

River Corridor Closure Contract

100 Area D4 Project Building Completion Report

**January 1, 2014, to
September 30, 2014**

October 2014

For Public Release

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor



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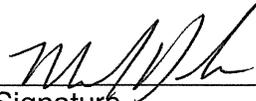
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Title: 100 Area D4 Project Building Completion Report – January 1, 2014, to September 30, 2014

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EXECUTIVE SUMMARY

This report documents the final status of buildings after the completion of deactivation, decontamination, decommissioning, and demolition (D4) activities by Washington Closure Hanford at the U.S. Department of Energy's Hanford Site in the 100 Area from January 1, 2014, to September 30, 2014. The following buildings are included in this report:

- 151-B-A2 Electrical Substation Switchyard
- 151-D-A4 Electrical Substation Switchyard
- 181-N River Pump House Cable Float Barrier Anchor Blocks
- 183-B Water Treatment Plant Clearwells and Pump House
- MO-474 100-B Area Mobile Office
- MO-767 100-N Area Mobile Office
- MO-827 100-N Area Mobile Office.

Demolition debris and soil associated with completion of these building closures were disposed at the Environmental Restoration Disposal Facility located on the Hanford Site. Post-demolition direct-hand instrument surveys and Global Positioning Environmental Radiological Surveyor surveys were not performed on these facilities because they were "radiologically clean" facilities.

The 100 Area D4/Interim Safe Storage Project personnel worked 26,990 hours (manual and non-manual, not including subcontractors) from January 1, 2014, to September 30, 2014. During this time there were zero Occupational Safety and Health Administration lost-work injuries, recordable injuries, and first-aid cases.

No clothing contamination and no skin contamination incidents occurred during demolition of the 100 Area buildings discussed in this building completion report. Workers received no radiological exposure from January 1, 2014, to September 30, 2014, while supporting D4 activities associated with buildings discussed in this report. All boundary air sample results were below procedural action levels for the duration of the work performed.

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METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
<i>If You Know</i>	<i>Multiply By</i>	<i>To Get</i>	<i>If You Know</i>	<i>Multiply By</i>	<i>To Get</i>
Length			Length		
Inches	25.4	millimeters	Millimeters	0.039	Inches
Inches	2.54	centimeters	Centimeters	0.394	Inches
Feet	0.305	Meters	Meters	3.281	Feet
Yards	0.914	Meters	Meters	1.094	Yards
Miles	1.609	kilometers	Kilometers	0.621	Miles
Area			Area		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
Acres	0.405	Hectares	Hectares	2.47	Acres
Mass (weight)			Mass (weight)		
Ounces	28.35	Grams	Grams	0.035	Ounces
Pounds	0.454	Kilograms	Kilograms	2.205	Pounds
Ton	0.907	metric ton	metric ton	1.102	Ton
Volume			Volume		
teaspoons	5	Milliliters	Milliliters	0.033	fluid ounces
tablespoons	15	Milliliters	Liters	2.1	Pints
Fluid ounces	30	Milliliters	Liters	1.057	Quarts
Cups	0.24	Liters	Liters	0.264	Gallons
Pints	0.47	Liters	cubic meters	35.315	cubic feet
Quarts	0.95	Liters	cubic meters	1.308	cubic yards
Gallons	3.8	Liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			Temperature		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			Radioactivity		
Picocuries	37	Millibecquerels	Millibecquerels	0.027	Picocuries

1.0 SCOPE

This report summarizes the deactivation, decontamination, decommissioning, and demolition (D4) activities performed by Washington Closure Hanford (WCH) in the 100 Area of the U.S. Department of Energy's Hanford Site from January 1, 2014, to September 30, 2014.

The activities at these facilities generally included utility disconnection, planning, characterization, engineering, removal of hazardous and radiologically-contaminated materials, removal of equipment, demolition of the above-grade structure, removal of the remaining slabs and foundation elements, load-out of debris to the Hanford Site's Environmental Restoration Disposal Facility (ERDF), and backfill of excavated sites.

As reference, previous D4 building completion reports include the following:

- WCH-102, *100 Area D4 Project Semi-Annual 2006 Building Completion Report August 2005 - April 2006*
- WCH-185, *100 Area D4 Project Building Completion Report May 2006 - June 2007*
- WCH-319, *100 Area D4 Project Building Completion Report – July 2007 to December 2008*
- WCH-410, *100 Area D4 Project Building Completion Report – December 2008 to December 2009*
- WCH-473, *100 Area D4 Project Building Completion Report January 1, 2010, to December 31, 2010*
- WCH-523, *100 Area/400 Area D4 Project Building Completion Report January 1, 2011, to December 31, 2011*
- WCH-551, *100 Area/400 Area D4 Project Building Completion Report January 1, 2012, to December 31, 2012*
- WCH-573, *100 Area D4 Project Building Completion Report January 1, 2013, to December 31, 2013.*

2.0 FACILITY DESCRIPTION AND CONDITIONS

The buildings detailed in this report were located in the 100 Area of the Hanford Site. The Hanford Site was constructed and operated for the production of plutonium.

