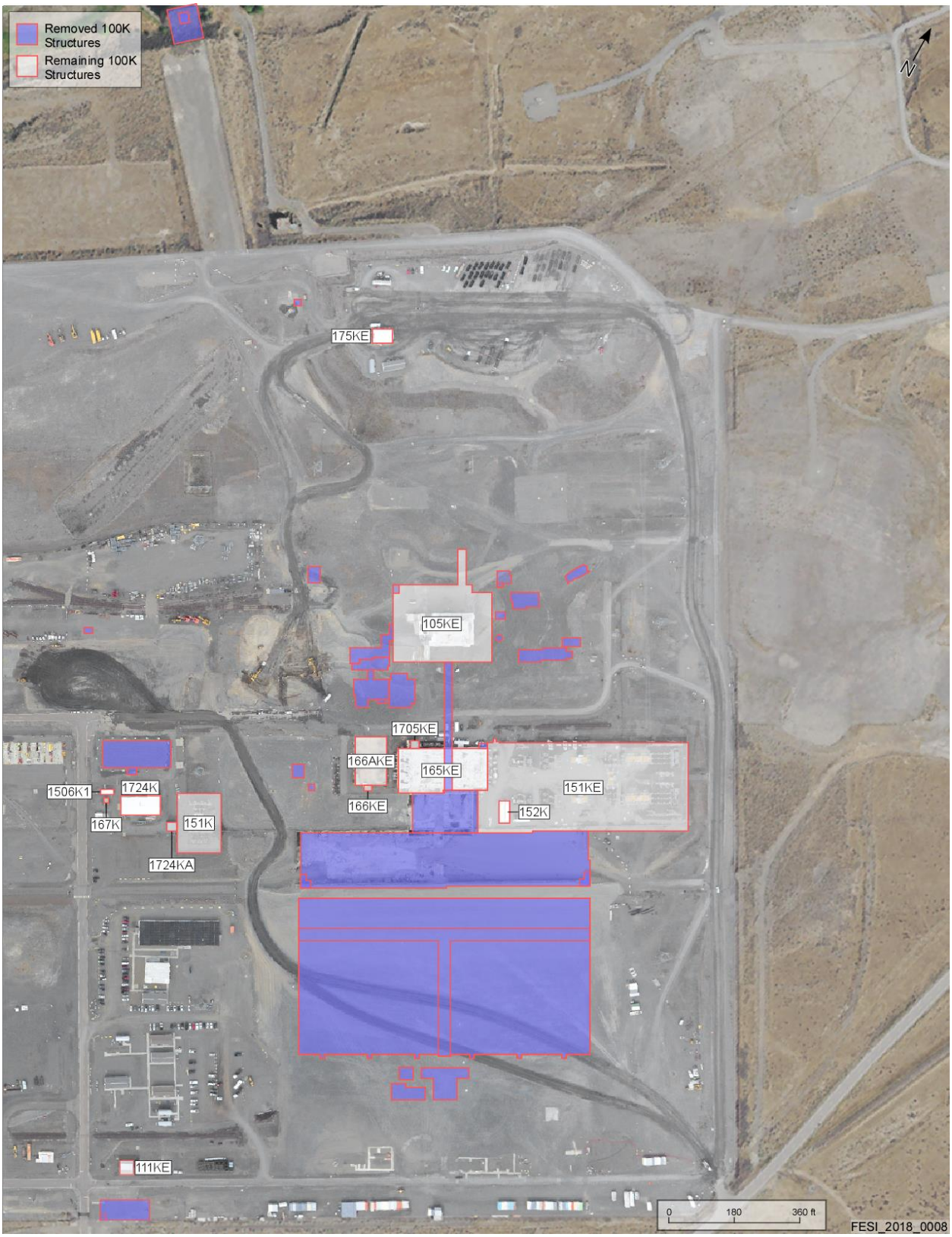

Figure A-2. Remaining 100KE Structures

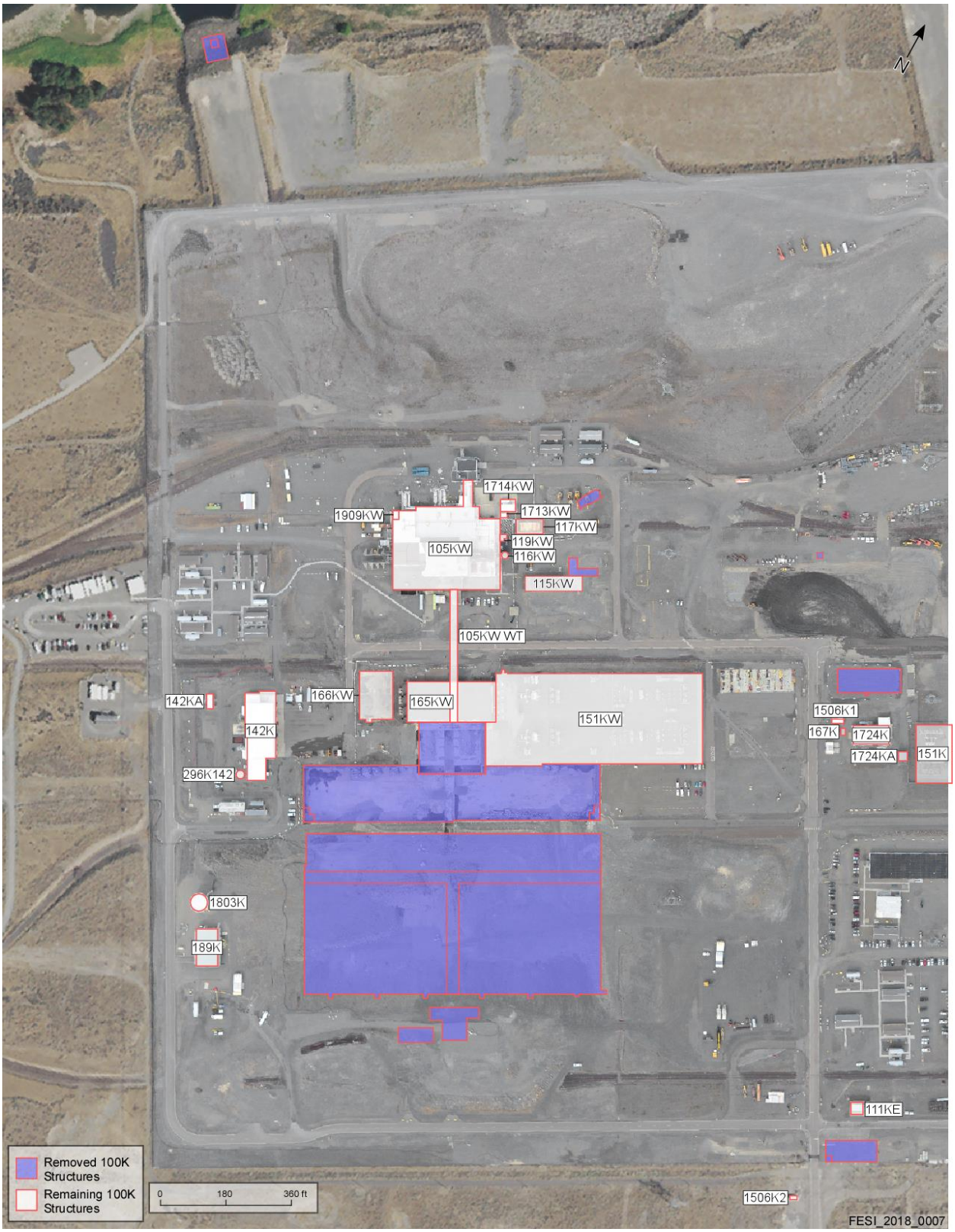

Figure A-3. Remaining 100KW Structures

A2 Facility Descriptions

A2.1 Remaining Facilities

105KE – Reactor Building. The 105KE Reactor Building operated from 1955 to 1971 for nuclear material production. It is a multi-story, concrete and structural steel building that contains a reactor, control room, offices, conference room, lunchroom, change room, spent fuel storage areas, ventilation systems, and test facilities.

105KW – Reactor Building. The 105KW Reactor Building operated from 1955 to 1970 for nuclear material production. It is a multi-story, concrete and structural steel building that contains a reactor, control room, offices, conference room, lunchroom, change room, spent fuel storage areas, ventilation systems, and test facilities.

105KW WT – Water Tunnels. The 105KW Water Tunnels are made up of a concrete raceway that carries pipes from the 190KW Main Pump House Building to the 105KW Reactor Building.

111KE – Compressed Gas Storage. The 111KE Compressed Gas Storage is a corrugated metal structure with three walls and a roof. The structure is used for storage of compressed gasses.

115KW – Gas Recirculation Building. The 115KW Gas Recirculation Building is a single-story facility that was designed to house gas circulation pumps, gas dryers, filters, heat exchangers, and related instruments and piping for the reactor gas coolant system. It was also designed to detect water leaks within the reactor cores. The facility contains heaters/coolers, gas dryer towers, condensers, filters, pumps, silica-gel drying beds, piping and ductwork, heating and ventilation systems, spindle-type helium storage tanks, and a gas unloading room.

