SGW-62096
Revision 1

200-DV-1 OPERABLE UNIT SHALLOW SOIL RISK SAMPLING FIELD SUMMARY REPORT

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
Plateau Remediation Company

P.O. Box 1600
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APPROVED
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Release Approval Date

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Terms

bgs	below ground surface
COPC	contaminant of potential concern
ESL	ecological screening level
FY	fiscal year
Hf1	Hanford formation unit 1
OU	operable unit
SAP	sampling and analysis plan

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1 Introduction

This field summary report documents the drilling, sampling, and decommissioning of 28 shallow vadose zone characterization boreholes installed in fiscal year (FY) 2018 in the 200-DV-1 Operable Unit (OU) within the Central Plateau of the Hanford Site. The shallow vadose zone is defined in this report as the soil media between the ground surface and 4.6 m (15 ft) below ground surface (bgs). Ten additional boreholes were drilled as replacements when refusal occurred or when sampling did not collect enough soil. The boreholes were drilled as part of the 200-DV-1 OU remedial investigation for supplemental characterization of the shallow vadose zone, and to support the determination of risk to human health and the environment. The boreholes were drilled and sampled as defined in DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling* (hereinafter called the sampling and analysis plan [SAP]).

The purpose of this field summary report is to compile the field methods and results from drilling and sampling the 28 original boreholes and 10 replacement boreholes at 16 waste sites in the 200-DV-1 OU.

1.1 Background on 200-DV-1 Operable Unit and the B, T, and S Complex Waste Sites

The 200-DV-1 OU comprises 43 waste sites in three distinct geographical areas of the Central Plateau: the B Complex Area, the T Complex Area, and the S Complex Area. This OU includes the vadose zone from the ground surface to the water table at these 43 waste sites. The 200-DV-1 OU was created in 2010 to support remedy selection for waste sites with deep vadose zone contamination (DOE/RL-2011-102, *Remedial Investigation/Feasibility Study and RCRA Facility Investigation/ Corrective Measures Study Work Plan for the 200-DV-1 Operable Unit*).

The deep vadose zone contamination in the B Complex and T Complex Areas resulted from disposal of hazardous waste produced during the plutonium separation process. Both B Plant and T Plant used the bismuth phosphate process to chemically extract plutonium from irradiated fuel rods. The initial step in the plutonium separation process was to dissolve the fuel rods using nitric acid. After the plutonium had been removed from the fuel, it was further processed for use in military applications. All of the chemicals needed to extract the plutonium, as well as the excess parts of the irradiated fuel rods, became waste.

The deep vadose zone in the S Complex Area was also contaminated during disposal of hazardous waste produced during the plutonium separation process; however, the process used was different from that used at both B Plant and T Plant. S Plant (also known as the Reduction-Oxidation Plant) used methyl isobutyl ketone (hexone) as the nonaqueous solvent in an aqueous/nonaqueous separation process to extract plutonium and uranium from the dissolved fuel rod solutions. This process represented a major increase in efficiency over the bismuth phosphate process used at B Plant and T Plant because it was the first process used at the Hanford Site to recover both plutonium and uranium for further use in military applications.

The liquid waste generated during these processes was generally both chemically and radiologically contaminated. The liquids percolated through the soil column, and the chemical and radiological waste contaminants migrated with movement of fluid, interacting to varying degrees with the surrounding soil. Residual radiological and chemical constituents remain within the soil column under each of the 200-DV-1 OU waste sites and pose a potential risk to human health and the environment.

In 2015, 2016, and 2017, in accordance with DOE/RL-2011-104, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, data were obtained within the 0 to 3 m (10 ft) bgs and 0 to 4.6 m (15 ft) bgs intervals. However, insufficient numbers of samples were collected within the shallow vadose zone at some of the waste sites to calculate the 95% upper confidence level on the mean concentration, which necessitated additional shallow vadose zone characterization (DOE/RL-2011-104-ADD2). Additional drilling commenced in 2018.

The shallow vadose zone was characterized by drilling boreholes at or near waste sites and collecting soil samples at selected depths. The primary contaminants of potential concern (COPCs) regarding risk to human health in the shallow vadose zone are cesium-137 and strontium-90. The primary COPCs regarding risk to the ecological environment in the shallow vadose zone include cesium-137, strontium-90, copper, mercury, and selenium (DOE/RL-2011-104-ADD2).

Table 1-1 provides a summary of the 38 boreholes (28 planned boreholes and 10 replacements) that were drilled at 16 waste sites in the B Complex Area, T Complex Area, and S Complex Area, as well as the locations at the Hanford Site according to civil surveys performed at each location.

Table 1-1. Borehole Location Summary

Borehole ID	Northing[a] (m)	Easting[a] (m)	Elevation[b] (m)
216-B-5 Reverse Well			
C9839	136730.22	573778.92	209.61
C9558[c]	136730.87	573778.58	209.64
216-B-9 Crib and Tile Field			
C9840	136831.24	573855.66	207.97
C9559[c]	136830.05	573854.93	208.09
C9841	136862.90	573860.48	207.34
C9842	136837.56	573863.58	207.68
216-B-35 Trench			
C9843	137277.11	573448.46	203.83
216-B-36 Trench			
C9844	137292.16	573403.74	203.84
216-B-39 Trench			
C9845	137373.92	573458.27	200.96
C9560[c]	137373.50	573458.57	200.99
216-B-40 Trench			
C9846	137403.15	573431.43	200.14

Table 1-1. Borehole Location Summary

Borehole ID	Northing[a] (m)	Easting[a] (m)	Elevation[b] (m)
216-B-41 Trench			
C9847	137429.20	573449.70	199.34
216-S-9 Crib			
C9848	134508.49	567156.35	208.05
C9849	134484.55	567167.58	209.41
C9939[c]	134484.98	567167.55	209.42
C9850	134451.37	567180.74	209.47
C9851	134474.54	567184.31	209.33
C9852	134456.53	567194.84	208.29
216-S-21 Crib			
C9853	134405.42	566615.78	203.03
C9854	134413.15	566607.84	202.69
216-T-5 Trench			
C9855	136722.33	566672.45	206.79
C9856	136727.39	566674.46	206.82
216-T-14 Trench			
C9857	136856.60	566947.30	212.61
C9940[c]	136856.62	566946.64	212.62
216-T-15 Trench			
C9858	136849.93	566973.24	213.15
C9941[c]	136849.87	566972.49	213.14
216-T-16 Trench			
C9859	136805.03	567007.57	213.50
C9942[c]	136805.06	567008.27	213.53
216-T-17 Trench			
C9860	136843.01	567021.98	213.65
216-T-18 Crib			
C9861	136463.38	566944.22	205.30
C9862	136454.98	566946.91	205.12

Table 1-1. Borehole Location Summary

Borehole ID	Northing[a] (m)	Easting[a] (m)	Elevation[b] (m)
C9863	136455.71	566958.51	205.25
216-T-26 Crib			
C9864	136405.16	566929.09	205.73
C9943[c]	136405.24	566929.87	205.76
C9865	136396.61	566926.71	205.73
C9944[c]	136395.95	566926.69	205.72
C9866	136390.97	566930.04	205.74
C9945[c]	136390.88	566930.88	205.76

a. Coordinates are in Washington State Plane south (FIPS 4602) using NAD83, *North American Datum of 1983*.

b. Elevation values are based on NAVD88, *North American Vertical Datum of 1988*.

c. Replacement borehole.

ID = identification

1.1.1 216-B-5 Reverse Well

The 216-B-5 Reverse Well is located east of Baltimore Avenue, south of the 216-B-9 Crib (Figure 1-1). The waste site is 92 m (302 ft) deep and is composed of vertical risers with various diameter sizes in sections measuring as follows:

- 16 in. diameter riser from ground surface to 4 m (13 ft) bgs
- 12 in. diameter riser placed inside the 16 in. diameter riser, extending to 30.5 m (100 ft) bgs
- 10 in. diameter riser placed inside of the 12 in. diameter riser, extending to 73.8 m (242 ft) bgs
- 8 in. diameter riser placed inside the 10 in. diameter riser, extending to 92 m (302 ft) bgs

The lowest 15.2 m (50 ft) section of 8 in. diameter riser is perforated (Figure 1-2). The well was connected to the 241-B-361 Settling Tank by a 2 in. diameter stainless-steel inlet pipe, entering 3.7 m (12 ft) bgs. The 200-E-279-PL pipeline fed the reverse well from the settling tank. The waste site received approximately 32.1 million L (8.5 million gal) of B Plant and 224B waste solutions. The site was deactivated in 1947 by blanking (i.e., installing a solid metal disc on a flange to isolate flow in a pipeline) the pipeline inlet to the well when the radionuclide capacity was reached. Table 1-2 shows the total estimated inventory of contaminants discharged to the 216-B-5 Reverse Well.

Two boreholes, C9839 and C9558 (replacement), were pushed at this location (shown in Figure 2-3 in Chapter 2; coordinates are provided in Table 1-1). The location was selected due to limited reliable analytical data.

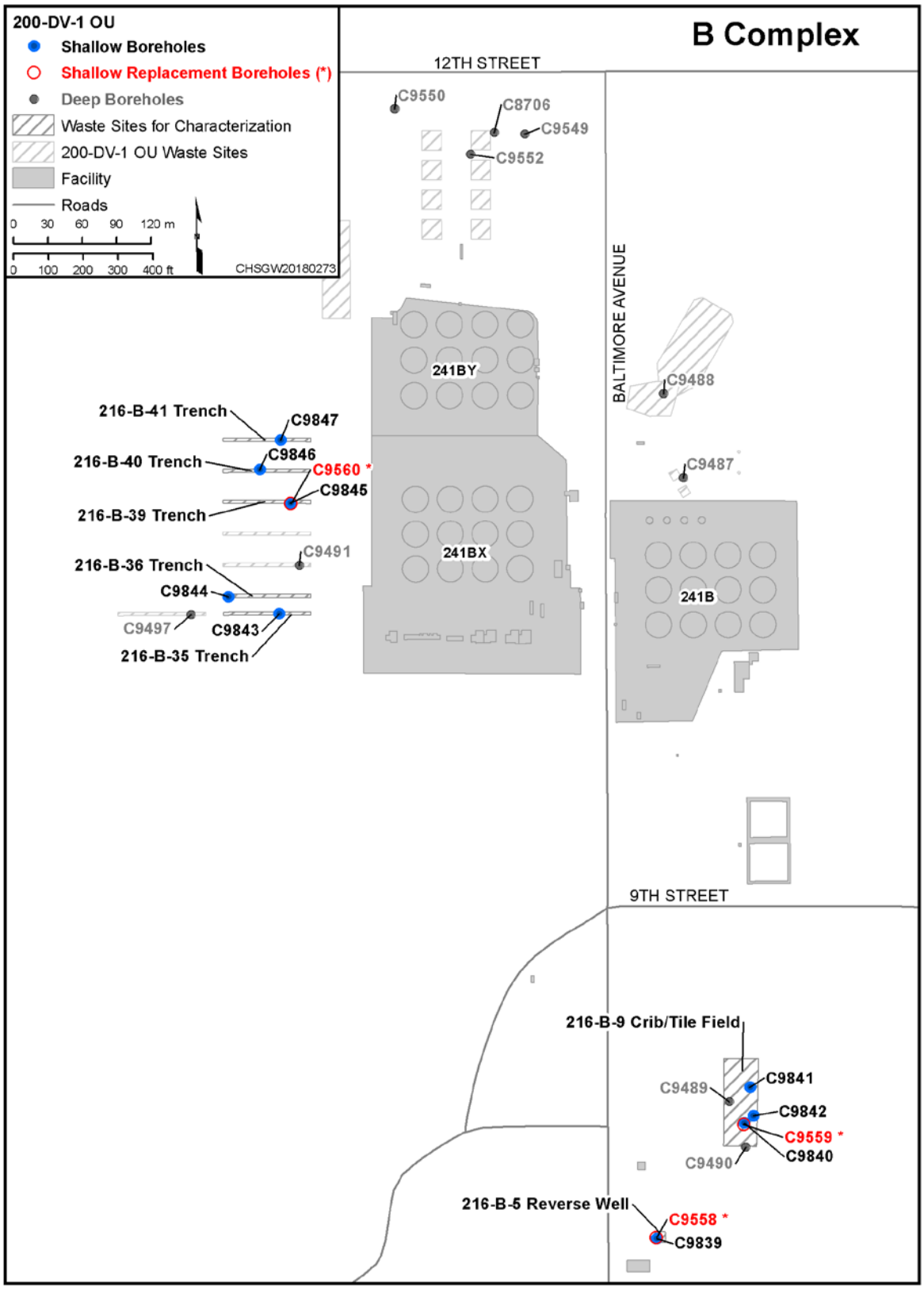
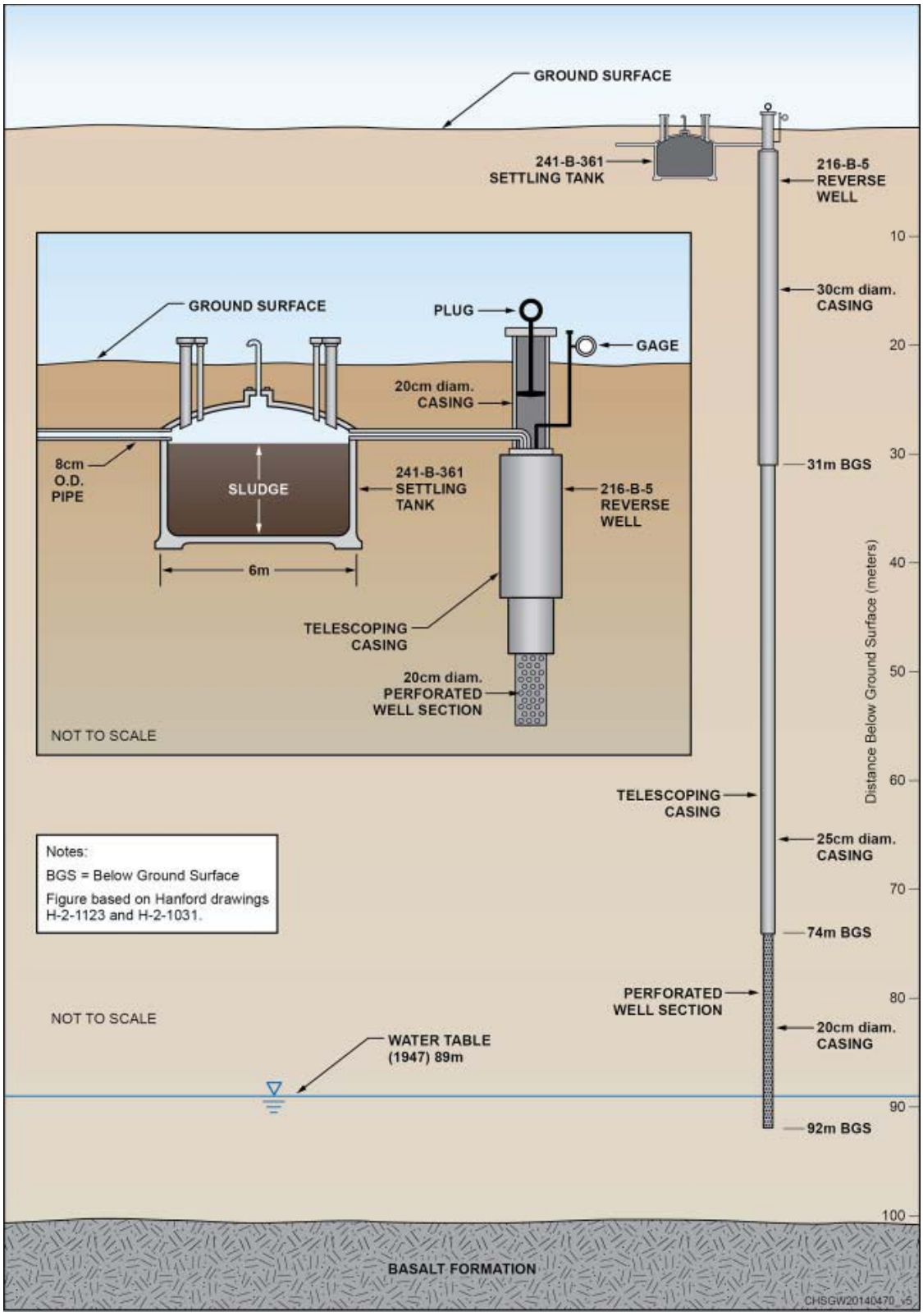


Figure 1-1. Borehole Locations in the B Complex Area



Note: Modified from Figure 3 in RHO-ST-37, *216-B-5 Reverse Well Characterization Study*.

Figure 1-2. Configuration of the 216-B-5 Reverse Well

Table 1-2. 216-B-5 Reverse Well Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	9.50×10^{5}
Fluoride (kg)	5.63×10^{4}
Uranium (total) (kg)	1.05×10^{1}
Chromium (kg)[a]	3.79×10^{3}
Ferrocyanide (kg)	None
Cesium-137 (Ci)[b]	8.67
Strontium-90 (Ci)[b]	7.55
Plutonium-239 (Ci)[b]	3.72×10^{1}
Plutonium-240 (Ci)[b]	2.51
Cobalt-60 (Ci)[b]	5.28×10^{-3}
Iodine-129 (Ci)[b]	1.88×10^{-6}
Technetium-99 (Ci)[b]	4.25×10^{-3}
Tritium (Ci)[b]	1.07×10^{-4}

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1.*

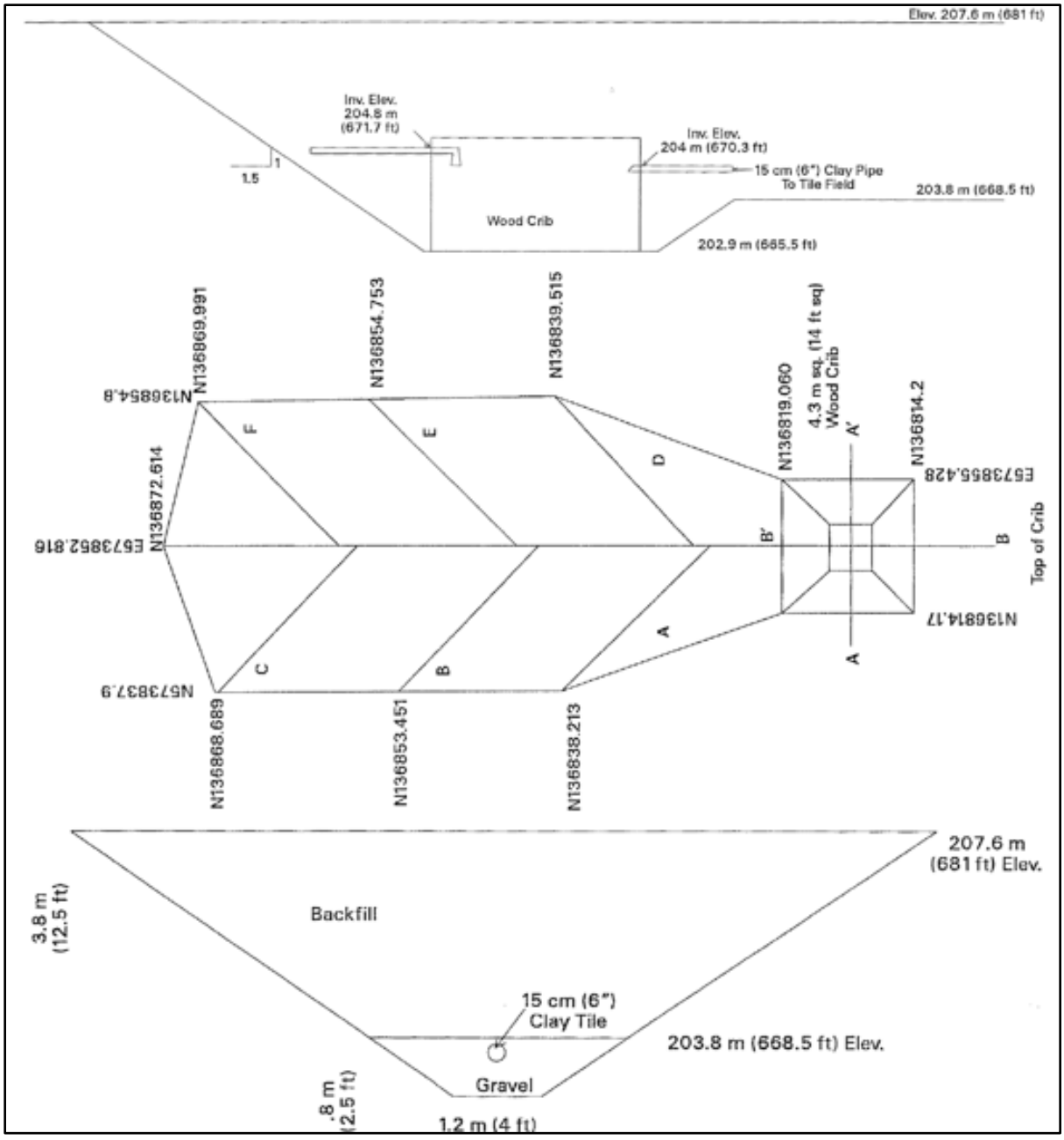
a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.

1.1.2 216-B-9 Crib and Tile Field

The 216-B-9 Crib and Tile Field are located south of B Tank Farm, east of Baltimore Avenue (Figure 1-1). The waste site consists of a wooden structure measuring 4.3 by 4.3 m (14 by 14 ft) by 2.1 m (7 ft) high, located in an excavation (Figure 1-3). The tile field is 55.0 by 25.6 m (180 by 84 ft) and contains 165 m (541 ft) of 6 in. clay tile pipe. Pipes are buried 3.7 m (12 ft) deep at the head and 1.8 m (6 ft) deep at the other end. The tile field was covered by roofing felt and gravel but has since been surface stabilized and is now covered in wheatgrass. The 216-B-9 Crib and Tile Field were built to replace the 216-B-5 Reverse Well and the 241-B-361 Settling Tank and received waste between 1948 and 1950. A total of 36.0 million L (9.5 million gal) was discharged to the crib during that timeframe. Sludge in the waste plugged the crib and decreased its capacity. Acid was added to the crib to keep it operational, but eventually the crib became sealed with sludge and overflowed into the tile field. Table 1-3 shows the estimated inventory of contaminants discharged to the 216-B-9 Crib.

Four boreholes (C9840, C9559 [replacement], C9841, and C9842) were pushed at this location (shown in Figure 2-3 in Chapter 2; coordinates are provided in Table 1-1). The location was selected due to elevated geophysical values of cesium-137 between 3 to 4.6 m (10 to 15 ft) bgs and an insufficient number of analytical samples between 0 to 3 m (10 ft) bgs.



Source: Appendix A of CP-49279, *Central Plateau Waste Site Dimensions.*

Figure 1-3. Configuration of the 216-B-9 Crib and Tile Field

Table 1-3. 216-B-9 Crib and Tile Field Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	1.71×10^{5}
Fluoride (kg)	9.53×10^{3}
Uranium (total) (kg)	1.23×10^{1}
Chromium (kg)[a]	6.41×10^{2}
Ferrocyanide (kg)	None
Cesium-137 (Ci)[b]	1.24×10^{1}
Strontium-90 (Ci)[b]	1.07×10^{1}
Plutonium -239 (Ci)[b]	8.08
Plutonium-240 (Ci)[b]	7.17×10^{-1}
Cobalt-60 (Ci)[b]	7.59×10^{-3}
Iodine-129 (Ci)[b]	1.32×10^{-6}
Technetium-99 (Ci)[b]	5.74×10^{-3}
Tritium (Ci)[b]	1.68×10^{-3}

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1.*

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.

1.1.3 216-BX Trenches

The eight 216-BX Trenches (also referred to as the BX Trenches) are located west of the BX Tank Farm (Figure 1-1). The trenches are shallow, 3.0 by 3.0 by 76.8 m (10 by 10 by 252 ft) excavations (Figure 1-4) that were fed by aboveground piping. From 1953 to 1955, the trenches received 14.9 million L (3.9 million gal) of primarily first-cycle decontamination waste that had not been evaporated after B Plant operations shut down (DOE/RL-2011-102). The following trenches were sampled in this investigation:

- **216-B-35 Trench:** This trench is located north of B Plant and west of the BX Tank Farm and received 1.06 million L (0.28 million gal) of mixed liquid process effluent.
- **216-B-36 Trench:** This trench is located north of B Plant and west of the BX Tank Farm and received 1.94 million L (0.51 million gal) of mixed liquid process effluent.
- **216-B-39 Trench:** This trench is located north of B Plant and west of BX Tank Farm and received 1.54 million L (0.41 million gal) of mixed liquid process effluent.
- **216-B-40 Trench:** This trench is located north of B Plant and west of the BX Tank Farm and received 1.64 million L (0.43 million gal) of mixed liquid process effluent.
- **216-B-41 Trench:** This trench is located north of B Plant and west of the BX Tank Farm and received 1.44 million L (0.38 million gal) of mixed liquid process effluent.

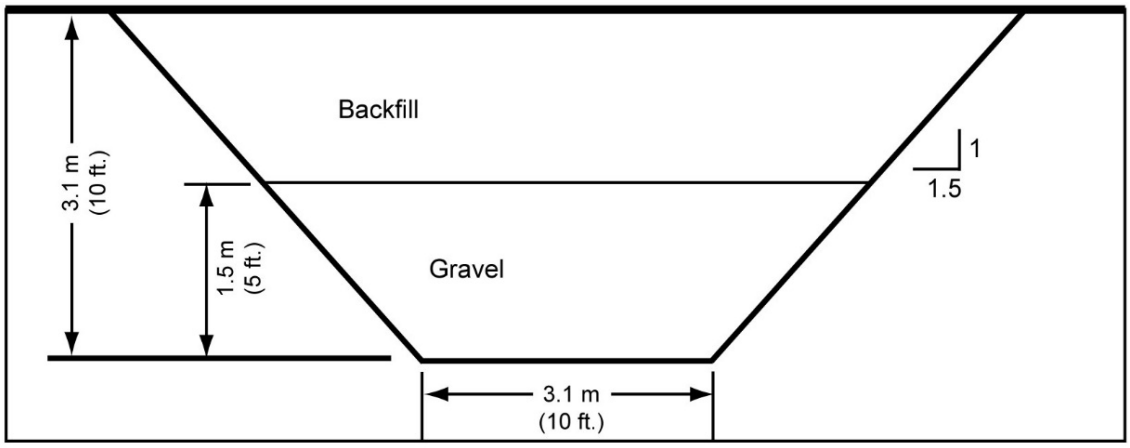


Figure 1-4. Configuration of the BX Trenches

Table 1-4 shows the total estimated inventory of contaminants discharged to each of the BX Trenches.

Table 1-4. BX Trenches Inventory of Contaminants

Contaminant	216-B-35 Trench Inventory	216-B-36 Trench Inventory	216-B-39 Trench Inventory	216-B-40 Trench Inventory	216-B-41 Trench Inventory
Nitrate (kg)	1.14×10^{5}	2.08×10^{5}	1.65×10^{5}	1.76×10^{5}	1.54×10^{5}
Fluoride (kg)	3.97×10^{3}	7.27×10^{3}	5.77×10^{3}	6.14×10^{3}	5.39×10^{3}
Uranium (total) (kg)	3.63×10^{1}	6.64×10^{1}	5.27×10^{1}	5.62×10^{1}	4.93×10^{1}
Chromium (kg)[a]	3.80×10^{2}	6.95×10^{2}	5.52×10^{2}	5.87×10^{2}	5.16×10^{2}
Ferrocyanide (kg)	None	None	None	None	None
Cesium-137 (Ci)[b]	4.85×10^{2}	8.87×10^{2}	7.04×10^{2}	7.50×10^{2}	6.59×10^{2}
Strontium-90 (Ci)[b]	7.62×10^{1}	1.40×10^{2}	1.11×10^{2}	1.18×10^{2}	1.04×10^{2}
Plutonium -239 (Ci)[b]	4.28×10^{-1}	7.85×10^{-1}	6.22×10^{-1}	6.63×10^{-1}	5.82×10^{-1}
Plutonium-240 (Ci)[b]	6.10×10^{-2}	1.11×10^{-1}	8.82×10^{-2}	9.37×10^{-2}	8.23×10^{-2}
Cobalt-60 (Ci)[b]	3.37×10^{-1}	6.16×10^{-1}	4.89×10^{-1}	5.21×10^{-1}	4.57×10^{-1}
Iodine-129 (Ci)[b]	1.87×10^{-3}	3.42×10^{-3}	2.72×10^{-3}	2.89×10^{-3}	2.54×10^{-3}
Technetium-99 (Ci)[b]	2.14×10^{-1}	3.92×10^{-1}	3.11×10^{-1}	3.32×10^{-1}	2.9×10^{-1}
Tritium (Ci)[b]	6.46	1.18×10^{1}	9.39	1.00×10^{1}	8.78

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1*.

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.

The following boreholes were pushed at this location (shown in Figure 2-4 in Chapter 2; coordinates are provided in Table 1-1):

- C9843 was pushed at the 216-B-35 Trench
- C9844 was pushed at the 216-B-36 Trench
- C9845 and C9560 (replacement) were pushed at the 216-B-39 Trench
- C9846 was pushed at the 216-B-40 Trench
- C9847 was pushed at the 216-B-41 Trench

These trenches were selected due to elevated values of cesium-137 contamination (based on geophysical logging) between 1.5 to 4.6 m (5 to 15 ft) bgs exceeding the risk-based level and ecological screening level [ESL]); ESLs for aluminum, nitrate, and selenium were exceeded between 0 and 4.6 m (15 ft) bgs; and an insufficient number of samples collected and analyzed from past projects from 0 to 3 m (10 ft) bgs.

1.1.4 216-S-9 Crib

The 216-S-9 Crib is located east of the S-SX-SY Tank Farms (Figure 1-5). The site includes a gravel structure that measures 91.4 by 9.1 by 7.4 m (300 by 30 by 24.3 ft) (Figure 1-6). Waste flowed into the unit through the distribution system, which consists of 177 m (581 ft) of 6 in. diameter, vitrified clay tile perforated pipe in a “U” shape, connected by 7.3 m (24 ft) of 3 in. diameter Schedule 10 piping in a “Y” shape. The entire distribution system is 6.4 m (21 ft) bgs. The site received approximately 49.6 million L (13.1 million gal) of mixed liquid process effluent from the D-2 receiver tank in the 202S Building. The site was retired when it reached a prescribed radionuclide limit and was deactivated by blanking the pipeline at the south end of the unit. Table 1-5 shows the total estimated inventory of contaminants discharged to the 216-S-9 Crib.

Six boreholes (C9848, C9849, C9939 [replacement], C9850, C9851, and C9852) were pushed at this location (shown in Figure 2-5 in Chapter 2; coordinates are provided in Table 1-1). This location was selected because an insufficient number of analytical samples were collected and analyzed between 0 to 4.6 m (15 ft) bgs, and the ESLs for aluminum, nitrate, and selenium were exceeded at these depths.

1.1.5 216-S-21 Crib

The 216-S-21 Crib is located west of the S Tank Farm (Figure 1-5). The site consists of a wooden crib box measuring 15.2 by 15.2 by 6.7 m (50 by 50 by 22.1 ft) and is covered by 2.5 m (8.3 ft) of overburden (Figure 1-7). The site received approximately 87.1 million L (23.0 million gal) of mixed liquid process effluent from the 401SX condenser facility via tank 241-SX-106 in the SX Tank Farm between 1954 and 1970. Table 1-6 shows the total estimated inventory of contaminants discharged to the crib.

Two boreholes, C9853 and C9854, were pushed at this location (shown in Figure 2-6 in Chapter 2; coordinates are provided in Table 1-1). This location was selected due to an insufficient number of samples collected and analyzed between 0 and 3 m (10 ft) bgs; the ESLs for aluminum, nitrate, selenium, and mercury were exceeded between 1.5 and 4.6 m (5 and 15 ft) bgs; and elevated cesium-137 contamination was found (based on geophysical logging) between 3 and 4.6 m (10 and 15 ft) bgs.

