

Removal Action Report for the 182-K Emergency Water Pump House, 100-K Area

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

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

 **CH2MHILL**
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Date Published
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By Shauna E. Adams at 3:34 pm, Nov 13, 2012

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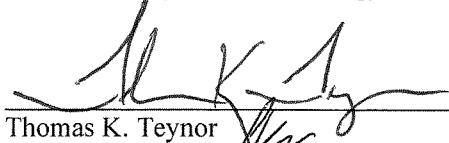
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Thomas K. Teynor
Federal Project Director for the River Corridor
U.S. Department of Energy, Richland Operations Office

November 1, 2012
Date

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Executive Summary

This Removal Action Report summarizes the completion of deactivation, decommissioning, decontamination, and demolition (D4) activities associated with the 182-K Emergency Water Pump House (182-K Pump House). The D4 activities were conducted by the U.S. Department of Energy under a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) response action in accordance with the *Action Memorandum for the Non-Time-Critical Removal Action of the 100-K Area Ancillary Facilities* ([Action Memorandum] EPA, 2005) and the *Removal Action Work Plan for 105-KE/105-KW Reactor Facilities and Ancillary Facilities* (DOE/RL-2005-26).

The 182-K Pump House was located in the 100-K Area of the Hanford Site, and was a single-story building that housed diesel engine driven pumping gear, compressors, fuel oil day tanks, a fuel oil centrifuge and storage batteries to support pump house operations. In support of an emergency back-up cooling water system, the 182-K Pump House could develop the pressure necessary to pump treated water from the 183.4-KE and 183.4-KW Clearwells to the 105-KE or 105-KW Reactors for emergency cooling. The facility was never put into full operation, as there was never an occurrence requiring emergency cooling.

The physical demolition and load out activities for the 182-K Pump House occurred between February 2010 and June 2012. The above-grade and below-grade portions of the 182-K Pump House were removed completely.

The completion of this removal action mitigates the potential threat of release of contaminants to the environment and is consistent with the remedial actions for the 100-KR-1 and 100-KR-2 Operable Units, identified in the Action Memorandum (EPA 2005). The D4 activities for the 182-K Pump House were base funded.

Contents

1	Introduction.....	1
1.1	Site Description	1
1.2	Regulatory and Enforcement History	2
1.3	Environmental Setting	3
2	182-K Pump House Description and Background	3
2.1	Contaminants Identification	6
2.2	Description of the Removal Action	6
2.2.1	Removal Action Objectives	6
2.2.2	Exposure and Land Use Assumptions	7
2.2.3	Design Summary	7
2.3	ROD Amendments, Significant Differences, or Waivers.....	7
3	Removal Activity Summary	7
3.1	Summary of Activities.....	7
3.2	Verification Activities	11
3.2.1	Radiological Surveys	11
4	Chronology of Events.....	11
5	Performance Standards and Construction Quality Control	12
5.1	Attainment of Performance Standards.....	12
5.1.1	Performance Completion Criteria	12
5.1.2	Removal Action Objectives Verification	14
5.1.3	Statement of Protectiveness	15
5.2	Construction Quality Assurance/Quality Control	15
5.3	Cleanup Verification Quality Assurance/Quality Control.....	15
5.3.1	Data Quality Assessment	15
5.3.2	Environmental Quality Assurance	15
5.4	Regulatory Oversight	16
6	Final Inspection and Certifications	16
7	Operation and Maintenance Activities.....	16
8	Summary of Project Costs	16
9	Observations and Lessons Learned	16
10	Contact Information	17
11	References	17

Figures

Figure 1-1. Hanford Site Map Including the 100-K Area 1

Figure 1-2. Location of the 182-K Pump House within the 100-K Area..... 2

Figure 2-1. 182-K Pump House, Crib and Pipeline Layout 4

Figure 2-2. 182-K Pump House Elevation View 5

Figure 3-1. 182-K Stockpiles (June 2012) 9

Figure 3-2. 182-K Pump House (Date Unknown, Looking South) 9

Figure 3-3. 182-K Pump House Post Remediation (June 2012)..... 10

Figure 3-4. 182-K Excavation Backfilled (September 2012) 10

Terms

ACM	asbestos-containing material
ARAR	applicable or relevant and appropriate requirement
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
COC	contaminants of concern
D4	deactivation, decommissioning, decontamination, and demolition
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
HEIS	Hanford Environmental Information System
KE	K East
KW	K West
NPL	National Priorities List
OU	operable unit
PCB	polychlorinated biphenyl
RAO	removal action objective
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RAWP	Removal Action Work Plan
ROD	Record of Decision
SAP	sampling and analysis plan
TPHD	Total petroleum hydrocarbons-diesel
Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
UHCM	unquantified hazardous construction materials

1 Introduction

This report documents completion of a removal actions conducted by the U.S. Department of Energy (DOE) for the 182-K Emergency Water Pump House (182-K Pump House). The deactivation, decommissioning, decontamination, and demolition (D4) of the 182-K Pump House was conducted in accordance with the *Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities* ([Action Memorandum] EPA, 2005) and the *Removal Action Work Plan for 105-KE/105-KW Reactor Facilities and Ancillary Facilities* ([RAWP], DOE/RL-2005-26).

1.1 Site Description

The Hanford Site, located in southeastern Washington State and situated along the Columbia River, is approximately 1,518 km² (586 mi²) in size (Figure 1-1). The Hanford Site mission from the early 1940s to approximately 1989 included defense-related nuclear research, development, and weapons material production activities. These activities created chemical and radioactive wastes. The Hanford Site mission now is focused on the cleanup of those wastes and ultimate closure of the site.

The 100 Area, which encompasses approximately 68 km² (26 mi²) bordering the southern shore of the Columbia River, included six reactor areas (i.e., 100-B/C, 100-D/DR, 100-F, 100-H, 100-K, and 100-N) that contained nine reactors. The location of the identified structure 182-K Pump House is shown in Figure 1-2 and included in the 100-K Area.