2.1 151-B-A2 ELECTRICAL SUBSTATION SWITCHYARD

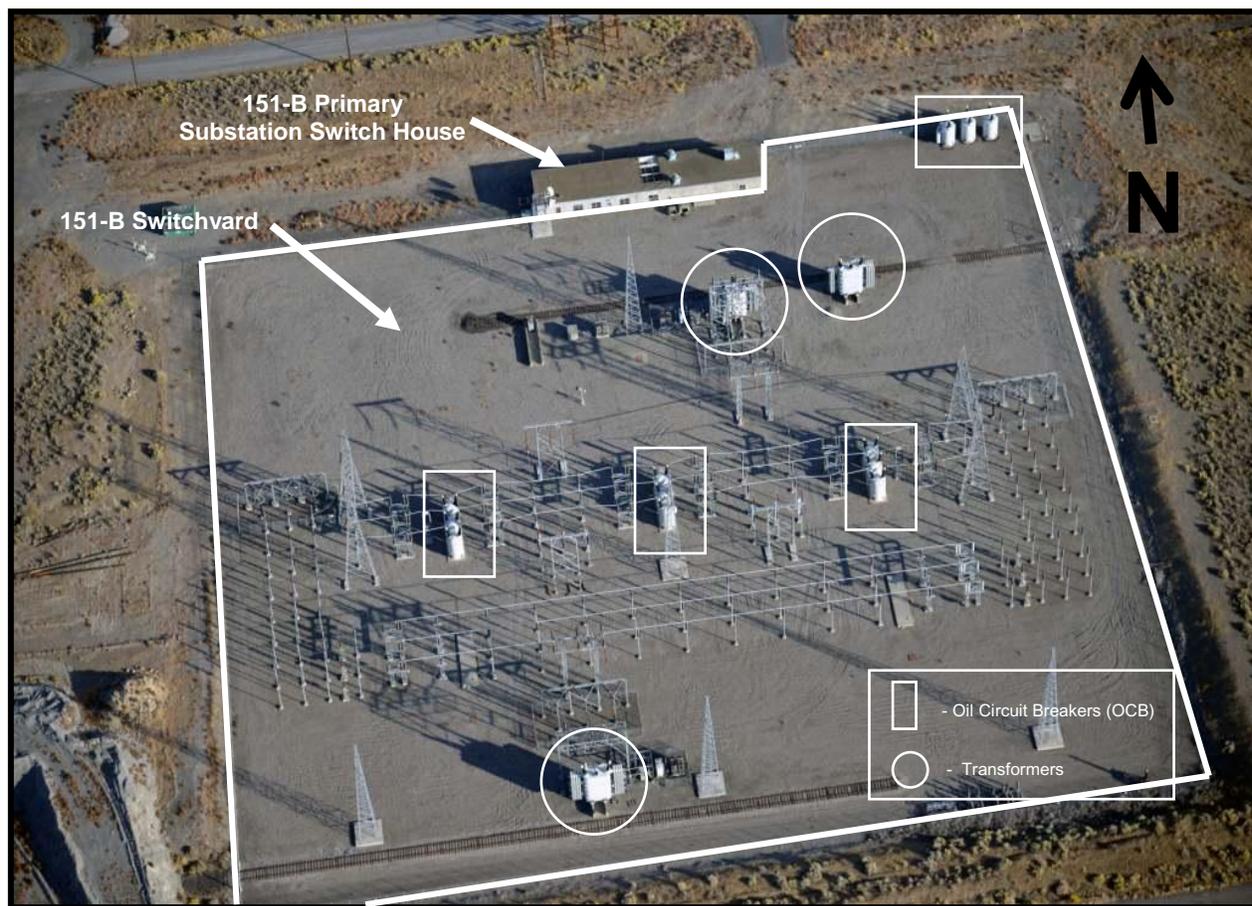
The 151-B-A2 Electrical Substation Switchyard (151-B Switchyard) was located in the 100-B/C Area, approximately 1,000 ft southwest of the 105-B Reactor at Washington State plane coordinates N144238, E5650618. Energized in June 1944, the 151-B Switchyard received 230-kV power from the Midway Substation and served as the primary source of electrical power for all facilities in the 100-B/C Area (Figure 1). The 151-B Switchyard transmitted power from 3 main transformers to 13 secondary substations and 9 distribution substations located throughout the 100-B/C Area via underground cables. One 27.5-kV transformer, located adjacent to the 151-B Substation Switch House, provided service for the building. Five oil circuit breakers (OCBs) were also in service to support the switchyard operations.

The 151-B Switchyard originally included a fenced, gravel-surfaced area with wooden-framed bus structures, two main 15,000-kV transformers, three OCBs, and terminal structures. Served by a rail spur, the 151-B Switchyard contained several underground ducts that connected the 151-B Switchyard to the 151-B Substation Switch House. The 151-B Switchyard equipment rested on two types of foundations (i.e., reinforced concrete slabs and reinforced concrete piers with spread footings).