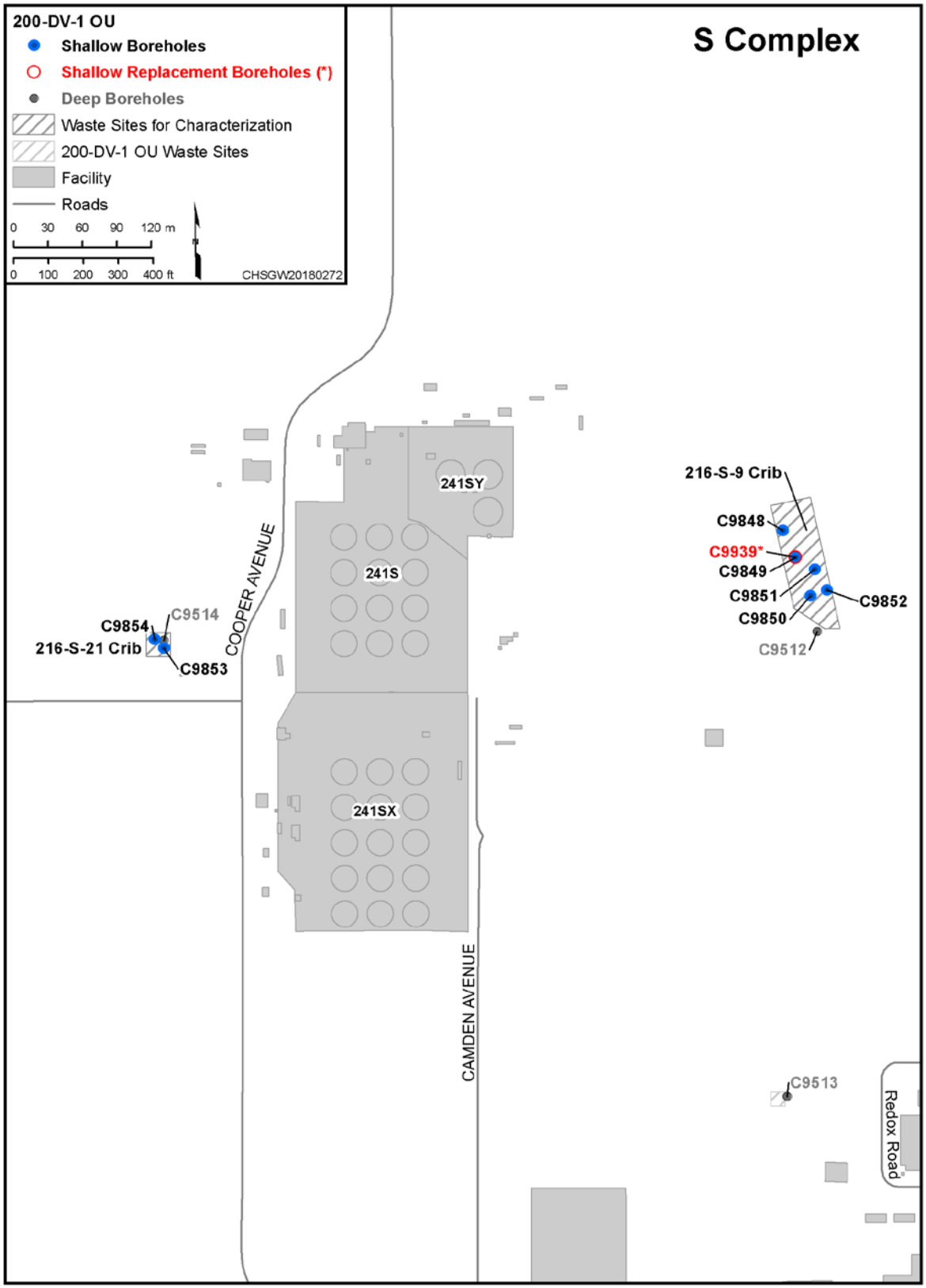
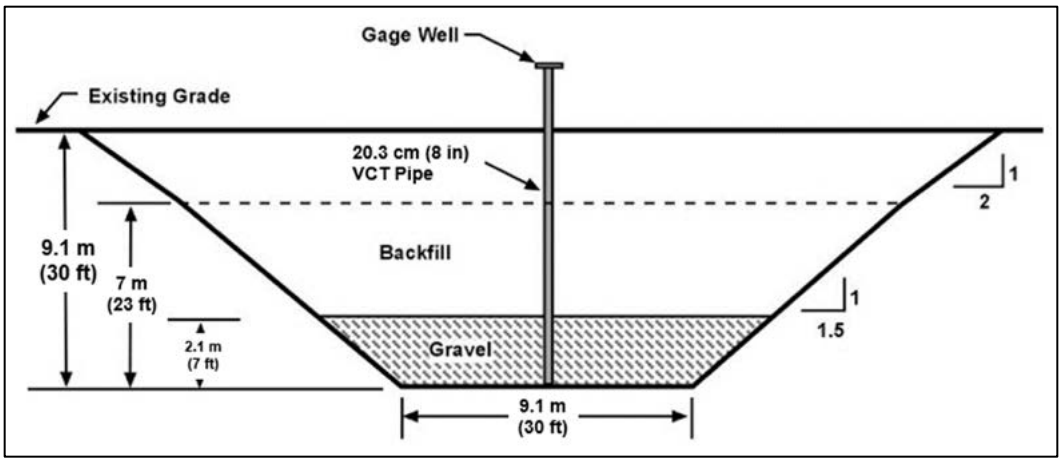


Figure 1-5. Borehole Locations in the S Complex Area



Source: Appendix A of CP-49279, *Central Plateau Waste Site Dimensions*.

Figure 1-6. Configuration of the 216-S-9 Crib

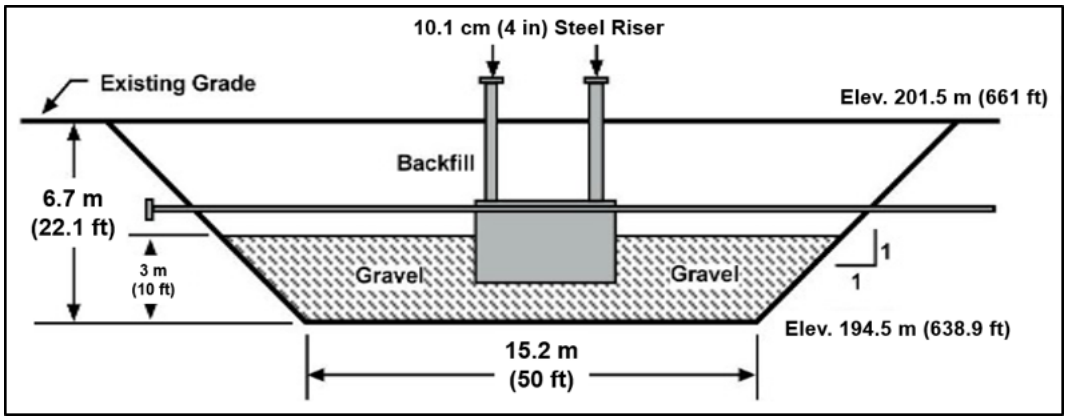
Table 1-5. 216-S-9 Crib Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	4.18×10^{4}
Fluoride (kg)	None
Uranium (total) (kg)	2.76×10^{2}
Chromium (kg)[a]	None
Ferrocyanide (kg)	None
Cesium-137 (Ci)[b]	6.04×10^{1}
Strontium-90 (Ci)[b]	1.19×10^{2}
Plutonium -239 (Ci)[b]	2.90
Plutonium-240 (Ci)[b]	6.77×10^{-1}
Cobalt-60 (Ci)[b]	1.12×10^{-2}
Iodine-129 (Ci)[b]	2.95×10^{-2}
Technetium-99 (Ci)[b]	1.04×10^{-1}
Tritium (Ci)[b]	1.17×10^{3}

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1*.

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.



Source: DOE/RL-2007-02-VOLII-ADD3, *Site-Specific Field-Sampling Plans for the 216-B-42 Trench, 216-S-13 Crib, 216-S-21 Crib, 216-T-18 Crib and 216-T-19 Crib and Tile Field in the 200-TW-1/ 200-PW-5 Operable Units*.

Figure 1-7. Configuration of the 216-S-21 Crib

Table 1-6. 216-S-21 Crib Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	4.91×10^{2}
Fluoride (kg)	2.19×10^{1}
Uranium (total) (kg)	1.06×10^{-1}
Chromium (kg)[a]	5.08×10^{1}
Ferrocyanide (kg)	None
Cesium-137 (Ci)[b]	6.28×10^{2}
Strontium-90 (Ci)[b]	6.63
Plutonium -239 (Ci)[b]	5.99×10^{-2}
Plutonium-240 (Ci)[b]	1.34×10^{-2}
Cobalt-60 (Ci)[b]	3.36×10^{-2}
Iodine-129 (Ci)[b]	3.23×10^{-4}
Technetium-99 (Ci)[b]	2.11×10^{-1}
Tritium (Ci)[b]	2.54×10^{3}

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1*.

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.

1.1.6 216-T-5 Trench

The 216-T-5 Trench is located west of the T Tank Farm (Figure 1-8). The site was active in May 1955 and consists of a 15.2 by 3.0 by 3.7 m (50 by 10 by 12 ft) trench (Figure 1-9) that received approximately 3.2 million L (0.8 million gal) of second-cycle process effluent that had been stored in the 241-T-112 tank via an aboveground pipeline. The site was deactivated when the specific retention capacity was reached. Table 1-7 shows the total estimated inventory of contaminants discharged to the 216-T-5 Trench.

Boreholes C9855 and C9856 were pushed at this location (shown in Figure 2-7 in Chapter 2; coordinates are provided in Table 1-1). These locations were selected due to an insufficient number of samples collected and analyzed between 0 and 3 m (10 ft) bgs, as well as elevated values of cesium-137 (based on geophysical logging) between 3 and 4.6 m (10 and 15 ft) bgs.

1.1.7 216-T Trenches

The four 216-T Trenches (also referred to as the T Trenches) are located north of 23rd Street and northeast of the T Tank Farm (Figure 1-8). The T Trenches are shallow excavations; the 216-T-14 Trench measured 3 by 3 by 61 m (10 by 10 by 200 ft); and the 216-T-15, 216-T-16, and 216-T-17 Trenches measured 3 by 3 by 73.1 m (10 by 10 by 240 ft) (Figure 1-10). The trenches were fed by aboveground piping. From 1953 to 1954, the trenches received approximately 3.9 million L (1.0 million gal) of first-cycle supernatant waste from the 221T Building via the 241-T-104, 241-T-105, and 241-T-106 tanks in the T Tank Farm. The 216-T-14 Trench, 216-T-15 Trench, and 216-T-16 Trench each received 1.0 million L (0.3 million gal) of mixed liquid process effluent. The 216-T-17 Trench received 0.8 million L (0.2 million gal) of mixed liquid process effluent. Table 1-8 shows the total estimated inventory of contaminants discharged to each of the T Trenches.

The following boreholes were pushed at this location (shown in Figure 2-8 in Chapter 2; coordinates are provided in Table 1-1):

- C9857 and C9940 (replacement) were pushed at the 216-T-14 Trench
- C9858 and C9941 (replacement) were pushed at the 216-T-15 Trench
- C9859 and C9942 (replacement) were pushed at the 216-T-16 Trench
- C9860 was pushed at the 216-T-17 Trench

These trenches were selected due to an insufficient number of samples collected and analyzed between 0 and 3 m (10 ft) bgs; elevated values of cesium-137 (based on geophysical logging) between 3 and 4.6 m (10 and 15 ft) bgs; and ESLs for aluminum, nitrate, and selenium were exceeded at the 216-T-15 Trench between 0 and 4.6 m (15 ft) bgs.

1.1.8 216-T-18 Crib

The 216-T-18 Crib is located northeast of the TY Tank Farm and north of the 216-T-26 Crib (Figure 1-8). Historically, the site has been described as a 3 by 3 by 3 m (10 by 10 by 10 ft) “hole in the ground” fed by an aboveground pipeline. However, according to the Hanford Site Waste Information Data System, the site consists of a steel inlet pipe reducing to another steel pipe, which then branches into four steel pipes that each extend to a concrete open-ended sewer pipe. These structures are in an excavation measuring 9.1 by 9.1 by 4.6 m (30 by 30 by 15 ft) (Figure 1-11) and are covered in gravel and earthen backfill. The site received approximately 1.0 million L (0.3 million gal) of mixed liquid process effluent from the 241-T-101 tank between October and December 1953. The site was deactivated when the discharge of waste was completed. Table 1-9 shows the total estimated inventory of contaminants discharged to the crib.

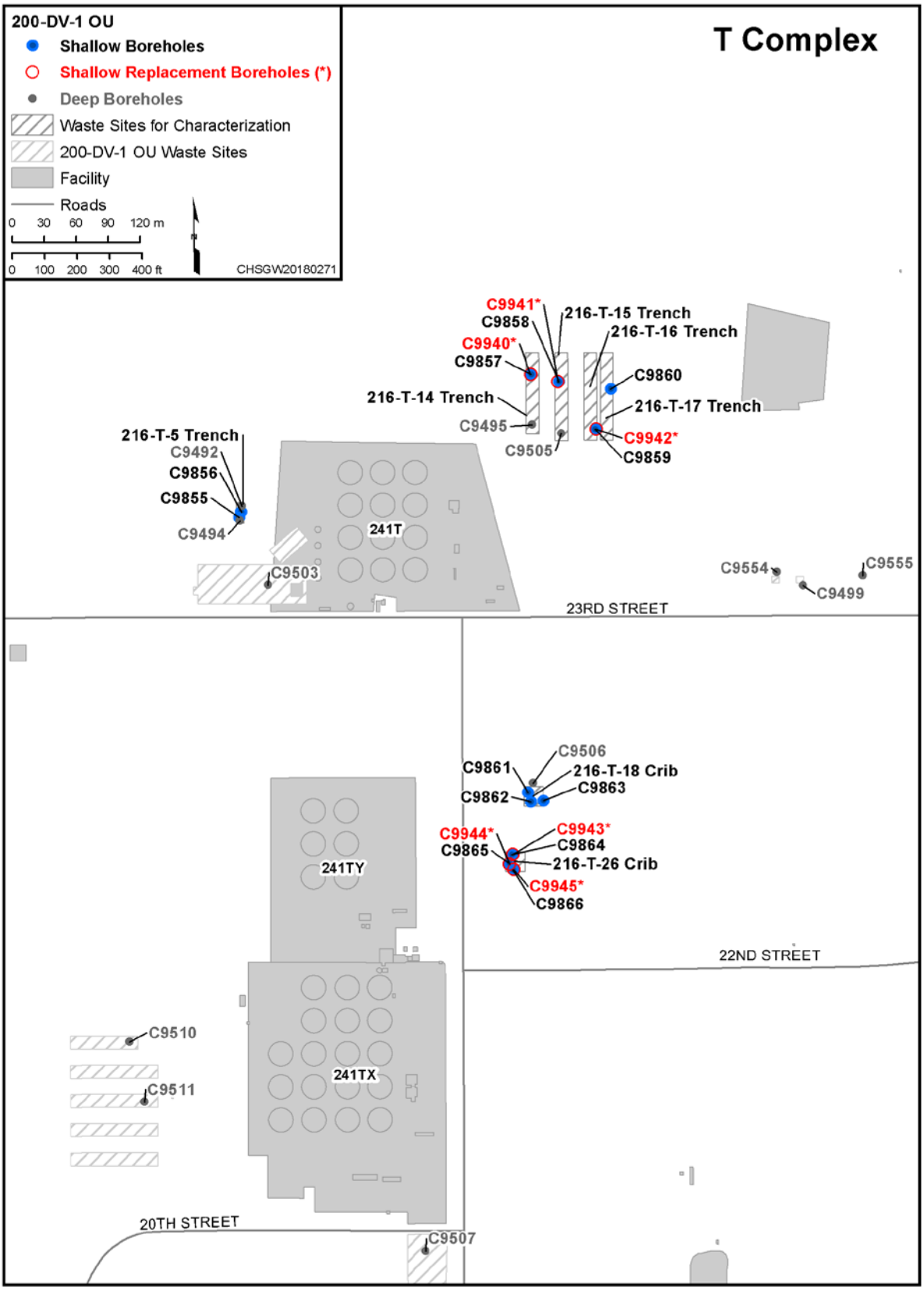
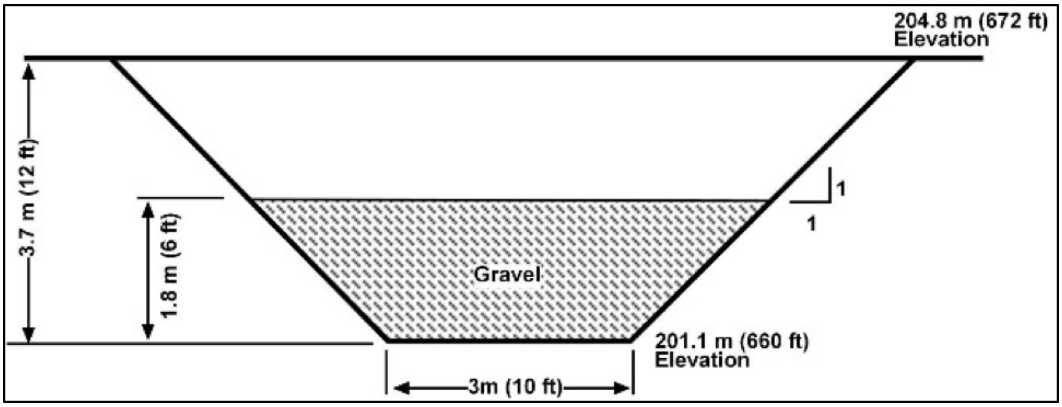


Figure 1-8. Borehole Locations in the T Complex Area



Source: DOE/RL-2007-02-VOL II-ADD4, *Site-Specific Field-Sampling Plans for the 216-B-7A&B Crib, 216-B-8 Crib and Tile Field, 216-T-3 Injection/Reverse Well, 216-T-5 Trench, 216-T-6 Cribs, 216-T-7 Crib and Tile Field, 216-T-15 Trench, and 216-T-32 Crib in the 200-TW-2 Operable Unit: Addendum 4.*

Figure 1-9. Configuration of the 216-T-5 Trench

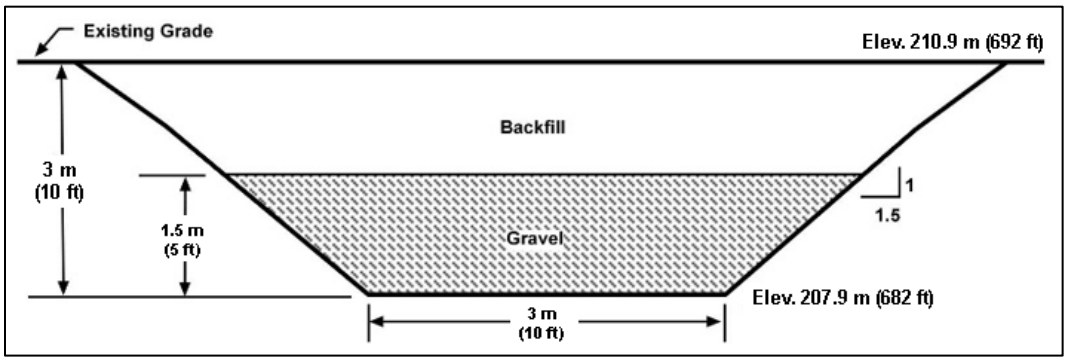
Table 1-7. 216-T-5 Trench Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	2.42×10^{5}
Fluoride (kg)	1.31×10^{4}
Uranium (total) (kg)	2.42×10^{1}
Chromium (kg)[a]	1.21×10^{3}
Ferrocyanide (kg)	None
Cesium-137 (Ci)[b]	3.43×10^{1}
Strontium-90 (Ci)[b]	2.94×10^{1}
Plutonium -239 (Ci)[b]	1.65×10^{1}
Plutonium-240 (Ci)[b]	2.09
Cobalt-60 (Ci)[b]	2.54×10^{-2}
Iodine-129 (Ci)[b]	None
Technetium-99 (Ci)[b]	1.50×10^{-2}
Tritium (Ci)[b]	8.77×10^{-3}

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1.*

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.



Source: DOE/RL-2007-02-VOL II-ADD4, *Site-Specific Field-Sampling Plans for the 216-B-7A&B Crib, 216-B-8 Crib and Tile Field, 216-T-3 Injection/Reverse Well, 216-T-5 Trench, 216-T-6 Cribs, 216-T-7 Crib and Tile Field, 216-T-15 Trench, and 216-T-32 Crib in the 200-TW-2 Operable Unit: Addendum 4.*

Figure 1-10. Configuration of the T Trenches

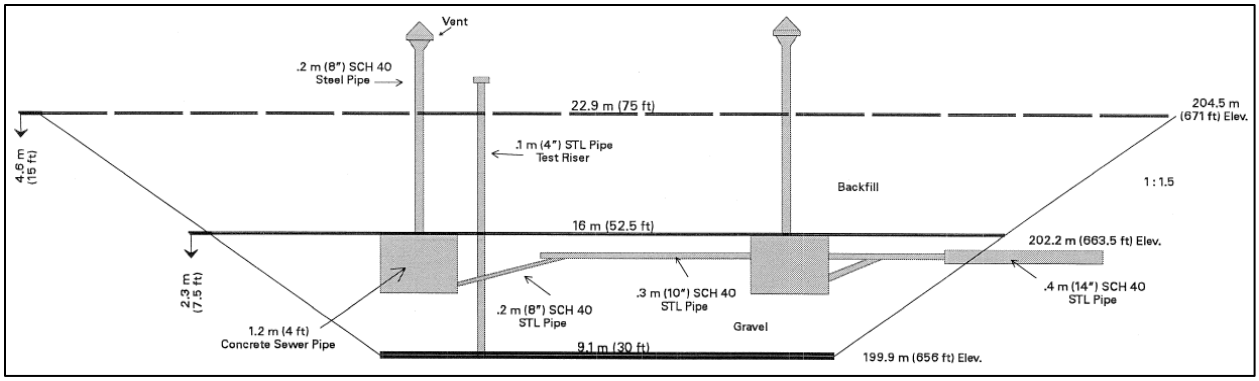
Table 1-8. 216-T Trenches Inventory of Contaminants

Contaminant	216-T-14 Trench Inventory	216-T-15 Trench Inventory	216-T-16 Trench Inventory	216-T-17 Trench Inventory
Nitrate (kg)	1.08×10^{5}	1.12×10^{5}	1.09×10^{5}	8.41×10^{4}
Fluoride (kg)	3.77×10^{3}	3.90×10^{3}	3.82×10^{3}	2.94×10^{3}
Uranium (total) (kg)	3.44×10^{1}	3.57×10^{1}	3.49×10^{1}	2.69×10^{1}
Chromium (kg)[a]	3.6×10^{2}	3.73×10^{2}	3.65×10^{2}	2.81×10^{2}
Ferrocyanide (kg)	None	None	None	None
Cesium-137 (Ci)[b]	4.60×10^{2}	4.77×10^{2}	4.67×10^{2}	3.59×10^{2}
Strontium-90 (Ci)[b]	7.23×10^{1}	7.50×10^{1}	7.34×10^{1}	5.65×10^{1}
Plutonium -239 (Ci)[b]	4.07×10^{-1}	4.21×10^{-1}	4.13×10^{-1}	3.18×10^{-1}
Plutonium-240 (Ci)[b]	5.8×10^{-2}	6.00×10^{-2}	5.85×10^{-2}	4.50×10^{-2}
Cobalt-60 (Ci)[b]	3.19×10^{-1}	3.31×10^{-1}	3.24×10^{-1}	2.49×10^{-1}
Iodine-129 (Ci)[b]	1.78×10^{-3}	1.84×10^{-3}	1.80×10^{-3}	1.39×10^{-3}
Technetium-99 (Ci)[b]	2.03×10^{-1}	2.11×10^{-1}	2.06×10^{-1}	1.59×10^{-1}
Tritium (Ci)[b]	6.13	6.35	6.22	4.79

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1.*

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.



Source: CP-49279, *Central Plateau Waste Site Dimensions.*

Figure 1-11. Configuration of the 216-T-18 Crib

Table 1-9. 216-T-18 Crib Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	3.28×10^{4}
Fluoride (kg)	4.21×10^{3}
Uranium (total) (kg)	5.52×10^{1}
Chromium (kg)[a]	1.01×10^{2}
Ferrocyanide (kg)	1.44×10^{2}
Cesium-137 (Ci)[b]	4.22×10^{1}
Strontium-90 (Ci)[b]	3.96×10^{1}
Plutonium -239 (Ci)[b]	3.24
Plutonium-240 (Ci)[b]	2.19×10^{-1}
Cobalt-60 (Ci)[b]	6.14×10^{-2}
Iodine-129 (Ci)[b]	1.48×10^{-3}
Technetium-99 (Ci)[b]	1.54×10^{-1}
Tritium (Ci)[b]	2.36×10^{-1}

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1.*

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.

Three boreholes (C9861, C9862, and C9863) were pushed at this location (shown in Figure 2-9 in Chapter 2; coordinates are provided in Table 1-1). This location was selected due to an insufficient number of samples collected and analyzed between 0 and 3 m (10 ft) bgs, as well as elevated values of cesium-137 (based on geophysical logging) between 3 and 4.6 m (10 and 15 ft) bgs.

1.1.9 216-T-26 Crib

The 216-T-26 Crib is located south of 23rd Street and east of the TY Tank Farm (Figure 1-8). The site consists of a steel inlet pipe reducing to a steel pipe (below ground). This pipe branches to four steel pipes, with each pipe extending to a concrete open-ended sewer pipe. These structures are in an excavation measuring 9.1 by 9.1 by 4.6 m (30 by 30 by 15 ft) (Figure 1-12) and under 2.1 m (7 ft) of overburden made up of gravel and earthen backfill. The site received approximately 11.1 million L (2.9 million gal) of first-cycle scavenged supernatant waste from T Plant via the 241-TY-101, 241-TY-103, and 241-TY-104 tanks. The site operated in 1955. Table 1-10 shows the total estimated inventory of contaminants discharged to the crib.

Six boreholes (C9864, C9943 [replacement], C9865, C9944 [replacement], C9866, and C9945 [replacement]) were pushed at this location (shown in Figure 2-9 in Chapter 2; coordinates are provided in Table 1-1). This location was selected due an insufficient number of samples collected and analyzed between 0 and 4.6 m (15 ft) bgs.

1.2 Hydrogeology of the 200-DV-1 Operable Unit

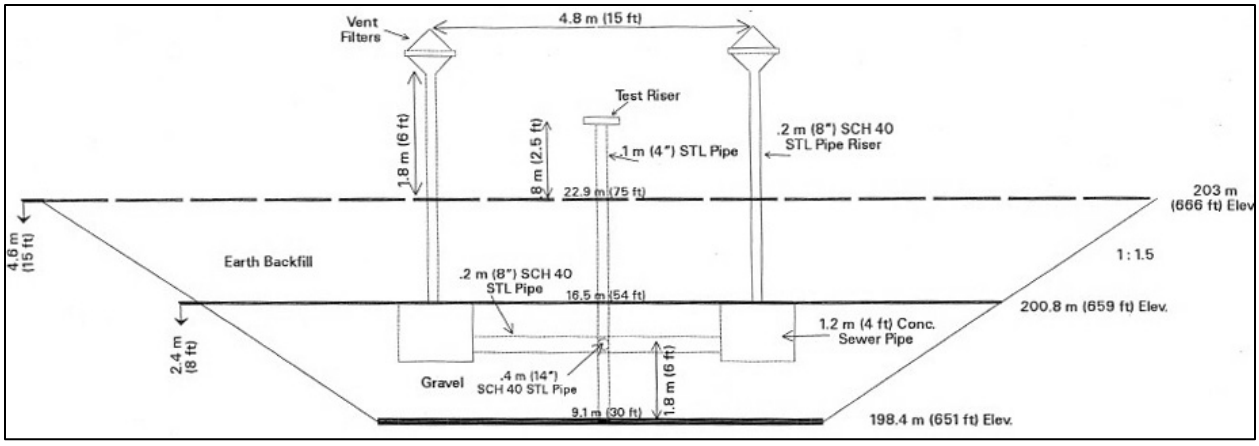
This section describes the hydrogeology of the 200-DV-1 OU waste site areas addressed in this field summary report.

1.2.1 Hydrostratigraphy

The hydrogeologic designations were determined by evaluating available borehole and geophysical logs and then integrating these data with hydrostratigraphic correlations from existing reports (DOE/RL-2011-102). The hydrostratigraphic units of interest in the 200-DV-1 OU, focusing specifically on the scope of this field summary report, include recent surficial deposits and the Hanford formation located primarily within the vadose zone.

1.2.2 Vadose Zone

The thickness and stratigraphy of the vadose zone varies across the Hanford Site. The vadose zone thickness ranges from approximately 71.3 to 77.7 m (234 to 255 ft) in the T Complex Area and from approximately 67.4 to 72.5 m (221 to 238 ft) in the S Complex Area. In these areas, the vadose zone is composed of the Hanford formation, the Cold Creek unit, the Ringold Formation member of Taylor Flat upper fines, and a portion of Ringold Formation member of Wooded Island – unit E. The vadose zone in the B Complex Area ranges from 70.1 to 82.3 m (230 to 270 ft) thick and is composed of the Hanford formation, the Cold Creek unit silt, and a portion of the Cold Creek unit gravel. Below the 216-B-5 and 216-B-9 waste sites, the vadose zone thickness ranges from 85.3 to 88.4 m (280 to 290 ft) (DOE/RL-2011-102).



Source: CP-49279, *Central Plateau Waste Site Dimensions*.

Figure 1-12. Configuration of the 216-T-26 Crib

Table 1-10. 216-T-26 Crib Inventory of Contaminants

Contaminant	Inventory
Nitrate (kg)	3.75×10^{5}
Fluoride (kg)	4.82×10^{4}
Uranium (total) (kg)	6.33×10^{2}
Chromium (kg)[a]	1.16×10^{3}
Ferrocyanide (kg)	1.63×10^{3}
Cesium-137 (Ci)[b]	4.81×10^{2}
Strontium-90 (Ci)[b]	4.54×10^{2}
Plutonium -239 (Ci)[b]	3.69×10^{1}
Plutonium-240 (Ci)[b]	2.51
Cobalt-60 (Ci)[b]	7.02×10^{-1}
Iodine-129 (Ci)[b]	1.70×10^{-2}
Technetium-99 (Ci)[b]	1.76
Tritium (Ci)[b]	2.70

Source: RPP-26744, *Hanford Soil Inventory, Rev. 1*.

a. The soil inventory model in RPP-26744 does not provide speciation information for chromium. All chromium inventoried is assumed to be hexavalent unless other information is available.

b. In RPP-26744, radionuclides are decayed to January 1, 2001.

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2 Field Methods

Drilling was performed in accordance with SGW-61226, *Description of Work for the Installation Twenty-Eight Shallow Characterization Boreholes in the 200-DV-1 Operable Unit, FY 2018.* Sampling, sample quality assurance, and quality control were completed in accordance with the SAP (DOE/RL-2011-104-ADD2). Holt Services, Inc. pushed the 28 boreholes and 10 replacement boreholes between January 9 and March 13, 2018, under the direction of CH2M HILL Plateau Remediation Company. Freestone Environmental Services provided well site geology services.

2.1 Drilling

A GeoProbe® 7800 direct-push technology drill rig (hereinafter called GeoProbe drill rig), which uses a hydraulic hammer combined with the weight of the drill pipe and downward thrust of the drill head to penetrate the subsurface, was used to push each of the boreholes (Figures 2-1 and 2-2). Each borehole was pushed with 4.5 in. outer-diameter threaded temporary casing.

2.1.1 B Complex Area

Boreholes C9839, C9558 (replacement), C9840, C9559 (replacement), C9841, C9842, C9843, C9844, C9845, C9560 (replacement), C9846, and C9847 were pushed to supplement characterization of the shallow vadose zone contaminants at or near the waste sites in the B Complex Area (Figures 2-3 and 2-4), as well as to support the determination of risk to human health and the environment. Geophysical logs from previous characterization activities indicated a zone of elevated radiological contamination (specifically cesium-137) between 3 and 4.6 m (10 and 15 ft) bgs at the 216-B-9 Crib and between 1.5 and 4.6 m (5 and 15 ft) bgs at the BX Trenches. Risk-based levels and ESLs, respectively, were exceeded within the BX Trenches, providing further reason to supplement characterization of shallow vadose zone contaminants.

2.1.2 S Complex Area

Boreholes C9848, C9849, C9939 (replacement), C9850, C9851, C9852, C9853, and C9854 were pushed to supplement characterization of the shallow vadose zone contaminants at or near the waste sites in the S Complex Area (Figures 2-5 and 2-6), as well as to support the determination of risk to human health and the environment. Geophysical logs from previous characterization activities indicated a zone of elevated radiological contamination (specifically cesium-137) between 3 and 4.6 m (10 and 15 ft) bgs at the 216-S-21 Crib. The ESLs were exceeded in the 216-S-9 and 216-S-21 Cribs, providing further reason to supplement characterization of shallow vadose zone contaminants.

2.1.3 T Complex Area

Boreholes C9855, C9856, C9857, C9940 (replacement), C9858, C9941 (replacement), C9859, C9942 (replacement), C9860, C9861, C9862, C9863, C9864, C9943 (replacement), C9865, C9944 (replacement), C9866, and C9945 (replacement) were pushed to supplement characterization of the shallow vadose zone contaminants at or near the waste sites in the T Complex Area (Figures 2-7, 2-8, and 2-9), as well as to support the determination of risk to human health and the environment. Geophysical logs from previous characterization activities indicated a zone of elevated radiological contamination (specifically cesium-137) between 3 and 4.6 m (10 and 15 ft) bgs at the 216-T-5 Trench, 216-T-18 Crib, and the T Trenches. The ESLs were exceeded in the 216-T-15 Trench, providing further reason to supplement characterization of shallow vadose zone contaminants.

®GeoProbe is registered trademark of Kejr, Inc., Salina, Kansas.