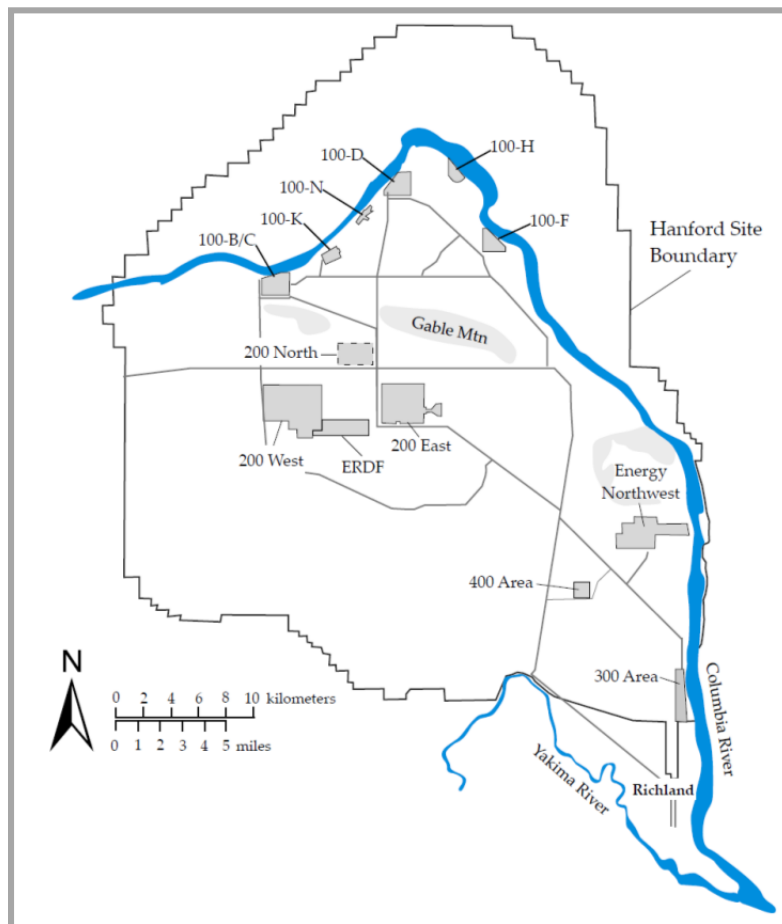


Figure 1-1. Hanford Site Map Including the 100-K Area

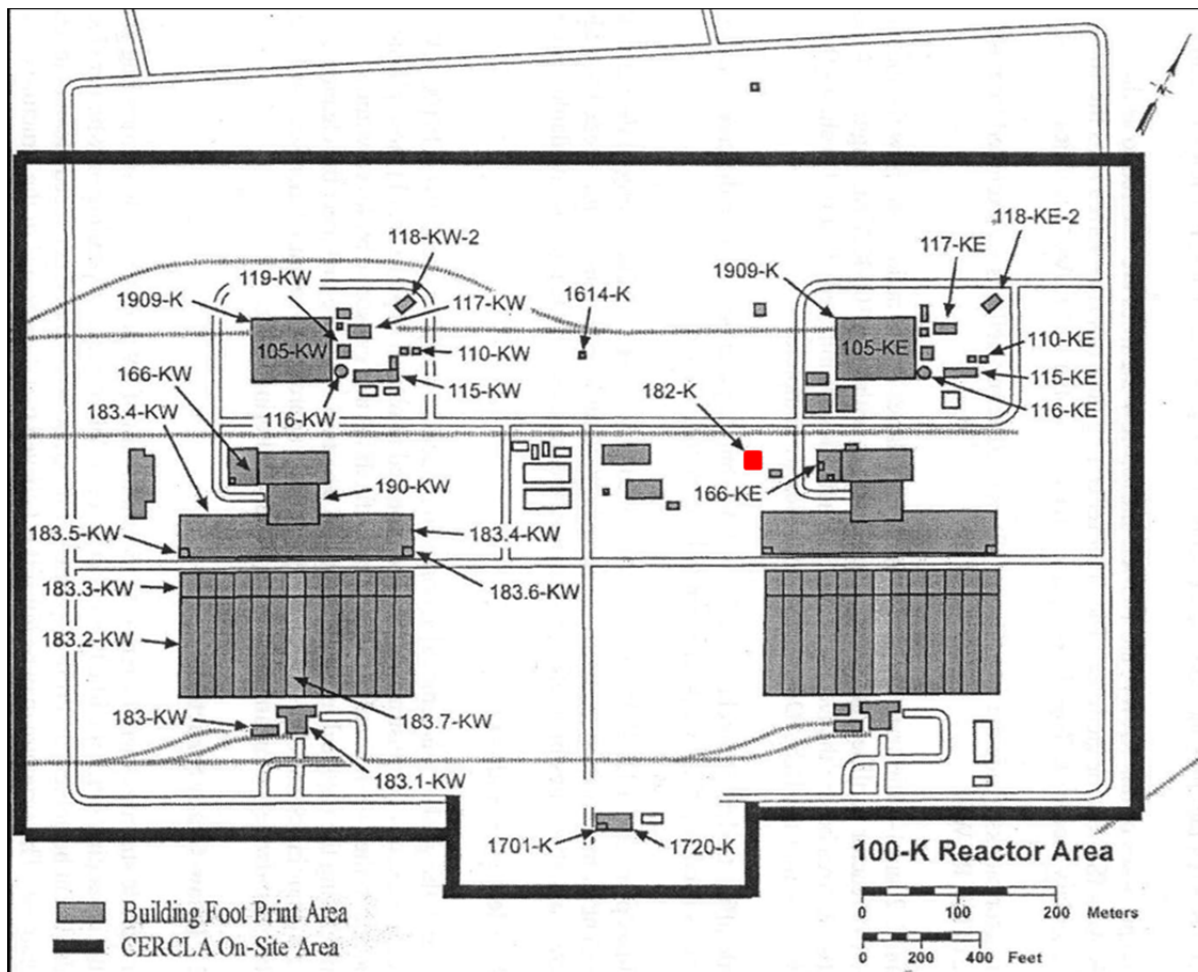


Figure 1-2. Location of the 182-K Pump House within the 100-K Area

1.2 Regulatory and Enforcement History

The *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) was enacted to enable the Federal government to conduct cleanup of hazardous substances released into the environment. In 1986, CERCLA was amended by the *Superfund Amendments and Reauthorization Act of 1986*, which included Section 120 (42 USC 9620, "Federal Facilities"), developed specifically for federal facility cleanup. Presidential Executive Order 12580 delegated to DOE the primary authority to conduct removal and remedial actions under authority of CERCLA Section 104, "Response Authorities."