116KW – Reactor Exhaust Stack. The 116KW Reactor Stack was originally 300 ft high and designed to discharge exhaust into the atmosphere from the 105KW Reactor. In 1980 and 1981, the stack was shortened to 175 ft. The rubble was placed inside the remaining portion of the stack.

117KW – Exhaust Air Filter Building. The 117KW Exhaust Air Filter Building was constructed as part of the reactor confinement project. The 117KW facility was designed to filter ventilation air from the confinement zone of the 105KW Reactor building before it was discharged into the atmosphere through the 116KW Reactor Stack. The building was constructed almost entirely belowgrade and houses two identical filter cells with an operating gallery. The roof was constructed with a steel frame with large steel hatch covers. The facility is divided into two large filter cells that are separated by a small operating area. Underground concrete ventilation and gas pipe tunnels extend from the reactor to the 115KW and 117KW Buildings and to the reactor stack. The tunnels serve as intake and exhaust plenums to the filter cells.

119KW – Exhaust Air Sample Building. The 119KW Building is a small, pre-engineered metal structure that housed most of the instrumentation for the exhaust air systems.

142K – Cold Vacuum Drying Facility (CVDF). The 142K Building is constructed of steel frame and concrete with process bays for dewatering and drying fuel in multi-canister overpacks shipped from the K Basins. The building also contains change rooms, mechanical rooms, a tank room, control room, and an underground retention basin.

142KA – CVDF Generator Building. The 142KA CVDF Generator Building is a steel building on a concrete slab that houses the CVDF generator.

1506K1 – Fiber Optics Computer Hut. The 1506K1 Structure is a conex box that contains a terminal for computing needs.

1506K2 – Telecommunications. The 1506K2 Structure is a modified conex box used to house equipment outside the 100-K Area gate.

151K – Switching Substation. The 151K Substation provides power to the 105KE and 105KW basins.

151KE – Substation 230 KV. The 151KE Substation provides power to 100-K Area buildings.

151KW – Substation 230 KV. The 151KW Substation provides power to 100-K Area buildings.

152K – Switchgear Control Building. The 152K Switchgear Control Building contains electrical distribution equipment.

165KE – Power Control Building. The 165KE Power Control Building is a single-story concrete structure that consists of three parts: a pump room and valve pit, an electrical area with a steam plant, and a control room.

165KW – Power Control Building. The 165KW Power Control Building is a single-story concrete structure that consists of three parts: a pump room and valve pit, an electrical area with a steam plant, and a control room.

166AKE – Oil Storage Facility Valvehouse. The 166AKE Building is an instrument shed for the 166K oil bunker and equipment.

166KE – Oil Storage Vault. The 166KE Oil Storage Vault was designed to provide storage for the fuel oil used in the 100-K Area. The vault contains tanks that stored Bunker No. 6 fuel oil.

166KW – Oil Storage Vault. The 166KW Oil Storage Vault was designed to provide storage for the fuel oil used in the 100-K Area. The vault contains tanks that stored Bunker No. 6 fuel oil.

167K – Cross Tie Tunnel Building. The 167K Cross Tie Tunnel Building is a concrete structure that is the midway ventilation and entry shaft for the 100KE/KW crosstie tunnel.

1705KE – Effluent Water Treatment Pilot Plant. The 1705KE Building is a concrete structure that is attached to 165KE.

1713KW – Warehouse. The 1713KW Warehouse is a sheet metal structure that was used for storage.

1714KW – Warehouse. The 1714KW Warehouse is a sheet metal structure that was used for storage of electrical equipment.

1724K – Maintenance Shop. The 1724K Building is a single-story concrete and steel frame structure that housed the repair and fabrication facilities for everyday repairs needed in the 100-K Area.

1724KA – Equipment Shed. The 1724KA Building is a single-story concrete and steel frame structure that was used for storage.

175KE – Survey Tent. The 175KE Survey Tent is used as a storage area for dunnage and truck racks.

1803K – Water Treatment Storage Tank. The 1803K Water Treatment Storage Tank was built to support the 189K Water Treatment Facility.

189K – Water Treatment Facility. The 189K Water Treatment Facility is a pre-engineered metal structure.

1909KW – 105KW Effluent Junction Box. The 1909KW Junction Box contains effluent piping for the 105KW Reactor. Pipelines enter the reactor buildings from the junction box.

296K142 – Cold Vacuum Drying Facility Main Stack. The 296K142 Stack is the main stack for the Cold Vacuum Drying Facility.

Mobile Offices – There are many mobile offices in the 100-K Area that are used for engineering, administration, management, laboratory, and craft support during remediation work.