Figure 2-1. Side View of GeoProbe® 7800 Direct-Push Technology Drill Rig

Figure 2-2. Rear View of GeoProbe® 7800 Direct-Push Technology Drill Rig

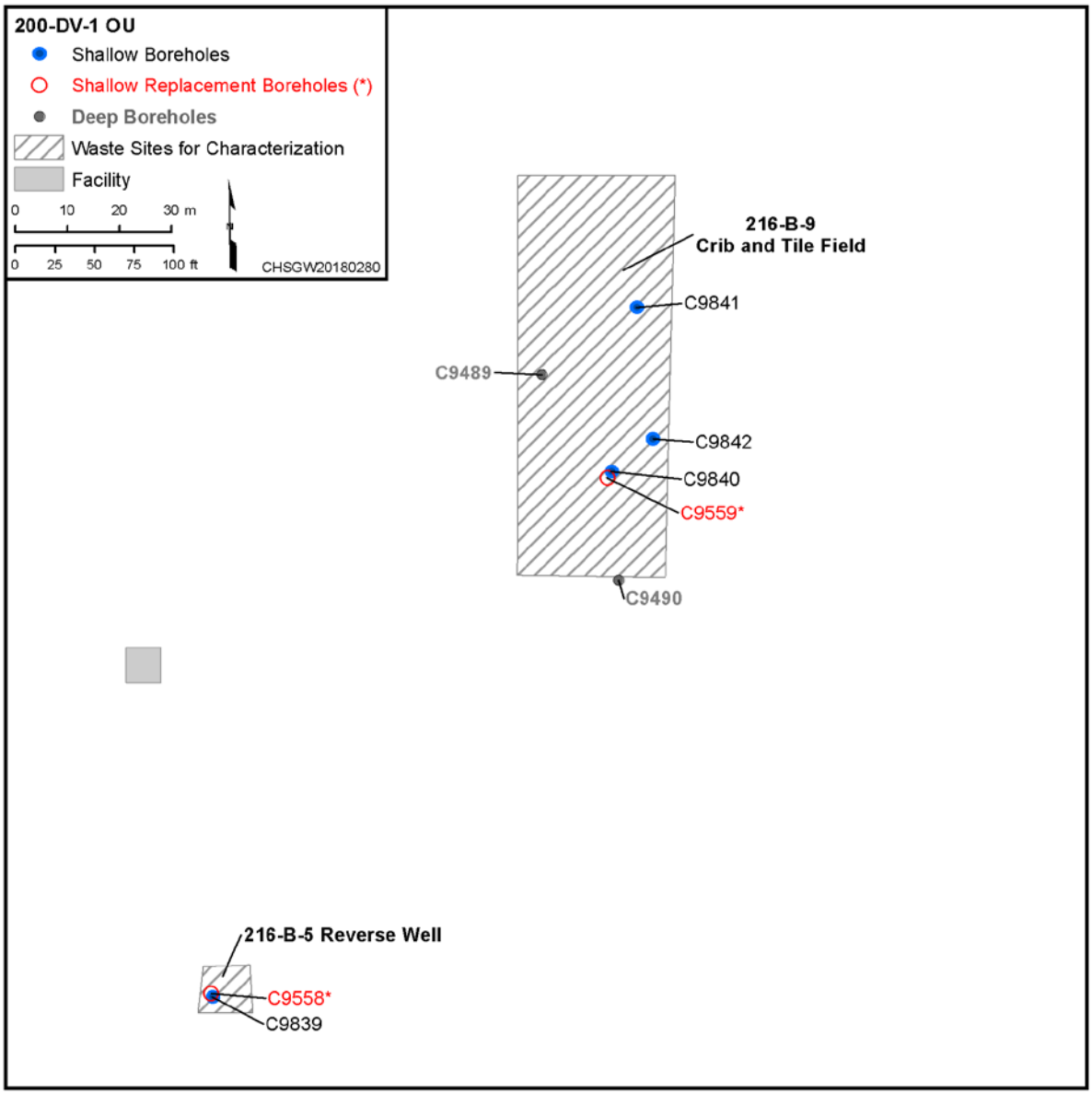

Figure 2-3. Borehole Locations at the 216-B-9 Crib and Tile Field and 216-B-5 Reverse Well

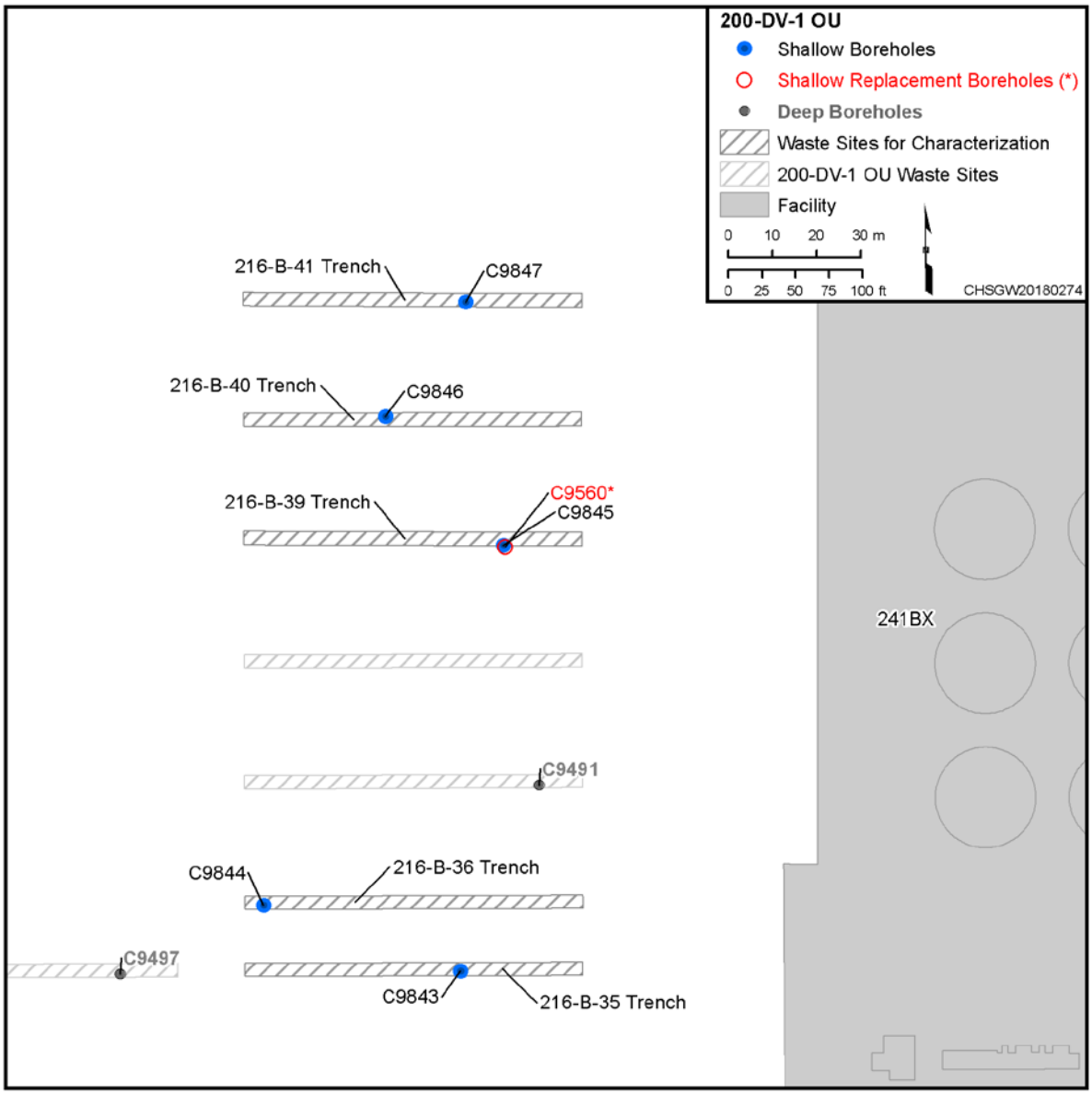

Figure 2-4. Borehole Locations at the BX Trenches

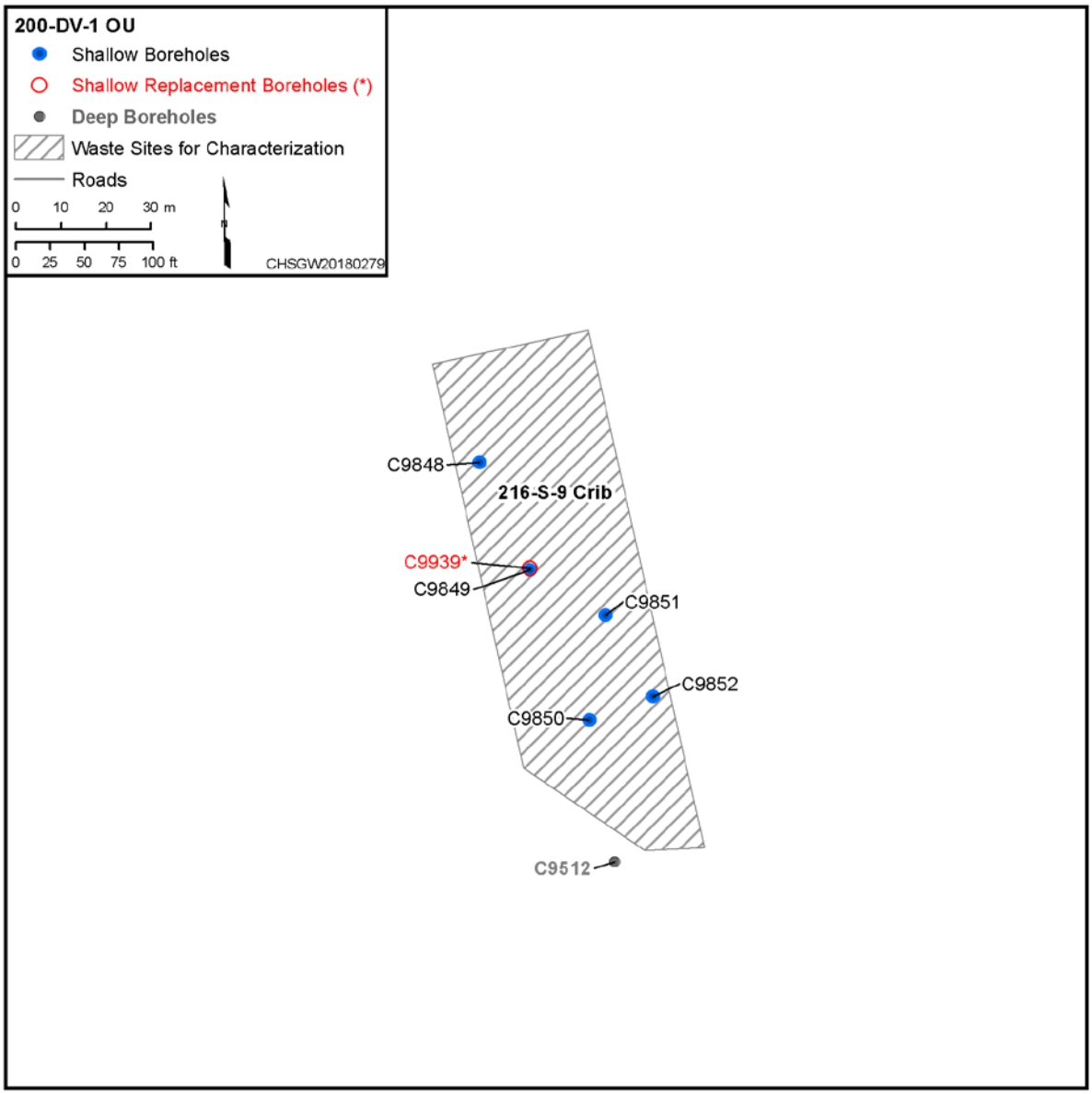

Figure 2-5. Borehole Locations at the 216-S-9 Crib

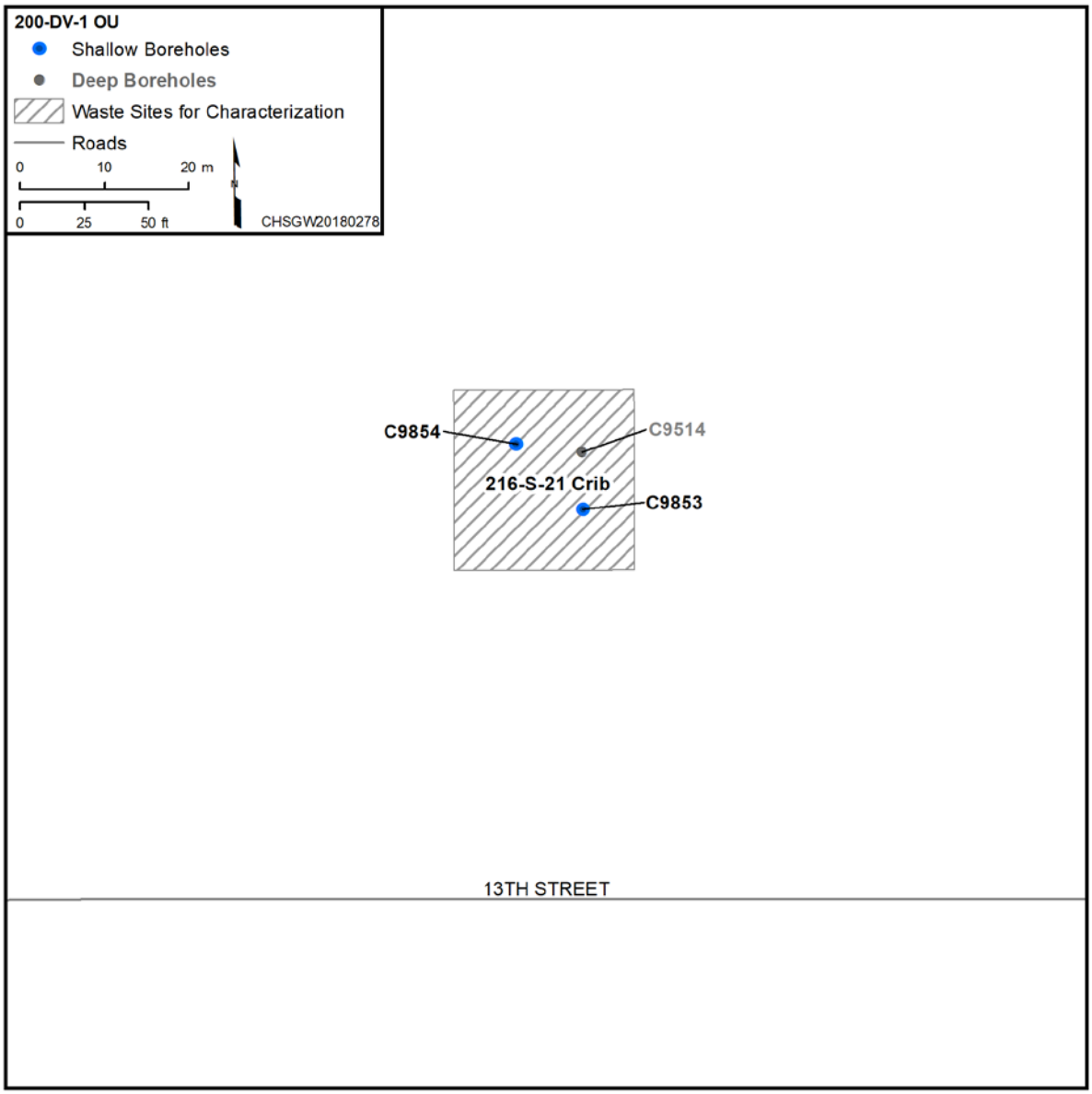

Figure 2-6. Borehole Locations at the 216-S-21 Crib

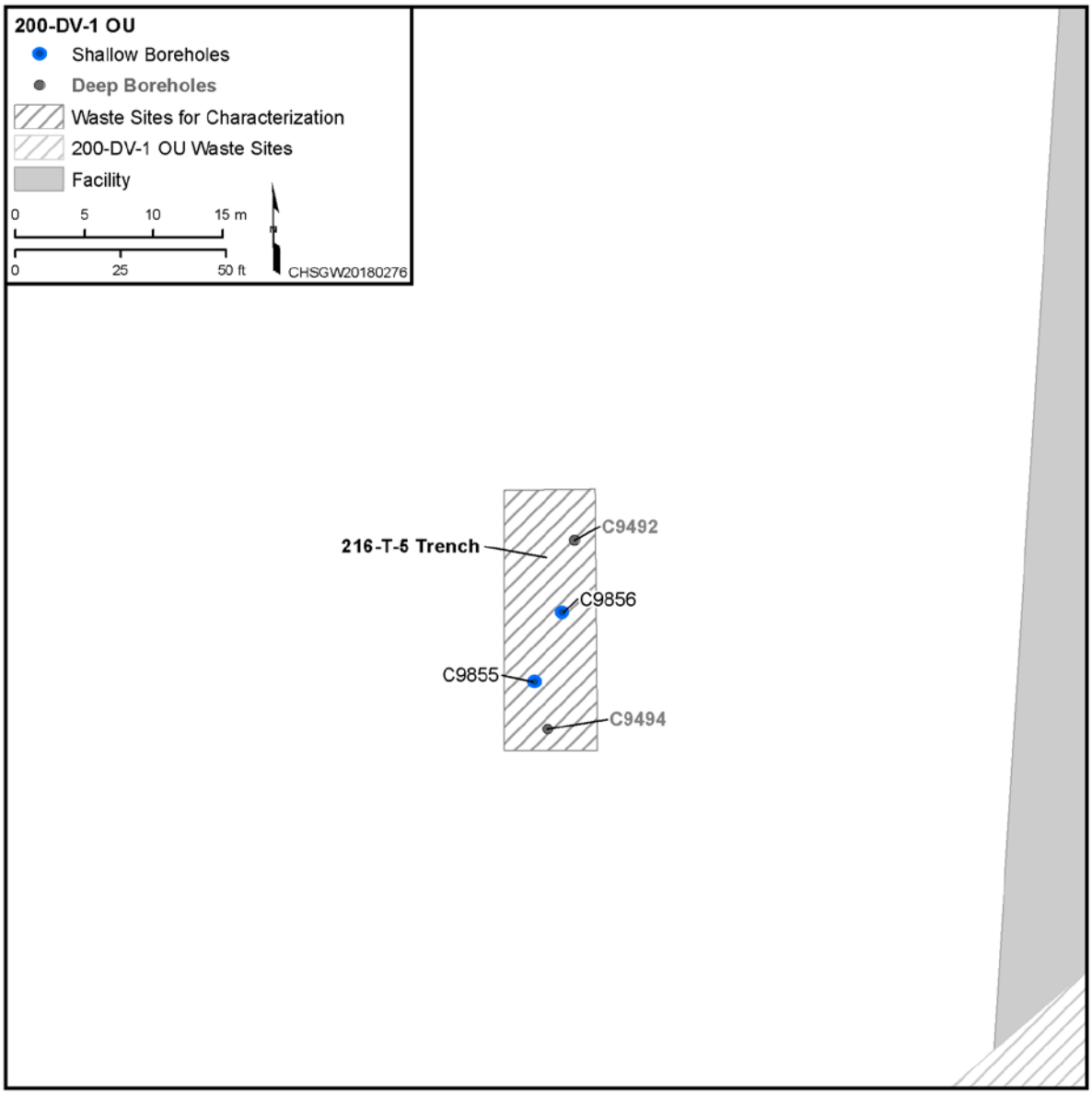

Figure 2-7. Borehole Locations at the 216-T-5 Trench

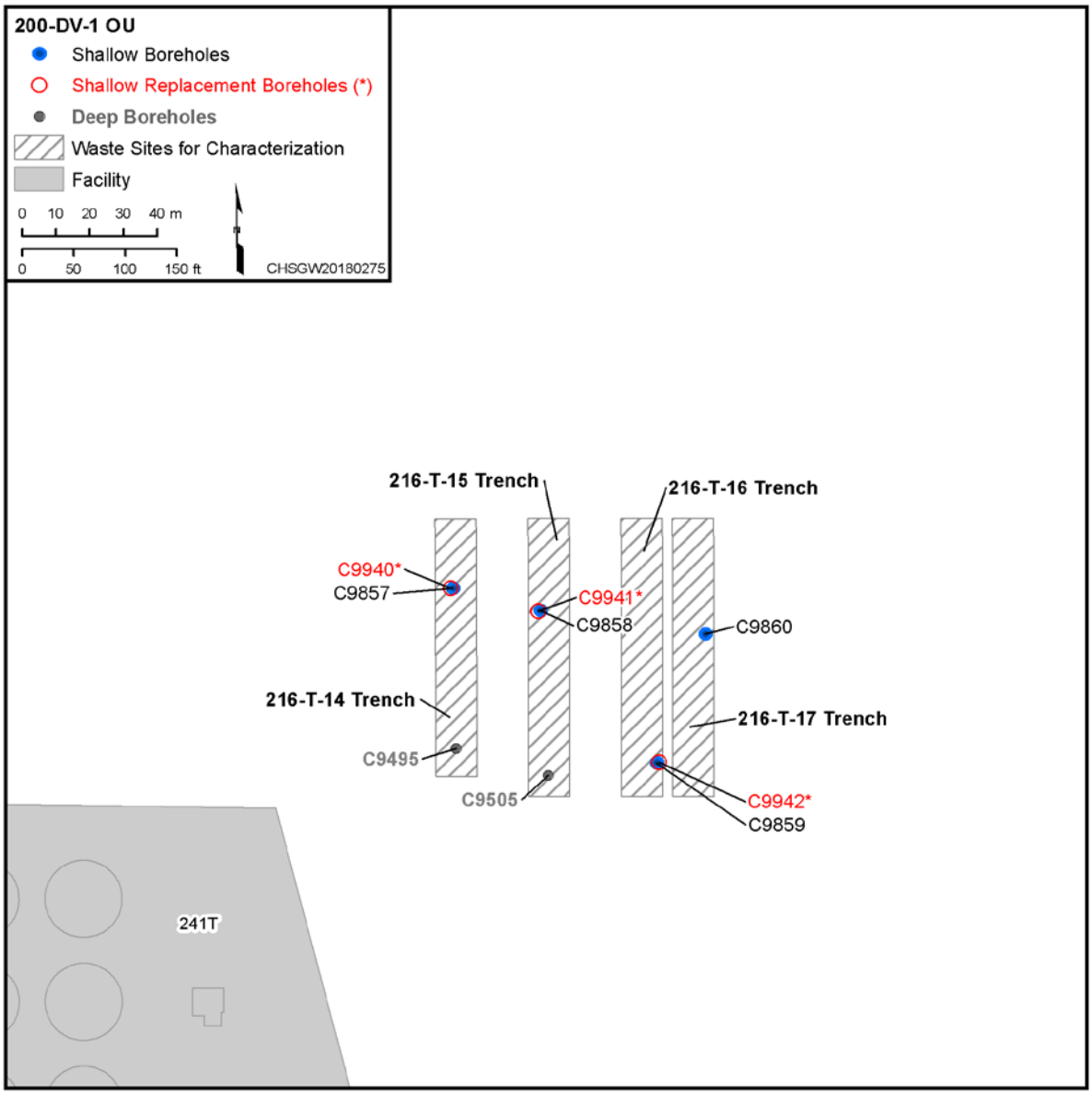

Figure 2-8. Borehole Locations at the T Trenches

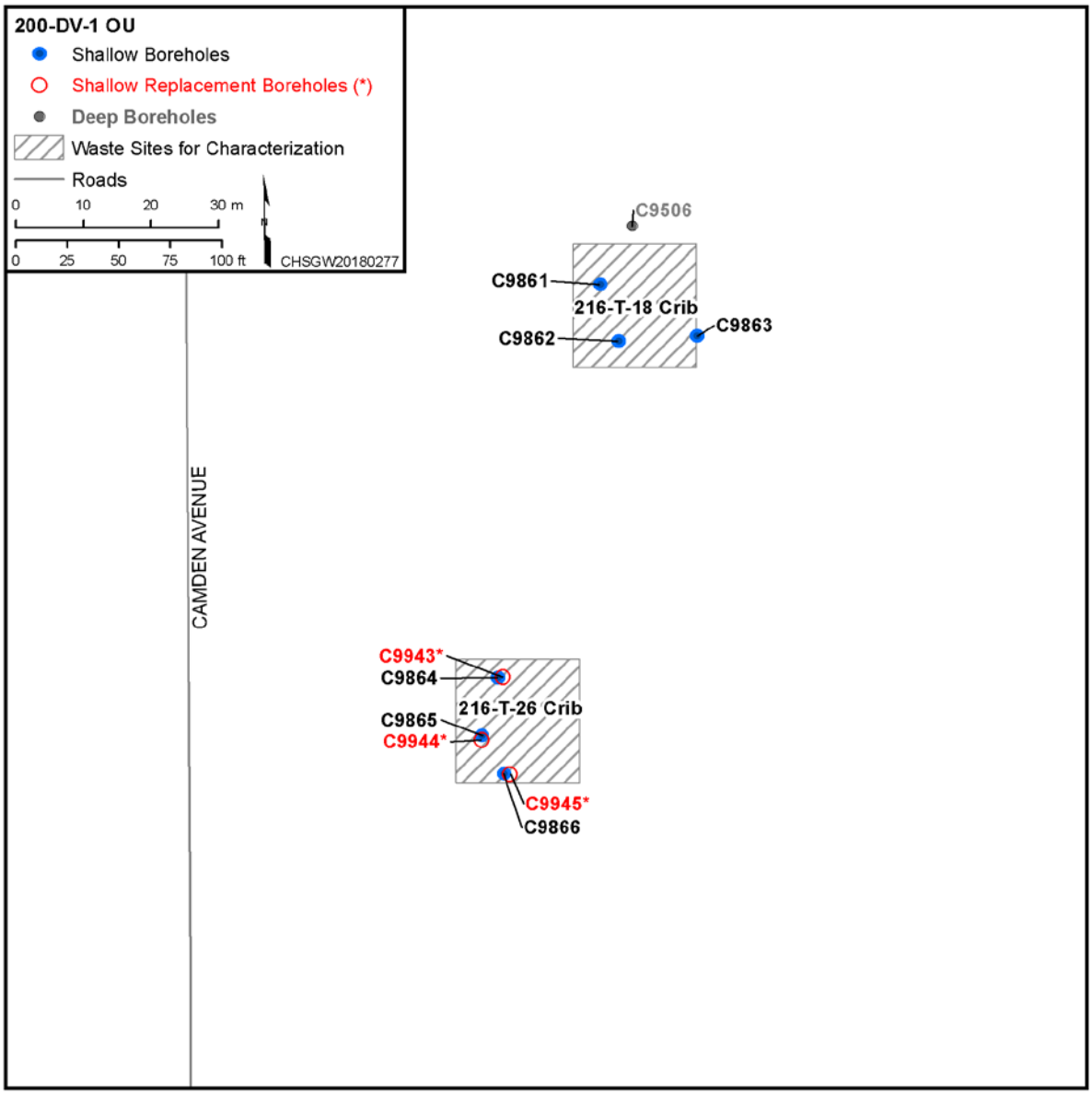

Figure 2-9. Borehole Locations at the 216-T-18 Crib and 216-T-26 Crib

2.2 Sampling and Analysis

Samples were collected by driving 3 in. outer-diameter LEXAN® liners (Figure 2-10) through the sampling interval or until refusal in the shallow vadose zone between ground surface and a total depth of 3 to 4.6 m (10 to 15 ft) bgs (depending on the waste site). All soil samples were analyzed for COPCs at Test America Laboratories or GEL Laboratory in accordance with the SAP (DOE/RL-2011-104-ADD2). Table 2-1 lists the analytical methods used by the laboratories.

®LEXAN is a trademark of SABIC Global Technologies B.V., Riyadh, Saudi Arabia.

Figure 2-10. LEXAN Liner (3 in. Outer Diameter) Used for Sample Collection

2.3 Geologic Logging

Geologic logging was performed in conjunction with the boreholes being pushed in accordance with standard methods for geologic logging. Geologic logging activities included preparing daily reports, borehole logs, and well summary sheets. Appendix A provides the well site geologist drilling summary reports for the following boreholes:

- C9839
- C9558 (replacement)
- C9840
- C9559 (replacement)
- C9841
- C9842
- C9843
- C9844
- C9845
- C9560 (replacement)
- C9846
- C9847
- C9848
- C9849
- C9939 (replacement)
- C9850
- C9851
- C9852
- C9853
- C9854
- C9855
- C9856
- C9857
- C9940 (replacement)
- C9858
- C9941 (replacement)
- C9859
- C9942 (replacement)
- C9860
- C9861
- C9862
- C9863
- C9864
- C9943 (replacement)
- C9865
- C9944 (replacement)
- C9866
- C9945 (replacement)

2.4 Borehole Decommissioning

The boreholes listed in Section 2.3 were decommissioned from total depth to approximately 0.6 m (2 ft) bgs with bentonite pellets. High-strength concrete was then poured from approximately 0.6 m (2 ft) bgs to ground surface. A brass survey marker was placed at ground surface for identification. Each borehole was decommissioned in accordance with WAC 173-160-460, "Minimum Standards for Construction and Maintenance of Wells," "What is the Decommissioning Process for Resource Protection Wells?," which is an applicable or relevant and appropriate requirement under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*.

2.5 Waste Management

The waste generated from 200-DV-1 OU drilling, sampling, and borehole decommissioning activities was managed in accordance with DOE/RL-2012-20, *Waste Control Plan for the 200-DV-1 Operable Unit*. Waste generated during the drilling and sampling activities included soil cuttings, decontamination water, personal protective equipment, and miscellaneous solid waste.

Table 2-1. 200-DV-1 OU Analytical Methods

Constituent	Method [HEIS Method Name]	Description	Sample Preparation
Radiological			
Am-241	AEA [AMCMISO_EIE_PREC_AEA] [AMCMISO_EIE_PLT_AEA]	Isotopic americium/curium analysis by alpha spectrometry	Acid extraction, separation by sequential Eichrom™ ion-exchange resin, and precipitation on a filter
C-14	LSC [C14_LSC] [C14_CHEM_LSC]	Carbon-14 analysis by LSC	Burn sample in a furnace and collect gas
Cs-137 Co-60 Eu-152 Eu-124 Eu-155	GS [GAMMA_GS]	Gamma-emitting radionuclide analysis by gamma spectroscopy using germanium high-energy detectors	No sample preparation
I-129	LEPS [I129_SEP_LEPS_GS]	Iodine-129 analysis by LEPS	Solvent extraction and precipitation
Np-237	AEA [NP237_IE_PRECIP_AEA] [NP237_LLE_PLATE_AEA]	Neptuniun-237 analysis by alpha spectrometry	Acid leach, separation by ion exchange, and precipitation on a filter
Ni-63	LSC [NI63_LSC]	Nickel-63 analysis by LSC	Acid leach and separation by ion exchange
Pu-238 Pu-239/240	AEA [PUISO_PLATE_AEA] [PUISO_IE_PRECIP_AEA]	Isotopic plutonium analysis by alpha spectrometry	Acid leach and separation by ion exchange
Sr-90	GPC [SRISO_SEP_PRECIP_GPC] [SRTOT_SEP_PRECIP_GPC]	Total beta strontium analysis by GPC	Acid leach, chemical separation, and precipitation on a filter
Tc-99	LSC [TC99_EIE_LSC] [TC99_ETVDSK_LSC]	Technetium-99 analysis by LSC	Acid leach and separation by Eichrom ion-exchange resin
H-3	LSC [TRITIUM_DIST_LSC]	Tritium analysis by LSC	Burn sample in a furnace and collect gas

Table 2-1. 200-DV-1 OU Analytical Methods

Constituent	Method [HEIS Method Name]	Description	Sample Preparation
U-233/234 U-235 U-238	AEA [UISO_IE_PRECIP_AEA] [UISO_IE_PLATE_AEA] [UISO_IE_PLATE_AEA]	Isotopic uranium analysis by alpha spectrometry	Acid leach, separation by ion-exchange resin, and precipitation on a filter
Nonradiological			
Al As Ba Cd Cr Cu Pb Mn Ni Se U	6020 Metals (EPA 846) [6020_METALS_ICPMS]	Metal analysis by inductively coupled plasma/mass spectrometry	Acid leach
NH_3	350.1 Ammonia (EPA 846) [350.1_AMMONIA]	Ammonium analysis by automated colorimetry	Sulfuric acid extraction
Sb Ag	6010 Metals (EPA 846) [6010_METALS_ICP]	Metal analysis by inductively coupled plasma/atomic emission spectroscopy	Acid leach
Cl^- F^- NO_3^- NO_2^- PO_4^{3-} SO_4^{2-}	300 Anions (EPA 600) or 9056 Anions (EPA 846) [300.0_ANIONS_IC] [9056_ANIONS_IC]	Anion analysis by ion chromatography	10:1 water extraction
CN^-	9012 Cyanide (EPA 846) or equivalent [9012_CYANIDE]	Cyanide analysis by automated colorimetry	Water leach with a base
Cr(VI)	7196 Hexavalent Chromium (EPA 846) [7196_CR6]	Hexavalent chromium analysis by colorimetry	Alkaline leach
Hg	7471 Mercury (EPA 846) [7471_HG_CVAA]	Mercury analysis by cold vapor atomic absorption	Chemical vapor generation

Table 2-1. 200-DV-1 OU Analytical Methods

Constituent	Method [HEIS Method Name]	Description	Sample Preparation
Geochemical			
Al Ba Ca Fe Mg Mn K Na	6010 Metals (EPA 846) [6010M_ICP_WE]	Metal analysis by inductively coupled plasma/atomic emission spectroscopy or inductively coupled plasma/mass spectrometry	Ratio of 1:1 water extraction
Ca Fe Mg K Na	6010 Metals (EPA 846) [6010_METALS_ICP]	Metal analysis by inductively coupled plasma/atomic emission spectroscopy	Acid leach
Al Ba Mn	6020 Metals (EPA 846) [6020_METALS_ICPMS]	Metals by inductively coupled plasma/ mass spectrometry	Acid leach
TIC	9060 Total Organic Carbon (EPA 846) [9060_TOC] [9060_TOC_WE]	TIC analysis by measuring carbon dioxide after acid purging	Water leach
TOC		TOC analysis by measuring carbon dioxide after chemical oxidation	
Physical			
pH	9045 pH (EPA 846) [9045_PH]	pH of soils using an electrode	—
Specific conductance	9050 Specific Conductivity (EPA 846) [9050_CONDUCT]	Specific conductance is measured using a self-contained conductivity *m* (Wheatstone bridge-type or equivalent)	—
Bulk density	D2937 Bulk Density (ASTM) [D2937_DENSITY]	Standard test method for density of soil in place by the drive-cylinder method (Vol. 4.08)	—

Table 2-1. 200-DV-1 OU Analytical Methods

Constituent	Method [HEIS Method Name]	Description	Sample Preparation
Percent moisture	D2216 Percent Moisture (ASTM) [D2216_%MOIS]	Percent moisture in soils measured by drying soil in an oven	—
Particle size	D422 Particle Size (ASTM) [D422_PARTCLSIZE]	Particle-size distribution using a sieve	—
Organics			
Kerosene	Total petroleum hydrocarbons (Ecology) [NWTPH_DIESEL]	Analysis by gas chromatography/flame ionization detector	Solvent extraction
TBP	8270 Semivolatile Organic Analysis (EPA 846) [8270_SVOA_GCMS]	Semivolatile organic compound analysis by gas chromatography/mass spectrometry	Solvent extraction
MIBK	8260 Volatile Organic Analysis (EPA 846) [8260_VOA_GCMS]	Volatile organic compound analysis by gas chromatography/mass spectrometry	Gas purge
PCB	8082 Polychlorinated Biphenyl (EPA 846) [8082_PCB_GC]	PCB analysis by gas chromatography/electron capture detector	Solvent extraction

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AEA = alpha energy analysis
ASTM = ASTM International (formerly American Society for Testing and Materials
Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
GPC = gas proportional counting
GS = gamma spectroscopy
HEIS = Hanford Environmental Information System
LEPS = low-energy photon spectroscopy
LSC = liquid scintillation counter
MIBK = methyl isobutyl ketone
OU = operable unit
PCB = polychlorinated biphenyl
TBP = tributyl phosphate
TIC = total inorganic carbon
TOC = total organic carbon

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3 Borehole Results

This chapter presents borehole as-built diagrams and analytical results. Preliminary observations are also discussed based on soil data from the 28 characterization boreholes and the 10 boreholes pushed to replace sample depths not obtained from the original boreholes. The observations focus on contaminants with the largest masses discharged to the waste sites (uranium, technetium-99, nitrate, fluoride, and hexavalent chromium), which are presented in tables for each waste site. Geological statements are paraphrased from SGW-62009, *Borehole Summary Report for the 28 Shallow Characterization Boreholes in the 200-DV-1 Operable Unit, FY 2018*.