In 1952, the 151-B Switchyard was expanded to support the new facilities associated with the 105-C Reactor Building. The expansion included the installation of a new 18,750-kV transformer, OCBs, disconnect switches, bus, and conductor. Below-grade oil transfer lines were installed within the 151-B Switchyard to fill the OCBs. Oil containing polychlorinated biphenyls (PCBs) was transferred from a rail tanker through above-ground and underground piping to the transformers and OCBs in the 151-B Switchyard.

Final D4 documentation is contained in CCN 175434, "Post-Demolition Summary Report for 151-B-A2 Electrical Substation Switchyard."

Figure 1. 151-B-A2 Electrical Substation Switchyard.



2.2 151-D-A4 ELECTRICAL SUBSTATION SWITCHYARD

The 151-D-A4 Electrical Substation Switchyard (151-D Switchyard) was used as the primary source of electrical power for all facilities in the 100-D Area. It was first energized in August 1944 and received 230 kV of power from the Midway Substation. From the three main transformers in the 151-D Switchyard, power was transmitted primarily via underground cables to 13 secondary substations and 9 distribution substations located throughout the 100-D Area. One 27.5-kV transformer, located adjacent to the 151-D Substation Switch House, provided service for the building. Three OCBs were also in service to support the 151-D Switchyard operations.

The 151-D Switchyard continued to be used after the 105-D and 105-DR Reactors were shut down in the 1960s to provide power for occupied facilities in the 100-D Area and backup power to 100-N Area. It also provided power for pumping firewater for the 100-D and 100-F Areas and for backup export water supply to the 200 Areas.

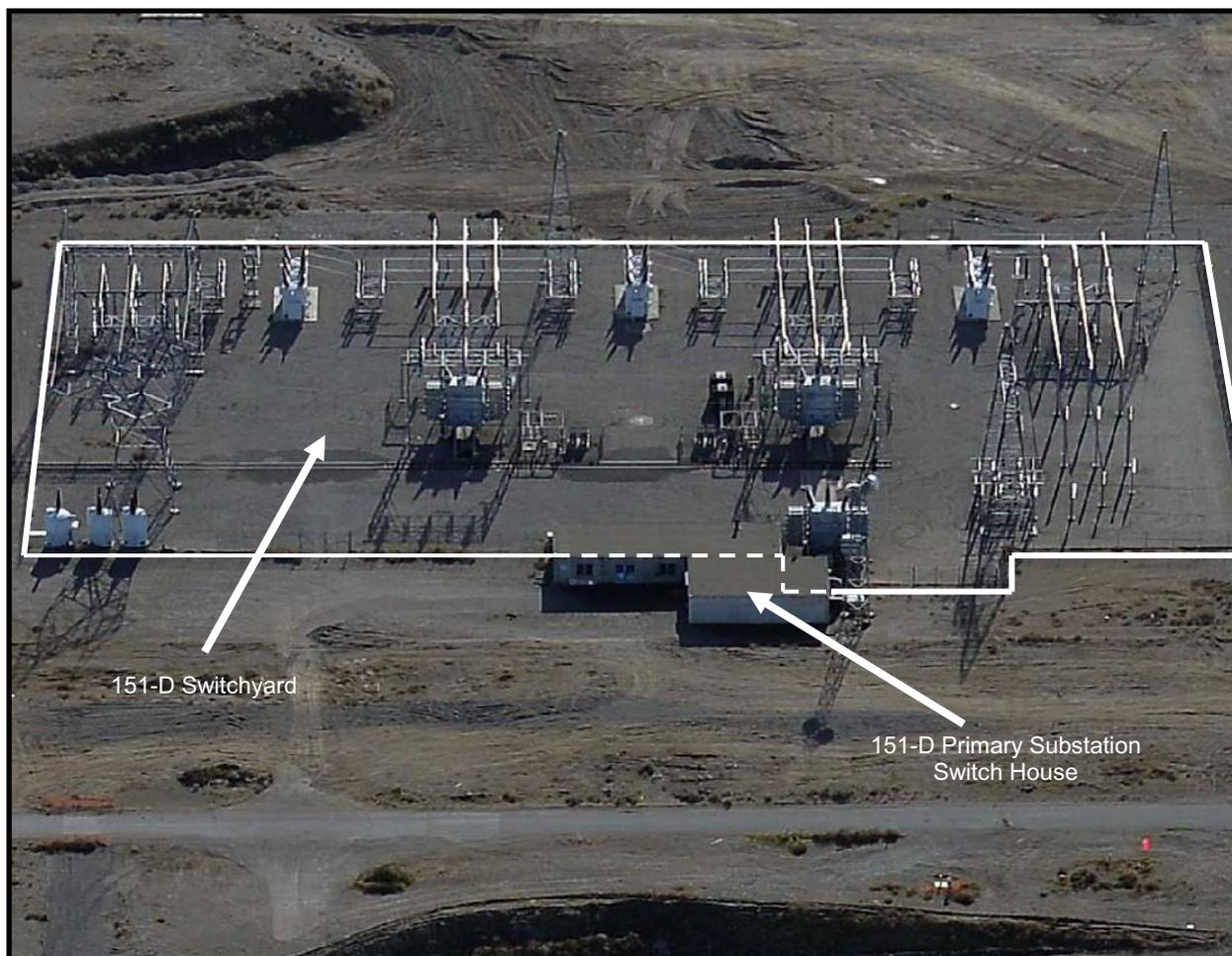
The 151-D Switchyard included a fenced, gravel-surfaced area originally 430 by 303 ft and contained wooden-framed bus structures, two main 15,000-kV transformers, three OCBs, and terminal structures. The area was served by rail spur and contained several underground ducts