In 1987, the Federal government determined that wastes which included a mixture of radioactive and hazardous chemical components were subject to regulation under the *Resource Conservation and Recovery Act of 1976* (RCRA) and its Washington State counterpart. In 1989, DOE, the U.S. Environmental Protection Agency (EPA) and Washington Department of Ecology (Ecology) signed the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989, also known as the Tri-Party Agreement or TPA). The TPA implemented DOE's exercise of CERCLA remedial action authority under EPA oversight, in accordance with CERCLA Section 120, and also included an Ecology Consent Order containing a schedule for bringing all current Hanford hazardous waste operations into compliance with RCRA under the new mixed waste requirements. DOE's authority to conduct removal

actions under CERCLA Section 104 is independent of the TPA, but is exercised cooperatively with the respective oversight authorities of EPA and Ecology.

During this timeframe, the Hanford Site was proposed for inclusion on the Superfund National Priorities List (NPL, 53 FR 23988, “National Priorities List for Uncontrolled Hazardous Waste Sites – Update 7”). EPA placed the Hanford Site’s 100, 200, 300, and 1100 Areas on the NPL on November 3, 1989 (54 FR 41015, “National Priorities List for Uncontrolled Hazardous Waste Sites – Final Rule 10/04/89”). These areas were then further divided into CERCLA operable units (OUs).

1.3 Environmental Setting

The 100-K Area is located in the Columbia River corridor of the Hanford Site. Most of the area within the 100-K boundary is highly disturbed, with substrate consisting primarily of compacted gravel. Vegetation consists primarily of widely scattered weedy species, with most of the areas having essentially no vegetation. The 182-K Pump House was located approximately 1,300 m (4,265 ft) from the Columbia River, and depth of groundwater at these locations is approximately 25 m (82 ft) below original ground surface.

2 182-K Pump House Description and Background

The 182-K Pump House, also known as the 182-K midway pump station, was a steel frame structure with concrete foundation and floors, transite walls, and a roof of insulated steel decking with built-up tar and gravel surfacing.

There is no record of the 182-K Pump House actually being used to supply emergency water; any operations of the facility were to support equipment testing or maintenance activities. Prior to being introduced into the 182-K Pump House, water from the Columbia River was pumped from the 181-KW and 181-KE River Pump Houses to the 183.1-KW and 183.1-KE Headhouses, where the water was treated and filtered. The water entered the flocculation basins and then the sedimentation basins (183.2-KW and 183.2-KE), where coagulated particles and other solids were allowed to settle out. The water was further filtered at the 183.3-KW and 183.3-KE Filter Basins and then sent to the 183.4-KE or 183.4-KW Clearwells for storage. Water from the clearwells entered the 182-K Pump House sump below the floor of the pump house, where the three turbine pumps could pull water, as needed, to provide emergency cooling water to either the 105-KE or 105-KW Reactor via the cross-tie pipeline (Figure 2-1). Each of the pumps was fueled directly from a dedicated 946 L (250-gal) fuel oil day tank, which was located within the building above the pump.

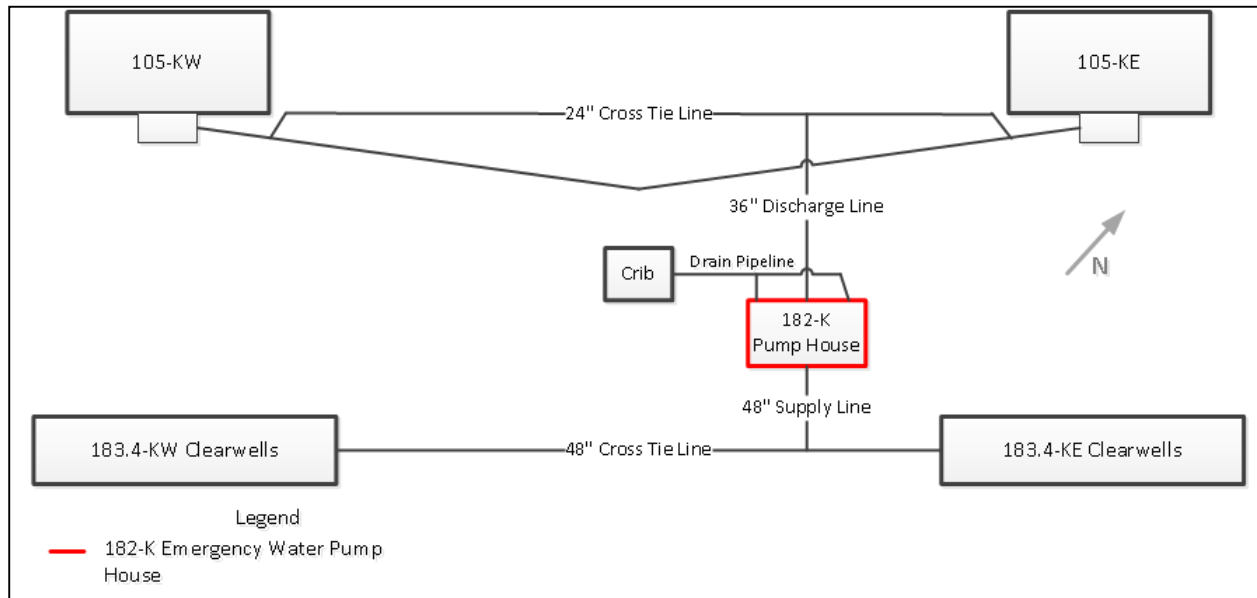


Figure 2-1. 182-K Pump House, Crib and Pipeline Layout

The approximately 242.5 m² (2,610 ft²) 182-K Pump House building contained diesel engine-driven pumping gear, compressors, fuel oil day tanks, a fuel oil centrifuge, and storage batteries to support pump house operations. A 0.6 m (2 ft) wide by approximately 0.6 m (2 ft) deep (depth varied) pipe trench (Figure 2-2) extended the length of the building floor, south to north approximately 3.7 m (12 ft) from the east wall. Figure 2-2 was created from the original construction drawings and shows elevations that use the National Geodetic Vertical Datum of 1929 (NGVD 29). The pipe trench emptied into a “funnel drain” near the northeast corner of the building, which drained via a drain pipeline to the 182-K Fuel Oil Crib (100-K-106 waste site). Another floor drain, located in the northwest corner of the pipe gallery, also flowed into the same crib drain pipeline. A 1.98 m (6.5 ft) wide by 3.5 m (11.5 ft) deep pipe gallery was located along the west end of the building floor and housed the 0.9 m (36 in.) diameter discharge line. The 182-K Pump House was equipped with a 3 m (10 ft) wide by 11.6 m (38 ft) deep sump that extended the length of the building, again with a south to north orientation. The sump floor was approximately 10.8 m (35.5 ft) below grade. Influent to the sump was from a 1.2 m (48 in) diameter supply pipeline that collected water from either the 183.4-KE or 183.4-KW Clearwells, or from both simultaneously. The 182-K Pump House was located approximately 125 m (410 ft) southwest of the 105-KE Reactor.

