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Appendix C

Map Plates

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Contents

Plate C-1. **200-WA-1/200-BC-1 Remedial Investigation Work Plan Waste Sites**

Plate C-2. **200-WA-1/200-BC-1 Waste Sites Where Cs-137 Concentrations Have Been Detected in Groundwater**

Plate C-3. **200-WA-1/200-BC-1 Waste Sites Where Sr-90 Concentrations Have Been Detected in Groundwater**

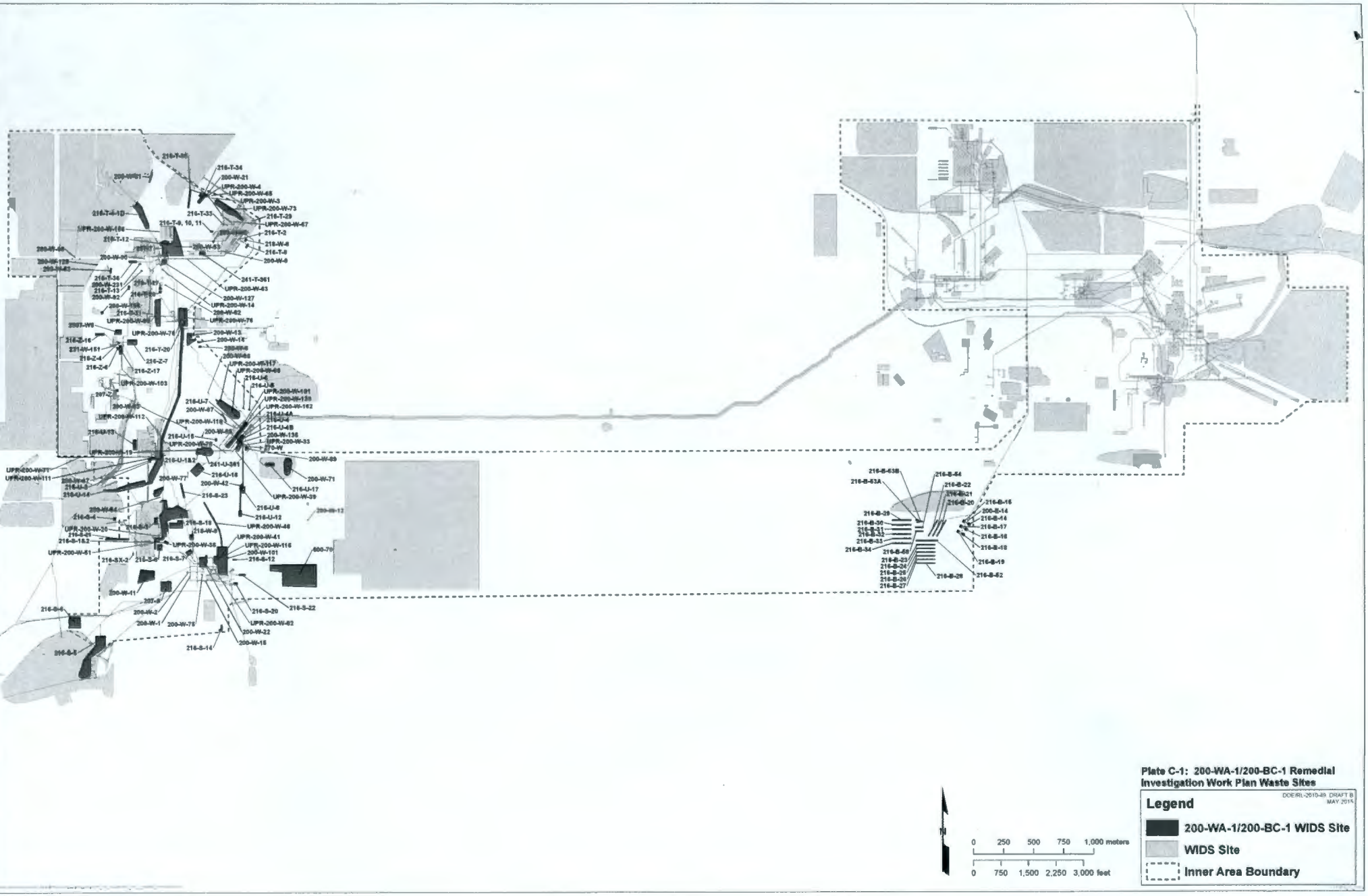

Plate C-1: 200-WA-1/200-BC-1 Remedial Investigation Work Plan Waste Sites

DOE/RL-2010-89 DRAFT B
MAY 2015

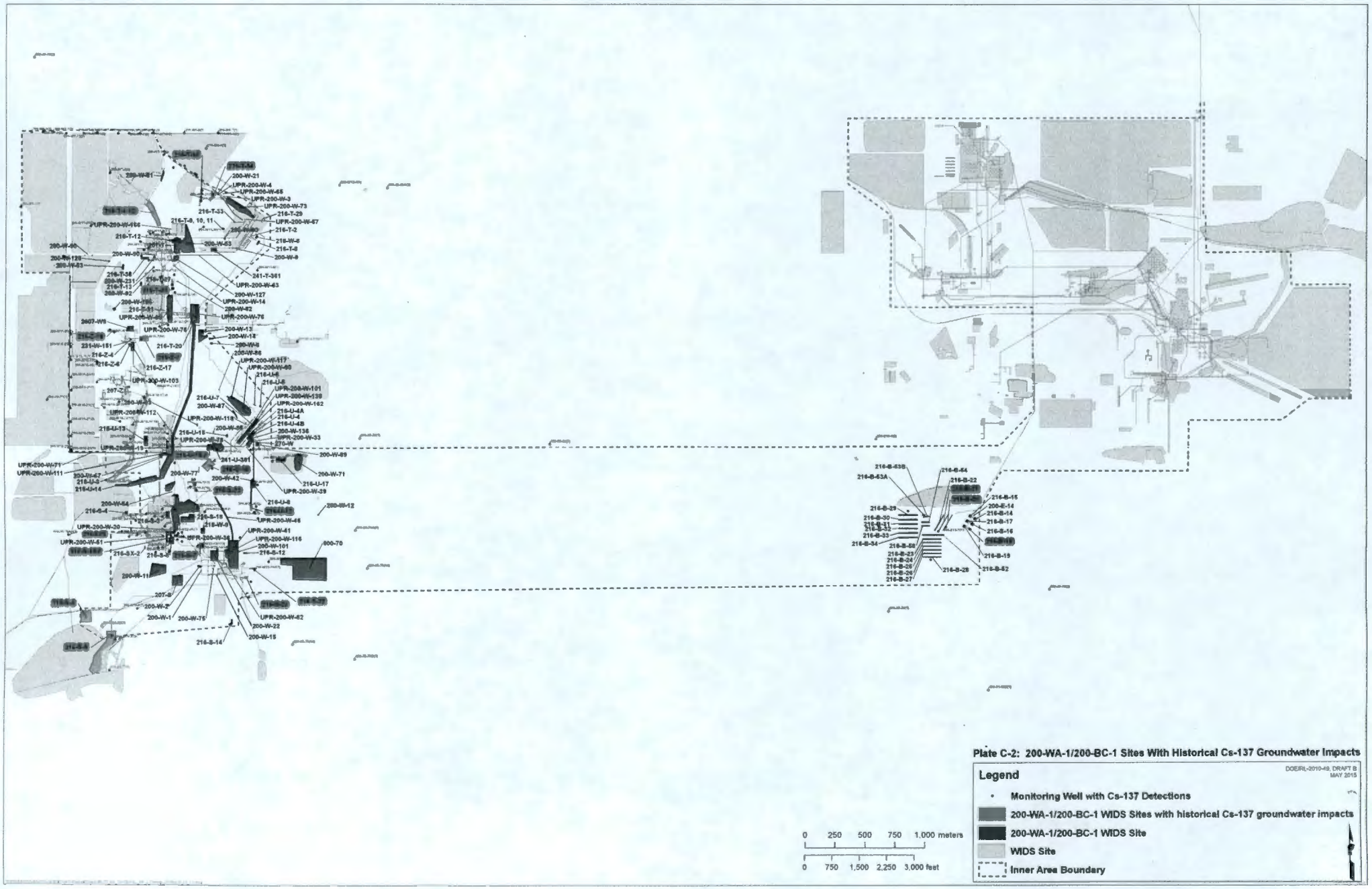

Plate C-2: 200-WA-1/200-BC-1 Sites With Historical Cs-137 Groundwater Impacts

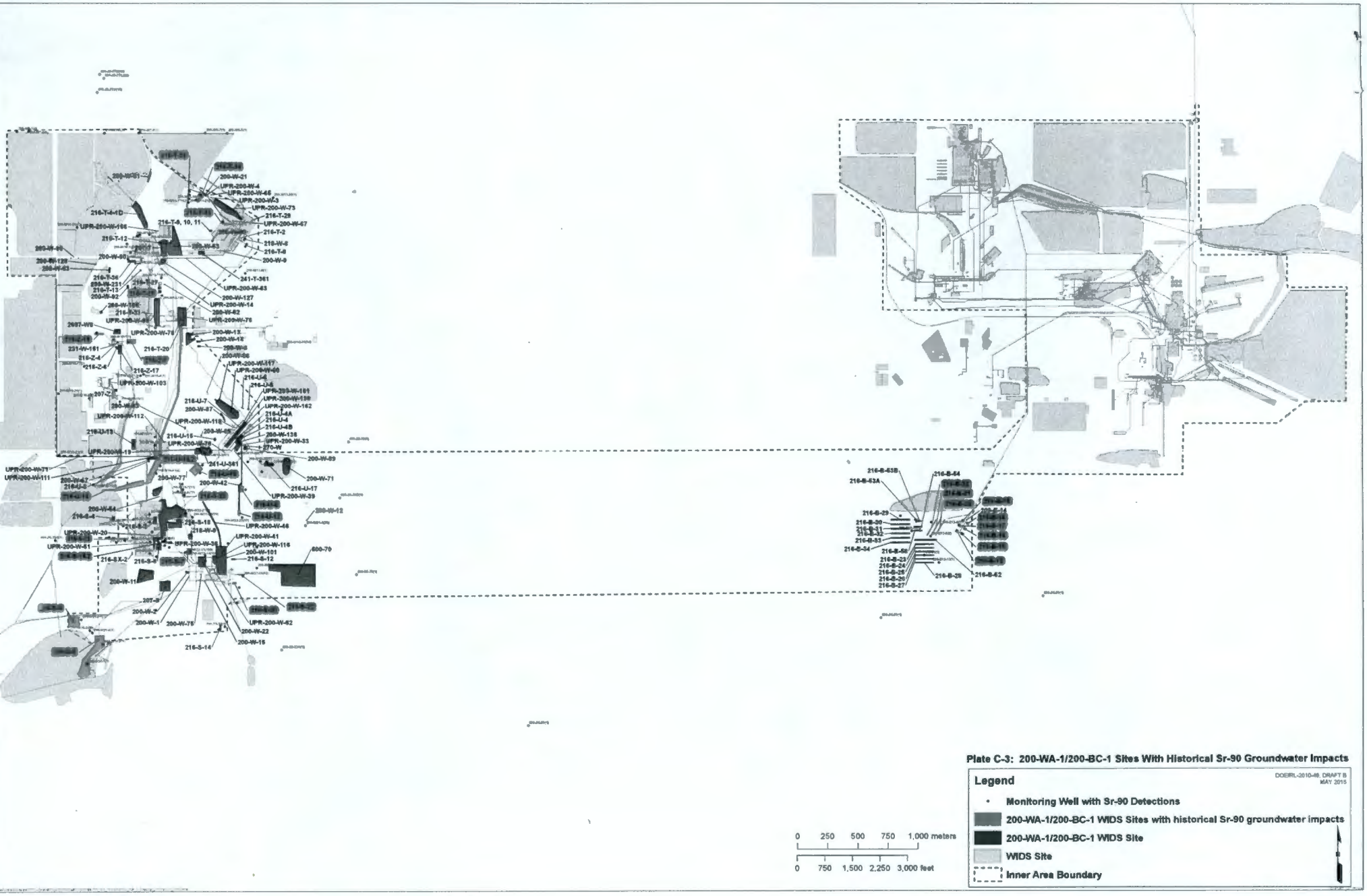

Plate C-3: 200-WA-1/200-BC-1 Sites With Historical Sr-90 Groundwater Impacts

DOE/RL-2010-49, DRAFT B
MAY 2015

Appendix D

Waste Site Summaries

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BC Sites **D-1**

S Plant Sites **D-171**

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Site: 200-E-14	Area: BC Cribs	Category: Intermediate

