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Appendix B
Descriptions of Waste Sites

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Terms

DPT	direct-push technology
EMI	electromagnetic imaging
GPR	ground-penetrating radar
MSCM	Mobile Surface Contamination Monitor
N/A	not applicable
PUREX	Plutonium/Uranium Extraction (Facility)
REDOX	Reduction/Oxidation (Facility)
TMF	total magnetic field
TSD	treatment, storage, and/or disposal

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1 **B1 Summary Descriptions Waste Sites Associated with**
2 **the 200-SW-2 Radioactive Landfills Group Operable Unit**

3 This appendix contains summary descriptions of waste sites associated with the 24 landfills in the
4 200-SW-2 Operable Unit. Table B-1 describes 11 unplanned release waste sites located within, or close
5 to, the 24 landfills considered in the data quality objectives processes for this work plan. Contamination
6 potentially remaining from these sites may be located within in-scope landfills. Table B-2 summarizes the
7 characterization activities performed on each of the landfills, to date. Table B-3 summarizes the drawings
8 available for the 200-SW-2 Operable Unit (OU) landfills.

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Table B-1. Summary of Information for Other Waste Sites Collocated with or near 200-SW-2 OU Landfills

Site Code	Site Name	Location	Years of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-E-23	UPR-200-E-23, Burial Box Collapse at the 218-E-10 Burial Ground, UPR-200-W-158	Release occurred at the 218-E-10 Landfill; the contamination spread east and southeast up to 4.8 km (3 mi) beyond the eastern Inner Area perimeter fence.	1960	PUREX F-11 and H-4 Tube Bundles	Particles and contaminated soil	N/A	N/A	The unplanned release (UPR-200-E-23) occurred at the 218-E-10 Landfill when large boxes of contaminated PUREX equipment collapsed and spread contamination. The maximum dose rate at the box was 5 rad/h (100 ft) from the box. The box was partially covered with soil. ("Consolidated")
UPR-200-E-24	UPR-200-E-24, Contamination Plume from the 218-E-10 Burial Ground, UN-200-E-24	Contamination spread from the 218-E-10 Landfill to 4.8 km (3 mi) beyond the eastern Inner Area perimeter fence.	1960	PUREX F-11 and H-4 Tube Bundles	Particles and contaminated soil	N/A	N/A	An unplanned release (UPR-200-E-23) occurred at the 218-E-10 Landfill when large boxes of PUREX equipment collapsed and spread contamination. This related unplanned release (UPR-200-E-24) also is reported to account for the airborne contamination plume from the broken box. ("Consolidated")
UPR-200-E-30	UPR-200-E-30, UN-200-E-30	Within the 218-E-10 Landfill.	1961	N/A	Process jumpers and contaminated soil	N/A	Area of 37,161 m ² (400,000 ft ²)	A wooden burial box containing 82 highly contaminated process jumpers collapsed as it was covered with soil. This has been assigned to the 218-E-10 Landfill. Maximum contamination of 500 mR/h was spread over a 37,161 m ² (400,000 ft ²) area. The landfill has been surface stabilized. ("Consolidated")
UPR-200-E-53	UPR-200-E-53, UN-200-E-53, Contamination at 218-E-1	The release occurred at the 218-E-1 Landfill.	1978	N/A	Contaminated soil	N/A	46 by 15 m (150 by 50 ft)	In October 1978, a contamination spread occurred during backfilling operations when a bulldozer uncovered shallow buried contaminated waste in an adjacent trench. Numerous spots of radioactive contamination were detected within the south end of the 218-E-1 Trench. The contaminated soil was reburied, and clean fill was spread over the area. The surface of the landfill was stabilized in 1981. The release is not marked or posted, but the 218-E-1 Landfill is marked and posted. ("Consolidated")
UPR-200-W-11	UPR-200-W-11, Burial Ground Fire, UN-200-W-11, UPR-200-W-16	Within the 218-W-1 Landfill.	1952	N/A	Airborne radioactive contamination including alpha particles	N/A	N/A	This site was a result of a spontaneous fire in the 218-W-1 Landfill. It has been consolidated into its duplicate (UPR-200-W-16). ("Consolidated")
UPR-200-W-16	UPR-200-W-11, Burial Ground Fire, UN-200-W-11, Fire at 218-W-1 Burial Ground	Within the 218-W-1 Landfill.	1952	N/A	Airborne radioactive contamination including alpha particles	N/A	N/A	The release was a result of a spontaneous fire in the 218-W-1 Landfill. The trench where the fire occurred runs east and west and was roughly in the center of the landfill. A fire in the dry waste spread plutonium contamination near the 231-Z Building. The contaminated soil was bulldozed into the trench. The ground on the north side was stabilized with road oil, and roads near Z Plant were washed down with water. ("Consolidated")
UPR-200-W-26	UPR-200-W-26, Contamination Spread During Burial Operation	Assumed to be the 218-W-1A Landfill and along the railroad tracks.	1953	221-T	Soil contamination from 221-T spent equipment	N/A	N/A	A box of used connectors was removed from the 221-T Building and buried in the 218-W-1A (alias Railroad) Landfill. During unloading, the lid was dislodged and contamination was spread to the flatcar and surrounding ground. ("Consolidated")