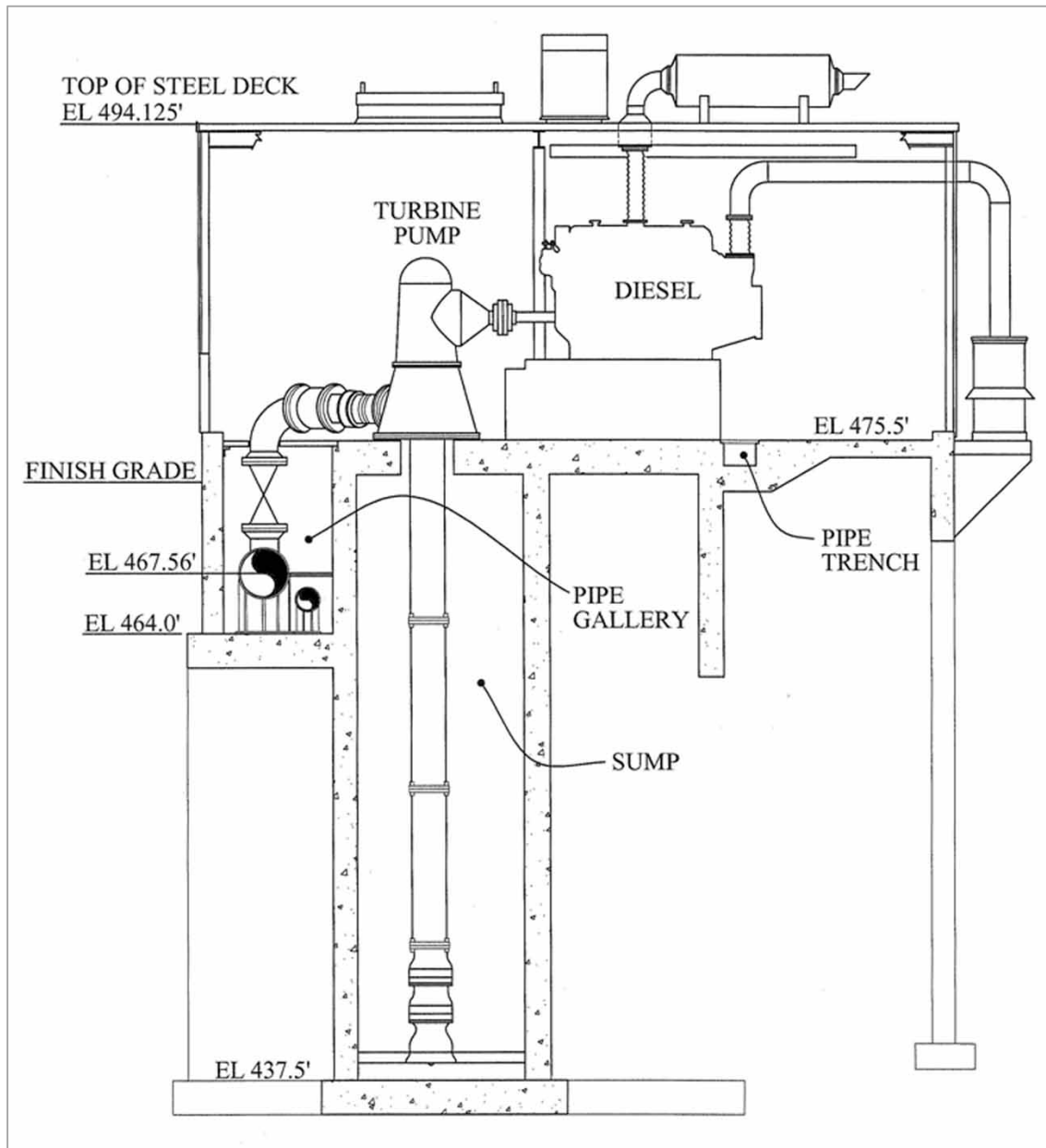


Figure 2-2. 182-K Pump House Elevation View

In addition to the floor drains, any releases from a refrigerated drinking fountain and the fuel oil centrifuge drained into the pipeline that extended to the 182-K Fuel Oil Crib. Because the 182-K Pump House used fuel oil to operate the diesel engines that powered the pumps, there was the possibility of a release(s) of oil to the crib. Any spills, as well as equipment or maintenance wash down, within the 182-K Pump House would have run to one of the floor drains and to the 182-K Fuel Oil Crib. Spills would not have remained within the building.

When the 182-K Pump House was constructed in 1961, the initial design did not include treatment of the backup water for corrosion inhibition, resulting in issues with corrosion build up in the cross-tie pipeline downstream of the pump house. In 1963, a sodium silicate injection system was installed to reduce corrosion, but was soon found to be ineffective. Subsequent testing at the pump house also evaluated two

other corrosion inhibitors, sodium dichromate and sodium nitrate, both of which were ineffective. After this, mechanical cleaning of the cross-tie pipeline was determined to be “most economical” (DUN-213, *Interim Report, 100-KEW Backup Coolant System Improvement*). No further information has been discovered to suggest that a corrosion inhibition system was subsequently installed. The pump house has been idle since approximately 1971.