All sampling and analyses identified in the SAP (DOE/RL-2011-104-ADD2) were completed. Analytical results from the 200-DV-1 OU boreholes have been reviewed and verified as part of the quality assurance process in accordance with Section 2.4 of the SAP. Data validation was performed when sample data packages were returned to CH2M HILL Plateau Remediation Company. Data validation will be documented in a data validation report. The determination of data usability will be documented in a data usability assessment report, and detailed interpretations of the borehole and analytical data will be presented in future reports.

Table 3-1 provides information on the number of samples collected, the total depth achieved for each borehole, and deviations from the SAP (DOE/RL-2011-104-ADD2).

Table 3-1. Deviations from the 200-DV-1 OU SAP for all 200-DV-1 OU Shallow Boreholes

Waste Site	Borehole	Planned (SAP)	Actual	Reason for Deviation
216-B-5 Reverse Well	C9839	Samples: 6 Depth: 15 ft	Samples: 5 Depth: 14.5 ft	**Samples:** The 8 to 10 ft sample interval at C9839 had insufficient volume for sample collection. C9558* was drilled to collect the one remaining sample. **Depth:** C9839 hit refusal 6 in. before target depth.
	C9558*	N/A	Samples: 1 Depth: 10.1 ft	**Samples:** N/A **Depth:** N/A
216-B-9 Crib/ Tile Field	C9840	Samples: 4 Depth: 10 ft	Samples: 3 Depth: 10.1 ft	**Samples:** The 8 to 10 ft sample interval at C9840 had insufficient volume for sample collection. C9559* was drilled to collect the one remaining sample. **Depth:** N/A
	C9559*	N/A	Samples: 1 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
	C9841	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** All four sample intervals were collected; however, due to a lack of sample volume, the sample at 8.6 to 10 ft bgs was not analyzed for metals (EPA Method 6010/6020 and EPA Method 7471 [Hg]). **Depth:** N/A
	C9842	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A

Table 3-1. Deviations from the 200-DV-1 OU SAP for all 200-DV-1 OU Shallow Boreholes

Waste Site	Borehole	Planned (SAP)	Actual	Reason for Deviation
216-BX Trenches: 216-B-35 Trench	C9843	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 12.6 ft	**Samples:** N/A **Depth:** N/A
216-BX Trenches: 216-B-36 Trench	C9844	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10.2 ft	**Samples:** N/A **Depth:** N/A
216-BX Trenches: 216-B-39 Trench	C9845	Samples: 4 Depth: 10 ft	Samples: 1 Depth: 6.7 ft	**Samples:** The 4 to 6 ft, 6 to 8 ft, and 8 to 10 ft sample intervals at C9845 had insufficient volume for sample collection. C9560* was drilled to collect the three remaining samples. **Depth:** C9845 hit refusal at 6.7 ft bgs.
	C9560*	N/A	Samples: 3 Depth: 10.1 ft	**Samples:** N/A **Depth:** N/A
216-BX Trenches: 216-B-40 Trench	C9846	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
216-BX Trenches: 216-B-41 Trench	C9847	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
216-S-9 Crib	C9848	Samples: 6 Depth: 15 ft	Samples: 6 Depth: 15 ft	**Samples:** N/A **Depth:** N/A
	C9849	Samples: 6 Depth: 15 ft	Samples: 4 Depth: 15.2 ft	**Samples:** The 10 to 12 ft and the 13 to 15 ft sample intervals at C9849 had insufficient volume for sample collection. C9939* was drilled to collect the two remaining samples. **Depth:** N/A
	C9939*	N/A	Samples: 2 Depth: 15.1 ft	**Samples:** N/A **Depth:** N/A
	C9850	Samples: 6 Depth: 15 ft	Samples: 6 Depth: 15.1 ft	**Samples:** N/A **Depth:** N/A
	C9851	Samples: 6 Depth: 15 ft	Samples: 6 Depth: 15.1 ft	**Samples:** N/A **Depth:** N/A
	C9852	Samples: 6 Depth: 15 ft	Samples: 6 Depth: 15.2 ft	**Samples:** N/A **Depth:** N/A
216-S-21 Crib	C9853	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
	C9854	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10.1 ft	**Samples:** N/A **Depth:** N/A

Table 3-1. Deviations from the 200-DV-1 OU SAP for all 200-DV-1 OU Shallow Boreholes

Waste Site	Borehole	Planned (SAP)	Actual	Reason for Deviation
216-T-5 Trench	C9855	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
	C9856	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
216-T Trenches: 216-T-14 Trench	C9857	Samples: 4 Depth: 10 ft	Samples: 3 Depth: 10 ft	**Samples:** The 6 to 8 ft sample interval at C9857 had insufficient volume for sample collection. C9940* was drilled to collect the one remaining sample. **Depth:** N/A
	C9940*	N/A	Samples: 1 Depth: 8.6 ft	**Samples:** N/A **Depth:** N/A
216-T Trenches: 216-T-15 Trench	C9858	Samples: 4 Depth: 10 ft	Samples: 2 Depth: 10.1 ft	**Samples:** The 6 to 8 ft and the 8 to 10 ft sample intervals at C9858 had insufficient volume for sample collection. C9941* was drilled to collect the two remaining samples. **Depth:** N/A
	C9941*	N/A	Samples: 2 Depth: 10.2	**Samples:** N/A **Depth:** N/A
216-T Trenches: 216-T-16 Trench	C9859	Samples: 4 Depth: 10 ft	Samples: 1 Depth: 6.3 ft	**Samples:** The 4 to 6 ft, 6 to 8 ft, and 8 to 10 ft sample interval at C9859 had insufficient volume for sample collection. C9942* was drilled to collect the three remaining samples **Depth:** C9859 hit refusal at 6.3 ft bgs.
	C9942*	N/A	Samples: 3 Depth: 10.1 ft	**Samples:** N/A **Depth:** N/A
216-T Trenches: 216-T-17 Trench	C9860	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
216-T-18 Crib	C9861	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
	C9862	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10.1 ft	**Samples:** N/A **Depth:** N/A
	C9863	Samples: 4 Depth: 10 ft	Samples: 4 Depth: 10 ft	**Samples:** N/A **Depth:** N/A
216-T-26 Crib	C9864	Samples: 6 Depth: 15 ft	Samples: 4 Depth: 15.1 ft	**Samples:** The 10 to 12 ft and the 13 to 15 ft sample intervals at C9864 had insufficient volume for sample collection. C9943* was drilled to collect the two remaining samples. **Depth:** N/A
	C9943*	N/A	Samples: 2 Depth: 14.9 ft	**Samples:** N/A **Depth:** N/A

Table 3-1. Deviations from the 200-DV-1 OU SAP for all 200-DV-1 OU Shallow Boreholes

Waste Site	Borehole	Planned (SAP)	Actual	Reason for Deviation
	C9865	Samples: 6 Depth: 15 ft	Samples: 4 Depth: 15 ft	**Samples:** The 10 to 12 ft and the 13 to 15 ft sample intervals at C9865 had insufficient volume for sample collection. C9944* was drilled to collect the two remaining samples. **Depth:** N/A
	C9944*	N/A	Samples: 1 Depth: 15.1 ft	**Samples:** The 13 to 15 ft sample was not collected because it was all cobbles and no soil. **Depth:** N/A
	C9866	Samples: 6 Depth: 15 ft	Samples: 5 Depth: 13.5 ft	**Samples:** The 10 to 12 ft sample interval at C9866 had mostly cobbles and little soil. The 13 to 15 ft sample interval at C9866 could not be collected due to refusal. C9945* was drilled to collect the two remaining samples. **Depth:** C9866 hit refusal at 13.5 ft bgs.
	C9945*	N/A	Samples: 2 Depth: 15.5 ft	**Samples:** N/A **Depth:** N/A

Reference: DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

*Replacement borehole.

bgs = below ground surface
EPA = U.S. Environmental Protection Agency
N/A = not applicable
OU = operable unit
SAP = sampling and analysis plan

3.1 216-B-5 Reverse Well

Boreholes C9839 and C9558 (replacement) are located in the southwestern corner of the 216-B-5 Reverse Well waste site boundary. The GeoProbe rig drilled to a target depth of approximately 4.6 m (15 ft) bgs at the C9839 borehole location. However, due to lack of sample volume recovered from the 2.4 to 3 m (8 to 10 ft) interval, borehole C9558 (replacement) was required. The GeoProbe drill rig was moved 0.3 m (1.1 ft) and drilled to 3 m (10 ft) bgs to collect the remaining required sample interval. Sediment samples were analyzed for the COPCs listed in Tables 3-2 and 3-3. Figures 3-1 and 3-2 show the sampling depths and how the boreholes were decommissioned.

3.1.1 Borehole C9839

Borehole C9839 consisted of sediments composed of the Hanford formation unit 1 (Hf1). The Hf1 is generally composed of a gravel-dominated flood deposit, which typically includes poorly sorted, highly mafic (mostly basaltic) sandy gravels and silty, sandy gravels. At this location, the Hf1 was classified as a sandy gravel consisting primarily of reworked Hanford formation and backfill material. The sediment from ground surface to total depth was approximately 60% sand, varying between very fine-grained to very coarse-grained particles, and 40% gravel clasts varying between fine pebble and small cobble (2 to 126 mm in diameter) that tended to be angular in overall shape.

3.1.2 Borehole C9558 (Replacement for Borehole C9839)

Borehole C9558 (replacement) consisted of the same Hf1 sediment; however, the sandy gravel at the 2.6 to 3 m (8.4 to 10 ft) bgs interval consisted of 55% gravel clasts varying in size between very fine pebble to very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and 45% sand varying between very fine- and coarse-grained particles.

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Table 3-2. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-5 Reverse Well

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9839	2 – 5.3	B3FL00							1,930 B			120 U	573 B	161 U					3,240 B	1,050 U	1,990 U			5,770	
		B3FL03	6,230,000 D	742 N	520 BD	2,900 D	65,800 D	73 BD		10,500 D	12,900 D				4,100 D	313,000 DN	23 B	11,500 D				750 UD	180 UD		400 D
	5.3 – 6.3	B3FL05							1,680 B			120 U	800 B	127 U					3,130 B	1,050 U	1,990 U			8,150	
		B3FL08	6,070,000 D	863 N	610 BD	3,100 D	84,100 D	92 BD		18,000 D	14,900 D				4,100 D	310,000 DN	11 B	15,700 D				930 BD	190 UD		400 D
	6.3 – 8.3	B3FL10							1,730 B			120 U	819 B	146 U					3,490 B	1,080 U	2,050 U			8,520	
		B3FL13	6,290,000 D	547 BN	840 BD	3,200 D	81,700 D	120 D		15,900 D	16,900 D				6,300 D	323,000 DN	39	11,300 D				740 UD	170 UD		480 D
C9558[a]	8.4 – 10.1	B3FL34							2,090			120 U	1,140	134 U					4,600	1,190 B	2,110 U			19,000	
		B3FL37	6,060,000 D	1,130 C	740 BD	2,800 D	68,400 D	81 BD		7,800 D	13,700 D				3,400 D	293,000 DN	11 U	8,000 D				800 UD	190 UD		400 D
C9839	10.0 – 13.9	B3FL20							1,500 B			120 U	337 U	154 U					2,430 B	1,070 U	2,040 U			3,300 B	
		B3FL23	5,910,000 D	571 BN	480 UD	1,900 BD	43,800 D	58 UD		11,000 D	12,300 D				2,900 D	268,000 DN	11 B	28,500 D				780 UD	180 UD		340 D
		B3FL24							1,660 B			120 U	648 B	131 U					2,830 B	1,070 U	2,020 U			3,920 B	
		B3FL27	6,040,000 D	669 N	470 UD	1,700 BD	55,800 D	58 UD		7,600 D	14,800 D				2,900 D	332,000 DN	10 U	7,800 D				770 UD	180 UD		400 D
	13.9 – 14.5	B3FL29							1,470 B			120 U	748 B	139 U					3,780 B	1,010 U	1,920 U			5,510	
		B3FL32	6,330,000 D	888 N	490 UD	2,300 D	50,400 D	55 UD		9,200 D	13,500 D				3,300 D	287,000 DN	11 U	8,600 D				730 UD	170 UD		390 D

Note: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling.*

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control blank
D = analyte was reported at a secondary dilution factor
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but was not detected

Table 3-3. Radiological Contaminant Concentrations in Samples Collected from the 216-B-5 Reverse Well

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9839	2 – 5.3	B3FL00	0.624 U	3.16 U	0.243	0.0363 U	0.0813 U	0.138 U	0.109 U	0.773 U	0.412 U	5.61 U	0.687 U	0.719 U	1.03 U	2.54 U	20.2 U	0.681	0.412 U	0.800
	5.3 – 6.3	B3FL05	0.559 U	3.13 U	0.165	0.0392 U	0.11 U	0.14 U	0.0886 UXR	1.02 U	0.58 U	5.05 U	0.768 U	0.728 U	0.815 U	2.87 U	19.9 U	0.607	0.486 U	0.695
	6.3 – 8.3	B3FL10	0.26 U	3.09 U	0.0433	0.0272 U	0.059 U	0.083 U	0.0517 UXR	0.837 U	0.734 U	4.87 U	0.687 U	0.831 U	1.49 U	2.44 U	19.8 U	0.812	0.581 U	0.600
C9558[a]	8.4 – 10.1	B3FL34	0.384 U	3.54 U	0.0295 U	0.0347 U	0.067 U	0.105 U	0.0554 U	0.968 U	0.441 U	5.99 U	0.433 U	0.53 U	1.29 U	3.36 U	18.2 U	0.543 U	0.42 U	0.816
C9839	10.0 – 13.9	B3FL20	0.353 U	3.18 U	0.0241 U	0.0304 U	0.0718 U	0.0992 U	0.0958 U	0.573 U	0.571 U	4.71 U	1.24 U	1.32 U	0.784 U	2.8 U	20.5 U	0.573 U	0.506 U	0.633 U
		B3FL24	0.461 U	3.12 U	0.0335 U	0.0241 U	0.0817 U	0.109 U	0.0869 U	1.09 U	0.204 U	6.95 U	0.939 U	1.12 U	0.767 U	2.34 U	19.3 U	0.654	0.401 U	0.4111 U
	13.9 – 14.5	B3FL29	0.267 U	3.19 U	0.0371 U	0.039 U	0.0861 U	0.116 U	0.0977 U	0.823 U	1.18 U	4.87 U	0.507 U	0.476 U	1.02 U	2.45 U	19.9 U	0.432 U	0.4 U	0.41 U

Note: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers
R = do not use; further review indicates the result is not valid
U = analyzed for but not detected
X = indicates a result-specific comment is provided in the data report or case narrative

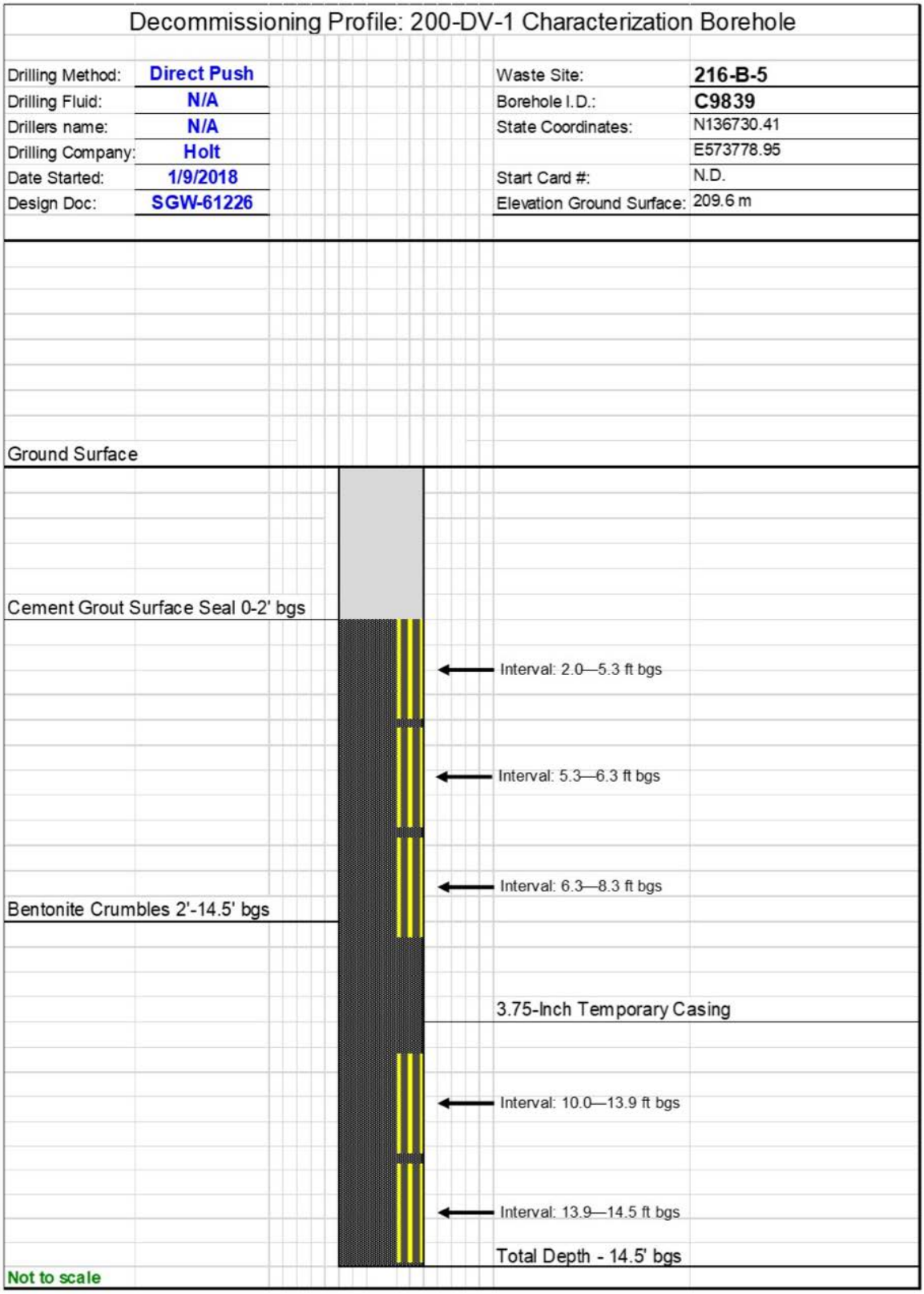

Figure 3-1. Sample Depths and Decommissioning Profile for Borehole C9839 at the 216-B-5 Reverse Well

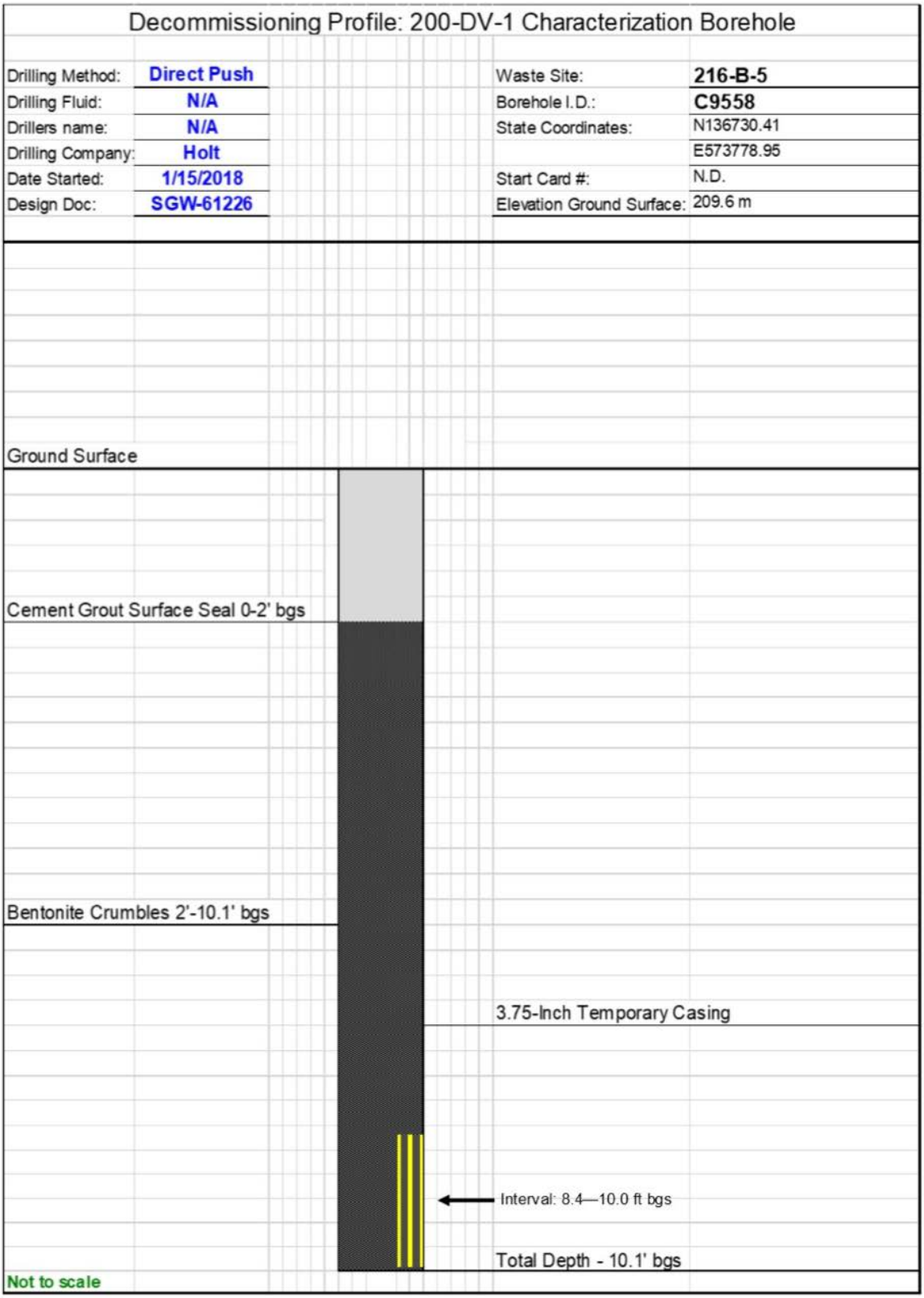

Figure 3-2. Sample Depths and Decommissioning Profile for Borehole C9558 (Replacement) at the 216-B-5 Reverse Well

3.2 216-B-9 Crib and Tile Field

Boreholes C9840, C9559 (replacement), C9841, and C9842 are located on the eastern side and southeastern portion of the 216-B-9 Crib and Tile Field waste site boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9841 and C9842 borehole locations. Borehole C9840 was also pushed to 3 m (10 ft) bgs; however, due to a lack of sample volume recovered from the 2.4 to 3 m (8 to 10 ft) interval, borehole C9559 (replacement) was required. The GeoProbe drill rig was moved 0.7 m (2.4 ft) over and drilled to 3 m (10 ft) bgs to collect the remaining required sample interval. Sediment samples were analyzed for the COPCs listed in Tables 3-4 and 3-5. Figures 3-3, 3-4, 3-5, and 3-6 show the sampling depths and how the boreholes were decommissioned.

3.2.1 Borehole C9840

Borehole C9840 consisted of sediments composed of the Hf1. At this location, Hanford formation backfill extended from ground surface to approximately 0.5 m (1.6 ft) bgs. From 0.5 to 2.4 m (1.6 to 8 ft) bgs, the sediment was classified as a sandy gravel consisting of 65% very fine- to medium-grained sand particles and 35% angular gravels ranging in size from very fine pebble to very coarse pebble (2 to 64 mm in diameter), with a trace amount of silt present. Below 2.4 m (8 ft) bgs, the sediment was primarily gravel (85%) clasts ranging in size from medium pebble to small cobble (8 to 126 mm in diameter) and tending to be angular in overall shape. The sand (15%) at this depth varied from very fine- to very coarse-grained particles. This gravel-dominated sediment extended to the total depth of the borehole at 3.1 m (10.1 ft) bgs.

3.2.2 Borehole C9559 (Replacement for Borehole C9840)

Borehole C9559 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to the depth of 2.5 m (8.1 ft) bgs. From 2.5 m (8.1 ft) bgs to total depth of the borehole at 3 m (10 ft) bgs, sediment consisted of 85% gravel clasts ranging in size from very fine pebbles to small cobbles (2 to 126 mm in diameter) that were angular to subangular in overall shape, and 15% fine- to very coarse-grained sand particles.

3.2.3 Borehole C9841

Borehole C9841 consisted of sediments composed of the Hf1. At this location, reworked Hanford formation backfill extended from ground surface to 0.5 m (1.8 ft) bgs. From 0.5 to 2.6 m (1.8 to 8.6 ft) bgs, the sediment was classified as a sandy gravel containing 60% very fine- to medium-grained sand particles and 40% gravel clasts ranging in size between fine pebble and small cobble (4 to 126 mm in diameter) that were angular to subangular in overall shape. From 2.6 m (8.6 ft) bgs to total depth of the borehole at 3 m (10 ft) bgs, the sediment was primarily gravel (80%) ranging in size from fine pebble and small cobble (4 to 126 mm in diameter) that were angular to subangular in overall shape. The sand (20%) at this depth varied between very fine- and very coarse-grained particles.

3.2.4 Borehole C9842

Borehole C9842 consisted of sediments composed of the Hf1. At this location, reworked Hanford formation backfill extended from ground surface to 0.5 m (1.8 ft) bgs. From 0.5 to 1.3 m (1.8 to 4.3 ft) bgs, the sediment was classified as a sandy gravel consisting of 55% gravel clasts ranging in size between fine pebble and very coarse pebble (4 to 64 mm in diameter) that were angular to subangular in overall shape, and 45% sand varying between fine- and medium-grained particles. From 1.3 to 1.8 m (4.3 to 6 ft) bgs, the sediment consisted of 85% gravel clasts ranging in size from very fine pebble to small cobble (2 to 126 mm in diameter) that were angular to subangular in overall shape, and 15% sand varying between fine- and very coarse-grained particles. From 1.8 m (6 ft) bgs to total depth of the borehole at 3 m (10 ft) bgs, the sediment consisted of a sandy gravel that was made up of 65% gravel clasts ranging in size between fine pebble and small cobble (2 to 126 mm in diameter) that were angular in overall shape, and 35% sand varying between fine- and very coarse-grained particles.

Table 3-4. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9840	1.6 – 4.0	B3FL48							1,540 B			120 U	1,060	168 U					8,280	1,130 U	3,310 B			3,210 B	
		B3FL51	7,980,000 D	1,170 N	490 UD	2,600 D	76,300 D	72 BD		10,100 D	12,400 D				4,400 D	364,000 DN	11 U	10,500 D				790 UD	190 UD		790 D
	4.0 – 6.0	B3FL53							1,900 B			120 U	1,310	158 U					5,980	1,280 B	2,060 U			4,470	
		B3FL56	6,500,000 D	900 N	450 UD	3,800 D	79,500 D	71 BD		10,400 D	15,200 D				3,600 D	356,000 DN	9.9 U	10,100 D				1,100 D	170 UD		500 D
	6.0 – 8.0	B3FL58							2,190			120 U	1,260	159 U					11,800	1,550 B	2,130 U			5,430	
		B3FL61	6,280,000 D	924 N	510 UD	3,700 D	70,500 D	83 BD		11,600 D	19,000 D				4,000 D	393,000 DN	12 B	11,900 D				1,500 D	180 UD		420 D
C9559[a]	8.1 – 10.0	B3FL68	7,260,000 D	6,030	1,670 UD	3,180 D	101,000 D	78.8 BD	2,110	12,600 D	14,000 D	77.1 U	1,670	110 U	4,660 D	371,000 D	5.93 B	10,700 D	13,100	1,200 B	2,230 B	906 BD	101 U	9,280	533 D
C9841	1.8 – 4.5	B3FL82							1,390 B				938 B	150 U					8,900	1,130 B	2,960 B			3,370 B	
		B3FL83	7,340,000 D	1,580 N	500 UD	8,500 D	73,500 D	75 BD		10,700 D	13,700 D	120 U			5,700 D	380,000 DN	11 U	11,300 D				810 UD	190 UD		430 D
	4.5 – 6.6	B3FL85		12,300 CXH					1,840 B				1,380	155 U					3,880 B	1,050 U	2,000 U			4,470	
		B3FL86	7,290,000 D		500 UD	4,400 D	61,200 D	70 BD		10,900 D	13,900 D	120 U			4,600 D	384,000 DN	11 U	10,100 D				730 UD	170 D		420 D
		B3FL87		15,800 CXH					1,580 B				1,280	160 U					6,420	1,190 B	2,080 U			4,500	
		B3FL88	7,440,000 D		500 UD	4,200 D	70,600 D	69 BD		12,200 D	14,000 D	120 U			4,700 D	382,000 DN	10 U	11,900 D				1,300 D	190 UD		440 D
	6.6 – 8.6	B3FL90							1,710 B				484 B	146 U					5,980	1,350 B	2,080 U			6,720	
		B3FL91	5,840,000 D	790 N	480 UD	2,100 BD	61,500 D	71 BD		6,600 D	15,500 D	120 U			2,500 D	395,000 DN	9.9 U	6,800 D				1,600 D	180 UD		440 D
	8.6 – 10.0	B3FL93	NA	6,300 CXH	NA	NA	NA	NA	2,110 H	NA	NA	78.2 UXH	489 BH	143 UH	NA	NA	NA	NA	1,600 BH	1,100 UH	3,220 BH	NA	NA	12,900 H	NA

Table 3-4. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9842	1.8 – 4.3	B3FLB4							2,440				486 B	149 U					23,200	1,340 B	2,720 B			6,510	
		B3FLB5	7,010,000 D	1,200 N	550 BD	2,900 D	71,700 D	85 BD		11,000 D	14,100 D	120 U			4,400 D	349,000 DN	10 U	10,700 D				830 UD	190 UD		380 D
	4.3 – 6.0	B3FLB7	6,850,000 D	8,450 CXH	1,670 UD	6,870 D*N	69,500 D	74.1 BD	2,210 H	9,280 D	16,500 DN	86.3 UX	1,160 H	157 UH	4,630 DN	369,000 D	6.59 BX	9,780 DN	6,990 H	1,100 UH	3,740 BH	1,600 DN	101 U	8,360 H	517 D
	6.0 – 8.3	B3FLC0		11,900 CXH					2,730 H			77.8 UXH	1,470 H	141 UH					13,100 H	1,110 UH	3,560 BH			9,920 H	
		B3FLC1	7,160,000 D		550 BD	4,400 D	79,700 D	94 BD		12,700 D	18,900 D				4,200 D	457,000 DN	11 U	11,400 D				800 BD	180 UD		490 D
	8.3 – 10.0	B3FLC3		8,420 CXH					2,180 H			64.2 UXH	1,220 H	153 UH					13,300 H	1,120 UH	3,990 BH			7,430 H	
		B3FLC4	7,200,000 D		560 BD	3,800 D	75,300 D	79 BD		15,300 D	18,100 D				4,500 D	478,000 DN	18 B	10,600 D				940 BD	190 UD		600 D

Notes: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification
NA = not analyzed

Data qualifiers

* = duplicate analysis not within control limits
B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control blank
D = analyte was reported at a secondary dilution factor
H = laboratory holding time was exceeded before the sample was analyzed
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected
X = indicates a result-specific comment is provided in the data report or case narrative