Site Description

Site Type: Siphon Tank
Facility/Geographic Area: BC Cribs and Trenches
Current OU Assignment: 200-BC-1
Former OU Assignment: 200-BC-1
Service Dates: January 1956 to October 1957

Waste Site Location and Physical Description: The 200-E-14 siphon tank is located south of Route 4S, south of the 200 East Area (Figure 1). The tank is 18 m (60 ft) north of the center line between the 216-B-14 and 216-B-15 cribs. The siphon tank was designed to receive liquid waste from the 200-E-114-PL (Pipeline) and release the waste into the 216-B-14 through 216-B-19 Cribs. The siphon tank was designed to hold the waste until the liquid level reached 1.6 m (5.5 ft). When the level was reached, the siphon action would begin and the tank contents would discharge to the designated crib. The siphon action would stop when the tank level receded to 0.07 m (6 in). The siphon action was intended to flood the crib area with a significant amount of liquid, resulting in a uniform spread of contaminants throughout the crib, instead of a large amount of contaminants concentrating near the discharge point.

Waste Site Coordinates:
E-573639.15478 N-134439.31401

Site Dimensions:
Site Length: 8.2 m (27 ft)
Site Width: 3.9 m (12.8 ft)
Site Area: 32 m^2 (344.4 ft^2)
Site Depth: 21.5 ft (estimated per drawing H-2-2770)
Cover Thickness: 0.6 m (2 ft) over 2.1 m (7 ft) of overburden

Related Site Structure(s): The siphon tank is associated with the 200-E-114-PL, the 216-B-14, 216-B-15, 216-B-16, 216-B-17, 216-B-18, and 216-B-19 cribs, 241-BY Tank Farm and 221-U Building.

Site Posting: The area was covered with a minimum of 0.6 m (2 ft) of top soil and posted as Underground Radioactive Material.

Site History

Release Summary: Estimated release volume from the siphon tank into the BC Cribs is 38.9E+6 L (10.3E+6 gal). The waste received by the siphon tank from the 200-E-114-PL was scavenged uranium recovery process (tributyl phosphate [TBP] solvent extraction) liquid waste from the 241-BY Tank Farm and 241-C Tank Farm.

A 1998 evaluation of the IMUST tank contents based on crib inventory data concluded the potential from hydrogen generation, ferrocyanide induced reaction, organic chemical reactions, heat generation, criticality, flammability, noxious vapor emissions, leakage and radiation exposure were all ranked as low.

Volume Discharged: The approximate effluent discharged from the siphon tank into the BC Cribs was 38.9E+6 L (10.3E+6 gal). An unknown volume may have leaked from the tank.

Pore Volume Discharged: (unknown) L/ (325 ft x 345.6 ft^2 / 35.3 m^3/ft^3 * 1000 L/m^3 * 0.3) = Unknown

Previous Site Characterization

Site Characterization Summary: The BC Cribs area was surface stabilized in 1981. Prior to stabilization, a radiological survey found vent hoods and liquid level risers on the cribs and siphon tank were contaminated with levels ranging from 200 to 30,000 counts per minute. The vent hoods and risers were removed, wrapped in plastic and transported to the burial grounds.

A surface radiological survey of the BC Crib area is done annually. The surface above the siphon tank is also covered in the survey.

Nature and Extent of Contamination:

No data are available to evaluate the shallow or deep soil contamination.