2.1 Contaminants Identification

The contaminants identified in the Action Memorandum (EPA, 2005) for the 100-K ancillary facilities included asbestos, ethylene glycol, lead, and mercury for the 182-K Pump House. The AM states that the 182-K Pump House is radiologically contaminated. However, the RAWP (DOE/RL-2005-26) indicates that radiological contamination is not expected and the *100-K Area Interim Sate Storage and D4 Project Waste Sampling and Analysis Plan* (DOE/RL-2005-33) documents 182-K as a building related to clean water activities. The 182-K Pump House was not radiologically posted and controlled. Radiological control technician surveys did not locate any radiological contamination prior to or during demolition. Therefore, radiological constituents were not considered contaminants of concern (COCs). Before demolition activities began, unquantified hazardous construction materials (UHCM) items such as mercury containing gauges, and ballasts were removed from the building.

Total petroleum hydrocarbons-diesel (TPHD) is a COC due to the presence of fuel oil and diesel engines in the pump house, along with hexavalent chromium and nitrate due to past corrosion inhibition tests. The chemicals associated with the upstream water treatment processes included chlorine, bauxite, and sulfuric acid.

2.2 Description of the Removal Action

The purpose of the removal of the 182-K Pump House was to mitigate the threat of release of contaminants from the 100-K Area ancillary facilities to the environment, and to be consistent with remedial actions for the 100-KR-2 OU. These removal actions were performed in accordance with the Action Memorandum (EPA, 2005) and the approved RAWP (DOE/RL-2005-26).

2.2.1 Removal Action Objectives

The following removal action objectives (RAOs) were established in the approved RAWP (DOE/RL-2005-26):

- 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 applicable or relevant and appropriate requirements (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 105-KE and 105-KW Reactor blocks

The end state of the removal actions implemented must be supportive of institutional controls prescribed in the Remaining Sites ROD for the period between completion of the facility removal actions and initiation of the waste site remedial actions.

The completion criteria by which the RAOs were achieved for these removal actions are documented in Section 5.

2.2.2 Exposure and Land Use Assumptions

Cleanup activities at the 100-K Area are conducted to achieve compliance with a rural-residential exposure scenario, as stipulated in the *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-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (100 Area Remaining Sites Record of Decision [ROD], EPA/ROD/R10-99/039).

2.2.3 Design Summary

The removal action was planned through research of the process history and review of historical drawings of the buildings. Additionally, prior to the start of the removal actions field investigations and walk downs of the 182-K Pump House were conducted by project personnel (engineers, planners, field work supervisors, waste specialists and management), DOE and EPA. From this information, a demolition plan was developed and documented in site-specific work packages, which included the following:

- Pre-demolition location of all utility interfaces (i.e., electrical, water, etc.) within the building footprint were identified
- Pre-demolition characterization activities to identify UHCM requiring disposition
- Estimated depth to support structure removal
- The placement of access roads into and out of the basement of the structure
- Disposal pathways identified for all materials found within the structure
- Characterization of the structure and identification of any potential waste sites

2.3 ROD Amendments, Significant Differences, or Waivers

No ROD amendments, significant differences, or waivers apply to this removal action.

3 Removal Activity Summary

This section describes actions taken to complete the removal of the 182-K Pump House.

3.1 Summary of Activities

Work to demolish the 182-K Pump House followed detailed site-specific work packages (1K-09-05973 and 1K-11-09798) as described in Section 2.2.3. Pre-demolition planning activities included field investigations to identify any utility interfaces (i.e., electrical, water, etc.) and characterization activities to identify UHCM requiring disposition prior to or during demolition of the building.

Removal of the 182-K Pump House began in February 2010 and was completed in June 2012 in accordance with the RAWP (DOE/RL-2005-26). The above grade portion of the 182-K Pump House deactivation and demolition was completed in June 2010. The below grade demolition was executed from March 2012 through June 2012.

The facilities were deactivated through equipment and component demolition and removal. The service utility pipelines were isolated by cutting, plugging, or air gapping the water lines. Eight conduit lines exiting 182-K containing wires for control wiring, communication cables, fire alarm and accumulation circuits were isolated and air gapped. Service water, raw water, sanitary, and sodium sulfite lines were air gapped in the cross-tie tunnel. The ethylene glycol lines were drained from the building and also air gapped in the cross-tie tunnel. The building was demolished implementing wet methods with the non-friable asbestos containing materials remaining on the building. The walls and all equipment within the 182-K Pump House were removed during the above grade demolition leaving the slab and sump remaining for below grade removal action.

No cracking was noted in the pump house concrete prior to removal. The sump and crib drain pipeline both appeared to be intact; the sump still contained approximately 530,000 L (140,000 gal) of water prior to demolition of the sump. Samples were collected from within the sump to characterize the water and are documented in report WSCF120034. All constituents were found to be below the groundwater cleanup levels based on cleanup criteria indicated in the Remaining Sites ROD (EPA 1999) as required by the RAWP (DOE/RL-2005-26). The sump water was evaluated to ensure there was no risk of releasing contaminants to the environment. Therefore, the sump water was used for dust suppression during excavation activities. There was no indication of any major leaks or process upsets at the pump house at the completion of demolition activity. All of the concrete from the foundation and sump was removed to below the sump. No staining was observed below the building slab that would have indicated a potential leak or spill from within the 182-K Pump House.

Excavation of the sump, to a depth of approximately 10.8 m (35.5 ft), required removal of soil from the surrounding area to allow safe access to the excavation area. The nearby crib waste site was enveloped in this excavation. Therefore, the crib waste site (100-K-106) remediation coincided with the removal of the below grade portions of the 182-K Pump House. Three stockpiles were formed in proximity of the excavation site from this soil removal (Figure 3-1). The sampling of the stockpiles and the crib (waste site 100-K-106) is addressed in the *Remaining Sites Verification Package for the 100-KR-2 Operable Unit Waste Site 100-K-106 and Stockpiles*, (RSVP) DOE/RL-2012-50.

Due to safety issues associated with the steep side-slopes of the excavation and protruding pipelines (Figure 3-1), a civil survey of the excavation site was not prepared.

Waste characterization and demolition waste load-out activities were conducted in accordance with the waste management applicable or relevant and appropriate requirements (ARARs) identified in the Action Memorandum (EPA, 2005), the RAWP (DOE/RL-2005-26), and the Environmental Restoration Disposal Facility (ERDF) waste acceptance criteria. Approximately 400 ERDF containers (7,324 tons) of soil and debris were disposed at ERDF from the excavation site. Figures 3-2 and 3-3 are pre-demolition and post-demolition photographs of the 182-K Pump House.