Table 3-5. Radiological Contaminant Concentrations in Samples Collected from the 216-B-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9840	1.6 – 4.0	B3FL48	0.412 U	3.26 U	0.2	0.0464 U	0.107 UXR	0.143 U	0.108 U	0.606 U	0.37 U	4.96 U	0.471 U	0.905 U	1.3 U	1.99 U	19.1 U	1.11	0.531 U	0.799
	4.0 – 6.0	B3FL53	0.567 U	3.24 U	0.0364 U	0.0415 U	0.0947 U	0.108 U	0.0961 U	1.07 U	0.686 U	4.6 U	0.641 U	0.719 U	1.04 U	2.16 U	19.6 U	0.52	0.421 U	0.464
	6.0 – 8.0	B3FL58	0.285 U	3.25 U	0.0374 U	0.0388 U	0.103 U	0.105 U	0.106 U	0.904 UXR	0.741 U	4.93 U	0.961 U	1.38 U	1.1 U	2.46 U	18.8 U	0.693	0.398 U	0.52 U
C9559[a]	8.1 – 10.0	B3FL68	0.309 U	3.45 U	0.0334 U	0.0361 U	0.0591 U	0.108 U	0.0457 UXR	0.592 U	0.644 U	5.44 U	0.672 U	0.645 U	0.911 U	2.9 U	19.7 U	0.626	0.441 U	0.878
C9841	1.8 – 4.5	B3FL82	0.451 U	3.29 U	0.599	0.0443 U	0.111 U	0.122 U	0.108 UXR	1.25 U	0.814 U	6.02 U	0.49 U	0.622 U	1.07 U	2.92 U	20 U	0.572 U	0.405 U	0.45 U
	4.5 – 6.6	B3FL85	0.468 UA	3.2 UA	0.172 A	0.0425 UA	0.0841 UA	0.141 UA	0.0998 UA	0.621 UA	0.676 UA	5.34 UA	0.617 UA	0.681 UA	0.744 UA	2.5 UA	20.2 UA	0.761 UA	0.705 UA	0.678 UA
		B3FL87	0.355 UA	3.22 UA	0.0745 A	0.0478 UA	0.106 UA	0.127 UA	0.132 UA	0.915 UA	0.983 UA	5.52 UA	0.806 UA	0.905 UA	1.32 UA	2.1 UA	20 UA	0.564 UA	0.607 UA	0.707 A
	6.6 – 8.6	B3FL90	0.365 U	2.9 U	0.0559	0.0321 U	0.0703 U	0.0977 U	0.075 U	0.481 U	0.776 U	4.46 U	0.57 U	0.569 U	0.887 U	2.13 U	19 U	0.803	0.687 U	0.888
	8.6 – 10.0	B3FL93	0.526 UA	3.19 UA	0.0648 A	0.0412 UA	0.0923 UA	0.136 UA	0.1 UA	0.68 UA	0.395 UA	4.78 UA	0.857 UA	0.746 UA	0.847 UA	2.4 UA	19.9 UA	0.386 UA	0.358 UA	0.407 A
C9842	1.8 – 4.3	B3FLB4	0.298 U	3.19 U	0.494	0.0512 U	0.116 U	0.148 U	0.144 U	0.84 U	0.603 U	5.49 U	0.467 U	0.582 U	1.09 U	2.11 U	19.7 U	0.522 U	0.25 U	0.323 U
	4.3 – 6.0	B3FLB7	0.426 UA	3.14 UA	0.0445 A	0.0385 UA	0.0768 UA	0.119 UA	0.0727 UA	0.64 UA	0.71 UA	4.44 UA	0.691 UA	0.88 UA	1.29 UA	2.33 UA	19.1 UA	0.554 UA	0.312 UA	0.513 UA
	6.0 – 8.3	B3FLC0	0.62 UA	3.21 UA	0.0364 UA	0.0377 UA	0.0817 UA	0.109 UA	0.0888 UA	0.534 UA	0.79 UA	4.1 UA	0.956 UA	1.03 UA	0.963 UA	2.23 UA	19.1 UA	0.62 UA	0.497 UA	1.47 A
	8.3 – 10.0	B3FLC3	0.433 UA	3.28 UA	0.0385 UA	0.0347 UA	0.0816 UA	0.111 UA	0.0977 UA	0.614 UA	0.841 UA	4.93 UA	0.378 UA	0.427 UA	1.49 UA	3.14 UA	19.5 UA	0.552 UA	0.37 UA	0.657 UA

Notes: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

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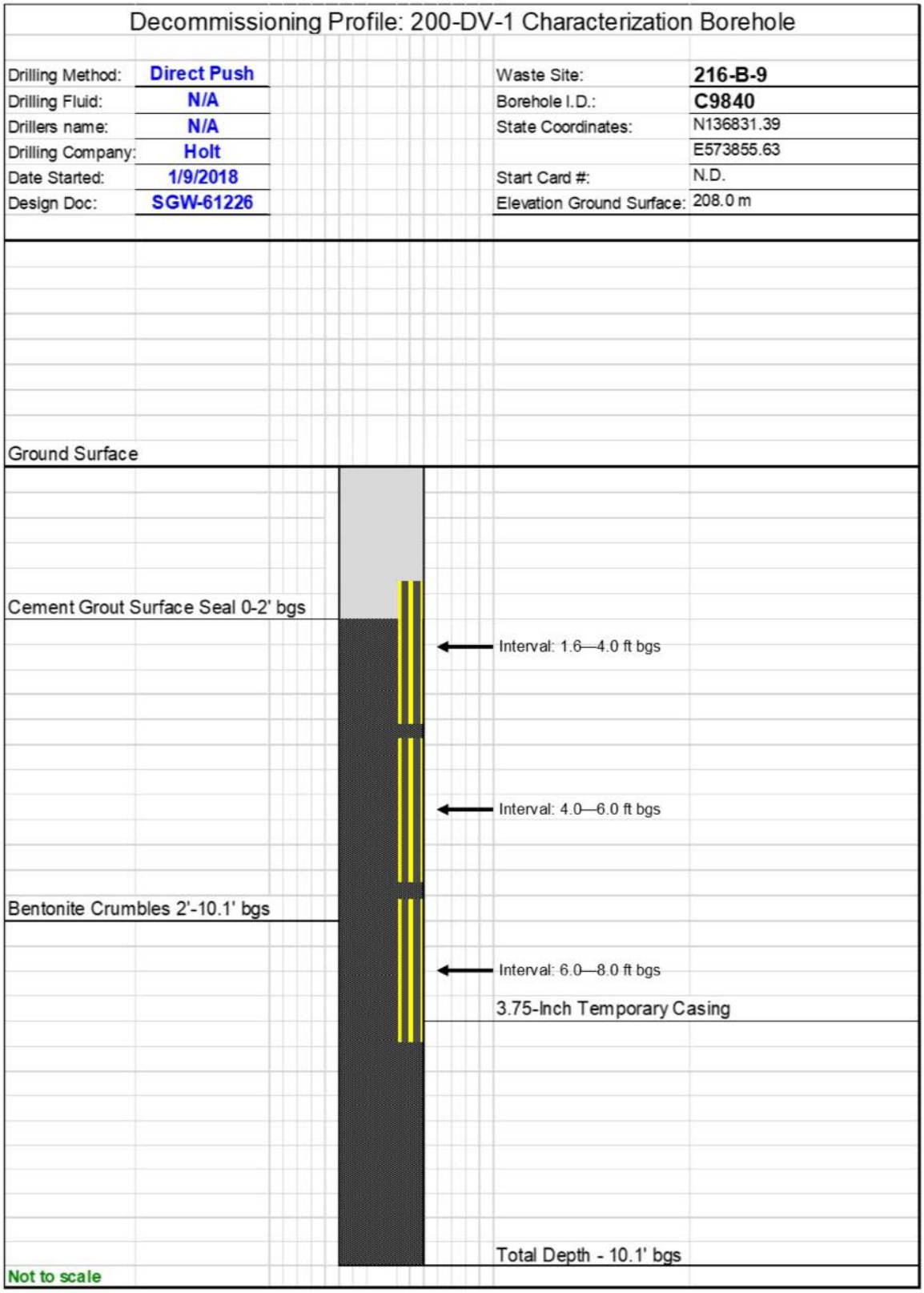

Figure 3-3. Sample Depths and Decommissioning Profile for Borehole C9840 at the 216-B-9 Crib

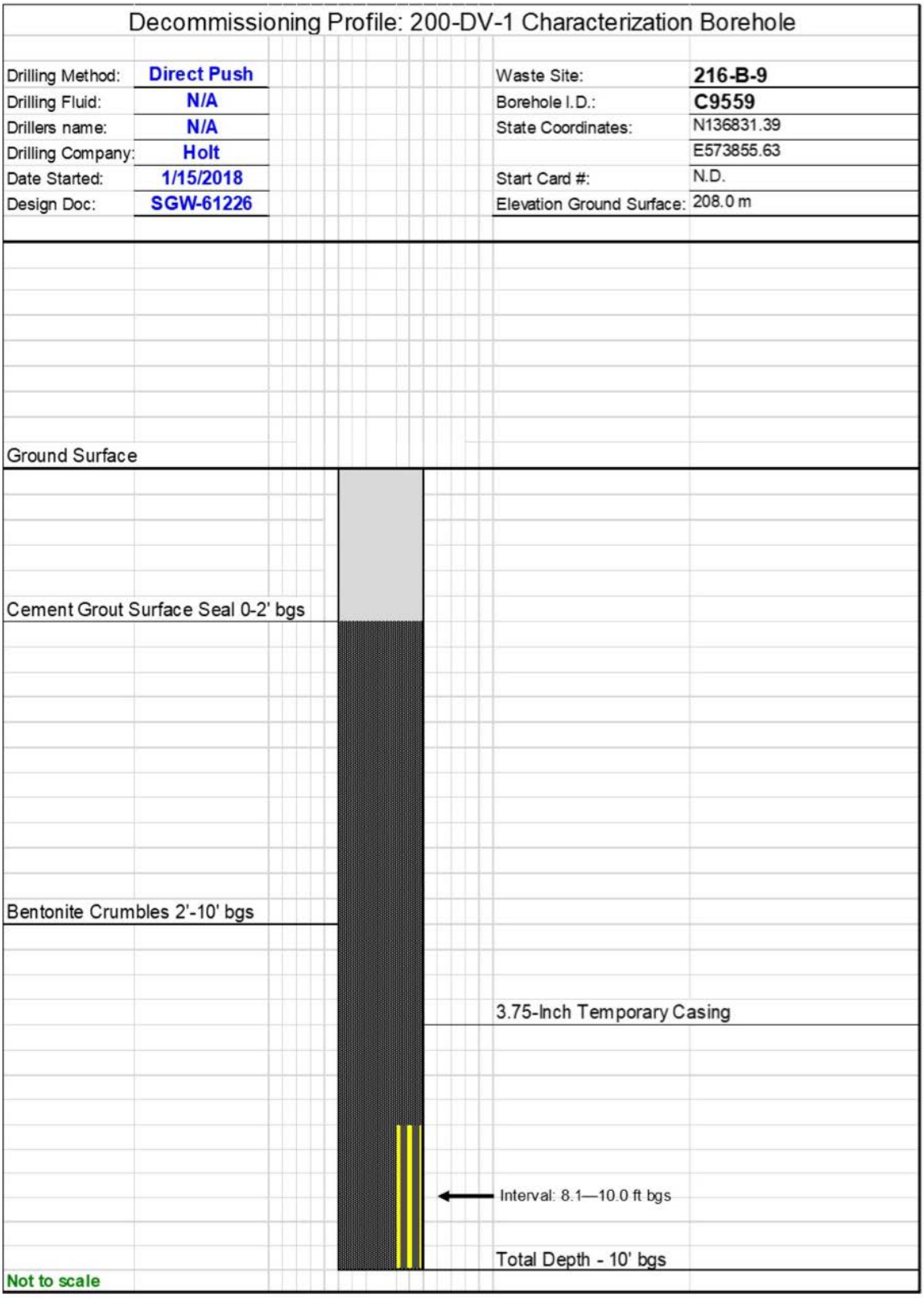

Figure 3-4. Sample Depths and Decommissioning Profile for Borehole C9559 (Replacement) at the 216-B-9 Crib

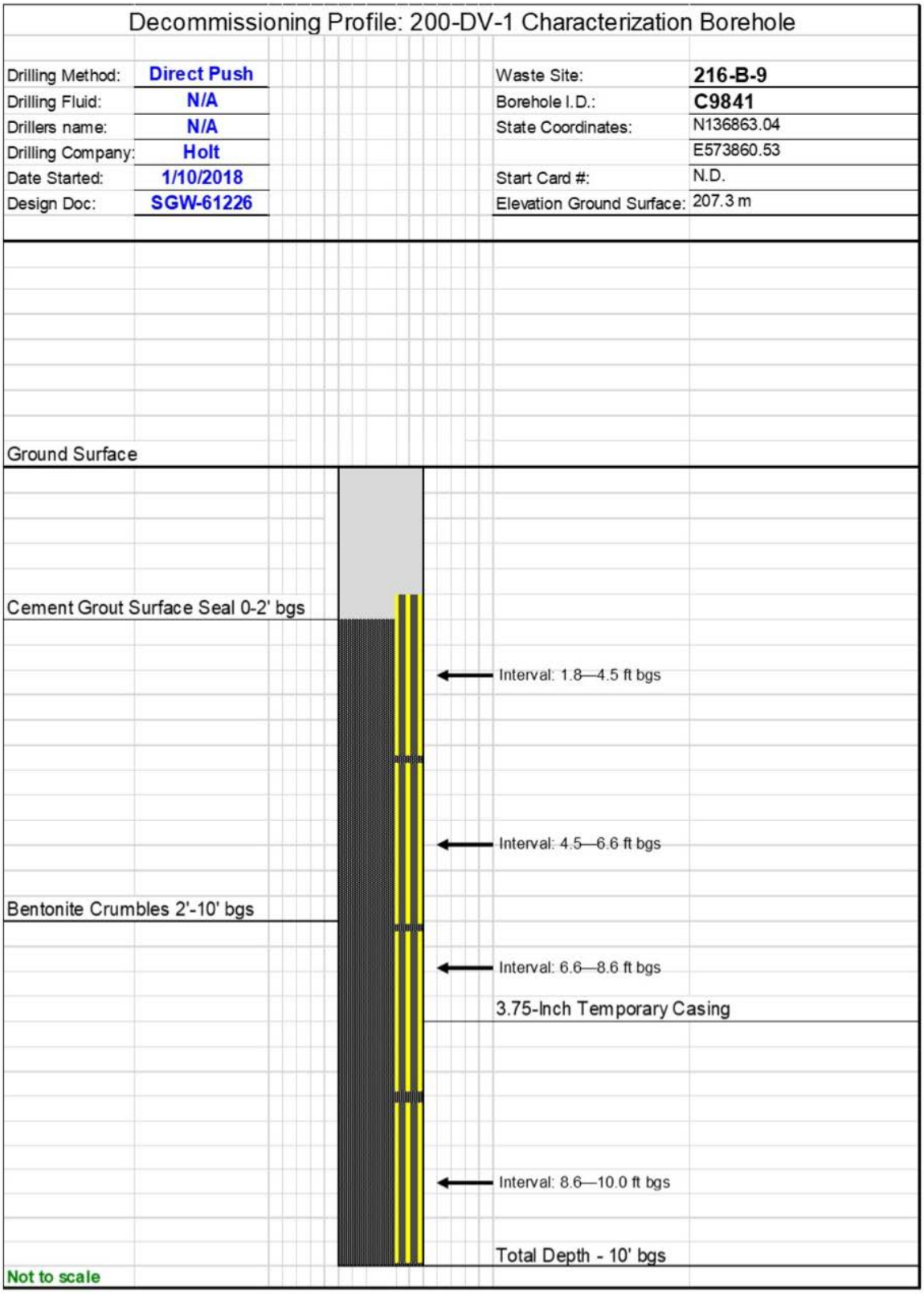

Figure 3-5. Sample Depths and Decommissioning Profile for Borehole C9841 at the 216-B-9 Crib

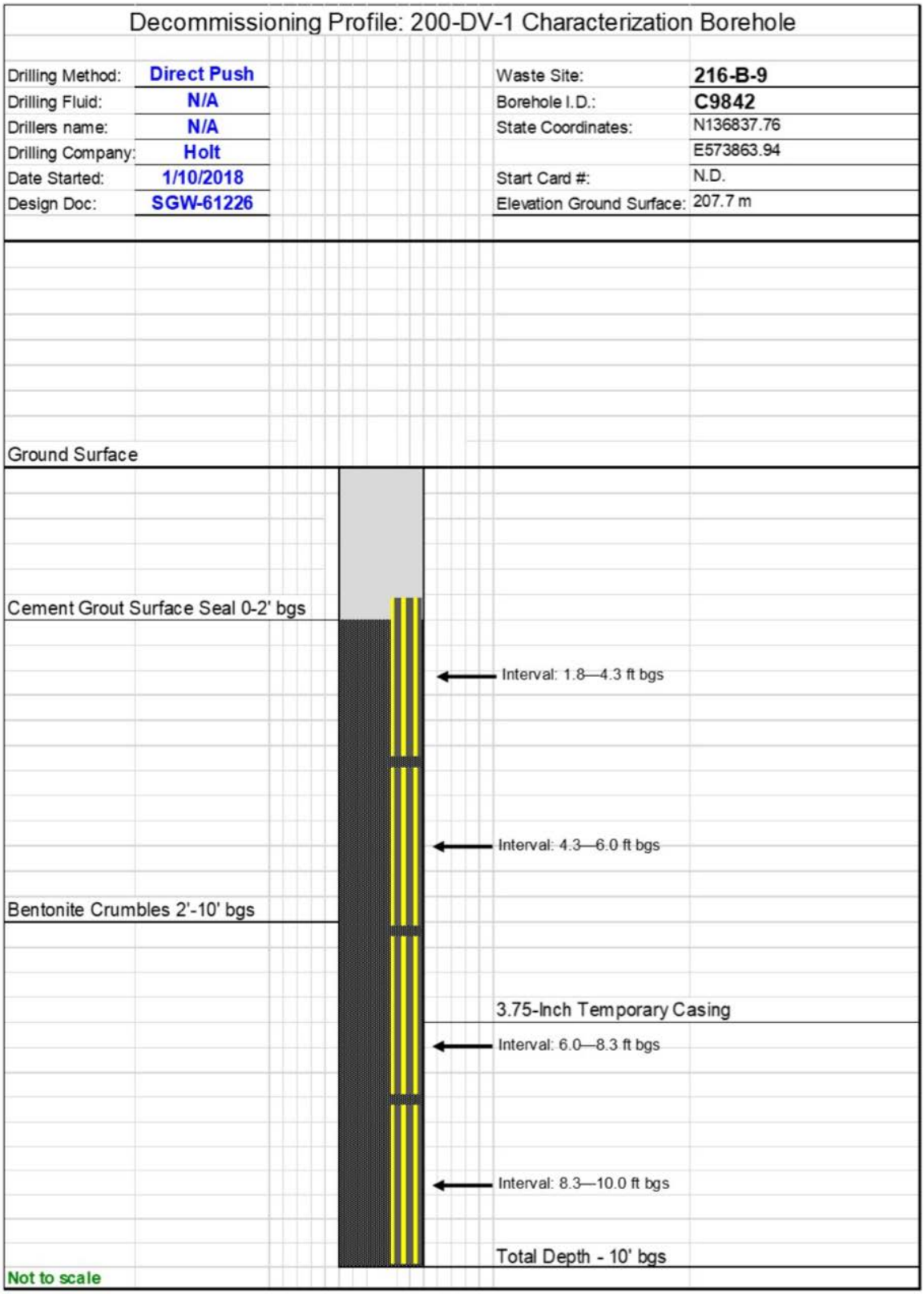

Figure 3-6. Sample Depths and Decommissioning Profile for Borehole C9842 at the 216-B-9 Crib

3.3 216-BX Trenches

This section provides information on boreholes C9843, C9844, C9845, C9560 (replacement), C9846, and C9847, which were drilled in the BX Trenches.

3.3.1 216-B-35 Trench

Borehole C9843 is located on the eastern end of the 216-B-35 Trench waste site boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9843 borehole location. Sediment samples were analyzed for the COPCs listed in Tables 3-6 and 3-7. Figure 3-7 shows the sampling depths and how the borehole was decommissioned.

3.3.1.1 Borehole C9843

Borehole C9843 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.3 ft) bgs, the sediment consisted of Hanford formation backfill. From 0.7 m (2.3 ft) bgs to total depth of the borehole (3.8 m [12.6 ft] bgs), the sediment was classified as a sandy gravel. The sandy gravel was composed of 65% sand varying between very fine- and medium-grained particles, 30% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) in size that were subangular in overall shape, and 5% silt-sized particles.

3.3.2 216-B-36 Trench

Borehole C9844 is located on the western end of the 216-B-36 Trench waste site boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9844 borehole location. Sediment samples were analyzed for the COPCs listed in Tables 3-8 and 3-9. Figure 3-8 shows the sampling depths and how the borehole was decommissioned.

3.3.2.1 Borehole C9844

Borehole C9844 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2.1 ft) bgs, sediment consisted of reworked Hanford formation backfill. From 0.6 m (2.1 ft) to total depth of the borehole (3.1 m [10.2 ft] bgs), the sediment was classified as a sandy gravel. The sandy gravel consisted of 65% sand varying between very fine- and medium-grained particles, 30% gravel clasts ranging between very fine pebble and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and 5% silt-sized particles.

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Table 3-6. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-35 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9843	2.3 – 4.6	B3FLD4							3,030 H				1,500 H	107 U					11,400 H	1,160 UH	2,720 BNH			4,130 BH	
		B3FLD5	7,100,000 D	1,220 N	520 UD	3,500 D	81,600 D	78 BD		13,900 D	15,500 D	120 U			4,600 D	351,000 D	12 B	10,900 D				1,200 BD	1,900 D		420 D
	4.6 – 6.6	B3FLD7							1,740 BH				1,730 H	86.9 U					7,610 H	1,180 BH	2,110 NUH			4,240 H	
		B3FLD8	8,210,000 D	790 N	490 UD	3,600 D	84,500 D	89 BD		11,100 D	16,200 D	120 U			4,400 D	324,000 D	12 B	10,500 D				1,000 BD	360 BD		440 D
	6.6 – 8.6	B3FLF0							1,690 BH				2,130 H	151 U					19,200 H	1,130 UH	2,140 NUH			8,280 H	
		B3FLF1	7,090,000 D	851 N	510 UD	3,600 D	79,900 D	80 BD		9,800 D	14,700 D	120 U			4,600 D	352,000 D	11 B	10,600 D				1,100 BD	650 D		820 D
	8.6 – 10.1	B3FLF3	7,650,000 D	13,600	1,580 UD	2,760 D	79,800 D	77.2 BD	2,060	7,860 D	13,200 D	77.9 U	1,260	96.2 U	4,320 D	336,000 D	3.92 U	8,260 D	46,500	1,250 B	2,350 B	823 BD	112 B	13,500	1.060 D

Note: Blank cells indicate no result for sample number.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
D = analyte was reported at a secondary dilution factor
H = laboratory holding time was exceeded before the sample was analyzed
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected

Table 3-7. Radiological Contaminant Concentrations in Samples Collected from the 216-B-35 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9843	2.3 – 4.6	B3FLD4	1.1 U	4.1 U	0.0297 U	0.0273 U	0.0661 U	0.0992 U	0.0534 UXR	0.971 U	0.537 U	6.63 U	0.559 U	0.438 U	1.56 U	3.29 U	24 U	0.604 U	0.416 U	0.701
	4.6 – 6.6	B3FLD7	0.706 U	3.69 U	0.0408 U	0.0372 U	0.0747 U	0.139 U	0.0516 UXR	0.844 U	0.593 U	6.79 U	0.289 U	0.334 U	1.58 U	3.29 U	23.8 U	0.767 U	0.915 U	0.896
	6.6 – 8.6	B3FLF0	0.779 U	3.77 U	0.0319 U	0.0368 U	0.0833 U	0.138 U	0.0819 UXR	0.737 U	0.477 U	6.3 U	0.539 U	0.581 U	0.982 U	3.19 U	22.8 U	1.32	0.519 U	0.792
	8.6 – 10.1	B3FLF3	0.662 U	3.54 U	0.533	0.0289 U	0.0626 U	0.0791 U	0.063 U	0.336 U	0.581 U	5.91 U	0.68 U	0.655 U	0.811 U	2.76 U	19.4 U	1.18	0.362 U	0.427

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

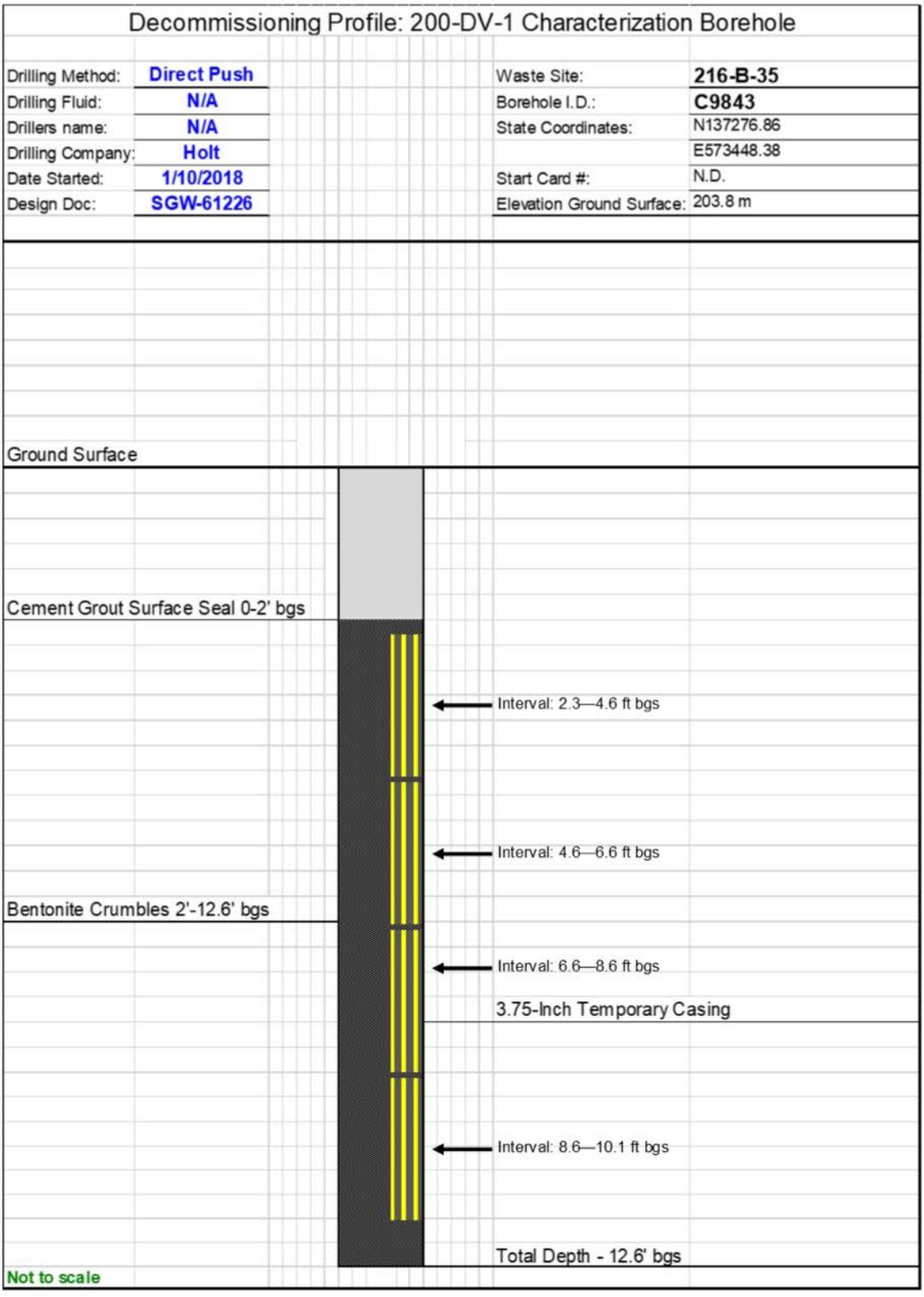

Figure 3-7. Sample Depths and Decommissioning Profile for Borehole C9843 at the 216-B-35 Trench

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Table 3-8. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-36 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI (µg/kg))	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9844	2.1 – 4.0	B3FLH4							3,120				1,140	131 U					19,300	1,150 U	2,170 NU			7,130	
		B3FLH5	7,990,000 D	1,700 N	470 UD	3,700 D	86,800 D	84 BD		10,200 D	14,600 D	120 U			7,500 D	373,000 D	12 B	10,800 D				1,000 BD	180 UD		370 D
	4.0 – 6.0	B3FLH7							1,230 BA				1,400 A	118 UA					11,000 A	1,100 UA	2,080 NUA			4,960 A	
		B3FLH8	6,980,000 D	754 N	450 UD	3,500 D	84,400 D	83 BD		8,800 D	15,800 D	120 U			4,000 D	373,000 D	11 B	9,800 D				1,500 D	190 UD		540 D
	6.0 – 8.0	B3FLJ0							1,590 B				1,800	87.8 U					29,700	1,120 U	2,120 NU			11,600	
		B3FLJ1	6,720,000 D	669 N	460 UD	3,700 D	95,100 D	140 D		8,400 D	17,100 D	120 U			5,000 D	419,000 D	9.9 U	9,600 D				1,500 D	190 UD		660 D
	8.0 – 10.2	B3FLK6							2,510				1,880	106 U					53,100	1,120 U	2,500 BN			14,500	
		B3FLK7	8,200,000 D	839 N	480 UD	3,400 D	88,600 D	84 BD		12,700 D	15,700 D	120 U			4,600 D	401,000 D	12 B	11,800 D				1,200 D	170 UD		530 D

Note: Blank cells indicate no result for sample number.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork
B = analyte was detected at less than the quantitation limit but greater than the method detection limit
D = analyte was reported at a secondary dilution factor
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected

Table 3-9. Radiological Contaminant Concentrations in Samples Collected from the 216-B-36 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-(pCi/g)3	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9844	2.1 – 4.0	B3FLH4	0.38 U	3.97 U	0.203	0.0298 U	0.0794 U	0.112 U	0.0916 U	1.03 U	0.491 U	6.61 U	0.403 U	0.563 U	1.09 U	3.42 U	23.7 U	1.45	0.376 U	0.746
	4.0 – 6.0	B3FLH7	0.225 UA	3.89 UA	0.0274 UA	0.0285 UA	0.0701 UA	0.097 UA	0.0775 UA	1.15 UA	0.433 UA	6.69 UA	0.612 UA	0.66 UA	1.04 UA	3.46 UA	24 UA	1.25 A	0.398 UA	0.489 A
	6.0 – 8.0	B3FLJ0	0.394 U	3.78 U	0.0329 U	0.0353 U	0.0859 U	0.108 U	0.0841 U	0.936 U	0.612 U	6.54 U	0.519 U	0.713 U	1.47 U	3.62 U	24.2 U	1.3	0.641 U	0.768
	8.0 – 10.2	B3FLK6	0.354 U	4.03 U	0.031 U	0.0365 U	0.0757 U	0.109 U	0.0791 U	1.26 U	0.639 U	6.89 U	0.282 U	0.815 U	1.12 U	3.23 U	23.9 U	0.787	0.513 U	0.529 U

Note: Undetected radionuclide value reported is the minimum detectable concentration

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork

U = analyzed for but not detected

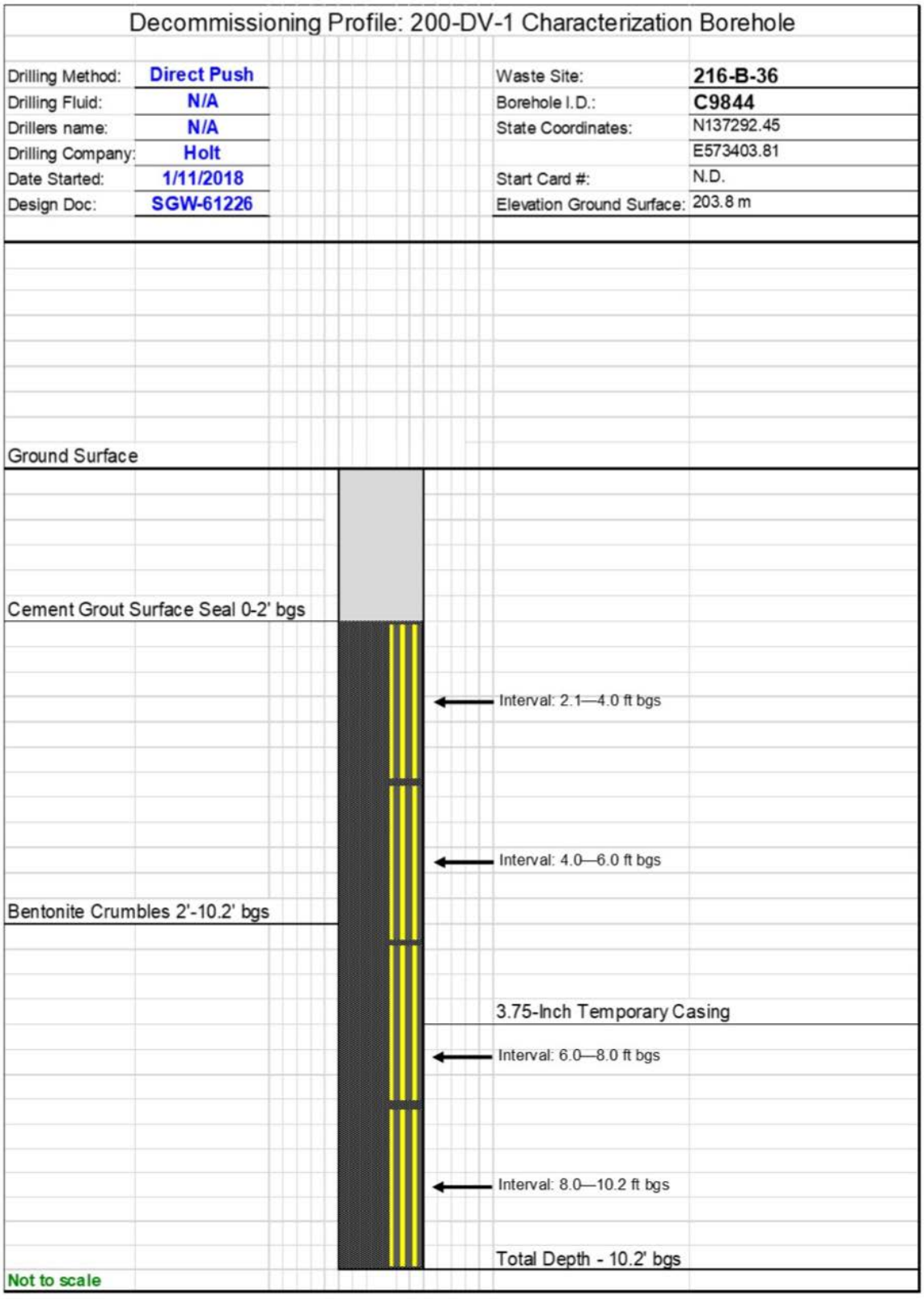

Figure 3-8. Sample Depths and Decommissioning Profile for Borehole C9844 at the 216-B-36 Trench

3.3.3 216-B-39 Trench

Boreholes C9845 and C9560 (replacement) are located on the eastern end of the 216-B-39 Trench waste site boundary. The GeoProbe rig drilled to a depth of approximately 2 m (6.6 ft) bgs at the C9845 borehole location rather than the target depth of 3 m (10 ft) bgs due to refusal. Since C9845 hit refusal at a depth that was shallower than the target depth, borehole C9560 (replacement) was required. The GeoProbe drill rig was moved 0.3 m (1 ft) over and drilled to 3 m (10 ft) bgs to collect the remaining required sample intervals. Sediment samples were analyzed for the COPCs listed in Tables 3-10 and 3-11. Figures 3-9 and 3-10 show the sampling depths and how the boreholes were decommissioned.