that connected the 151-D Switchyard to the 151-D Substation Switch House. Two types of foundations were used for 151-D Switchyard equipment (i.e., reinforced concrete slabs and reinforced concrete piers with spread footings).

The 151-D Switchyard was modified in 1949 to support the new 105-DR Reactor Building, including the addition of two 13.8-kV refrigeration feeders. A 13.8-kV crosstie line was installed between the 100-D and 100-H Areas. In 1956, the 151-D facility was expanded to meet the power requirements for the increased production under the project CG-558. A new 230-kV/13.8-kV transformer was installed in the 151-D Switchyard with a capacity of 18,750/31,250 kV (Figure 2).

Final D4 documentation is contained in CCN 174858, "Post-Demolition Summary Report for 151-D-A4 Electrical Substation Switchyard."

Figure 2. 151-D-A4 Electrical Substation Switchyard.



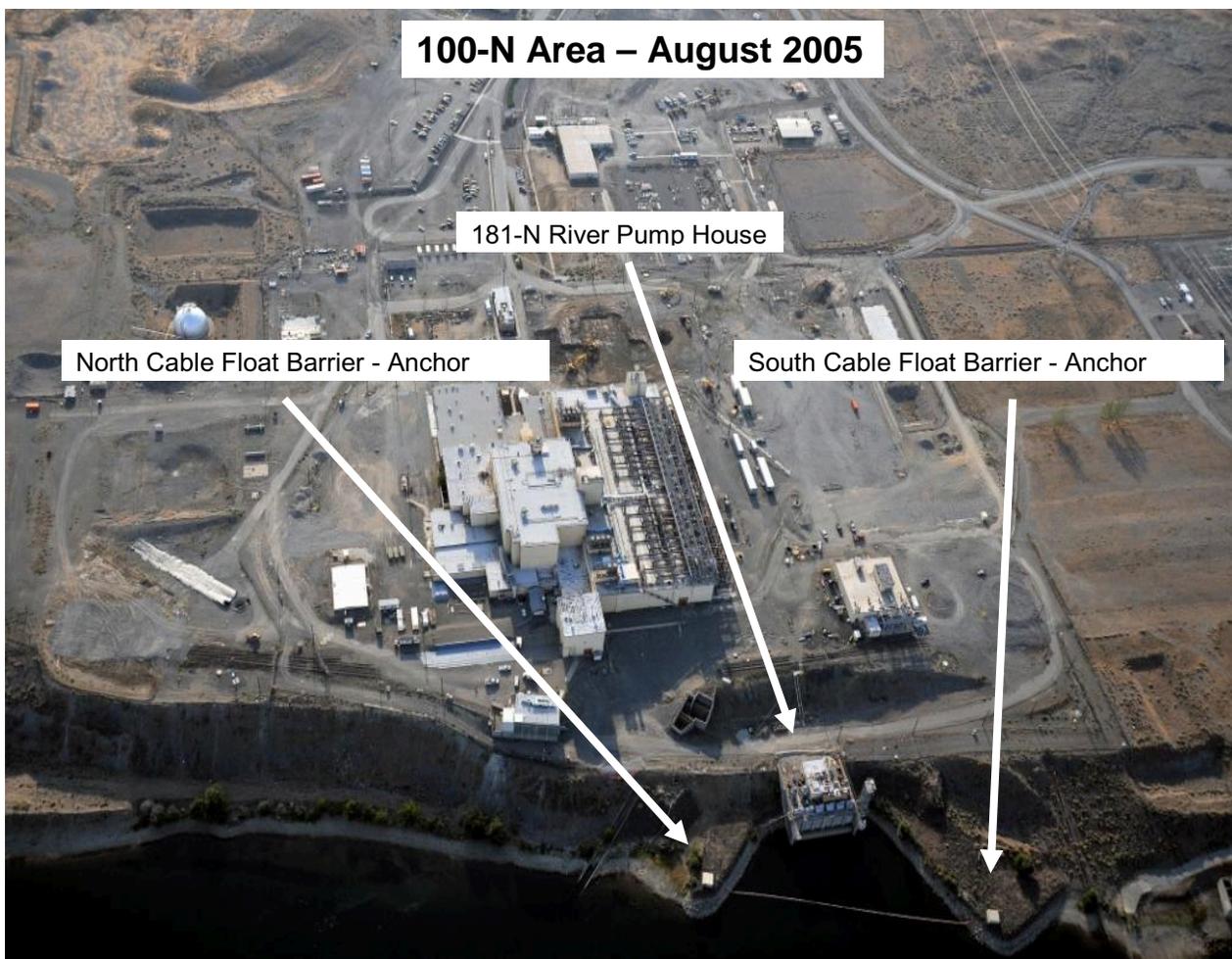
2.3 181-N RIVER PUMP HOUSE CABLE FLOAT ANCHOR BLOCKS