Cargo Containers – Various conex boxes remain in the 100-K Area that are used to support remediation work.

Storage Containers – Hazardous waste storage units are prefabricated units that have been installed to support remediation work.

A2.2 Demolished Facilities

105KE WT – Water Tunnels. The 105KE Water Tunnels are made up of a concrete raceway that carries pipes from the 190KE Main Pump House Building to the 105KE Reactor Building. This structure was demolished in 2012.

110KE – Gas Storage Facility. The 110KE Gas Storage Facility is an outdoor unloading gas storage area that supported the 115KE Building. The facility contained high-pressure helium tanks and four large-diameter tanks used for carbon dioxide. This structure was demolished in 2009.

110KW – Gas Storage Facility. The 110KW Gas Storage facility is an outdoor unloading gas storage area that supported the 115KW Building. The facility contained high-pressure helium tanks and four large-diameter tanks used for carbon dioxide. This structure was demolished in 2010.

115KE – Gas Recirculation Building. The 115KE Gas Recirculation Building is a single-story facility that was designed to house gas circulation pumps, gas dryers, filters, heat exchangers, and related instruments and piping for the reactor gas coolant system. It was also designed to detect water leaks within the reactor cores. The facility contains heaters/coolers, gas dryer towers, condensers, filters, pumps, silica-gel drying beds, piping and ductwork, heating and ventilation systems, spindle-type helium storage tanks, and a gas unloading room. This building was demolished in 2010.

116KE – Reactor Exhaust Stack. The 116KE Reactor Stack was originally 300 ft high and designed to discharge exhaust into the atmosphere from the 105KE Reactor. In 1980 and 1981, the stack was shortened to 175 ft. The rubble was placed inside the remaining portion of the stack. This structure was demolished in 2010.

117KE – Exhaust Air Filter Building. The 117KE Exhaust Air Filter Building was constructed as part of the reactor confinement project. The system modification filtered ventilation air from the confinement zone of the KE Reactor building through the 117KE facility before its discharge into the atmosphere through the 116KE Reactor Stack. The facility was constructed almost entirely belowgrade. The roof was constructed with a steel frame with large hatch doors. The filters were constructed of particulate and activated charcoal. Underground concrete ventilation and gas pipe tunnels extend from the reactor to the 115KE and 117KE Buildings and to the reactor stack. The tunnels serve as intake and exhaust plenums to the filter cells. This building was demolished in 2010.

118KE – Horizontal Control Rod Storage Cave. The 118KE Horizontal Control Rod Storage Cave was constructed on a concrete slab, with pipe cut in half and laid open side down on the slab, forming a tunnel. The tunnel was covered with fill material, with a vertical concrete wall and steel doors on each end. The storage cave was used for temporary storage of irradiated and radioactively contaminated horizontal control rods. This structure was demolished in 2009.

118KW – Horizontal Control Rod Storage Cave. The 118KW Horizontal Control Rod Storage Cave was constructed on a concrete slab, with pipe cut in half and laid open side down on the slab, forming a tunnel. The tunnel was covered with fill material, with a vertical concrete wall and steel doors on each end. The storage cave was used for temporary storage of irradiated and radioactively contaminated horizontal control rods. This structure was demolished in 2010.

119KE – Exhaust Air Sample Building. The 119KE Exhaust Air Sample Building is a small, pre-engineered metal structure that housed most of the instrumentation for the exhaust air systems. This building was demolished in 2009.

1605K – Guard Towers and Associated Structures. The 1605K fences and guard towers served as part of the security system to observe and guard the area, prevent unauthorized entries, and to watch for the outbreak of fires. These structures were demolished in 2011.

1614K3 – Environmental Monitoring Station. The 1614KE Building is constructed of concrete block. This structure was demolished in 2010

1701K – Abandoned Guardhouse. The 1701K Building is a single-story structure attached to the 1720K Building. This structure was demolished in 2011.

1706KE – Water Studies Semi-Works Building. The 1706KE Building is a single-story concrete and steel frame structure that was used to provide out-of-reactor facilities to support in-reactor test loops and single-pass tubes. The building provided water treatment facilities and instrumented supply systems for eight KE-Reactor tubes used for studies of corrosion and effects of water treatment parameters on effluent activity. The building had a small area called the "1706KE Waste Treatment System," which was regulated as a treatment, storage, and disposal (TSD) unit under the *Resource Conservation and Recovery Act of 1976* (RCRA). The RCRA TSD unit was clean closed and this structure was demolished in 2009.