3.3.3.1 Borehole C9845

Borehole C9845 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.3 ft) bgs, sediment consisted of reworked Hanford formation backfill. From 0.7 m (2.3 ft) bgs to the total depth of the borehole (2 m [6.7 ft] bgs), sediment was classified as a sandy gravel. The sandy gravel was composed of 65% sand varying between very fine- and medium-grained particles, 30% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) in size that were subangular in overall shape, and 5% silt-sized particles.

3.3.3.2 Borehole C9560 (Replacement for Borehole C9845)

Borehole C9560 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to the depth of 1.6 m (5.1 ft) bgs. From 1.6 m (5.1 ft) bgs to total depth of the borehole (3.1 m [10.1 ft] bgs), the sediment was classified as a sandy gravel. This sandy gravel consisted of 65% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) in size and subangular in overall shape, 30% sand varying between very fine- and medium-grained particles, and 5% silt-sized particles.

3.3.4 216-B-40 Trench

Borehole C9846 is located toward the middle of the 216-B-40 Trench waste site boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9846 borehole location. Sediment samples were analyzed for the COPCs listed in Tables 3-12 and 3-13. Figure 3-11 shows sampling depths and how the borehole was decommissioned.

3.3.4.1 Borehole C9846

Borehole C9846 consisted of sediments composed of the Hf1. Sediment from ground surface to 0.6 m (2.1 ft) bgs consisted of reworked Hanford formation backfill. From 0.6 m (2.1 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as a sandy gravel. This sandy gravel was composed of approximately 60% to 40% sand varying between very fine- and coarse-grained particles, 55% to 35% gravel clasts ranging between very fine pebble and very coarse pebble (2 to 64 mm in diameter) in size and subangular in overall shape, and 5% silt-sized particles.

Table 3-10. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-39 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9845	2.3 – 4.5	B3FLM8							2,340				1,090	164 U					26,900	1,270 B	2,900 B			8,950	
		B3FLM9	7,910,000 D	1,160 ZCH	540 BD	3,500 D	84,000 D	78 BD		12,800 D	14,900 D	120 UZRH			4,600 D	362,000 DN	11 U	12,400 D				750 UD	180 UD		350 D
C9560[a]	5.1 – 6.6	B3FLN1	7,560,000 D	20,500	1,630 UD	2,440 D	67,500 D	65.3 BD	2,360	10,200 D	11,200 D	82.4 U	1,540	162 U	5,070 D	292,000 D	3.69 B	8,690 D	42,900	1,150 B	2,060 U	603 BD	99.1 U	21,400	709 D
		B3FLN2	7,880,000 D		530 BD	4,300 D	79,100 D	80 BD		14,100 D	15,100 D	120 UZRH			5,300 D	344,000 DN	11 U	11,100 D				790 UD	180 UD		450 D
	6.6 – 8.7	B3FLN4	6,870,000 D	6,120	1,600 UD	2,920 D	80,100 D	55.1 BD	2,230	8,850 D	13,000 D	75.2 U	1,510	94.7 U	4,040 D	283,000 D	3.68 U	7,820 D	113,000	1,210 B	2,130 U	746 BD	96.7 U	24,900	597 D
	8.7 – 10.1	B3FLN7	8,410,000 D	9,070	1,580 UD	4,410 D	86,300 D	80.3 BD	1,760 B	8,710 D	12,800 D	76.6 U	1,720	142 U	11,600 D	343,000 D	4.04 B	9,150 D	90,300	1,210 B	2,200 B	619 BD	95.8 U	34,800	558 D
		B3FLN8	7,210,000 D		520 BD	3,100 D	72,100 D	85 BD		9,600 D	15,600 D				6,100 D	313,000 DN	11 U	10,200 D				740 UD	170 UD		450 D

Notes: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
D = analyte was reported at a secondary dilution factor
H = laboratory holding time was exceeded before sample was analyzed
N = spike and/or spike duplicate recovery is outside control limits
R = do not use; further review indicates the result is not valid
U = analyzed for but not detected
Z = indicates a result-specific comment is provided in the data report or case narrative

Table 3-11. Radiological Contaminant Concentrations in Samples Collected from the 216-B-39 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9845	2.3 – 4.5	B3FLM8	0.992 U	3.24 U	0.978	0.0324 U	0.0852 U	0.108 U	0.104 U	0.529 U	0.546 U	5.64 U	0.67 U	0.48 U	1.9	3.37 U	19.1 U	0.963	0.338 U	0.864
C9560[a]	5.1 – 6.6	B3FLN1	0.464 U	3.57 U	1.65	0.0329 U	0.103 U	0.12 U	0.105 U	0.74 U	0.636 U	5.53 U	0.445 U	0.588 U	1.08 U	2.89 U	19.2 U	1.64	0.784 U	0.665 U
	6.6 – 8.7	B3FLN4	0.715 U	3.53 U	1.41	0.0355 U	0.0909 U	0.116 U	0.102 U	0.783 U	0.642 U	5.99 U	0.499 U	0.451 U	1.41 U	2.87 U	18.5 U	0.651	0.599 U	0.789
	8.7 – 10.1	B3FLN7	0.417 U	3.65 U	0.484	0.0304 U	0.0685 U	0.109 U	0.0572 U	1.4 U	0.578 U	6.44 U	0.406 U	0.576 U	0.96 U	3.44 U	17.7 U	1.09	0.397 U	0.839

Note: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifier

U = analyzed for but not detected

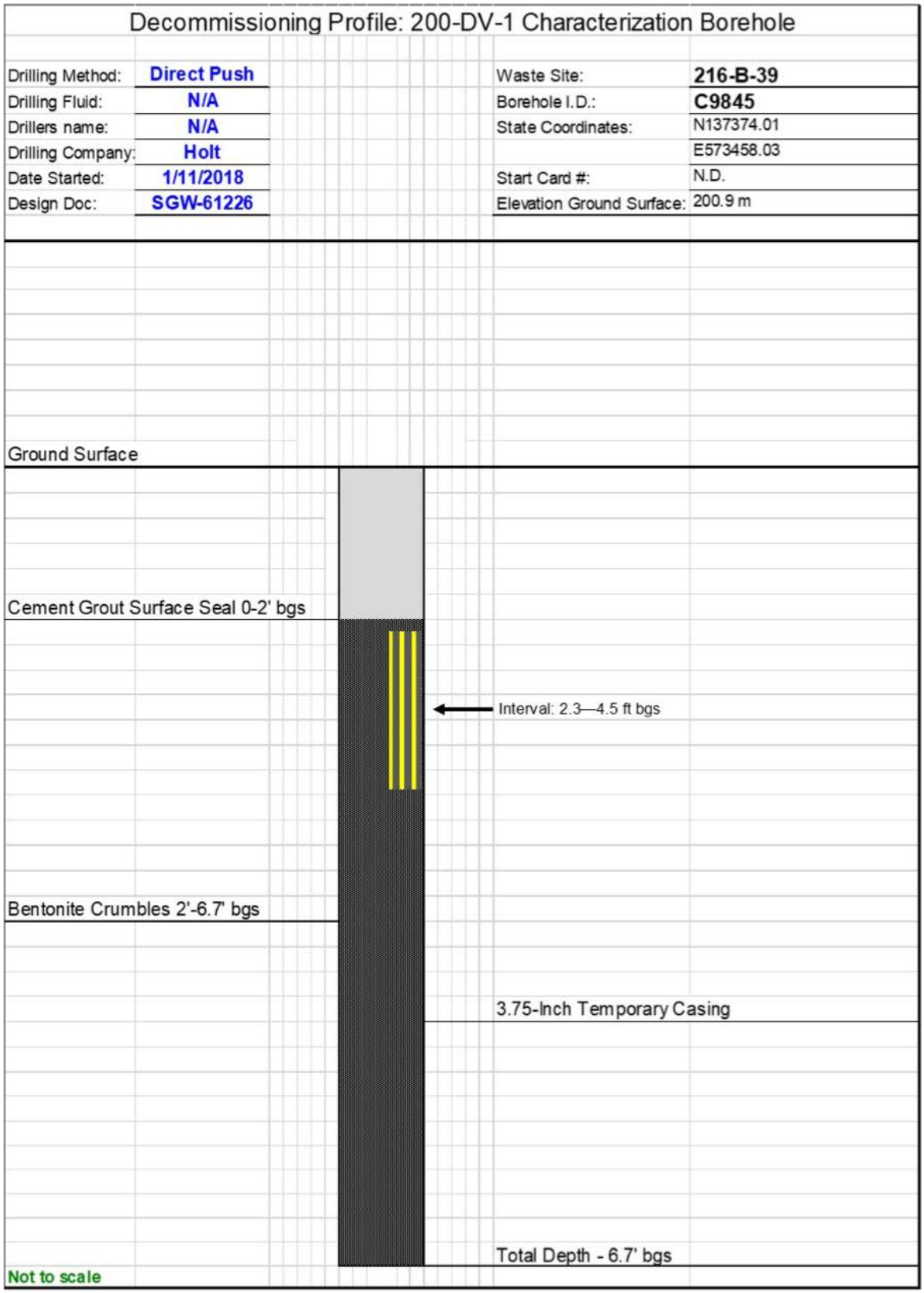

Figure 3-9. Sample Depths and Decommissioning Profile for Borehole C9845 at the 216-B-39 Trench

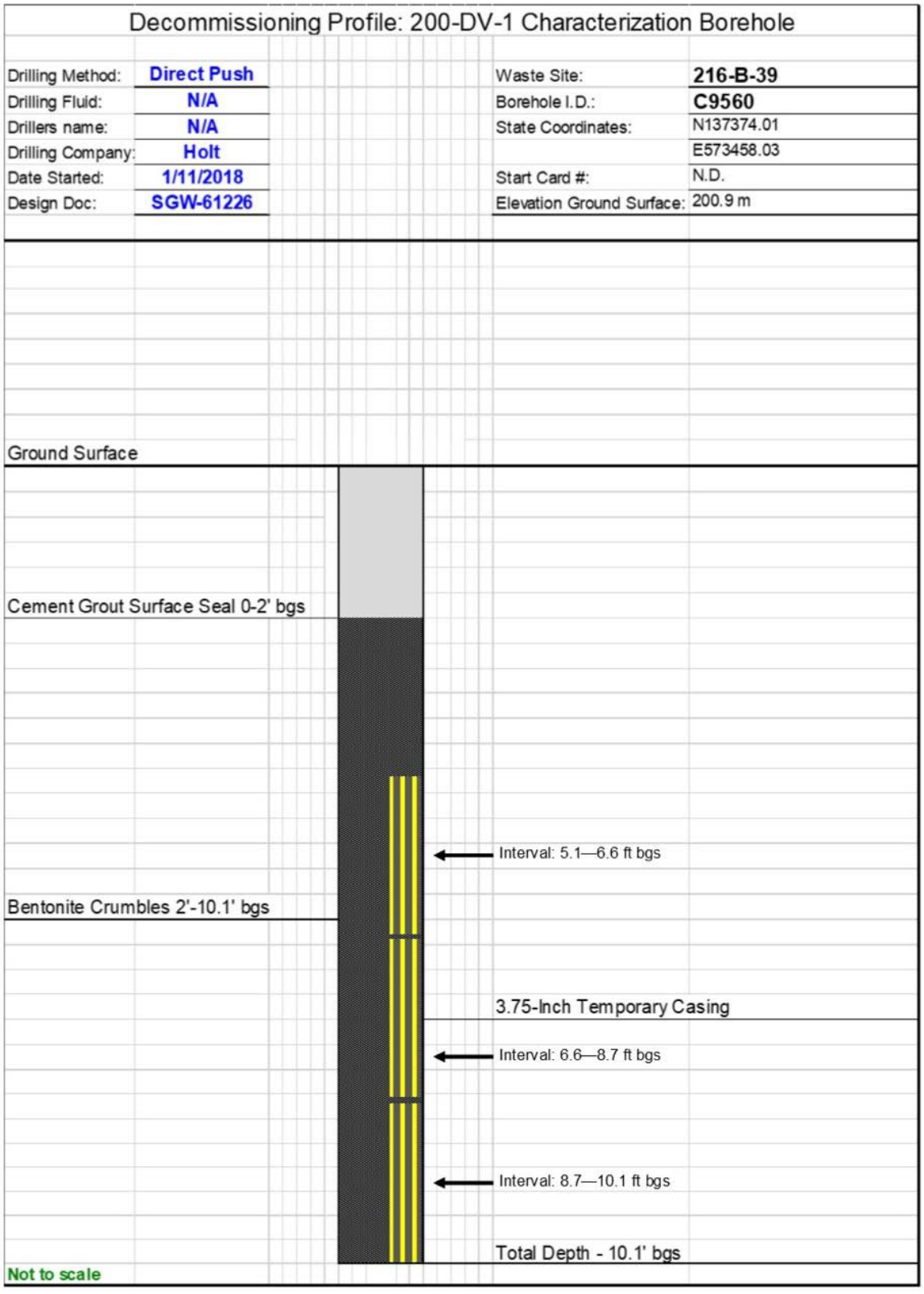

Figure 3-10. Sample Depths and Decommissioning Profile for Borehole C9560 (Replacement) at the 216-B-39 Trench

Table 3-12. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-40 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F $(µg/kg)^-$	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9846	2.1 – 4.4	B3FLV0							1,890 B				888 B	156 U					68,200	1,250 B	2,350 B			14,400	
		B3FLV1	7,440,000 D	851 C	480 BD	3,300 D	84,600 D	84 BD		9,700 D	12,800 D	120 U			4,900 D	362,000 DN	10 U	10,800 D				810 UD	190 UD		350 D
		B3FLV2							1,420 B				912 B	136 U					58,400	1,270 B	3,160 B			10,800	
		B3FLV3	7,060,000 D	1,580 C	550 BD	3,900 D	80,600 D	89 BD		9,700 D	12,900 D	120 U			4,500 D	359,000 DN	12 U	11,000 D				820 UD	190 UD		480 D
	4.4 – 6.8	B3FLV5							3,150				459 B	166 U					85,000	1,190 B	2,130 U			14,900	
		B3FLV6	7,110,000 D	790 C	500 UD	3,000 D	70,300 D	61 UD		9,000 D	12,700 D	120 U			3,900 D	343,000 DN	11 U	8,900 D				810 UD	190 UD		480 D
	6.8 – 8.5	B3FLV8							2,090				1,240	148 U					73,500	1,190 B	2,080 U			10,800	
		B3FLV9	7,600,000 D	754 C	480 UD	3,900 D	69,000 D	67 BD		11,200 D	13,600 D	120 U			4,400 D	330,000 DN	10 U	10,200 D				780 UD	180 UD		520 D
	8.5 – 10.0	B3FLW1	8,000,000 D	6,020	1,670 UD	2,770 D	74,600 D	61.2 BD	2,280	10,300 D	11,800 D	83.8 U	1,560	152 U	4,540 D	299,000 D	4.13 B	8,750 D	62,900	1,290 B	2,090 U	586 BD	101 U	8,950	542 D

Note: Blank cells indicate no result for sample number.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control blank
D = analyte was reported at a secondary dilution factor
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected

Table 3-13. Radiological Contaminant Concentrations in Samples Collected from the 216-B-40 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9846	2.1 – 4.4	B3FLV0	0.492 U	3.54 U	4.37	0.0327 U	0.0992 U	0.121 U	0.0839 U	0.697 U	0.385 U	5.85 U	0.433 U	0.551 U	1.04 U	3.43 U	19.1 U	2.06	0.57 U	0.793
		B3FLV2	0.739 U	3.53 U	8.63	0.0372 U	0.128 U	0.107 U	0.113 U	0.728 U	0.356 U	5.76 U	0.533 U	0.514 U	0.543 U	3.62 U	18.1 U	0.666	0.243 U	0.494
	4.4 – 6.8	B3FLV5	0.286 U	3.52 U	0.065	0.0404 U	0.0749 U	0.117 U	0.087 U	0.695 UXR	0.465 U	5.49 U	0.439 U	0.397 U	1.04 U	2.87 U	17.6 U	0.922	0.272 U	0.406 U
	6.8 – 8.5	B3FLV8	0.279 U	3.57 U	0.0594	0.0444 U	0.11 U	0.126 U	0.0895 U	1.07 U	0.424 U	5.26 U	0.373 U	0.53 U	1.13 U	3.47 U	18.5 U	0.582 U	0.301 U	0.496 U
	8.5 – 10.0	B3FLW1	0.6 U	3.61 U	0.165	0.0438 U	0.0761 U	0.136 U	0.0865 U	0.538 U	0.529 U	5.64 U	0.422 U	0.555 U	1.49 U	3.06 U	18.5 U	0.575 U	0.424 U	0.862

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

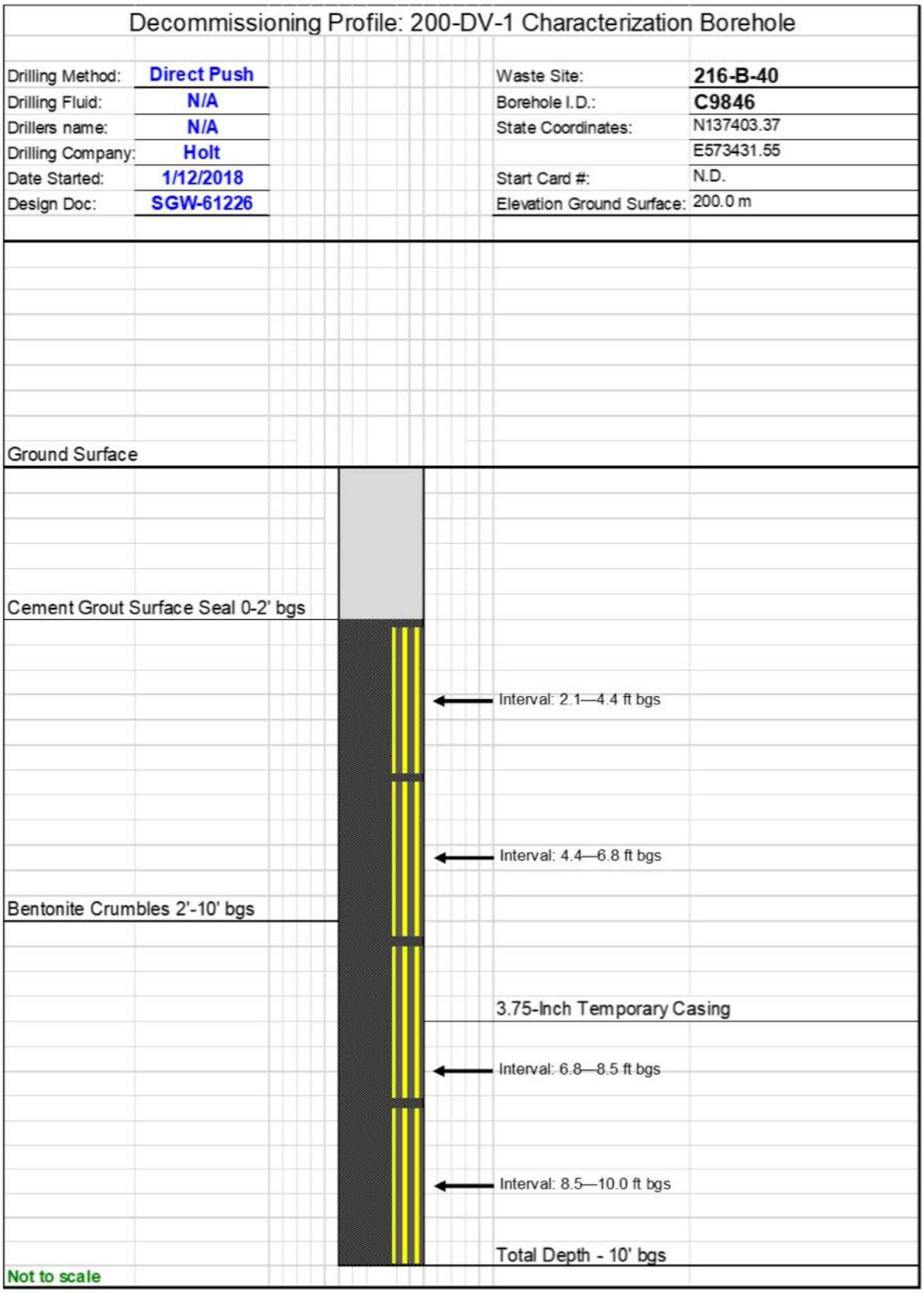

Figure 3-11. Sample Depths and Decommissioning Profile for Borehole C9846 at the 216-B-40 Trench

3.3.5 216-B-41 Trench

Borehole C9847 is located toward the eastern end of the 216-B-41 Trench waste site boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9847 borehole location. Sediment samples were analyzed for the COPCs listed in Tables 3-14 and 3-15. Figure 3-12 shows the sampling depths and how the borehole was decommissioned.

3.3.5.1 Borehole C9847

Borehole C9847 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.3 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.7 m (2.3 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as a sandy gravel that was made up of between 60% to 35% gravel clasts ranging in size between very fine pebble and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, 60% to 40% sand varying between fine- and medium-grained particles, and up to 5% silt-sized particles.

3.4 216-S-9 Crib

Borehole C9848 is located toward the northwestern corner of the 216-S-9 Crib waste site boundary. Boreholes C9849 and C9939 (replacement) are located on the western side of the crib boundary. Borehole C9850 is located on the southern end of the crib boundary. Borehole C9851 is located on the eastern side of the crib boundary, and borehole C9852 is located toward the southeastern corner of the crib boundary. The GeoProbe rig drilled to a target depth of approximately 4.6 m (15 ft) bgs at the C9848, C9850, C9851, and C9852 borehole locations. The GeoProbe rig drilled to a target depth of approximately 4.6 m (15 ft) bgs at C9849; however, samples at the 3 to 3.7 m (10 to 12 ft) and 4 to 4.6 m (13 to 15 ft) intervals lacked volume for analysis, so borehole C9939 (replacement) was drilled to obtain the remaining required sample intervals. The GeoProbe drill rig was moved 0.43 m (1.4 ft) over and drilled to a target depth of approximately 4.6 m (15 ft) bgs, and the remaining samples were collected. Sediment samples were analyzed for the COPCs listed in Tables 3-16 and 3-17. Figures 3-13 through 3-18 show the sampling depths and how the boreholes were decommissioned.

3.4.1 Borehole C9848

Borehole C9848 consisted of sediments composed of the Hf1. From ground surface to 0.9 m (3 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.9 to 1.3 m (3 to 4.4 ft), the sediment was classified as a sandy gravel with 60% varying between fine- and very coarse-grained particles, 35% gravel clasts ranging in size between very fine and coarse pebble (2 to 32 mm in diameter) that were subangular to subrounded in overall shape, and 5% silt-sized particles. From 1.3 to 4 m (4.4 to 13 ft) bgs, the sediment was classified as a sandy gravel made up of 90% to 80% sand varying between fine- and very coarse-grained particles, 15% to 10% gravel clasts ranging in size between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and up to 5% silt-sized particles. From 4 m (13 ft) bgs to total depth of the borehole (4.6 m [15 ft] bgs), the sediment was classified as a sand and was made up of 95% sand varying between very fine- and very coarse-grained particles, and 5% gravel clasts of very fine pebble (2 to 4 mm in diameter) that were subangular in overall shape.

Table 3-14. Nonradiological Contaminant Concentrations in Samples Collected from the 216-B-41 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9847	2.3 – 4.5	B3FMC2							1,520 B				654 B	160 U					17,800	1,230 B	4,110 B			5,160	
		B3FMC3	7,040,000 D	985 C	520 UD	2,800 D	73,100 D	89 BD		9,700 D	12,700 D	120 U			6,500 D	317,000 DN	11 B	9,900 D				810 UD	190 UD		390 D
	4.5 – 6.9	B3FMC5							1,490 B				976 B	597					28,200	1,170 B	2,120 U			6,900	
		B3FMC6	7,370,000 D	681 C	470 UD	3,100 D	72,100 D	64 BD		10,900 D	16,300 D	120 U			4,000 D	301,000 DN	11 B	10,900 D				810 UD	190 UD		460 D
	6.9 – 8.3	B3FMC8							1,350 B				1,170	126 U					23,000	1,210 B	2,130 U			6,050	
		B3FMC9	7,150,000 D	827 C	480 UD	2,900 D	67,500 D	64 BD		11,500 D	12,300 D	120 U			4,300 D	314,000 DN	11 U	20,700 D				770 UD	180 UD		1,900 D
	8.3 – 10.0	B3FMD1							1,940 B				1,550	135 U					35,700	1,180 B	2,130 U			7,250	
		B3FMD2	6,300,000 D	766 C	500 BD	3,400 D	71,100 D	60 BD		10,500 D	13,600 D	120U			4,000 D	313,000 DN	11 U	10,100 D				320 UD	190 UD		510 D

Note: Blank cells indicate no result for sample number.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control
D = analyte was reported at a secondary dilution factor
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected

Table 3-15. Radiological Contaminant Concentrations in Samples Collected from the 216-B-41 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9847	2.3 – 4.5	B3FMC2	0.24 U	3.43 U	6.8	0.0449 U	0.138 U	0.147 U	0.089 UXR	0.629 U	0.604 U	5.76 U	0.554 U	0.609 U	1.03 U	2.92 U	19.1 U	0.615	0.396 U	0.852
	4.5 – 6.9	B3FMC5	0.556 U	3.6 U	0.0583	0.033 U	0.0673 U	0.0945 U	0.0576 UXR	0.546 U	0.823 U	6.16 U	0.366 U	0.395 U	1.61 U	3.17 U	18.8 U	0.556 U	0.247 U	0.684
	6.9 – 8.3	B3FMC8	0.291 U	3.56 U	0.0433 U	0.0427 U	0.0828 U	0.134 U	0.0789 U	1.02 U	0.624 U	5.57 U	0.513 U	0.593 U	1.04 U	3.4 U	19.5 U	0.614 U	0.367 U	1.09
	8.3 – 10.0	B3FMD1	0.457 U	3.47 U	0.0286 U	0.0295 U	0.0663 U	0.0828 U	0.0571 UXR	0.615 U	0.471 U	5.46 U	0.192 U	0.306 U	1.37 U	3.22 U	18.6 U	1.94	0.297 U	1.64

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

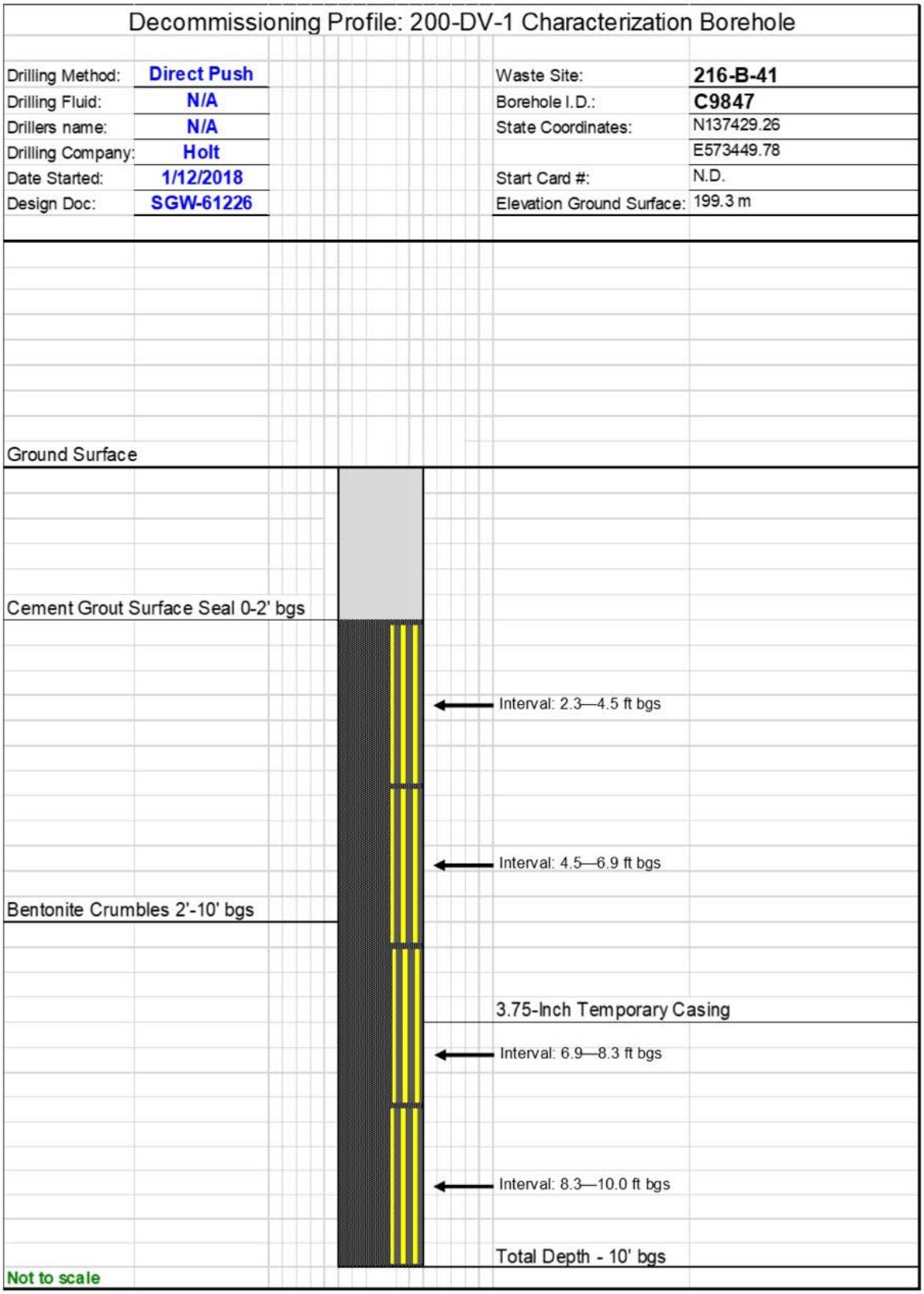

Figure 3-12. Sample Depths and Decommissioning Profile for Borehole C9847 at the 216-B-41 Trench

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Table 3-16. Nonradiological Contaminant Concentrations in Samples Collected from the 216-S-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9848	3.0 – 4.4	B3FMF2							903 B				864 B	168 U					2,820 B	1,140 U	2,160 U			2,640 B	
		B3FMF3	5,500,000 D	839 C	530 BD	4,700 D	70,200 D	71 BD		7,300 D	13,900 D	120 U			3,200 D	331,000 DN	11 U	7,900 D				1,100 BD	190 UD	---	350 D
	4.4 – 6.2	B3FMF5							782 B				724 B	139 U					1,790 B	1,120 U	2,120 U			1,920 B	
		B3FMF6	6,260,000 D	571 BC	520 BD	3,600 D	136,000 D	130 D		7,200 D	14,600 D	120 U			3,500 D	592,000 DN	11 U	10,000 D				860 BD	190 UD		410 D
	6.2 – 8.3	B3FMF8							797 B				852 B	148 U					2,270 B	1,120 U	2,120 U			2,620 B	
		B3FMF9	5,790,000 D	571 BC	460 UD	3,500 D	64,900 D	57 UD		7,700 D	14,400 D	120 U			3,100 D	323,000 DN	11 U	9,000 D				1,100 BD	180 UD		350 D
	8.3 – 10.0	B3FMH1							1,090 B				841 B	147 U					6,550	1,120 U	2,120 U			3,290 B	
		B3FMH2	5,930,000 D	620 BC	710 BD	4,000 D	67,900 D	80 BD		7,700 D	13,600 D	120 U			3,100 D	334,000 DN	10 U	8,400 D				1,200 D	180 UD		420 D
	10.0 – 12.2	B3FMH4							1,270 B				805 B	134 U					5,930	1,120 U	2,120 U			3,680 B	
		B3FMH5	5,720,000 D	693 C	510 UD	3,800 D	72,100 D	69 BD		8,100 D	15,000 D	120 U			3,100 D	323,000 DN	10 U	14,200 D				810 BD	170 UD		390 D
	13.0 – 15.0	B3FMH7							1,610 B				728 B	129 B					4,910	1,110 B	2,050 U			4,300	
		B3FMH8	4,550,000 D	620 Y	440 UD	2,400 D	61,600 D	76 BD		6,400 D	14,200 D	120 U			2,500 D	417,000 D	10 U	8,200 D				990 BD	180 UD		370 D
C9849	2.2 – 4.4	B3FMK0							1,620 B				922 B	123 U					3,940 B	1,080 B	1,960 U			4,980	
		B3FMK1	5,080,000 D	2,190	500 UD	3,600 D	75,400 D	110 BD		7,900 D	12,100 D	120 U			4,000 D	309,000 D	10 U	9,100 D				840 BD	190 UD		490 D
	4.4 – 6.6	B3FMK3							1,690 B				726 B	145 B					9,470	1,200 B	2,170 U			5,080	
		B3FMK4	6,300,000 D	1,170	520 UD	4,800 D	82,500 D	81 BD		7,500 D	15,200 D	120 U			5,100 D	435,000 D	11 U	10,700 D				1,200 BD	190 UD		500 D
	6.6 – 8.3	B3FMK6							1,840 B				582 B	127 U					10,500	1,190 B	2,050 U			6,560	
		B3FMK7	6,160,000 D	839	500 UD	4,600 D	75,900 D	80 BD		7,600 D	15,500 D	120 U			4,300 D	394,000 D	11 U	10,900 D				1,200 BD	190 UD		500 D