The 181-N River Pump House Cable Float Barrier Anchor Blocks were constructed in 1983, upstream and downstream of the 181-N River Pump House inlet (Figure 3). The 181-N Anchor Blocks restrained a 0.75-in. steel aircraft cable with foam-filled floats. The cable served as a safety barrier for the 181-N structure.

The solid concrete anchor blocks measured 16 ft wide, 16 ft long, and were 8 ft tall. They were reinforced around the perimeter with #5 rebar. The blocks were designed with a soil bearing pressure of 3,000 psf, and were able to withstand 80-mph winds and a 25-year flood. Although design drawings indicated the anchor blocks were recessed below grade, they were constructed on grade as noted during demolition.

Final D4 documentation includes a post-demolition global positioning system (GPS) survey. This data and other information are available in CCN 175461, "Post-Demolition Summary Report for the 181-N River Pump House Cable Float Barrier Anchor Blocks."

Figure 3. 181-N River Pump House Cable Float Anchor Blocks.



2.4 183-B WATER TREATMENT PLANT CLEARWELL AND PUMP HOUSE

The 183-B Water Treatment Plant Clearwells were located 1,300 ft west of the 105-B Reactor Building. The Clearwells and Pump House are described separately below and the spatial relationship of the facilities is depicted in Figure 4.

Most of the 183-B Water Treatment Plant was demolished in 1987 including the Headhouse, Flocculation Basins, Sedimentation Basins, above-grade Filter Building, and the Pump House down to 3 ft above grade.

2.4.1 Clearwells

The 183-B Clearwells (Clear Water Reservoirs) consisted of two below-grade, 5M-gal reinforced concrete enclosed reservoirs. Each Clearwell measured approximately 135 ft wide, 750 ft long, and 20 ft deep. Each reservoir had a reinforced concrete slab roof that was supported by reinforced concrete pillars. A tar and gravel surface covered the roof. The Pump House was located between the north and south Clearwells (Figure 4).

Water within the Clearwells gravity fed two suction wells located 5 ft below the Clearwell floors one on either side of the Pump House. Water within the Suction Wells was pumped to the B Reactor utilizing pumps located in the Pump Room.

Three valve houses on the east side of the Clearwells and a concrete over-flow flume on the south side of the south Clearwell were used to distribute water for operations and to maintain the reservoir level. The two-valve houses furthest from the Clearwells were constructed of 8-ft-diameter vertical corrugated galvanized steel culvert material with steel roofs. The valve house nearest the north Clearwell consisted of a small wooden structure (approximately 10 by 10 ft) with an asphalt shingle roof. The concrete over-flow flume (approximately 20 by 20 ft) had both a reinforced concrete roof and walls, and resided on the south end of the south Clearwell.

2.4.2 Pump House

The 183-B Pump House, located between the north Clearwell and the south Clearwell, measured approximately 45 by 135 ft. The remaining Pump House consisted of the reinforced concrete walls, which were 3 ft above grade and extended 20 ft below grade. The Pump House above-grade structure, including the above-grade and below-grade equipment, had been previously removed.