Table B-1. Summary of Information for Other Waste Sites Collocated with or near 200-SW-2 OU Landfills

Site Code	Site Name	Location	Years of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-W-37	UPR-200-W-37, Contaminated Boxes Found in a Burn Pit	East of Dayton Ave, southwest of Z Plant within the 218-W-4C Landfill.	1955	N/A	High-activity dry waste	N/A	N/A	Three boxes mistakenly containing dry, high-activity waste were sent to the Z Plant burn pit, which was located within what is now the 218-W-4C Landfill. The boxes were noticed before being burned, but during removal it was noted that one box had opened in the pit, causing radiological contamination. The boxes were removed and sent to the proper trench. ("Consolidated")
UPR-200-W-53	UPR-200-W-53, Burial Box Collapse	East from the 218-W-2A Landfill to within 275 m (902 ft) of the east perimeter fence of the western Inner Area.	1959	REDOX	Spent equipment caused contaminated soil and airborne particles	N/A	101 ha (250 ac)	A burial box containing process equipment from REDOX collapsed and released fission product contamination into the western Inner Area in January 1959. Skin and/or personal clothing contamination occurred to 12 employees and 15 vehicles. Personnel and property were decontaminated, and measures to prevent the spread of contamination were implemented. ("Consolidated") Also known as UPR-200-W-45.
UPR-200-W-72	UPR-200-W-72, Contamination at the 218-W-4A Burial Ground	Within the 218-W-4A Landfill.	1975	N/A	Laboratory waste and contaminated soil	N/A	15 by 15 m (50 by 50 ft)	Contaminated laboratory waste was found with gross alpha and mixed fission product contamination in October 1975. The waste had been buried years before at the previously required 1.2 m (4 ft) depth. Soil erosion caused the waste to become exposed. The waste was removed, and the area was covered with 15 cm (6 in.) of sand, a layer of urea bore, a layer of 10-mil plastic, 31 to 36 cm (12 to 14 in.) of soil, and 8 to 10 cm (3 to 4 in.) of rock. ("Consolidated")
UPR-200-W-84	UPR-200-W-84, Ground Contamination During Burial Operation at the 218-W-3A Burial Ground	Within the 218-W-3A Landfill, most likely Trench S9.	1980	N/A	Liquid waste	N/A	N/A	In July 1980, a liquid spill occurred in the 218-W-3A Landfill when chemical waste (beta/gamma) was being pumped from a truck to the landfill. The pump and contaminated soil were placed in a trench. The truck was cleaned and thoroughly decontaminated at a separate site. ("Consolidated")
216-C-9	216-C-9 Pond	North of 7 th Street and north of Hot Semiworks Facility.	1953 to 1983	209-E Critical Mass Laboratory Hot Semiworks Facility	1 billion L (264 million gal) mildly radioactive steam condensate liquid discharge	2.4 m (7.9 ft)	383 by 70 m (1,256 by 230 ft)	The excavation was originally intended to be the foundation for the 221-C Canyon Facility that was never built. It was modified to receive cooling water from the 201-C Hot Semiworks Facility. Over a period of 30 years, the pond received approximately 1 billion L (264 million gal) of mildly radioactive steam condensate liquid discharge from the 209-E Critical Mass Laboratory and the Hot Semiworks (201-C).
Z Plant BP	Z Plant BP, Z Plant Burning Pit	Located east of Dayton Ave, within the boundaries of the current 218-W-4C Landfill.	1948 to 1960	N/A	The burn pit received 2,000 m ³ of waste for burning, including less than 1,000 m ³ of laboratory chemicals	3 m (9.8 ft)	12.2 by 15.2 m (40 by 49.9 ft)	Consolidated with the 218-W-4C Landfill. This unit is a rectangular burning pit located within (under) the 218-W-4C Landfill. The burn pit was a disposal site for combustible nonradioactive construction, office, and nonhazardous laboratory waste, including unnamed chemicals. The burn pit was exhumed during construction of the 218-W-4C Landfill. It was located near the west end of Trench 33. ("Consolidated")