Table 3-16. Nonradiological Contaminant Concentrations in Samples Collected from the 216-S-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9939[a]	8.3 – 10.1	B3FMK9							2,140				847 B	193 B					17,100	1,120 U	2,130 U			8,020	
		B3FML0	5,630,000 D	705	490 UD	4,600 D	65,400 D	64 BD		7,500 D	14,000 D	120 U			3,800 D	356,000 D	11 U	9,400 D				1,100 BD	180 UD		420 D
	10.1 – 12.0	B3FML8							1,550 B				1,250	141 U					24,100	1,060 B	2,010 U			10,100	
		B3FML9	5,710,000 D	742	520 UD	3,900 D	85,900 D	71 BD		6,800 D	13,500 D	120 U			4,100 D	439,000 D	11 U	9,100 D				1,100 D	170 UD		450 D
	13.0 – 15.1	B3FMM1							1,380 B				558 B	143 U					18,400	1,130 B	2,020 U			6,420	
		B3FMM2	6,230,000 D	790	510 UD	4,000 D	79,000 D	72 BD		8,500 D	15,800 D	120 U			4,800 D	368,000 D	11 U	11,200 D				1,500 D	190 UD		550 D
C9850	1.9 – 4.5	B3FMM6							1,180 B				1,170	152 BN					5,890	1,140 U	2,160 U			4,500	
		B3FMM7	5,830,000 D	802	480 UD	3,000 D	76,500 D	63 BD		9,300 D	14,400 D	120 U			3,900 D	322,000 D	11 U	10,000 D				880 BD	180 UD		450 D
		B3RMN7							1,340 B				1,120	125 NU					4,740	1,140 U	2,160 U			4,170 B	
		B3FMN8	6,800,000 D	778	480 UD	5,700 D	94,600 D	88 BD		8,200 D	14,900 D	120 U			6,300 D	453,000 D	10 U	12,300 D				1,300 D	170 UD		540 D
	4.5 – 6.6	B3FMM9							1,700 B				869 B	312 N					15,900	1,190 B	3,650 B			5,770	
		B3FMN0	5,740,000 D	1,020	500 UD	4,400 D	75,300 D	88 BD		6,700 D	15,400 D	120 U			4,900 D	375,000 D	11 U	10,100 D				960 BD	190 UD		440 D
	6.6 – 8.4	B3FMN2							2,120 B				1,230	107 NU					19,300	1,150 U	2,190 U			6,210	
		B3FMN3	6,340,000 D	839	500 UD	5,300 D	85,300 D	80 BD		7,200 D	16,100 D	120 U			5,300 D	441,000 D	11 U	10,400 D				1,200 D	190 UD		700 D
	8.4 – 10.1	B3FMN5							1,750 B				1,240	101 NU					29,200	1,150 U	2,180 U			7,760	
		B3FMN6	6,740,000 D	936	510 UD	5,900 D	94,600 D	88 BD		8,300 D	15,500 D	120 U			6,100 D	430,000 D	11 U	11,100 D				1,200 BD	200 UD		540 D
	10.1 – 12.0	B3FMP0							1,460 B				1,330	169 NU					32,600	1,140 U	2,170 U			9,310	
		B3FMP1	789,000 D	924	550 UD	6,100 D	103,000 D	110 BD		9,800 D	20,500 D	140 U			6,400 D	516,000 D	13 U	12,900 D				1,500 D	200 UD		620 D

Table 3-16. Nonradiological Contaminant Concentrations in Samples Collected from the 216-S-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
	13.0 – 15.1	B3FMP3							1,190 B				1,220	156 NU					35,900	1,140 U	2,160 U			9,300	
		B3FMP4	6,180,000 D	863	490 UD	5,700 D	84,000 D	84 BD		7,400 D	17,200 D	120 U			5,200 D	452,000 D	11 U	10,600 D				1,200 D	190 UD		550 D
C9851	1.9 – 4.0	B3FMR4							1,220 BA				752 BA	146 BNA					7,300 A	1,090 BA	1,890 UA			5,020 A	
		B3FMR5	5,950,000 D	985	490 UD	4,000 D	72,300 D	89 BD		8,200 D	15,000 D	120 U			5,400 D	374,000 D	11 U	9,700 D				1,300 D	190 UD		440 D
	4.0 – 6.5	B3FMR7							1,100 B				1,070	159 NU					18,300	1,130 U	2,210 B			5,940	
		B3FMR8	5,540,000 D	985	510 UD	4,600 D	72,000 D	72 BD		6,800 D	13,300 D	120 U			4,800 D	393,000 D	11 U	9,300 D				1,200 D	190 UD		510 D
	6.5 – 8.0	B3FMT0							1,360 B				797 B	128 NU					28,000	1,150 U	2,170 U			7,830	
		B3FMT1	6,070,000 D	1,060	490 UD	5,400 D	81,800 D	88 BD		6,800 D	15,800 D	120 U			5,800 D	414,000 D	11 U	10,000 D				1,100 BD	180 UD		470 D
	8.0 – 10.1	B3FMT3							1,210 B				868 B	188 BN					29,700	1,130 U	2,140 U			7,920	
		B3FMT4	5,720,000 D	839	460 UD	4,300 D	70,400 D	73 BD		8,000 D	16,400 D	120 U			4,700 D	370,000 D	11 U	9,700 D				1,300 D	200 UD		570 D
	10.1 – 12.5	B3FMT6							1,370 B				1,180	121 NU					39,300	1,210 B	2,000 U			10,500	
		B3FMT7	5,730,000 D	827	470 UD	4,700 D	76,200 D	84 BD		6,900 D	15,000 D	120 U			4,900 D	384,000 D	11 U	9,600 D				970 BD	180 UD		460 D
	12.5 – 15.1	B3FMT9							1,340 B				1,150	85.2 NU					40,300	1,290 B	2,140 U			9,790	
		B3FMV0	5,910,000 D	936	500 UD	4,700 D	77,800 D	76 BD		8,100 D	13,700 D	120 U			4,400 D	385,000 D	11 U	9,700 D				1,100 BD	180 UD		450 D
C9852	2.2 – 4.2	B3FMW0							1,080 B				578 B	241 BN					3,120 B	1,170 B	2,090 U			3,400 B	
		B3FMW1	5,800,000 D	754	500 UD	4,600 D	70,400 D	90 BD		9,700 D	13,300 D	120 U			4,500 D	349,000 DN	11 U	9,900 D				1,000 BD	170 UD		510 D
	4.2 – 6.4	B3FMW3							985 B				1,050 B	146 NU					3,010 B	1,160 U	2,210 U			2,330 B	
		B3FMW4	6,740,000 D	815	510 UD	7,400 D	91,700 D	120 BD		7,800 D	15,200 D	120 U			5,700 D	433,000 DN	11 U	10,100 D				860 BD	190 UD		540 D

Table 3-16. Nonradiological Contaminant Concentrations in Samples Collected from the 216-S-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
	6.4 – 8.0	B3FMW6							1,060 B				1,250	186 BN					5,180	1,130 B	2,010 U			3,310 B	
		B3FMW7	6,580,000 D	888	530 UD	8,400 D	93,600 D	110 BD		8,600 D	14,500 D	430 B			7,700 D	444,000 DN	11 U	10,200 D				970 BD	200 UD		1,500 D
	8.0 – 10.0	B3FMW9							1,950 B				1,200	166 BN					15,000	1,210 B	2,090 U			4,660	
		B3FMX0	5,850,000 D	948	500 UD	7,800 D	74,300 D	92 BD		8,300 D	16,700 D	120 U			6,200 D	444,000 DN	11 U	9,800 D				1,300 D	180 UD		560 D
	10.0 – 12.5	B3FMX2							1,300 B				792 B	110 BN					9,070	1,160 B	1,990 U			3,990	
		B3FMX3	4,540,000 D	766	470 UD	4,800 D	53,300 D	57 UD		4,800 D	13,900 D	120 U			2,700 D	331,000 DN	10 U	8,200 D				1,100 BD	180 UD		410 D
	12.5 – 15.2	B3FMX5							1,140 B				1,280	88.2 NU					6,240	1,170 B	2,070 U			4,830	
		B3FMX6	4,700,000 D	912	490 UD	5,000 D	77,400 D	74 BD		4,900 D	13,700 D	120 U			3,200 D	358,000 DN	11 U	9,300 D				1,100 BD	180 UD		460 D

Notes: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork
B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control blank
D = analyte was reported at a secondary dilution factor
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected
Y = indicates a result-specific comment is provided in the data report or case narrative

Table 3-17. Radiological Contaminant Concentrations in Samples Collected from the 216-S-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9848	3.0 – 4.4	B3FMF2	0.368 U	3.63 U	1.64	0.0269 U	0.0826 U	0.0902 U	0.0926 U	0.304 U	0.656 U	5.86 U	0.37 U	0.489 U	1.34 U	3.66 U	16.9 U	0.567 U	0.274 U	0.613
	4.4 – 6.2	B3FMF5	0.24 U	3.53 U	0.025 U	0.0277 U	0.0603 U	0.087 U	0.0659 UXR	0.593 U	0.485 U	5.46 U	0.483 U	0.463 U	0.985 U	3.39 U	18.5 U	0.705	0.229 U	0.356
	6.2 – 8.3	B3FMF8	0.328 U	3.54 U	0.0355 U	0.0369 U	0.0901 U	0.117 U	0.0729 UXR	0.903 U	0.513 U	5.92 U	0.421 U	0.516 U	1.35 U	3.31 U	19 U	0.748	0.424 U	0.215 U
	8.3 – 10.0	B3FMH1	0.458 U	3.67 U	0.0208 U	0.0232 U	0.0506 U	0.0582 U	0.0439 UXR	0.673 U	0.617 U	5.72 U	0.44 U	0.578 U	0.923 U	3.02 U	19.4 U	0.639 U	0.459 U	0.622
	10.0 – 12.2	B3FMH4	0.315 U	3.34 U	0.0273 U	0.0233 U	0.0719 U	0.0949 U	0.0783 U	0.515 U	0.345 U	5.48 U	0.395 U	0.503 U	1.29 U	3.62 U	19.3 U	0.638	0.462 U	0.558
	13.0 – 15.0	B3FMH7	0.602 U	3.15 U	0.0283 U	0.0279 U	0.0764 U	0.0973 U	0.0882 U	0.87 U	0.777 U	6.33 U	0.978 U	1.21 U	1.24 U	3.2 U	22.3 U	0.868 U	0.616 U	0.519
C9849	2.2 – 4.4	B3FMK0	0.701 U	3.02 U	1.72	0.034 U	0.082 U	0.0994 U	0.0779 U	0.444 UXR	0.337 U	5.02 U	0.689 U	0.503 U	1.61 U	3.4 U	22.7 U	1.01	0.452 U	0.422 U
	4.4 – 6.6	B3FMK3	0.531 U	2.87 U	4.4	0.0319 U	0.112 U	0.124 U	0.111 U	0.627 U	0.476 U	6.38 U	0.682 U	0.657 U	1.76 U	3.31 U	23.4 U	0.521 U	0.514 U	0.528
	6.6 – 8.3	B3FMK6	0.49 U	3.14 U	0.0271 U	0.0258 U	0.0606 U	0.0946 U	0.0662 U	0.424 U	0.461 U	5.86 U	0.727 U	0.658 U	1.66 U	3.54 U	22.1U	0.666 U	0.43 U	0.728
	8.3 – 10.1	B3FMK9	0.478 U	3.04 U	0.0293 U	0.0295 U	0.0833 U	0.112 U	0.0876 U	0.575 U	1.12 U	5.28 U	0.489 U	0.766 U	1.13 U	3.53 U	23 U	0.588 U	0.482 U	0.533
C9939[a]	10.1 – 12.0	B3FML8	0.39 U	3.14 U	0.0304 UXR	0.0375 U	0.0691 U	0.121 U	0.0494 UXR	0.439 U	0.448 U	6.19 U	0.63 U	0.719 U	1.02 U	3.33 U	22.7 U	1.2	0.485 U	0.613
	13.0 – 15.1	B3FMM1	0.373 U	3.14 U	0.0274 U	0.0283 U	0.0663 U	0.0798 U	0.0726 U	0.656 U	0.439 U	5.59 U	0.443 U	0.478 U	1.1 U	3.41 U	23.3 U	0.799	0.438 U	0.815
C9850	1.9 – 4.5	B3FMM6	0.538 U	3.16 U	0.725	0.0291 U	0.0722 U	0.107 U	0.0702 U	0.306 U	0.413 U	5.53 U	0.386 U	0.508 U	0.822 U	2.76 U	22.2 U	1.12	0.426 U	0.612
		B3RMN7	0.396 U	2.99 U	0.402	0.0359 U	0.0827 U	0.0958 U	0.0959 U	0.716 U	0.488 U	5.22 U	0.464 U	0.61 U	1.03 U	3.59 U	23 U	0.742	0.233 U	0.583
	4.5 – 6.6	B3FMM9	0.305 U	2.94 U	1.45	0.0343 U	0.0912 U	0.113 U	0.0855 U	0.616 U	0.509 U	4.88 U	0.651 U	0.816 U	1 U	2.92 U	23.2 U	0.692	0.51 U	0.635
	6.6 – 8.4	B3FMN2	0.619 U	2.98 U	0.027 U	0.0289 U	0.0621 U	0.109 U	0.0653 UXR	0.633 U	0.555 U	6.37 U	0.21 U	0.461 U	1.17 U	4.01 U	22.9 U	0.473 U	0.355 U	0.395 U
	8.4 – 10.1	B3FMN5	0.428 U	3.14 U	0.0389 U	0.0356 U	0.104 U	0.141 U	0.104 UXR	0.662 U	0.425 U	5.68 U	0.341 U	0.341 U	1.02 U	3.21 U	22.6 U	0.494 U	0.391 U	0.628
	10.1 – 12.0	B3FMP0	0.548 U	3.12 U	0.0382 U	0.0506 U	0.117 U	0.134 U	0.129 U	0.703 U	0.318 U	6.14 U	0.323 U	0.5 U	1.15 U	3.64 U	22.5 U	0.503	0.41 U	0.586
	13.0 – 15.1	B3FMP3	0.492 U	3.15 U	0.0315 U	0.0362 U	0.0785 U	0.123 U	0.0835 U	0.414 U	0.408 U	4.84 U	0.448 U	0.692 U	0.823 U	2.99 U	22.3 U	0.831	0.559 U	0.969

Table 3-17. Radiological Contaminant Concentrations in Samples Collected from the 216-S-9 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9851	1.9 – 4.0	B3FMR4	0.472 UA	3.92 UA	9.24 A	0.025 UA	0.102 UA	0.0921 UA	0.0897 U	0.401 UA	0.305 UA	6.12 UA	0.563 UA	0.516 UA	0.965 UA	3.38 UA	20 UA	0.823 A	0.291 UA	0.235 UA
	4.0 – 6.5	B3FMR7	0.296 U	3.04 U	4.3	0.048 U	0.136 U	0.126 U	0.132 U	0.388 U	0.349 U	6.27 U	0.385 U	0.539 U	0.765 U	3.35 U	21.9 U	0.82	0.509 U	0.626
	6.5 – 8.0	B3FMT0	0.374 U	3.07 U	0.0331 U	0.0308 U	0.0667 U	0.104 U	0.0623 UXR	0.762 U	0.606 U	5.48 U	0.174 U	0.407 U	1.13 U	3.74 U	22 U	0.584 U	0.452 U	0.503 U
	8.0 – 10.1	B3FMT3	0.599 U	3.06 U	0.0342 U	0.0334 U	0.0804 U	0.115 U	0.0917 U	0.515 U	0.598 U	5.54 U	0.362 U	0.406 U	0.959 U	3.19 U	22.9 U	0.662 U	0.547 U	0.527 U
	10.1 – 12.5	B3FMT6	0.571 U	3.95 U	0.0295 U	0.0386 U	0.0674 U	0.109 U	0.0566 UXR	0.776 U	0.285 U	6.16 U	0.283 U	0.477 U	1.21 U	2.67 U	20.6 U	0.543 U	0.231 U	0.344 U
	12.5 – 15.1	B3FMT9	0.462 U	3.84 U	0.0448 U	0.0567 U	0.111 U	0.138 U	0.11 U	0.433 U	0.388 U	6.62 U	0.358 U	0.357 U	0.902 U	3.12 U	20.1 U	0.69	0.562 U	0.712
C9852	2.2 – 4.2	B3FMW0	0.637 U	3.69 U	0.757	0.0326 U	0.0779 U	0.0935 U	0.096 U	0.685 U	0.362 U	6.24 U	0.43 U	0.591 U	0.917 U	2.92 U	19.7 U	0.973	0.666 U	0.973
	4.2 – 6.4	B3FMW3	0.305 U	3.81 U	0.033 U	0.0331 U	0.071 U	0.105 U	0.0911 U	0.492 U	0.302 U	6.22 U	0.486 U	0.708 U	1.2 U	3.48 U	20 U	1.01 U	0.654 U	0.786
	6.4 – 8.0	B3FMW6	0.356 U	3.66 U	0.0287 U	0.0306 U	0.0709 U	0.103 U	0.0898 U	0.474 U	0.669 U	5.25 U	0.457 U	0.472 U	0.988 U	3.3 U	19.7 U	0.776	0.287 U	0.911
	8.0 – 10.0	B3FMW9	0.569 U	3.68 U	0.0269 U	0.0337 U	0.0823 U	0.104 U	0.0958 U	0.55 U	0.507 U	5.9 U	0.645 U	0.385 U	0.901 U	3.52 U	19.6 U	1.25	0.286 U	0.698
	10.0 – 12.5	B3FMX2	0.377 U	4.02 U	0.0268 U	0.0323 U	0.0721 U	0.103 U	0.0718 U	0.724 U	0.418 U	6.07 U	0.541 U	0.427 U	0.69 U	2.95 U	20.3 U	0.636 U	0.55 U	0.445 U
	12.5 – 15.2	B3FMX5	0.467 U	3.95 U	0.0294 U	0.0324 U	0.0761 U	0.087 U	0.0798 U	0.391 U	0.406 U	6.07 U	0.552 U	0.805 U	1.05 U	2.92 U	21.1 U	1.18	0.433 U	0.447 U

Note: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

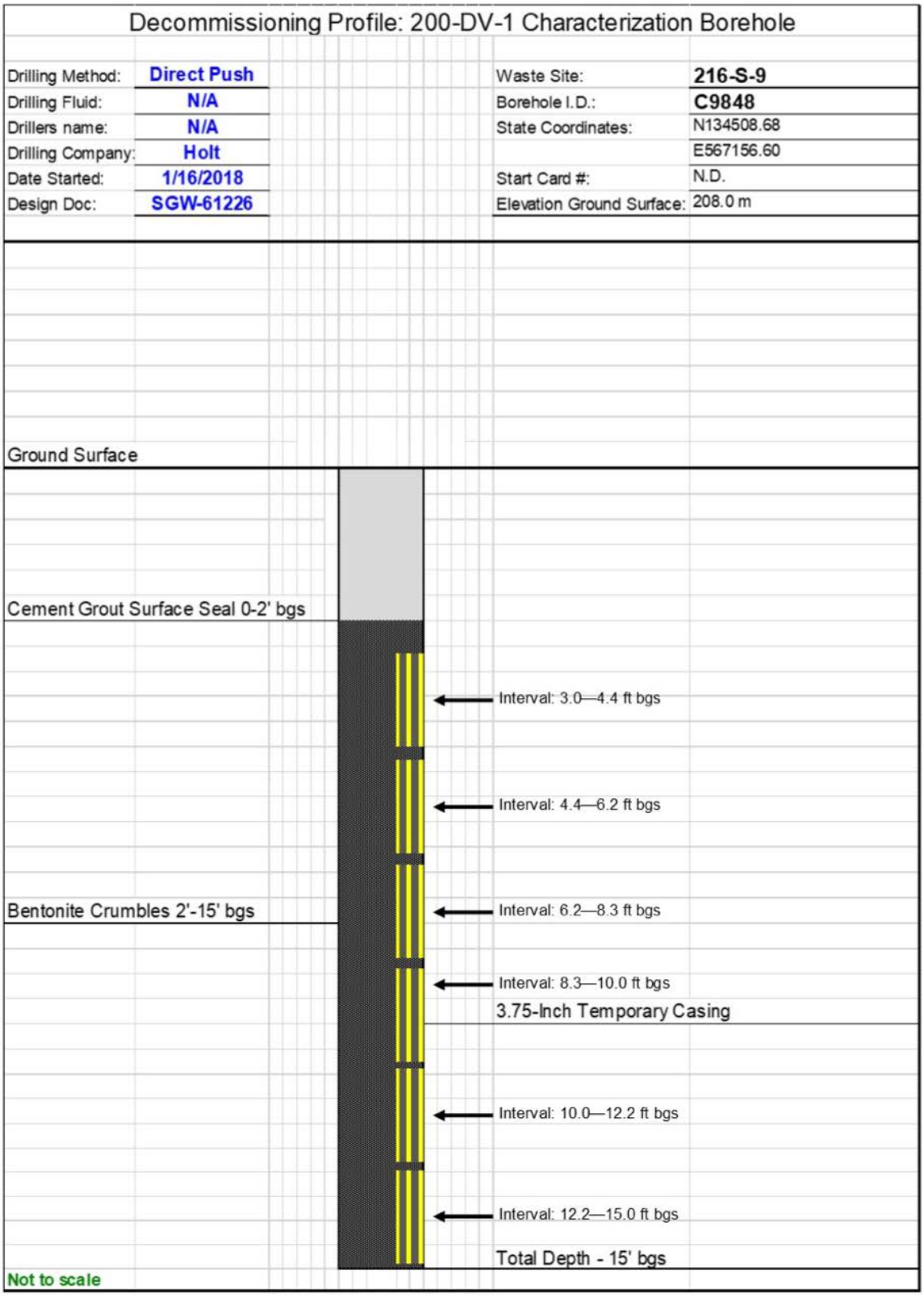

Figure 3-13. Sample Depths and Decommissioning Profile for Borehole C9848 at the 216-S-9 Crib

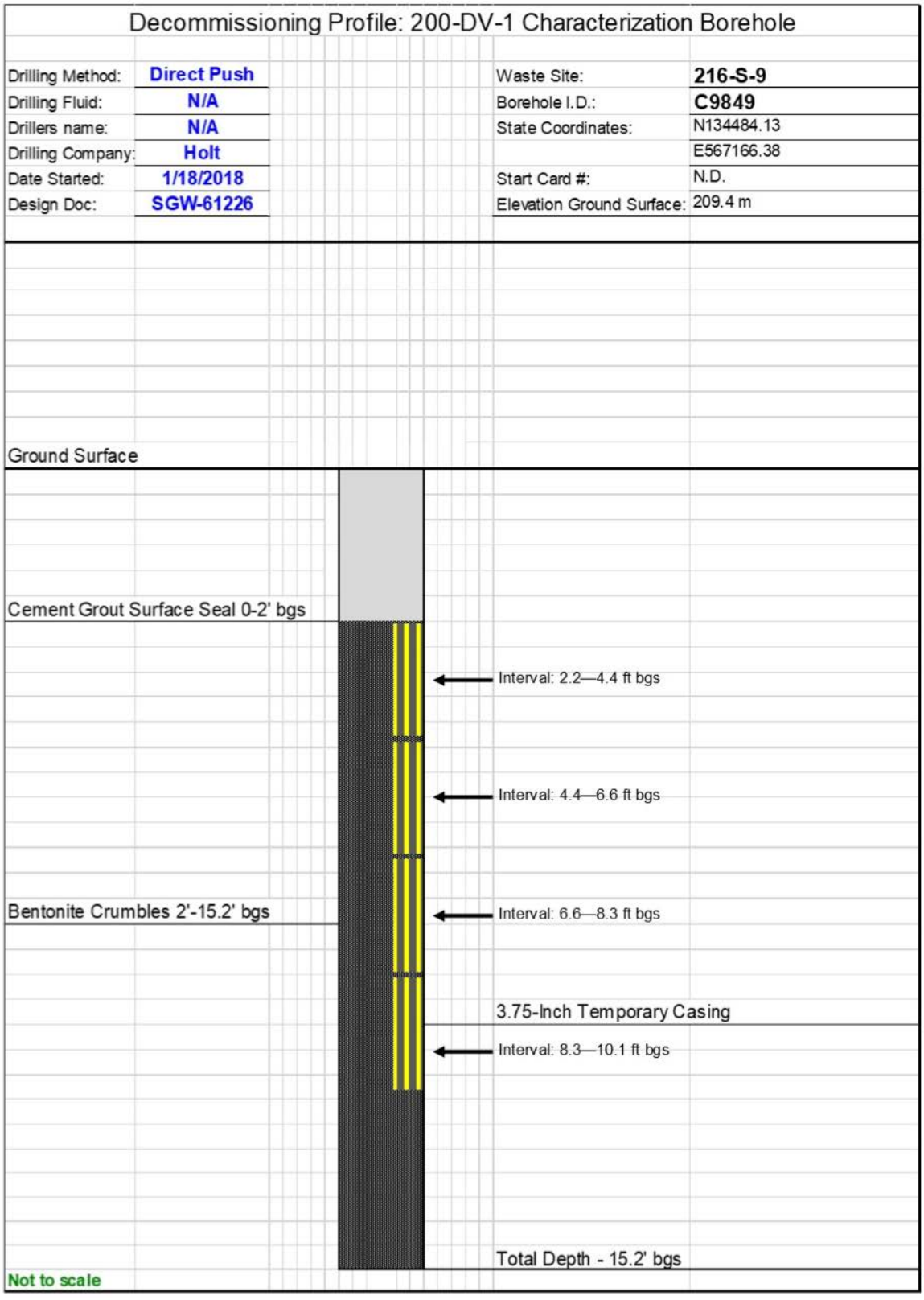

Figure 3-14. Sample Depths and Decommissioning Profile for Borehole C9849 at the 216-S-9 Crib

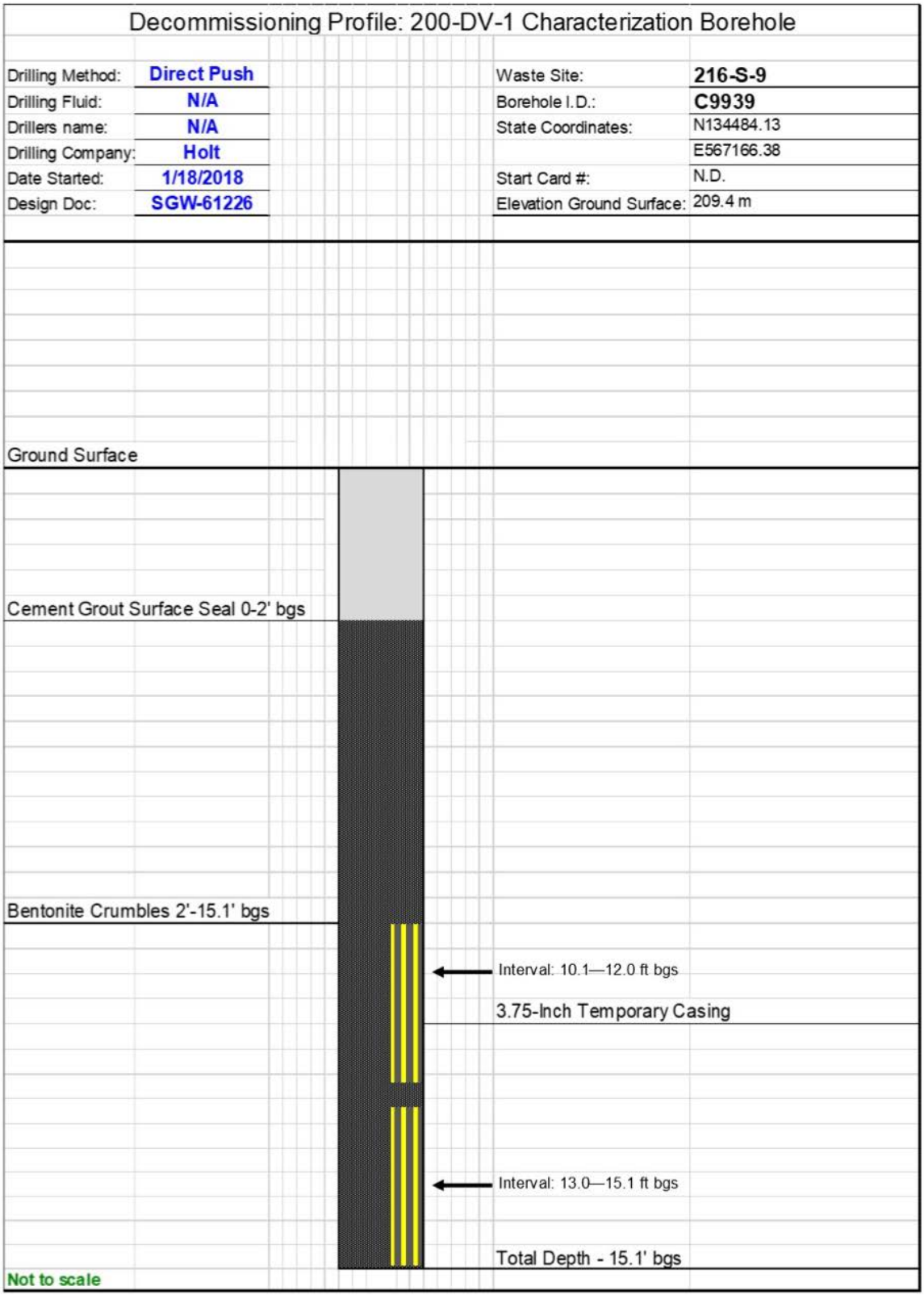

Figure 3-15. Sample Depths and Decommissioning Profile for Borehole C9939 (Replacement) at the 216-S-9 Crib

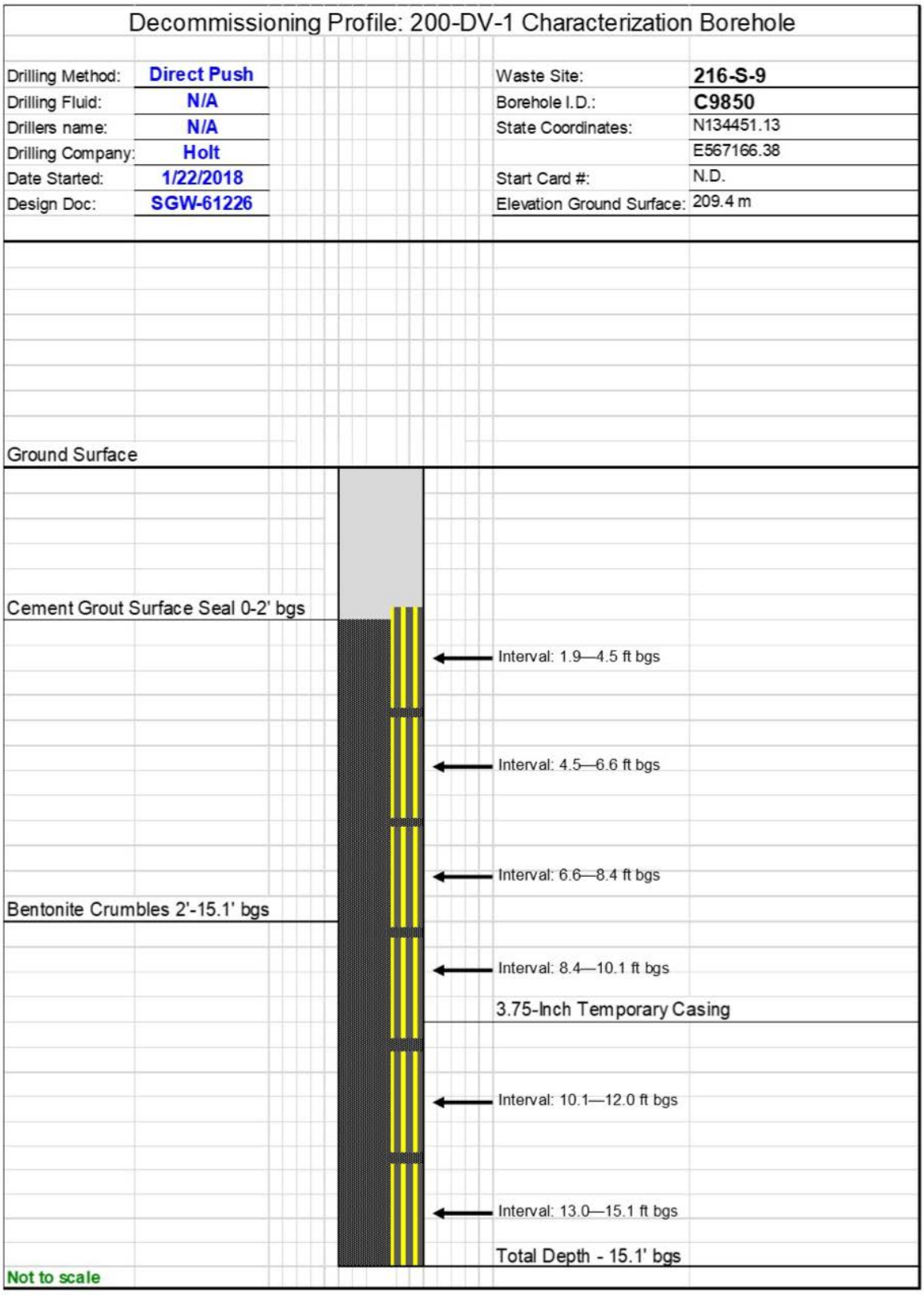

Figure 3-16. Sample Depths and Decommissioning Profile for Borehole C9850 at the 216-S-9 Crib