Field Sampling Plan

Data Needs and Rationale: No soil analytical data are available within the waste site footprint. Data are needed to reduce uncertainty associated with nature and extent of contamination resulting from potential liquid leaks from the 200-E-14 siphon tank. Data will be collected above 4.6 m (15 ft) bgs to assess risk to human health and the environment, to determine whether contaminants exceed acceptable risk levels for groundwater protection, and for remedy evaluation. Data will be collected below 4.6 m (15 ft) to determine the nature and extent of contamination in the deep vadose zone beneath the waste site footprint, to perform vadose zone modeling and remedy evaluation, and to determine whether contaminants exceed acceptable risk levels for groundwater protection. The nature and extent of contaminated materials within the tank is an uncertainty.

Sampling Plan: Soil investigation will follow the SAP protocol for intermediate and deep waste sites using a focused sampling strategy. Two shallow borings will be installed adjacent to the siphon tank structure, one near the inlet pipe and the other on the northwest side of the tank. One deep boring will be installed adjacent to the siphon tank structure near the discharge pipe to depth of contamination based on field screening, approximately 60 feet bgs. Boring locations are shown on Figure 1. Table 1 lists sample intervals and analytes.

The specific data needs assessment methodology for the tank and its contents should be consistent with the approach for assessing data needs for other similar 200 Areas tank sites. The RI/FS Work Plan for the 200-IS-1 OU is under development. Once the 200-IS-1 OU team has determined a methodology for data needs assessment for similar tanks, the 200-E-14 Siphon Tank will be evaluated consistent with that approach. If additional data needs are identified using the 200-IS-1 OU approach, the 200-WA-1/200-BC-1 OU SAP will be amended to incorporate characterization required to fulfill those data needs.

References:
WIDS Summary Report for site 200-E_14
Drawing H-2-2770 Sheet 1 Rev. 1

TABLE 1

Field Sampling Plan for 200-E-14

Sample Collection Methodology	Sample Location	Maximum Depth of Investigation	Sample Interval Depth (ft bgs)[a]	Analyte List[c]	Physical Properties	
					Sample Interval	Parameters
1 borehole to approximately 60 ft bgs and 2 shallow DPT to 16 ft bgs with sample barrel samples.	1 deep borehole adjacent to siphon tank discharge pipe and 2 shallow DPT within site footprint as shown on Figure 1.	To depth of contamination ~60 ft bgs	Shallow DPT: 0 – 16 ft bgs sample every 2 ft interval. Deep Borehole: Same as above, plus 20 – 22 ft bgs, 33 – 35 ft bgs, 41 – 43 ft bgs, 51 – 53 ft bgs, 58– 60 ft bgs, Approximate depth only, actual sample depths will be based on geophysical logging and/or field screening.	Radionuclides, inorganics and SVOCs per Table E-4.	A minimum of three samples collected at significant changes in lithology or fine-grained intervals below 20 ft bgs. (Suggested intervals per PNNL-14702[a]).	pH, moisture, bulk density, particle size distribution

Approximate number of split spoon samples	29
Approximate number of field quality-control samples[b]	3
Approximate number of physical property samples	3
Approximate number of soil samples to be analyzed	35
Approximate number of grab samples	0
Approximate number of soil samples collected	35

Non-Sample Data Collection	Maximum Depth of Investigation
Downhole gamma-spectroscopy log and neutron moisture log, Passive neutron log may be collected on a case-by-case-basis. If gamma-spectroscopy log and/or process history indicates the likely presence of plutonium contamination.	Surface to total depth in new borehole

a. Actual sampling depth may vary depending on the amount of backfill/overburden used in interim-stabilization activities at the waste site, field screening results and varying subsurface conditions, consistent with the field sampling strategy in the SAP. Estimated sample interval depths are based on hydrostratigraphic templates in Appendix A of PNNL-14702, *Vadose Zone Hydrogeology Data Package for Hanford Assessments*, Rev. 1, page A.2, and geophysical log DOE-EM/GJ887-2005 (see Figure 3 for excerpt).

b. One duplicate, one split, and one equipment blank, (as needed).