Table B-1. Summary of Information for Other Waste Sites Collocated with or near 200-SW-2 OU Landfills

Site Code	Site Name	Location	Years of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
216-T-4A	216-T-4 Swamp, 216-T-4-1 Pond	Located in the northeast portion of the current 218-W-2A Landfill.	1944 to 1972	221-T Chemical Separation Plant and 224-T Building	Steam condensate 42.5 E ⁹ L; radionuclide inventories for 216-T-4A and 216-T-4B Ponds are reported together as one site.	Surface	549 by 183 m (1,801 by 600 ft)	The pond received cooling water and steam condensate via the 207-T Retention Basin and 216-T-4-1 Ditch. The surface bottom was scraped and placed in the 218-W-2A Landfill. The area has been interim stabilized with backfill and revegetated.
216-T-4B	216-T-4 New Pond, 216-T-4-2 Pond	Located east of the former 216-T-4A Pond, north of 23 rd Street. The 218-W-3AE Landfill was built over the dry pond location.	1972 to 1995	242-T Evaporator and 221-T	Steam condensate from the 242-T Evaporator and nonradioactive wastewater from 221-T air conditioning filter units and floor drains; volume unspecified	Surface	6,100 m ² (65,660 ft ²)	The effluent was usually absorbed in the first quarter of the ditch, leaving the pond area dry. The pond was considered dry after 1977. The 1995 end date refers to the 216-T-4-2 Ditch discharge end date where the potential existed for effluent to reach the pond from the ditch.
216-T-4-2	216-T-4-2 Ditch	Located north of 23 rd Street and north of the 241-T Tank Farm.	1972 to 1995	242-T Evaporator and 221-T	Steam condensate from the 242-T Evaporator and nonradioactive wastewater from 221-T air conditioning filter units and floor drains; volume unspecified	1.2 m (3.9 ft)	533 by 2.4 m (1,749 by 7.9 ft)	Most of the effluent was absorbed in the first quarter of the ditch length. The distal end of the ditch was often dry. The ditch was backfilled and interim stabilized in July 1995.

N/A = not applicable

PUREX = Plutonium/Uranium Extraction (Facility)

REDOX = Reduction/Oxidation (Facility)