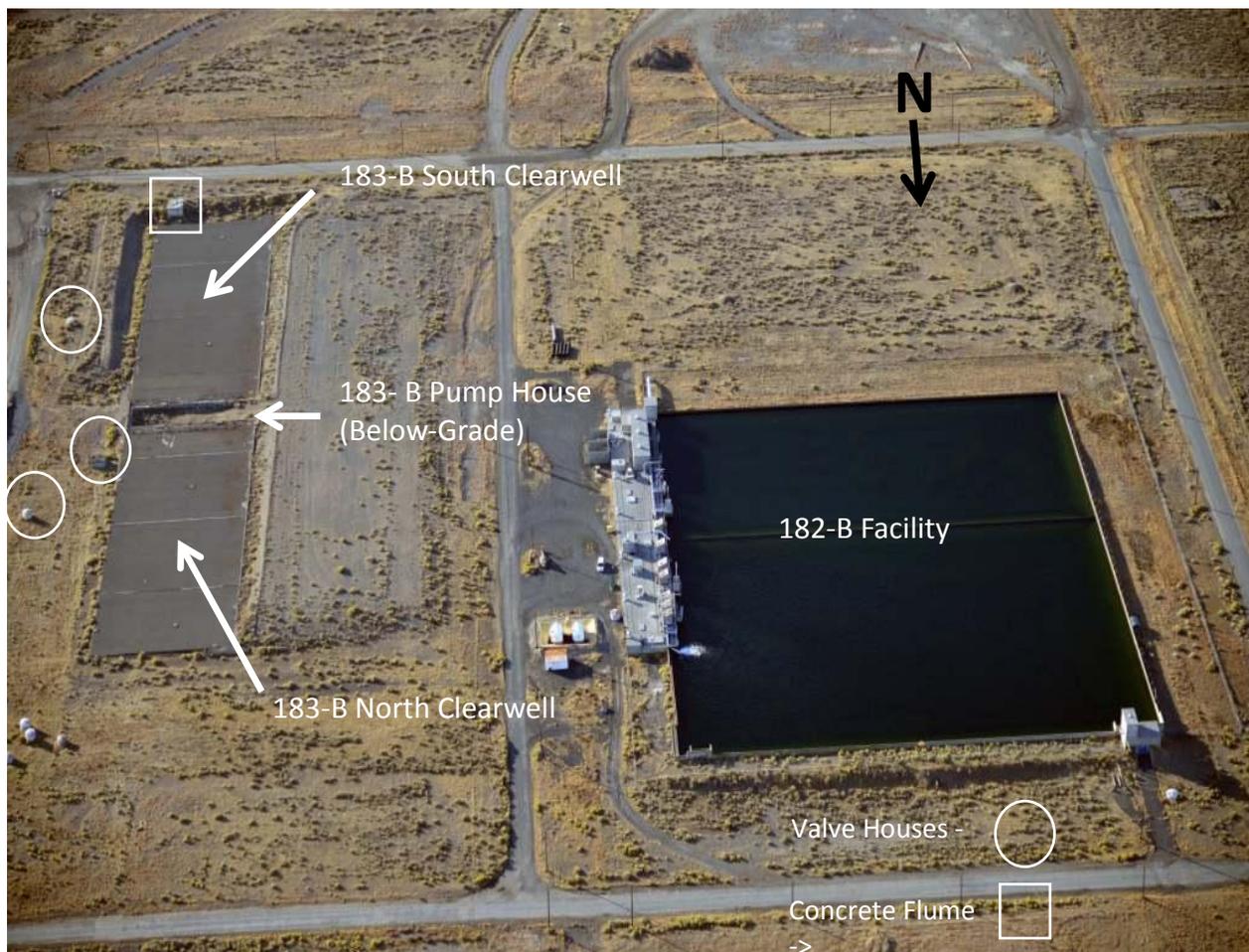
The Pump House originally contained 10 electric pumps and 6 steam turbine pumps. Two of these pumps were used for backwashing the filter beds and four pumps were connected to the combined sanitary and fire protection system. The remaining 10 pumps handled the distribution of filtered water.

Overflow trenches of 20,000-gpm capacity ran along both walls of the Pump Room below floor level, paralleling the two Clearwells.

The 183-B Clearwell and Pump House excavation backfill was completed on May 30, 2014, under the River Corridor Closure Contract (RCCC) using excavation permit DAN13-0120. An Ecological and Cultural Resources Review aided the preparation of the excavation permit.

Final D4 documentation includes a post-demolition GPS survey. This data and other information are available in CCN 176390, "Post-Demolition Summary Report for the 183-B Water Treatment Plant Clearwells and Pump House."

Figure 4. 183-B Water Treatment Plant Clearwells and Pump House.



2.5 MO-474 100-B AREA MOBILE OFFICE

Mobile office MO-474 was a triple-wide transportable office trailer. The 2,470-ft² structure was installed in the 100-B/C Area in 1996. Typical mobile office construction consisted of sheet metal, wood walls, and a roof on a steel frame. MO-474 was located approximately 885 ft northwest of the 105-B Reactor Building (Stewardship Information System) and served as the primary field office for WCH D4 and Field Remediation personnel (Figure 5).

Hazardous waste material was removed from MO-474 in June 2014. The trailer was split into three sections and transported to the ERDF on June 26, 2014, by George A Grant Construction (a subcontractor to WCH) and demolished at ERDF. This workscope was completed under the RCCC.

Final D4 documentation includes a post-demolition GPS survey. This data and other information are available in CCN 176967, "Post-Demolition Summary Report for 100-B Area Mobile Office MO-474."

Figure 5. MO-474 Mobile Office.



2.6 MO-767 MOBILE OFFICE

Mobile office MO-767 was a 620-ft² single-wide transportable facility that was originally located at the 100-N Area and later moved to the 300 Area. The trailer was of typical mobile office construction, sheet metal, wood walls, and a roof on a steel frame (Figure 6). It originally provided office space for 100-N personnel and later 300 Area personnel.

Hazardous waste material was removed from MO-767 in June 2014. The trailer was transported to the ERDF in June 2014 by George A Grant Construction (a subcontractor to WCH) and demolished at ERDF. This workscope was completed under the RCCC.

Final D4 documentation is available in CCN 176535, "Post-Demolition Summary Report for Mobile Offices MO-767 and MO-827."

Figure 6. MO-767 Mobile Office.