1706KEL – Development Laboratory. About half of the 1706KEL Building was used for instrument development pertinent to water treatment and corrosion control. The remaining part was outfitted for handling mildly contaminated corrosion coupons. This structure was demolished in 2009.

1706KER – Water Studies Recirculation Building. The 1706K Building contained four shielded cells belowgrade, each housing the waste treatment, heat exchange, pumping, and remote instrumentation equipment for each of the in-reactor loops. This structure was demolished in 2009.

1713KE – Shop Building. The 1713KE Shop Building is a sheet metal structure that was used for storage. This structure was demolished in 2009.

1713KER – Warehouse. The 1713KER Warehouse is a sheet metal structure that was used for storage. This structure was demolished in 2010.

1714KE – Oil and Paint Storage Shed. The 1714KE Building is a sheet metal structure that was used for storage and as a work area. This structure was demolished in 2009.

1717AKE – Fan House. The 1717AKE Building is a ventilation shed that housed the fan for the 1717K Building. This structure was demolished in 2011.

1717K – Maintenance/Transportation Shop. The 1717K Building is a single-story concrete and steel frame structure that housed carpenter, millwright, welding, and painting shops for routine area maintenance, as well as typical service station facilities and equipment for light automotive maintenance. This structure was demolished in 2011.

1720K – Administrative Office Building. The 1720K Building is a single-story structure that provided facilities for security patrol, duplicating, and mail operations. A portion of the building was used for the telephone exchange and patrol radio rooms, with the remainder of the building containing offices, an assembly room, a locker room, and other personnel facilities. This structure was demolished in 2011.

1724KB – Gas Bottle Storage Facility. The 1724KB Building is a single-story concrete and steel frame structure that was used for storage. This structure was demolished in 2010.

181KE – River Pump House. The 181KE Pump House is an open-air, reinforced concrete pad with subsurface pump wells. The pump wells are electrically driven and controlled remotely from the 165KE Building. The pump house transferred water from the Columbia River to the filter plant. This structure was demolished in 2011.

181KW – River Pump House. The 181KW Pump House is an open-air, reinforced concrete pad with subsurface pump wells. The pump wells are electrically driven and controlled remotely from the 165KE Building. The pump house transferred water from the Columbia River to the filter plant. This structure was demolished in 2011.

182K – Emergency Water Reservoir Pump House. The 182K Emergency Water Pumphouse housed diesel engine-driven pumping gear and related equipment for emergency reactor cooling. The facility was designed to pump water from the 105KE or 105KW clearwells to the 105KE or 105KW Reactors for emergency cooling. This structure was demolished in 2010.

183K – Water Plant Systems. The 105KE and 105KW Reactors each had water systems that were made up of multiple structures. All these structures were demolished between 2009 and 2012. The structures are listed below:

- 183.1KE/KW – Headhouse
- 183.2KE/KW – Sedimentation Basins
- 183.3KE/KW – Basin/Filters
- 183.4KE/KW – Reservoir and Clearwells
- 183.5KE/KW – Lime Feeder Building
- 183.6KE/KW – Lime Feeder Building
- 183.7KE/KW – Pipe Tunnel Between 105KE/KW and 165KE/KW

183KE – Chlorine Vault. The 183KE Building contained two bays, with a railroad spur at each bay. The building stored chlorine that was received from railcars. This structure was demolished in 2011.

183KW – Chlorine Vault. The 183KW Building contained two bays, with a railroad spur at each bay. The building stored chlorine that was received from railcars. This structure was demolished in 2005.

185K – Potable Water Treatment Plant. The 185K Building is a pre-engineered metal building that contains a self-contained packaged water treatment subsystem that can provide up to 100 gal/min of potable water. This structure was demolished in 2011.

1908KE – Effluent Water Monitoring Station. The 1908KE Building was used as an iodine monitoring facility and contained instruments and sampling systems for recording flow and temperature, and for recording samples at the river outfall. This structure was demolished in 2011.

1909KE – 105KE Effluent Junction Box. The 1909KE Junction Box contains effluent piping for the 105KE Reactor. Pipelines enter the reactor buildings from the junction box. This structure was demolished in 2011.

190KE – Main Pump House. The 190KE Building is a single-story concrete and steel frame structure with transite siding. The building contains a basement that housed all the large water pumping units. The pump house developed the pressure necessary to pump treated water to the reactor for cooling. This structure was demolished in 2011.

190KW – Process Water Pump House. The 190KW Process Water Pumphouse is a single-story building that housed all the large water pumping units. The pumphouse developed the pressure necessary to pump treated water to the reactor for cooling. This structure was demolished in 2011.

A3 References

EPA, 2005, *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA01291736.

EPA, 2007, *Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04316914.

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