Table B-2. 200-SW-2 OU Landfill Characterization Activities

Landfill	Preliminary Phase Investigation		Phase 1-A Characterization				Phase 1-B Characterization													RSW Sampling		
	Historical Information Review	Surface Geophysics (GPREMI/TMF)	Historical Information Review	Surface Geophysics (GPREMI/TMF)	MSCM Radiation Surveys ^a	Passive Soil Vapor Samples	Historical Information Review	Surface Geophysics (GPREMI/TMF) ^e	MSCM Radiation Surveys ^a	Logging Existing Wells ^f	Passive Soil Vapor Samples (Stage 1) ^g	Passive Soil Vapor Samples (Stage 2) ^h	Passive Soil Vapor Samples (Stage 3)	Passive Soil Vapor Samples (Stage 4)	DPT & Geophysical Logging ^d	Remote Radiation Surveys ^b	Remote Camera Surveys ^b	Inspection of Unused TSDs ⁱ	Step 1: Soil Vapor Samples, Pre-Waste Retrieval	Step 2: Radiological Survey, DPT and Soil Vapor Sampling/Field Screening	Step 3: Soil Sampling	
218-C-9	x	x	x		x				x	x					x							
218-E-1	x		x	x	x				x			x	x		x							
218-E-2					x		x	x							x							
218-E-2A	x	x		x	x ^b				x			x	x		x							
218-E-4					x		x	x							x							
218-E-5	x	x			x ^b				x			x	x		x							
218-E-5A	x	x			x				x			x	x		x							
218-E-8	x	x	x	x	x ^b				x	x		x	x		x							
218-E-9					x		x	x	x						x							
218-E-10	x		x							x					x			x				
218-E-12A	x		x	x	x				x	x		x	x		x							
218-E-12B	x									x					x ^j			x	x			
218-W-1	x			x	x				x			x	x		x							
218-W-1A	x	x	x		x				x	x		x	x		x							
218-W-2	x			x	x				x	x		x	x		x							
218-W-2A	x	x	x		x				x	x		x	x		x							
218-W-3	x		x	x	x				x	x		x	x	x	x							
218-W-3A	x		x						x	x					x ^j				x	x		
218-W-3AE	x								x	x		x			x							
218-W-4A	x		x		x			x	x	x					x	x	x					
218-W-4B	x		x						x	x		x			x ^j	x	x		x	x		
218-W-4C	x		x						x	x					x ^j			x	x	x		
218-W-5	x								x	x		x			x							
218-W-6							x ⁱ											x				
218-W-11	x	x	x	x	x				x	x		x	x		x							

Table B-2. 200-SW-2 OU Landfill Characterization Activities

Landfill	Preliminary Phase Investigation		Phase 1-A Characterization				Phase 1-B Characterization											RSW Sampling		
	Historical Information Review	Surface Geophysics (GPR/EMI/TMF)	Historical Information Review	Surface Geophysics (GPR/EMI/TMF)	MSCM Radiation Surveys ^a	Passive Soil Vapor Samples	Historical Information Review	Surface Geophysics (GPR/EMI/TMF) ^e	MSCM Radiation Surveys ^a	Logging Existing Wells ^c	Passive Soil Vapor Samples (Stage 1) ^f	Passive Soil Vapor Samples (Stage 2) ^g	Passive Soil Vapor Samples (Stage 3)	Passive Soil Vapor Samples (Stage 4)	DPT & Geophysical Logging ^d	Remote Radiation Surveys ^h	Remote Camera Surveys ^h	Inspection of Unused TSDs ⁱ	Step 1: Soil Vapor Samples, Pre-Waste Retrieval	Step 2: Radiological Survey, DPT and Soil Vapor Sampling/Field Screening

a. MSCM radiation surveys are annually conducted on the surface of all past-practice 200-SW-2 Operable Unit landfills.

b. Additional MSCM radiation surveys were performed on these landfills based on the Phase 1-A data quality objectives process.

c. Geophysical logging of existing wells is initially proposed in up to one upgradient well and one downgradient well where well logging data do not currently exist; the logging will collect information regarding site geology, soil moisture content, and presence/absence of mobile gamma-emitting contaminants. Wells to be logged will be determined per a focused investigation defined in SGW-34463, *Treatability Studies and Other Focused Investigations: An Initial Planning Basis for the 200-SW-2 Operable Unit Landfills*.

d. DPT borehole logging will be slim-hole instrumentation for measuring gross/spectral gamma, passive neutron, and active neutron moisture.

e. Surface geophysical investigations (e.g., GPR/EMI/TMF surveys) are not proposed for most TSD unit landfill trenches during Phase 1-B due to the higher quantity/quality of waste burial records. As part of a focused investigation per SGW-34463, a limited number of TSD landfill trenches will be surveyed to verify burial records.

f. Stage 1 passive soil vapor samples are targeted at areas that had detected levels of soil vapor during Phase 1-A activities.

g. Stage 2 passive soil vapor samples are targeted at areas with strong metallic signatures from the surface geophysical investigations.

h. Remote surveys only apply to caissons within each of the noted landfills.

i. Site walkdowns, records review, and surface geophysics are proposed to aid in procedural closure of unused portions of TSD landfills (entire 218-W-6 Landfill, annex of 218-W-4C Landfill, annex of 218-E-10 Landfill, and western portion of 218-E-12B Landfill).

j. Additional pushes to be performed in these landfills that have experienced historical events that could have provided a mechanism to cause contaminant migration.