2.7 MO-827 MOBILE OFFICE

Mobile office MO-827 was a 1,370-ft² double-wide transportable facility that originally was located at the 100-N Area and later moved to the 300 Area. The trailer was of typical mobile office construction, sheet metal, wood walls, and a roof on a steel frame (Figure 7). It originally provided office space for 100-N personnel and later 300 Area personnel.

Hazardous waste material was removed from MO-767 in June 2014. The trailer was split into two sections and transported to the ERDF in June 2014 by George A Grant Construction (a subcontractor to WCH) and demolished at ERDF. This workscope was completed under the RCCC.

Final D4 documentation is available in CCN 176535, "Post-Demolition Summary Report for Mobile Offices MO-767 and MO-827."

Figure 7. MO-827 Mobile Office.



3.0 PROJECT ACTIVITIES

3.1 ENGINEERING AND PERMITS

The Removal Action Work Plan for 100-N Area Ancillary Facilities (100-N RAWP) (DOE/RL-2002-70) and the Removal Action Work Plan for River Corridor General Decommissioning Activities (River Corridor RAWP) (DOE/RL-2010-34) were prepared to satisfy the requirements of the action memorandums (Ecology 1999; DOE/RL-2010-22), outlining how compliance with and enforcement of applicable regulations would be achieved for cleanup of 100 Area facilities. Additionally, the 100-N and River Corridor RAWPs, the Environmental Control Plan for 100-N D4/ISS Activities (WCH-79), and the Environmental Control Plan for River Corridor General Decommissioning Activities (WCH-402) served as the decommissioning and project management plans, respectively, for the 100 Area project. The 100-N and River Corridor RAWPs were prepared in accordance with the Tri-Party Agreement (Ecology et al. 1989) and were approved by the U.S. Department of Energy, Richland Operations Office and the appropriate lead regulatory agencies.

It was determined that the *Davis-Bacon Act of 1931* prevailing wage rates for demolition of 151-B-A2, 151-D-A4, 183-B, MO-474, MO-767, and MO-827 were not applicable and the work was performed by Hanford Atomic Metal Trades Council plant forces. The electrical component recycle workscope at the 151-B-A2 and 151-D-A4 Switchyards, and the wire saw cutting of the 181-N Anchor Blocks was performed under “work turn-down” process and performed by subcontractors with the required expertise.

The Plant Force Work Reviews (PFWR), the Initial/Final Hazard Categorizations (IHC/FHC), Post-Demolition Summary Reports, and Excavation Permits for each building are listed in Table 1.

Table 1. Building Documentation.

Building	PFWR	IHC/FHC	PDSR	Excavation Permit
151-B-A2 Switchyard	8850-011-12	N/A	175434	DAN12-0158
151-D-A4 Switchyard	8850-010-12	IHC-2013-0001	174858	DAN12-0096
181-N Anchor Blocks	8850-009-08	095435	175461	DAN12-0144, Rev. 7
183-B Clearwells and Pump House	8850-011-12	173814	176390	DAN13-0120
MO-474	8850-003-20	175698	176967	N/A
MO-767	8850-023-07	IHC-2006-0036	176535	N/A
MO-827	8850-023-07	IHC-2006-0036	176535	N/A

FHC = Final Hazard Categorization
 IHC = Initial Hazard Categorization
 N/A = not applicable
 PDSR = Post-Demolition Summary Report
 PFWR = Plant Force Work Reviews

3.2 HAZARDOUS MATERIAL REMOVAL

The scope of the demolition project included removing and properly disposing of hazardous materials (e.g., oils, grease, asbestos-containing material, mercury, and PCBs). All known hazardous materials were removed from inside and outside of the 151-B-A2 and 151-D-A4 Switchyards, the mobile offices, and the 183-B Clearwells and Pump House prior to demolition.

3.3 UTILITY AND DRAIN ISOLATION

All electrical, water, and telecommunications services were disconnected from the buildings prior to hazardous material removal operations.

3.4 DEMOLITION OF STRUCTURES

After the utilities were isolated, hazardous materials and equipment were removed and the structures were deemed ready for demolition. The structures were then demolished using excavator-mounted hydraulic shears, hydraulic hammers, and bucket-and-thumb combination shovels. The foundations were likewise removed or demolished to 1 m below grade. The 181-N Anchor Blocks were wire saw cut into sections approximately 3 by 4 by 8 ft. MO-474 was split into three sections (i.e., MO-474, MO-767, and MO-827) and were transported to ERDF for demolition. The debris was segregated for load out and disposal. Standard ERDF roll-off containers with 6-mil liners were used to package and ship debris. The 181-N Anchor Blocks were approved for use as backfill in the 182-N High Lift Pump House below-grade structure.

3.5 SITE RESTORATION

The remaining condition and posting of the aforementioned buildings are listed in Table 2.

Table 2. Site Conditions.