Due to depth of the excavation at 182-K for the excavation to remain opened pending sample results would have been a safety hazard. Per Section 2.1.9 in the RAWP (DOE/RL-2005-26) the excavation was backfill at risk with concurrence with EPA and DOE. Based on observations and building process history the risk was very low. The backfilled excavation is displayed Figure 3-4.

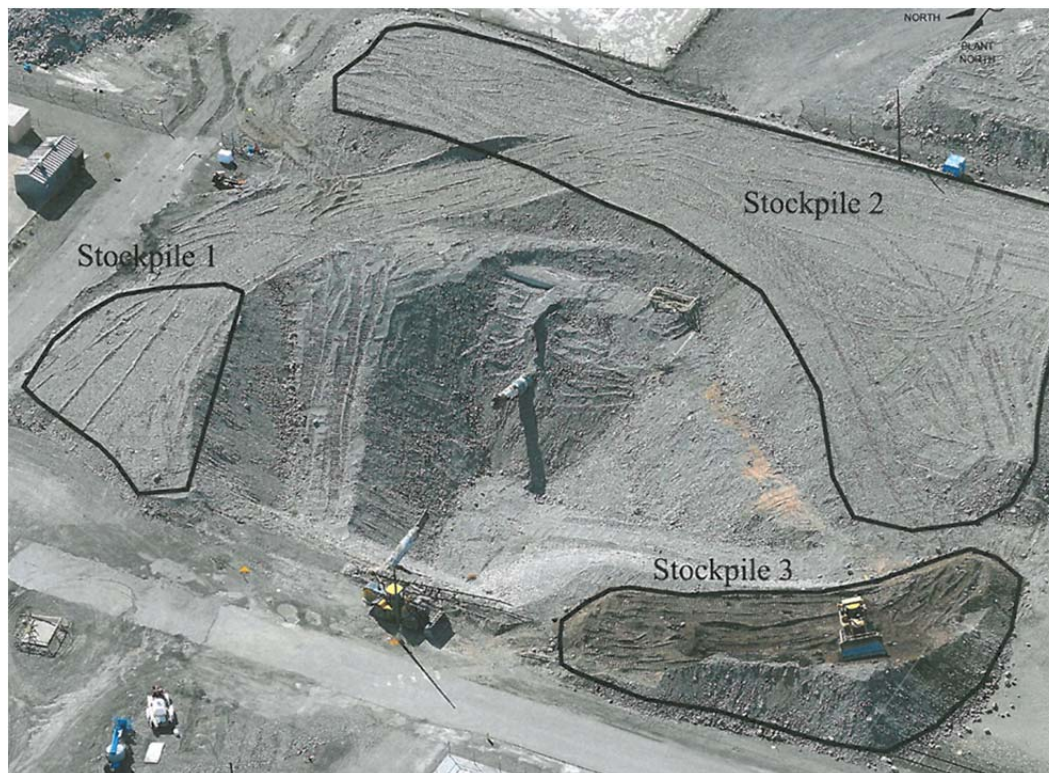


Figure 3-1. 182-K Stockpiles (June 2012)



Figure 3-2. 182-K Pump House (Date Unknown, Looking South)



Figure 3-3. 182-K Pump House Post Removal (June 2012)

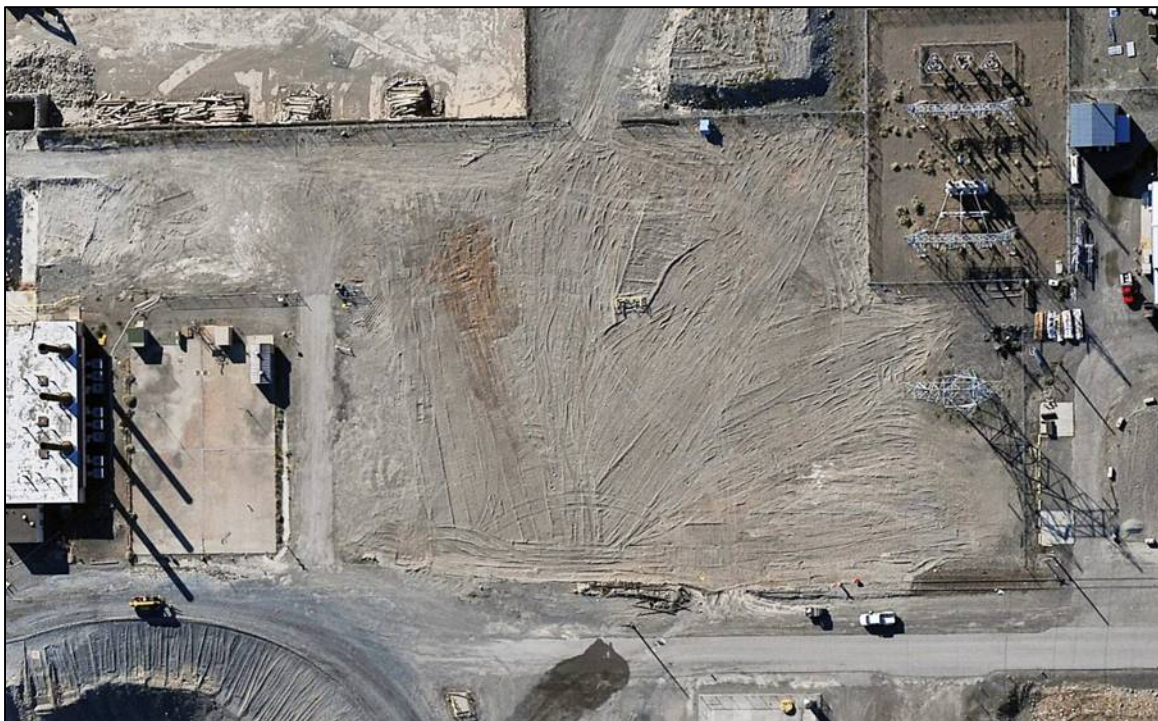


Figure 3-4. 182-K Excavation Backfilled (September 2012)

3.2 Verification Activities

Prior to initiating D4 activities, an extensive review of the operations of the facilities was performed including, investigation for records of potential releases, and walk downs of the building. As noted in Section 3.1, there was no evidence there was any contamination released from the building or remaining in the building at the time of demolition.