DPT = direct-push technology

EMI = electromagnetic imaging

GPR = ground-penetrating radar

MSCM = Mobile Surface Contamination Monitor

TMF = total magnetic field

TSD = treatment, storage, and/or disposal

x = denotes that the listed characterization activity has been completed for that landfill, whereas a blank indicates that the listed characterization activity has not been performed.

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System		Subsystem										Component								Material								
Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	Item	Code	

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Table B-3. Reference Drawing List

Landfill	Reference Drawing
218-E-10	H-2-821555, Sheet 4, <i>Industrial Landfill 218-E-10 Site Plan and Details</i> (site plan), H-2-92004; <i>Subsidence Drawing Landfill 218-W-3AE</i> (stabilization)
218-E-12B	H-2-96660, <i>East Area Dry Waste Landfill</i> (site plan); H-2-821555, Sheet 2, <i>Subsidence Drawing Landfill 218-E-12B</i> (stabilization)
218-W-3A	H-2-34880, Sheets 1 and 2 (site plan); H-2-821555 (stabilization)
218-W-3AE	H-2-75351, Sheets 1, 2, and 3, <i>Dry Waste Landfill 218-W-3AE</i> (site plan); H-2-821555 (subsidence); Typical trench cross sections are described on H-2-75351, Sheet 2
218-W-4B	H-2-33055 describes the trench layout; <i>Installation—Filtered & Shielded Caisson Covers—Dry Waste Landfill 218-W-4B</i> , describes caisson installation, H-2-74640; H-2-821555 describes stabilization
218-W-4C	H-2-37437, Sheets 1 through 4, <i>Dry Waste Landfill 218-W-4C</i> ; H-2-821555 (stabilization)
218-W-5	H-2-94677, <i>Dry Waste Landfill 218-W-5</i> (site plan); H-2-821555 (stabilization)
218-C-9	H-2-4010, <i>Strontium Semiworks & Vicinity Outside Lines Key Map</i> ; H-2-4606, <i>216-C-9 Pond Modifications</i>
218-E-1	H-2-00124, <i>218-E-1 Dry Waste Landfill</i>
218-E-2	H-2-55534, <i>218-E2, E2A, E4, E5, E5A, & E9 Industrial Landfill Plan & Details</i>
218-E-2A	H-2-55534
218-E-4	H-2-55534
218-E-5	H-2-55534
218-E-5A	H-2-55534
218-E-8	There are no known individual drawings of the landfill; however, drawings of the 218-E-12B Landfill (e.g., Hanford Site Drawing H-2-821555, Sheet 5) often show the 218-E-8 Landfill, which is near the southeast corner of the 218-E-12B Landfill
218-E-9	H-2-55534
218-E-12A	H-2-32560
218-W-1	H-2-75149, <i>Dry Waste Landfill 218-W-1</i> , trench arrangement and dimensions detail
218-W-1A	H-2-02516, <i>Industrial Landfill 218-W-1A</i>
218-W-2	H-2-02503, <i>218-W-2 Dry Waste Landfill</i>
218-W-2A	H-2-32095, <i>218-W-2A Industrial Landfill & 218-W-3 Dry Waste Landfill</i>
218-W-3	H-2-32095, Sheet 1
218-W-4A	RHO-D0101ER0101, <i>Burial Ground Characterization Engineering Report</i> (contains a drawing of trench configurations and locations on page 69)
218-W-11	H-2-94250, <i>Dry Waste Landfill 218-W-11</i> (the drawing likely is not accurate)

B2 References

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2 RHO-D0101ER0101, 1980, *Burial Ground Characterization Engineering Report*, Rockwell Hanford
3 Operations, Richland, Washington.

4 SGW-34463, 2008, *Treatability Studies and Other Focused Investigations: An Initial Planning Basis for*
5 *the 200-SW-2 Operable Unit Landfills*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.
6 Available at: <http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0082357H>.