c. Analyte list is based on waste inventory, process knowledge, and previous soil data.

bgs = below ground surface
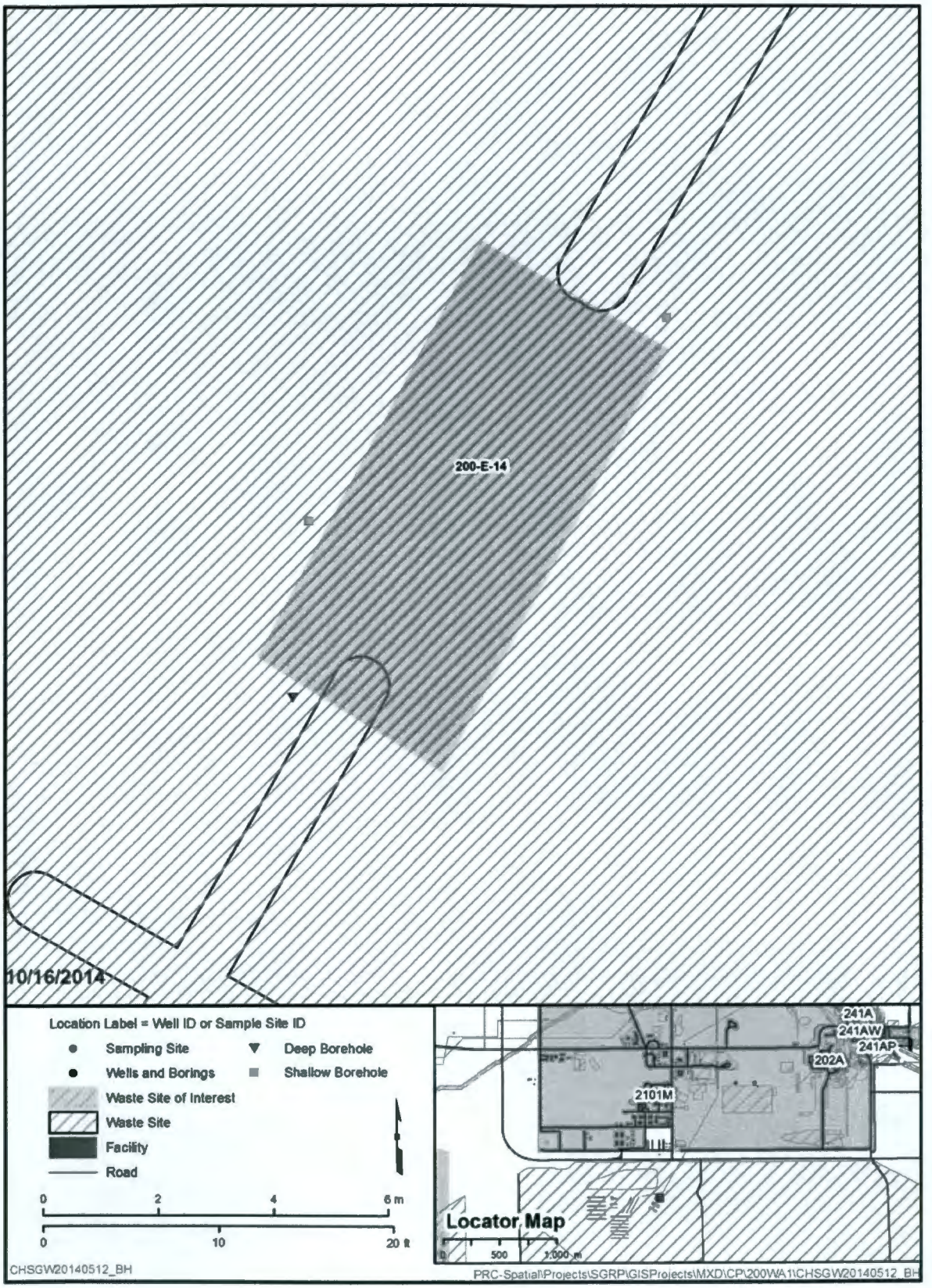
Figure 1: 216-E-14 Site Map and Boring Locations