Per an agreement reached on June 8, 2012 during an EPA field walk down of the 182-K excavation site, no samples were required from beneath the 182-K Pump House footprint. The excavation beneath the pump house was much deeper than the building foundation and exceeded the likely migration depth of any potential release. Had there been any spills or releases from the pump house the contamination would have been captured in the stockpiles. It was determined that sampling of the three stockpiles would be sufficient to evaluate if any contamination remained beneath the 182-K Pump House. If the stockpiles meet cleanup levels, then the remaining soil does as well.

The stockpile sample results are presented and discussed in the RSVP for waste site 100-K-106 (DOE/RL-2012-50).

3.2.1 Radiological Surveys

The 182-K Pump House presented no risk of radiological contamination as the facility stored and transported treated water before use in the 105-KE/KW Reactors and was not exposed to a radiological source.

Radiological surveys were performed as a part of routine monitoring. Radiological surveys were completed on the ERDF containers upon loading.

4 Chronology of Events

This section provides the significant events and activities pertinent to the removal of the 182-K Pump House. Table 4-1 lists those events chronologically.

Table 4-1. Chronology of D4 Activities for the 190-KE and 190-KW Pump Houses

Date	Event
1962	Construction of 182-K Pump House
1971	Operation of the 182-K Pump House in support of the 105-KE Reactor ended
February 2010	Demolition of the 182-K Pump House began
January 2012	182-K sump water sample collected
June 2012	Demolition and load out of the 182-K Pump House complete
August 2012	Backfill Complete

5 Performance Standards and Construction Quality Control

This section documents:

- The evaluation process for demonstrating achievement of performance standards
- The results of that evaluation
- The quality control requirements implemented during remedial activities

5.1 Attainment of Performance Standards

The overall performance of the removal action and evaluation of attainment of protectiveness for human health and the environment are addressed in the following sections.

5.1.1 Performance Completion Criteria

Table 5-1 presents the completion criteria developed from the approved RAWP (DOE/RL-2005-26) and a summary of the actions taken.

Table 5-1. Completion Criteria for the 182-K Pump Houses

Phase of the Demolition Activities	Completion Criteria*	Criteria Complete?	Description of How the Completion Criteria Were Addressed
Above-Grade Structures	Remove interior portions of the building, including ACM, lead bricks, sheeting, PCBs (primarily in motor oils and light ballasts), mercury (primarily in light components and switches), and other hazardous materials for treatment, recycle, or disposal.	Yes	Interior portions of the 182-K Pump House, including UHCM (e.g., mercury, ballasts, ACM, lubricants) were removed and/or absorbed and disposed prior to or during demolition. All substances removed were characterized and disposed in accordance with waste management ARARs and waste disposal facility criteria.
	Above-grade portions of the facility will be removed or demolished to grade using standard demolition techniques (e.g., excavator with a hoe-ram, hydraulic shear with steal shear jaws, concrete pulverizer jaws or breaker jaws, crane with wrecking ball, and/or controlled explosives).	Yes	The above-grade portions of the 182-K Pump House were demolished using standard demolition techniques.
Below-Grade Structures	Below-grade structures, if present, will be removed to a minimum of 3 ft (0.9 m) below surrounding grade, and the remaining portion will either be removed or left in place, depending on whether cleanup standards can be achieved.	Yes	The concrete floor level and below-grade structures (i.e., side walls, columns and sump) for 182-K Pump House were removed completely (meeting the minimum of 3 ft (0.9 m) below grade requirement).
	Remediate contaminated soils within the footprint of the facilities or defer to a later remedial action (with approval from EPA).	N/A	Visual inspection performed of structure prior to removal and soil post removal action indicated no contamination. No remediation was necessary.

Table 5-1. Completion Criteria for the 182-K Pump Houses

Phase of the Demolition Activities	Completion Criteria*	Criteria Complete?	Description of How the Completion Criteria Were Addressed
	Upon completion of demolition activities, a minimum of 3 ft (0.9 m) of clean fill/soil cover will be placed over any remaining below-grade structure and inert material, and the fill will be graded to match the surrounding terrain.	Yes	The demolition area for the 182-K Pump House has been backfilled and graded to match surrounding terrain. Debris with potentially asbestos containing material may have inadvertently been placed within adjacent stockpiles prior to using as backfill of the excavation site. Consequently, the excavation site is currently being evaluated for future action to address potential residual asbestos in the soil.
Waste Management	Conduct waste characterization prior to and during D4 activities in accordance with the data quality objectives process identified in the applicable SAP. Characterization is conducted to support waste disposal activities, define contaminants present before or after the completion of the removal action, and, in some cases, support site closure documentation.	Yes	Waste characterization for the 182-K Pump House was performed in accordance with the <i>100-K Area Interim Safe Storage and D4 Project Waste Sampling and Analysis Plan</i> (DOE/RL-2005-33) to guide waste removal and disposal. Based on pre-demolition planning activities, UHCM (i.e., ballasts, ACM, and lubricants) was identified, characterized, and disposed prior to and during demolition, as required.
	Manage and dispose of all waste (including general demolition debris, and any ACM, lead bricks, sheeting, PCBs, mercury, and other hazardous materials) generated during the removal action. Waste generated will be characterized in accordance with the contractor's procedures, the requirements of the receiving facility, and the waste characterization SAP.	Yes	All wastes generated during D4 activities were characterized, shipped, and disposed in accordance with waste management ARARs and the ERDF waste acceptance criteria. The D4 waste from the 182-K Pump Houses was sent to the ERDF for disposal.
Verification	After the removal activities are completed, the site will be characterized to document the condition following the removal of the facility and/or structure.	Yes	Sampling of the 182-K stockpiles were collected per agreement with EPA and DOE as representative of the remaining soil in the excavation. Results are presented in DOE/RL-2012-50.
Documentation	DOE-Richland Operations Office will provide documentation describing the environmental conditions at the end of the D4 activity.	Yes	The post-D4 environmental conditions for the 182-K Pump House are presented in this report.

* Completion criteria were developed from the removal action requirements of DOE/RL-2005-26, *Removal Action Work Plan for 105-KE/105-KW Reactor Facilities and Ancillary Facilities*.