Building	Remaining Conditions	Postings
151-B-A2 Switchyard	Portions of the tower pedestals and below-grade ducting, greater than 1 m below grade, remained in place following D4 activities, and prior to further WCH Field Remediation WIDS cleanup operations.	No radiological or Industrial Hygiene postings remain.
151-D-A4 Switchyard	Portions of the tower pedestals and below-grade ducting, greater than 1 m below grade, remained in place following D4 activities, and prior to further WCH Field Remediation WIDS cleanup operations.	No radiological or Industrial Hygiene postings remain.
181-N Anchor Blocks	The anchor blocks were completely removed.	No radiological or Industrial Hygiene postings remain.
183-B Clearwells and Pump House	The Clearwell and Pump House walls were demolished 1 m below grade and the Clearwell floors were perforated to ensure drainage.	No radiological or Industrial Hygiene postings remain.
MO-474	The mobile office was split into three pieces and transported to ERDF. A below-grade septic tank, adjacent to and north of the mobile office, remained following D4 activities.	No radiological or Industrial Hygiene postings remain.
MO-767	The mobile office was transported to ERDF and demolished in the landfill.	No radiological or Industrial Hygiene postings remain.
MO-827	The mobile office was split into two pieces, transported to ERDF and demolished in the landfill.	No radiological or Industrial Hygiene postings remain.

D4 = deactivation, decontamination, decommissioning, and demolition
ERDF = Environmental Restoration Disposal Facility
WCH = Washington Closure Hanford
WIDS = Waste Information Data System

4.0 COST AND COMPLETION

Building completion costs and dates are shown in Table 3.

Table 3. Cost and Completion Data.

Building	Total Cost (\$)	Completion Date
151-B-A2 Switchyard	437,733	March 11, 2014
151-D-A4 Switchyard	474,643	January 6, 2014
181-N Anchor Blocks	309,166	March 11, 2014
183-B Clearwells and Pump House	633,818	May 20, 2014
MO-474 Mobile Office	17,400	June 26, 2014
MO-767 Mobile Office	20,421	June 24, 2014
MO-827 Mobile Office	20,006	June 24, 2014

5.0 RECYCLED MATERIAL AND WASTE DISPOSAL

One of the objectives of the 100 Area demolition project is to support recycling and waste minimization. However, radiological contamination, primarily due to biological vectors (i.e., mud daubers, and wasps), is prevalent throughout the site reducing the amount of materials available for recycling. In calendar year 2014, 446 tons of scrap metal and 1,025 gal of oil were recycled from the 151-B-A2 Switchyard, 406 tons of scrap metal and 1,500 gal of oil were recycled from the 151-D-A4 Switchyard, and 153 tons of reinforced concrete from the 181-N Anchor Blocks was used to backfill the 182-N High Lift Pump House. Everything else was loaded out and sent to ERDF.

The waste volume transferred to ERDF from the 100 Area building demolition project is listed in Table 4.

Table 4. 100-B, 100-D, and 100-N Demolition Project Waste Transferred to the Environmental Restoration Disposal Facility.

Building	Number of ERDF Containers	Waste Volume (ft³)	Net Weight (tons)
151-B Switchyard	448	262,953	6,891
151-D Switchyard	219	108,274	3,088
181-N Anchor Blocks	5	530	25
183-B Clearwells	528	261,046	8,283
MO-474 Mobile Office	5	4,555	35
MO-767 Mobile Office	1	1,307	9
MO-827 Mobile Office	2	2,613	18

6.0 OCCUPATIONAL EXPOSURES

6.1 PERSONNEL INJURIES

WCH 100 Area D4 project personnel worked 26,990 hours (manual and non-manual, not including subcontractors) from January 1, 2014, to September 30, 2014. There were no Occupational Safety and Health Administration lost-work injuries, recordable injuries, or first-aid cases during this period.

6.2 PERSONNEL RADIOLOGICAL EXPOSURES

No clothing contamination or skin contamination incidents occurred during demolition of the 100 Area structures addressed in this report. Workers received zero person-mrem of radiological exposure from January 1, 2014, to September 30, 2014, during their support of WCH D4 activities associated with the buildings addressed in this report. All boundary air sample results were below procedural action levels during this time period.

7.0 LESSONS LEARNED

The following are lessons learned from the D4 project.

- 181-N Anchor Blocks – During wire saw cutting in freezing conditions, remove the diamond wire at the end of the work shift. While wire saw cutting the 181-N Anchor Blocks the wire was left in the cut over night during freezing conditions. The wire became frozen within the cut line and operations could not resume until weather conditions improved.
- 183-B Water Treatment Plant Demolition – Prepare for Ecological Impacts by Migratory Birds. Demolition of structures creates habitat for migratory birds. During the planning phase there were no mud swallow nests on the 183-B facility. During building demolition, mud swallows built nests on the structure when convenient nesting locations and ample water and mud were made available from dust-suppression water application. Where possible, conduct demolition activities in a manner that does not create opportunities for nesting. Remove nests prior to the birds laying their eggs (swallow nests need to be removed three to four times daily; once established, as many as three sets of eggs may be laid by one bird). Additionally, apply dust-suppression water conservatively.

8.0 REFERENCES

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