Table 5-1. Completion Criteria for the 182-K Pump Houses

Phase of the Demolition Activities	Completion Criteria*	Criteria Complete?	Description of How the Completion Criteria Were Addressed
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ACM = asbestos-containing material

ARAR = applicable or relevant and appropriate requirement

PCB = polychlorinated biphenyl

UHCM = unquantified hazardous construction materials

5.1.2 Removal Action Objectives Verification

Removal of the 182-K Pump House achieved the following RAOs identified in Section 2.3.1:

- *Protect human receptors from exposure to contaminants above acceptable exposure levels within facility structures*

The physical removal and appropriate disposal of the 182-K Pump House eliminated the potential for exposure to hazardous substances above acceptable levels within the structure.

- *Control the migration of contaminants from the facilities into the environment*

During D4 activities, the physical removal and appropriate management and disposal of the 182-K Pump House eliminated the potential for release of contaminants from each facility into the environment.

- *Facilitate and, to the extent practicable, be consistent with anticipated remedial actions within the 100-K Area OUs*

The physical removal and appropriate management and disposal of the 182-K Pump House is consistent with the selected remedy of Remove/Treat/Dispose from the 100 Area Remaining Sites ROD (EPA/ROD/R10-99/039).

- *Prevent adverse impacts to cultural resources and nesting migratory birds*

A cultural resources review was conducted for various D4 activities within an 183-acre area inside the fence line of the 100-K Area (encompassing the footprints of the 182-K Pump House), which found no known archaeological sites located on the ground surface within this area. Therefore, the removal action activities at the 182-K Pump House are not anticipated to have had an adverse impact to cultural resources.

A blanket biological review was completed in November 2010 and addressed the demolition and removal of several facilities, including the 182-K Pump House (ECR #2010-100-116, "Biological Review of the Accelerated D&D of the 100-K Area"). No migratory birds or nests were noted at the time of the survey or prior to D4 activities. Therefore, this removal action did not have an adverse impact to nesting migratory birds.

- *Achieve ARARs to the fullest extent practicable*

The ARARs presented in the Action Memorandum (EPA, 2005) and RAWP (DOE/RL-2005-26) included waste management standards, air emission control standards, protection of cultural and

natural resources, and safety and health standards. These removal actions were completed in accordance with these ARARs.

- *Safely treat, as appropriate, and dispose of waste streams generated by the removal action*

Waste streams generated by these removal actions were managed in accordance with the ARARs and sent to ERDF for disposal. These removal actions included the safe physical removal and disposal of D4 waste from the 182-K Pump House into the ERDF.

- *Take no action that will preclude the eventual final disposition of the 105-KE and 105-KW Reactor blocks*

Completion of these removal actions does not preclude the eventual disposition of the 105-KE or 105-KW Reactor blocks.

A discovery waste site was assigned to the 182-K backfilled excavation (100-K-119) following the discovery that potentially asbestos containing material may have inadvertently been placed within adjacent stockpiles prior to using as backfill of the excavation site. The area is roped off with asbestos danger sign postings to control access.

5.1.3 Statement of Protectiveness

This removal action mitigates the threat of release of contaminants to the environment and is consistent with interim remedial actions for the 100 Area of the Hanford site. Protection of human health and the environment has been demonstrated by the removal of the 182-K Pump House.

5.2 Construction Quality Assurance/Quality Control

Not applicable. No construction related aspects were implemented as part of the removal action for the 182-K Pump House.

5.3 Cleanup Verification Quality Assurance/Quality Control

The quality assurance and quality control pertaining to the sampling of the stockpiles is discussed in the RSVP DOE/RL-2012-50.

5.3.1 Data Quality Assessment

The data quality assessment pertaining to the 182-K Pump House stockpile samples is included in the RSVP DOE/RL-2012-50.

5.3.2 Environmental Quality Assurance

Although this was not a radiologically contaminated facility, radiological surveys were routinely performed during waste load out. Field instrumentation, calibration, and quality assurance checks were performed in accordance with the following procedures:

- Calibration of radiological field instruments on the Hanford Site is performed under contract by Pacific Northwest National Laboratory.
- Daily calibration checks are performed and documented for each radiological instrument used for conducting surveys. The calibration checks are made using direct comparison to standard materials that are sufficiently similar to the matrix under consideration and/or certified radioactive sealed sources.

The approval of field data by the radiological control organization provides the data validation and usability review for handheld field radiological measurements.

5.4 Regulatory Oversight

EPA is the lead regulatory agency for this removal action and provided oversight.

6 Final Inspection and Certifications

No final inspections or certifications are applicable to or required by the removal action for the 182-K Pump House.

7 Operation and Maintenance Activities

There are no operations and maintenance activities resulting from these removal actions.

8 Summary of Project Costs

The total cost for D&D activities associated with the 182-K Pump House is estimated at \$770,930 with \$250,155 of that cost attributed to waste disposal at the ERDF. Revegetation will be conducted as part of the area-wide activities; therefore, facility-specific costs are not included in these estimates.

9 Observations and Lessons Learned

This report of the removal of the 182-K Pump House provides the opportunity to identify project successes, areas for improvement, and lessons learned. The prime contractors, subcontractors, DOE, and EPA successfully worked together during removal action operations. In doing so, the work was performed safely without any lost-time injuries. There are lessons to be learned from the removal activities, which are discussed in the text following.

The complications encountered during the removal of 182-K highlight the necessity of proper planning of removal activities. The proximity of 182-K Pump House to access roads and other structures limited the area available for stockpiles. The depth of the sump required a large excavation to safely access the entire sump for removal and yielded large quantities of stockpiled soil. With the limited space available, the stockpiles were placed near the excavation thereby limiting the size of the excavation. The limiting of the breadth of the excavation restricted the sloping of the sidewalls. The slope of the excavation could not be accomplished to allow personnel to enter the entire excavation resulting in challenges in sampling the nearby waste site (100-K-106). Ideally, the upfront design of removal activities should include input from representatives from all organizations involved in the project from beginning to end (i.e., D4, soil remediation, characterization, closure and documentation). This integrated approach would provide the team with a picture of the goal and an understanding of the roles in reaching the goal safely and successfully. If this approach had been taken with 182-K the removal process many obstacles could have been identified prior to initiating fieldwork and handled accordingly.

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