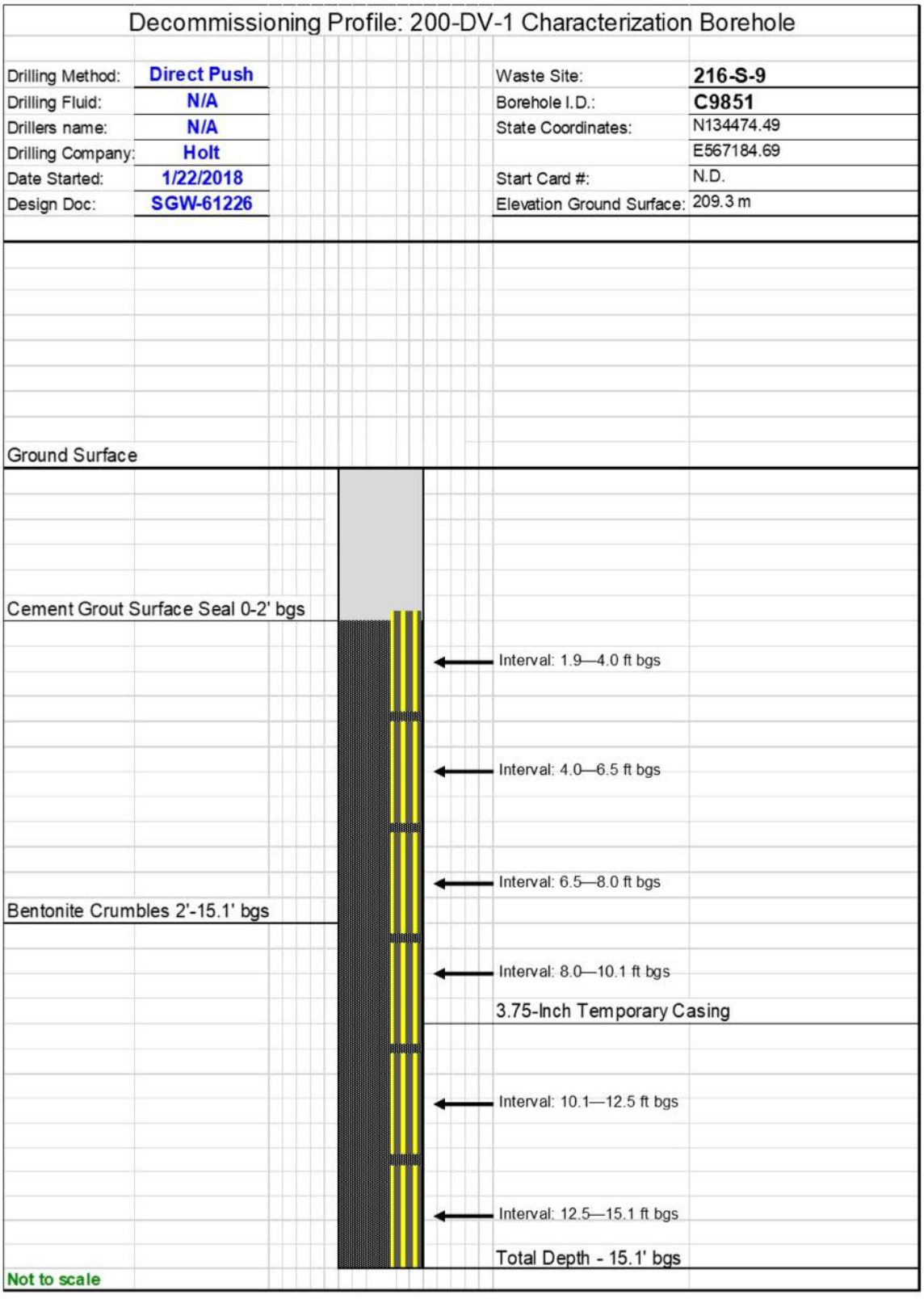

Figure 3-17. Sample Depths and Decommissioning Profile for Borehole C9851 at the 216-S-9 Crib

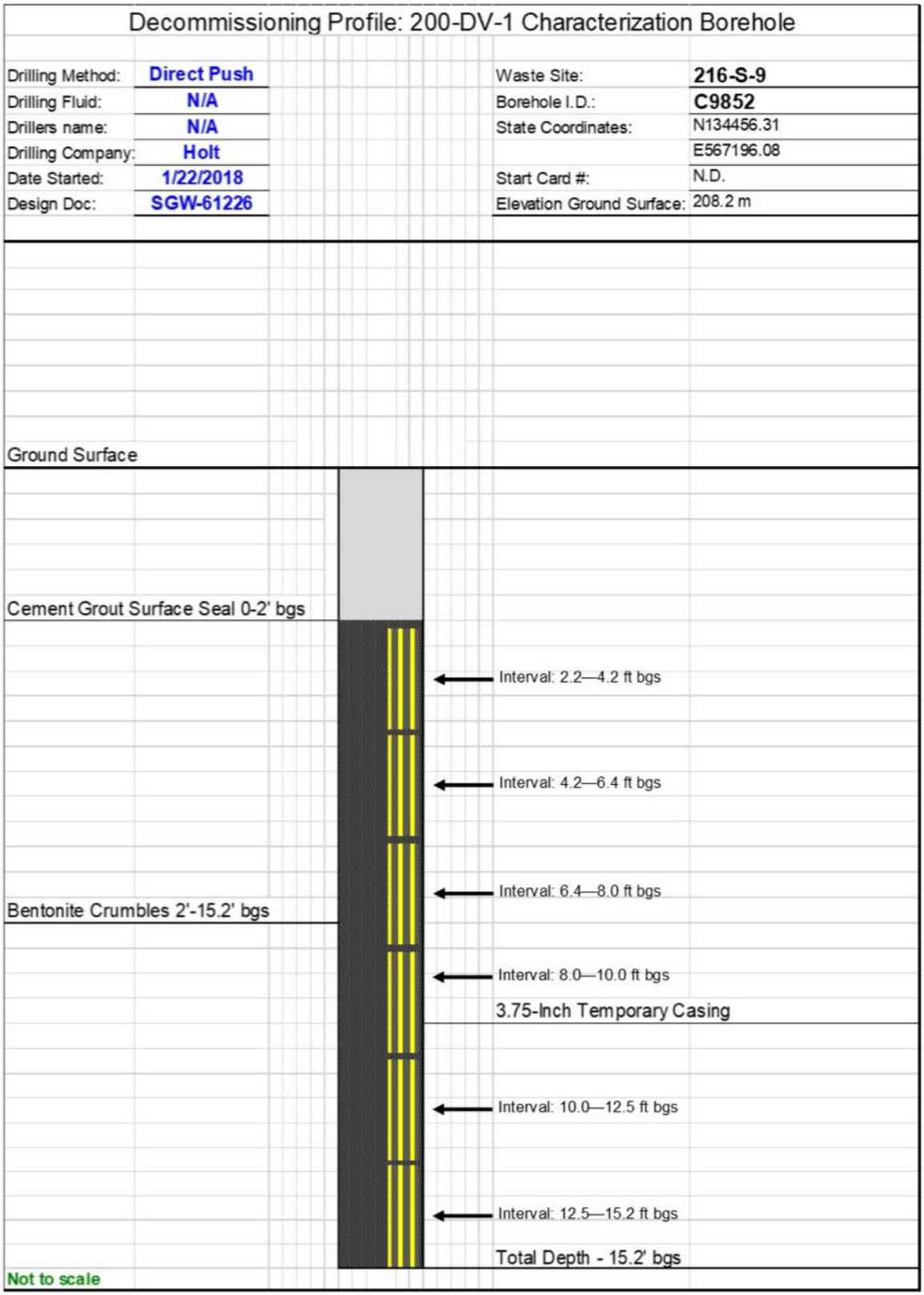

Figure 3-18. Sample Depths and Decommissioning Profile for Borehole C9852 at the 216-S-9 Crib

3.4.2 Borehole C9849

Borehole C9849 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.2 ft) bgs, the sediment was classified as a sandy gravel and was made up of 60% sand varying between fine- and very coarse-grained particles, and 35% gravel clasts ranging from very fine pebble and small cobble (2 to 126 mm in diameter) that were angular to subangular in overall shape. From 2 to 3.9 m (6.6 to 12.8 ft) bgs, the sediment was classified as a gravelly sand made up of 80% sand varying between fine- and very coarse-grained particles, and 20% gravel clasts ranging in size between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape. From 3.9 m (12.8 ft) bgs to total depth of the borehole (4.6 m [15.2 ft] bgs), sediment was not observed due to no soil recovery.

3.4.3 Borehole C9939 (Replacement for Borehole C9849)

Borehole C9939 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed before a depth of 3.1 m (10.1 ft) bgs. From 3.1 m (10.1 ft) bgs to total depth of the borehole (4.6 m [15.1 ft] bgs), the sediment was classified as a gravelly sand and was made up of 80% sand varying between fine- and very coarse-grained particles, and 20% gravel clasts ranging in size between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape.

3.4.4 Borehole C9850

Borehole C9850 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (1.9 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 m (1.9 ft) bgs to total depth of the borehole (4.6 m [15.1 ft] bgs), the sediment was classified as a sandy gravel and was made up of 60% to 35% gravel clasts ranging in size between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, 60% to 35% sand varying between fine- and very coarse-grained particles, and up to 5% silt-sized particles.

3.4.5 Borehole C9851

Borehole C9851 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (1.9 ft) bgs the sediment consisted of reworked Hanford formation backfill. From 0.6 to 2 m (1.9 to 6.5 ft), the sediment was classified as a sandy gravel and was made up of 60% to 45% sand varying between fine- and very coarse-grained particles, 50% to 35% gravel clasts ranging in size between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and up to 5% silt-sized particles. From 2 m (6.5 ft) bgs to total depth of the borehole (4.6 m [15.1 ft] bgs), the sediment was classified as gravelly sand and was made up of 75% sand varying between fine- and very coarse-grained particles, 20% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and 5% silt-sized particles.

3.4.6 Borehole C9852

Borehole C9852 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.2 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.7 to 1.3 m (2.2 to 4.2 ft) bgs, the sediment was classified as a sandy gravel and was made up of 55% gravel clasts ranging in size from very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, 40% sand varying between fine- and very coarse-grained particles, and 5% silt-sized particles. From 1.3 m (4.2 ft) bgs to total depth of the borehole (4.6 m [15.2 ft] bgs), the sediment was classified as gravelly sand and was made up of 75% to 70% sand varying between very fine and medium particles, 25% gravel ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and up to 5% silt-sized particles.

3.5 216-S-21 Crib

Borehole C9853 is located in the southeastern corner of the 216-S-21 Crib waste site boundary, and borehole C9854 is located in the northwestern corner of the crib boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at both of the C9853 and C9854 borehole locations. Sediment samples were analyzed for the COPCs listed in Tables 3-18 and 3-19. Figures 3-19 and 3-20 show the sampling depths and how the boreholes were decommissioned.

3.5.1 Borehole C9853

Borehole C9853 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2.1 ft) bgs, sediment consisted of reworked Hanford formation backfill. From 0.6 to 1.3 m (2.1 to 4.2 ft) bgs, the sediment was classified as a sandy gravel and was made up of 55% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, 40% sand varying between fine- and medium-grained particles, and 5% silt-sized particles. From 1.3 m (4.2 ft) to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as gravelly sand and was made up of 85% sand varying between fine- and medium-grained particles, and 15% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape.

3.5.2 Borehole C9854

Borehole C9854 consisted of sediments composed of the Hf1. From ground surface to 0.5 m (1.8 ft) bgs, sediment consisted of reworked Hanford formation backfill. From 0.5 m (1.8 ft) bgs to total depth of the borehole (3.1 m [10.1 ft] bgs), the sediment was classified as gravelly sand and was made up of 85% sand varying between fine- and medium-grained particles, and 15% gravel clasts ranging in size between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape.

3.6 216-T-5 Trench

Borehole C9855 is located in the southwestern corner of the 216-T-5 Trench waste site boundary, and borehole C9856 is located on the eastern side of the trench boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at both of the C9855 and C9856 borehole locations. Sediment samples were analyzed for the COPCs listed in Tables 3-20 and 3-21. Figures 3-21 and 3-22 show the sampling depths and how the boreholes were decommissioned.

3.6.1 Borehole C9855

Borehole C9855 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (1.9 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 to 1.2 m (1.9 to 4.1 ft) bgs, the sediment was classified as a sandy gravel and was made up of 55% gravel clasts ranging between very fine and medium pebble (2 to 16 mm in diameter) that were subangular in overall shape, and 45% sand varying between very fine- and medium-grained particles. From 1.2 to 1.9 m (4.1 to 6.3 ft) bgs, the sediment is classified as gravelly sand and was made up of 85% sand varying between very fine- and medium-grained particles, and 15% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape. From 1.9 m (6.3 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as sand and was made up of 90% sand varying between very fine- and coarse-grained particles, 5% gravel clasts ranging between very fine and coarse pebble (2 to 32 mm in diameter) that were subangular in overall shape, and 5% silt-sized particles.

Table 3-18. Nonradiological Contaminant Concentrations in Samples Collected from the 216-S-21 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)	Kerosene (µg/kg)	TBP (µg/kg)
C9853	2.1 – 4.2	B3H0F7							1,250 B			86.1 UXH	1,050 B	127 NU					13,700	1,150 U	3,030 B			3,450 B			
		B3H0F8	5,900,000 D	644	490 UD	4,500 D	75,600 D	74 BD		8,200 D	12,800 D				5,200 D	350,000 DN	11 U	10,000 D				1,200 D	180 UD		500 D	2,600 U	48 U
		B3H0H5							1,410 B			73.5 UXH	526 B	152 D					9,340	1,140 U	2,620 B			3,360 B			
		B3H0H6	6,200,000 D	340 B	500 UD	4,300 D	90,900 D	79 BD		8,500 D	13,500 D				5,500 D	479,000 DN	13 B	11,900 D				1,000 BD	190 UD		580 D	2,500 U	48 U
	4.2 – 6.4	B3H0H0							1,360 B			86.0 UXH	660 B	109 NU					17,700	1,140 U	2,190 B			3,790 B			
		B3H0H1	6,000,000 D	486 B	490 UD	3,900 D	81,400 D	71 BD		7,800 D	12,600 D				4,700 D	380,000 DN	11 U	10,400 D				1,000 BD	180 UD		390 D	2,500 U	48 U
	6.4 – 8.0	B3H0H3							1,520 B			70.0 UXH	782 B	139 BN					24,400	1,140 U	2,260 B			6,030			
		B3H0H4	6,080,000 D	511 B	490 UD	4,400 D	86,500 D	81 BD		7,300 D	13,200 D				5,200 D	390,000 DN	12 B	10,000 D				1,100 D	170 D		410 D	2,500 U	48 U
	8.0 – 10	B3H0H8							1,650 B			76.3 UXH	746 B	133 NU					32,400	1,140 U	2,440 B			10,300			
		B3H0H9	6,150,000 D	644 B	500 UD	4,000 D	84,700 D	80 BD		8,300 D	12,600 D				5,800 D	399,000 DN	13 B	11,100 D				960 BD	180 UD		430 D	2,600 U	49 U
C9854	1.8 – 4.4	B3H0J9							1,600 B			76.1 UXH	361 U	107 NU					14,400	1,150 U	2,180 U			4,510			
		B3H0K0	6,360,000 D	499 B	500 UD	3,800 D	87,400 D	87 BD		7,500 D	13,100 D				5,800 D	381,000 DN	13 B	10,000 D				1,200 D	180 UD		400 D	2,600 U	49 U
	4.4 – 7.2	B3H0K2							868 B			77.3 UXH	781 B	103 BN					6,650	1,120 U	2,280 B			2,900 B			
		B3H0K3	5,680,000 D	523 B	510 UD	4,600 D	112,000 D	91 BD		6,900 D	15,400 D				6,200 D	531,000 DN	12 B	9,400 D				1,400 D	190 UD		400 D	2,500 U	48 U
	7.2 – 8.0	B3H0K5							1,000 B			85.0 UXH	468 B	137 NU					8,460	1,130 U	2,140 U			3,250 B			
		B3H0K6	6,130,000 D	547 B	510 UD	4,000 D	83,600 D	82 BD		7,700 D	12,800 D				5,700 D	376,000 DN	14 B	10,000 D				990 BD	180 UD		790 D	2,500 U	48 U

Table 3-18. Nonradiological Contaminant Concentrations in Samples Collected from the 216-S-21 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)	Kerosene (µg/kg)	TBP (µg/kg)
	8.0 – 10.1	B3H0K8							1,150 B			58.1 UXH	476 B	90.3 NU					7,300	1,130 U	2,150 U			3,730 B			
		B3H0K9	5,860,000 D	620 B	500 UD	4,900 D	81,000 D	81 BD		7,900 D	15,100 D				5,800 D	324,000 DN	13 B	9,700 D				1,200 D	180 UD		470 D	2,500 U	48 U

Note: Blank cells indicate no result for sample number.

bgs = below ground surface

Cr(VI) = hexavalent chromium

HEIS = Hanford Environmental Information System

ID = identification

TBP = tributyl phosphate

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit

D = analyte was reported at a secondary dilution factor

H = laboratory holding time was exceeded before the sample was analyzed

N = spike and/or spike duplicate recovery is outside control limits

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

Table 3-19. Radiological Contaminant Concentrations in Samples Collected from the 216-S-21 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9853	2.1 – 4.2	B3H0F7	0.404 U	3.91 U	0.0895	0.0271 U	0.0685 U	0.096 U	0.0737 UXR	0.61 U	0.494 U	5.93 U	0.56 U	0.56 U	0.816 U	3.12 U	20.2 U	0.601 U	0.306 U	1.39
		B3H0H5	0.408 U	3.88 U	0.0720	0.0365 U	0.0786 U	0.125 U	0.0629 UXR	0.294 U	0.564 U	5.33 U	0.466 U	0.466 U	0.868 U	2.86 U	21 U	1.1	0.435 U	0.592 U
	4.2 – 6.4	B3H0H0	0.257 U	3.79 U	0.0301 U	0.0283 U	0.0623 U	0.0954 U	0.0518 UXR	0.469 U	0.443 U	5.25 U	0.347 U	0.413 U	0.948 U	3 U	19.8 U	0.535 U	0.244 U	0.596
	6.4 – 8.0	B3H0H3	0.663 U	3.93 U	0.0254 U	0.0323 U	0.0762 U	0.105 U	0.0829 U	0.717 U	0.439 U	6.3 U	0.423 U	0.581 U	0.82 U	2.78 U	19.8 U	0.767	0.3 U	0.69
	8.0 – 10	B3H0H8	0.623 U	3.74 U	0.0349 U	0.0422 U	0.0848 U	0.135 U	0.0872 U	0.793 U	0.568 U	5.62 U	0.417 U	0.608 U	0.631 U	3.34 U	20.3 U	0.603 U	0.294 U	0.523 U
C9854	1.8 – 4.4	B3H0J9	0.685 U	3.9 U	0.0358 U	0.041 U	0.0781 U	0.116 U	0.08 UXR	0.438 U	0.595 U	6.61 U	0.462 U	0.4 U	1.24 U	2.78 U	19.6 U	0.865	0.404 U	0.61 U
	4.4 – 7.2	B3H0K2	0.432 U	3.9 U	0.0266 U	0.0353 U	0.0678 U	0.0992 U	0.0817 U	0.56 U	0.567 U	5.53 U	0.235 U	0.579 U	1.82 U	3.12 U	20.3 U	0.722 U	0.512 U	0.659 U
	7.2 – 8.0	B3H0K5	0.419 U	3.91 U	0.026 U	0.0267 U	0.0547 U	0.0912 U	0.0509 U	0.233 U	0.43 U	5.61 U	0.659 U	0.659 U	1 U	2.99 U	20.1 U	0.953	0.563 U	0.8
	8.0 – 10.1	B3H0K8	0.829 U	3.72 U	0.0266 U	0.025 U	0.0642 U	0.086 U	0.0592 U	0.568 U	0.598 U	5.74 U	0.602 U	0.296 U	0.973 U	3.17 U	20.2 U	0.645	0.361 U	0.461

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

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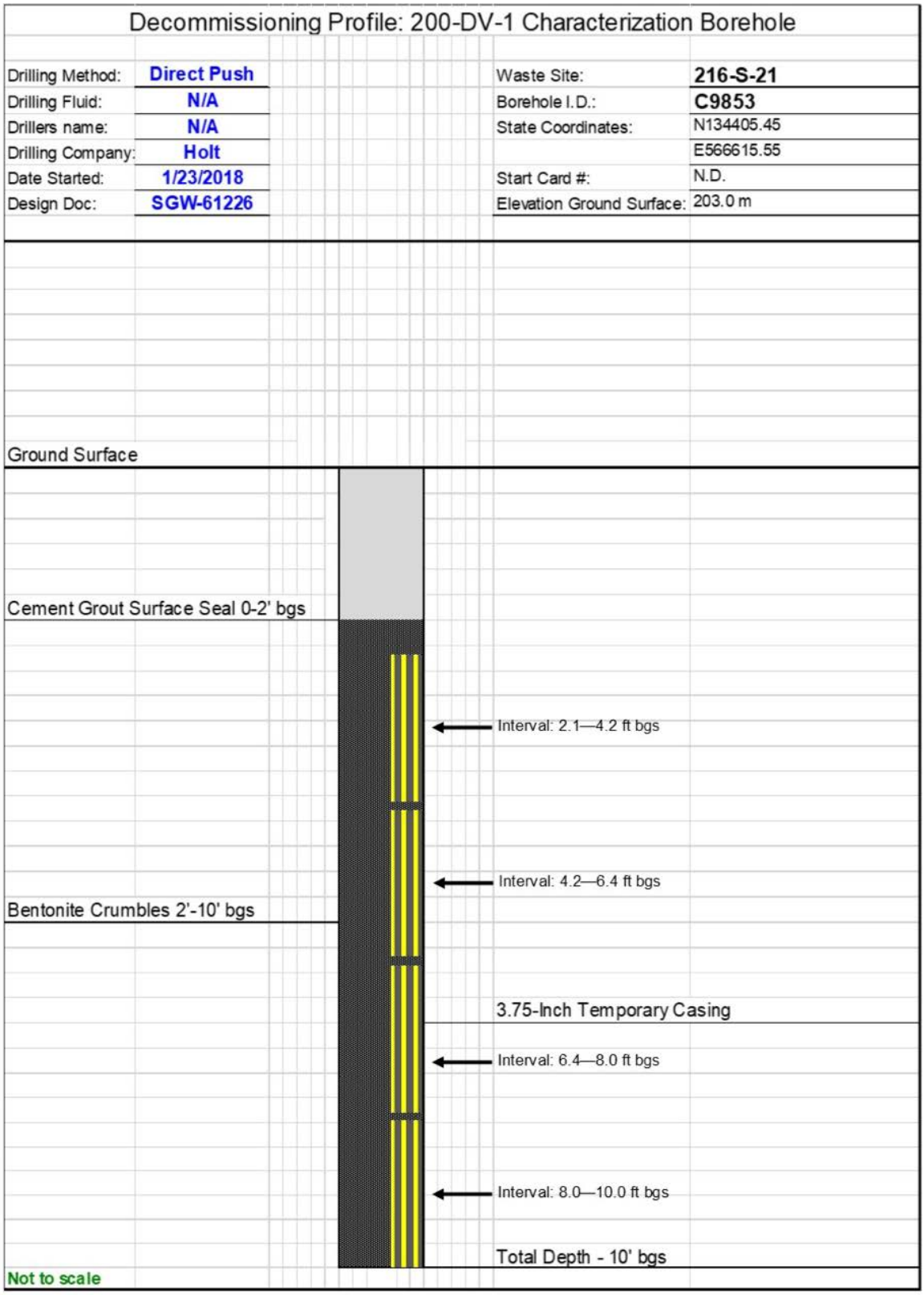

Figure 3-19. Sample Depths and Decommissioning Profile for Borehole C9853 at the 216-S-21 Crib

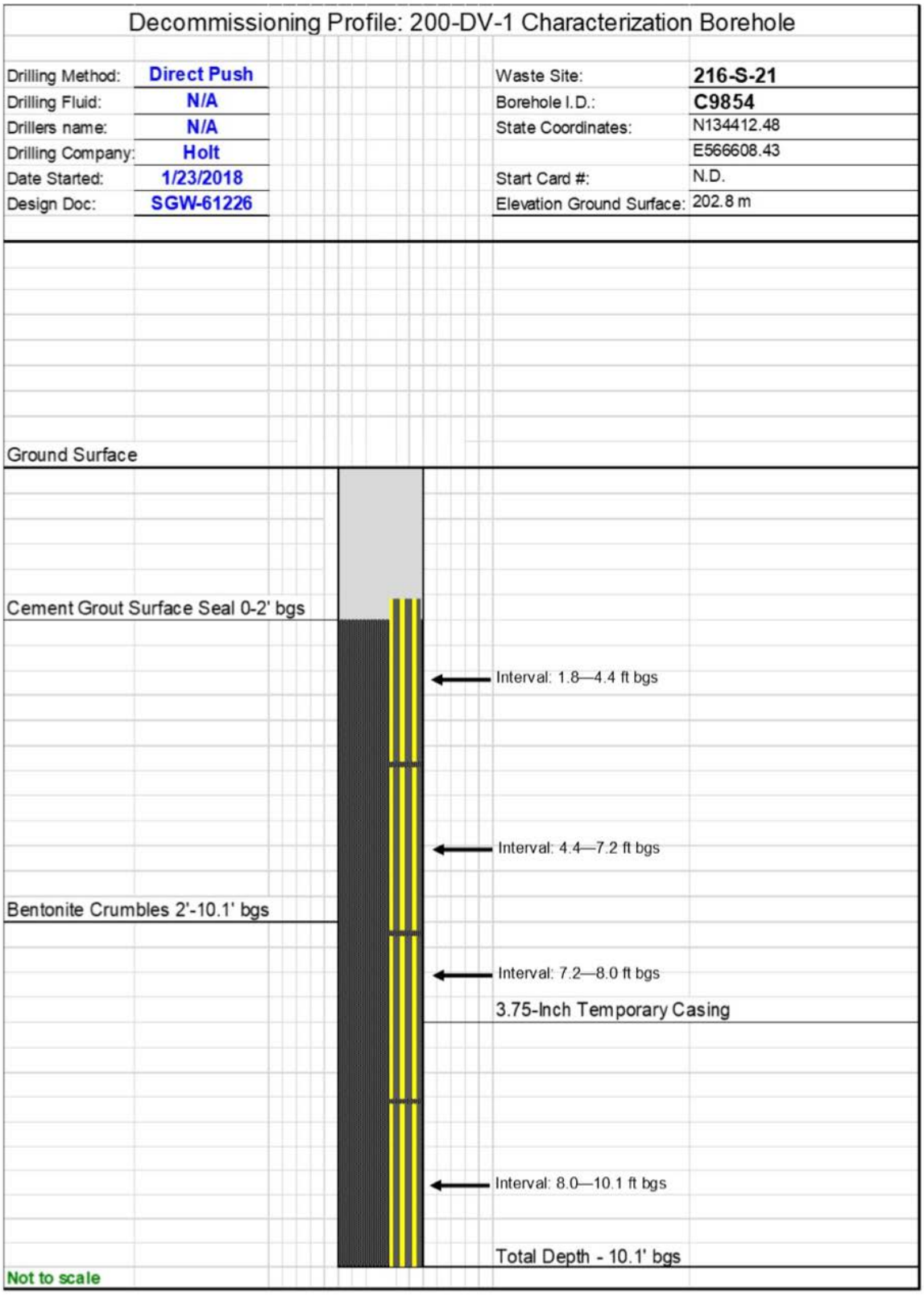

Figure 3-20. Sample Depths and Decommissioning Profile for Borehole C9854 at the 216-S-21 Crib

Table 3-20. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-5 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9855	1.9 – 4.1	B3H0L9							1,490 B			69.9 UXH	901 B	171 U					5,050	1,160 U	2,670 B			7,330	
		B3H0M0	5,760,000 D	657	490 BD	3,200 D	86,500 D	91 BD		10,500 D	15,300 D				4,700 D	346,00 DN	14 B	9,900 D				1,200 BD	190 UD		1,400 D
	4.1 – 6.3	B3H0M2							1,360 B			84.8 UXH	784 B	167 U					6,150	1,130 U	2,140 U			2,880 B	
		B3H0M3	6,070,000 D	559 B	480 UD	2,800 D	90,600 D	68 BD		7,900 D	12,500 D				4,200 D	369,000 DN	13 B	10,800 DN				860 BD	180 UD		370 D
	6.3 – 8.0	B3H0M5							2,320			75.7 UXH	1,150	171 U					12,700	1,150 U	2,180 U			4,430	
		B3H0M6	6,200,000 D	523 B	500 UD	4,200 D	107,000 D	84 BD		9,100 D	13,200 D				4,400 D	439,000 DN	13 B	11,500 D				960 BD	180 UD		440 D
	8.0 – 10.0	B3H0M8							1,950 B			94.4 UXH	1,960	168 U					23,800	1,220 U	2,320 U			7,540	
		B3H0M9	6,420,000 D	450 B	530 UD	5,900 D	82,500 D	98 BD		13,000 D	17,100 D				4,300 D	358,000 DN	17 B	15,000 D				830 UD	190 UD		450 D
C9856	2.1 – 4.1	B3H179							1,110 B				930 B	151 U					5,440	1,140 U	3,130 B			3,880 B	
		B3H180	6,020,000 D	875	500 UD	5,600 D	79,600 D	85 BD		9,300 D	13,800 D	120 UZH			8,000 D	399,000 DN	15 B	13,300 D				930 BD	180 UD		410 D
	4.1 – 6.1	B3H182							1,320 B				754 B	162 U					7,610	1,130 U	2,140 U			2,950 B	
		B3H183	6,110,000 D	742	500 BD	2,900 D	84,300 D	80 BD		8,800 D	12,700 D	120 UZH			4,100 D	388,000 D	12 B	11,800 D				1,300 D	180 UD		480 D
		B3H184							1,450 B				730 B	128 U					8,010	1,140 U	2,160 U			3,170 B	
		B3H185	6,620,000 D	499 B	640 BD	3,200 D	88,300 D	120 BD		8,000 D	12,900 D	120 UZH			4,300 D	380,000 D	13 B	10,200 D				1,000 BD	190 UD		420 D
	6.1 – 8.0	B3H187							1,730 B				872 B	161 NU					16,100	1,170 U	2,210 U			4,850	
		B3H188	6,610,000 D	839	520 BD	4,000 D	83,700 D	90 BD		9,200 D	14,200 D	130 UZH			4,400 D	385,000 D	13 B	11,000 D				980 BD	200 UD		420 D

Table 3-20. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-5 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
	8.0 – 10.0	B3H190							2,130 B				1,490	247 BN					28,200	1,220 U	2,300 U			6,690	
		B3H191	6,690,000 D	1,140	520 UD	4,400 D	83,400 D	110 BD		12,700 D	16,600 D	130 UZH			5,000 D	384,000 D	14 B	24,800 D				1,200 BD	200 UD		560 D

Note: Blank cells indicate no result for sample number.

bgs = below ground surface

Cr(VI) = hexavalent chromium

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit

D = analyte was reported at a secondary dilution factor

H = laboratory holding time was exceeded before the sample was analyzed

N = spike and/or spike duplicate recovery is outside control limits

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

Z = indicates a result-specific comment is provided in the data report or case narrative

Table 3-21. Radiological Contaminant Concentrations in Samples Collected from the 216-T-5 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9855	1.9 – 4.1	B3H0L9	0.399 U	3.05 U	0.843	0.0261 U	0.0668 U	0.0777 U	0.092 XR	0.825 U	0.767 U	6.47 U	0.416 U	0.497 U	1.90	2.8 U	18.3 U	1.19	0.552 U	0.751
	4.1 – 6.3	B3H0M2	0.458 U	3.21 U	0.0193 U	0.0239 U	0.05 U	0.075 U	0.0578 U	0.446 U	0.719 U	5.46 U	0.425 U	0.476 U	1.04 U	3.6 U	19 U	0.566 U	0.384 U	0.585
	6.3 – 8.0	B3H0M5	0.488 U	3.14 U	0.0258 U	0.0292 U	0.0647 U	0.0826 U	0.0691 U	0.727 U	0.88 U	6.05 U	0.677 U	0.588 U	1.27 U	3.4 U	18 U	0.839	0.464 U	1.14
	8.0 – 10.0	B3H0M8	0.645 U	3.1 U	0.0184 U	0.0226 U	0.0546 U	0.076 U	0.0603 U	0.602 U	0.874 U	5.25 U	0.337 U	0.401 U	1.35 U	3.09 U	19.7 U	0.929	0.428 U	0.487
C9856	2.1 – 4.1	B3H179	0.418 U	3.34 U	4.03	0.0238 U	0.0789 U	0.0791 U	0.0924 U	0.419 U	0.889 U	6.11 U	0.305 U	0.419 U	1.54	2.65 U	19.3 U	0.534 U	0.406 U	0.551
	4.1 – 6.1	B3H182	0.38 U	3.32 U	0.0245 U	0.024 U	0.0599 U	0.0751 U	0.0793 XR	0.555 U	1.02 U	6.71 U	0.396 U	0.396 U	1.27 U	2.92 U	19.2 U	0.841	0.462 U	0.494
		B3H184	0.405 U	3.29 U	0.0177 U	0.0183 U	0.0462 U	0.0606 U	0.0504 U	0.531 U	1.18 U	5.85 U	0.424 U	0.424 U	1.35 U	3.3 U	18.9 U	1.56	0.428 U	0.922
	6.1 – 8.0	B3H187	0.428 U	3.23 U	0.0322 U	0.037 U	0.0799 U	0.109 U	0.0726 U	0.694 U	0.728 U	6.33 U	0.413 U	0.491 U	1.18 U	2.86 U	18.8 U	0.974	0.762 U	0.632
	8.0 – 10.0	B3H190	0.417 U	3.3 U	0.0327 U	0.0337 U	0.0679 U	0.105 U	0.0757 U	0.66 U	0.985 U	5.44 U	0.44 U	0.37 U	1.15 U	2.9 U	19.2 U	1.2	0.639 U	0.657 U

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

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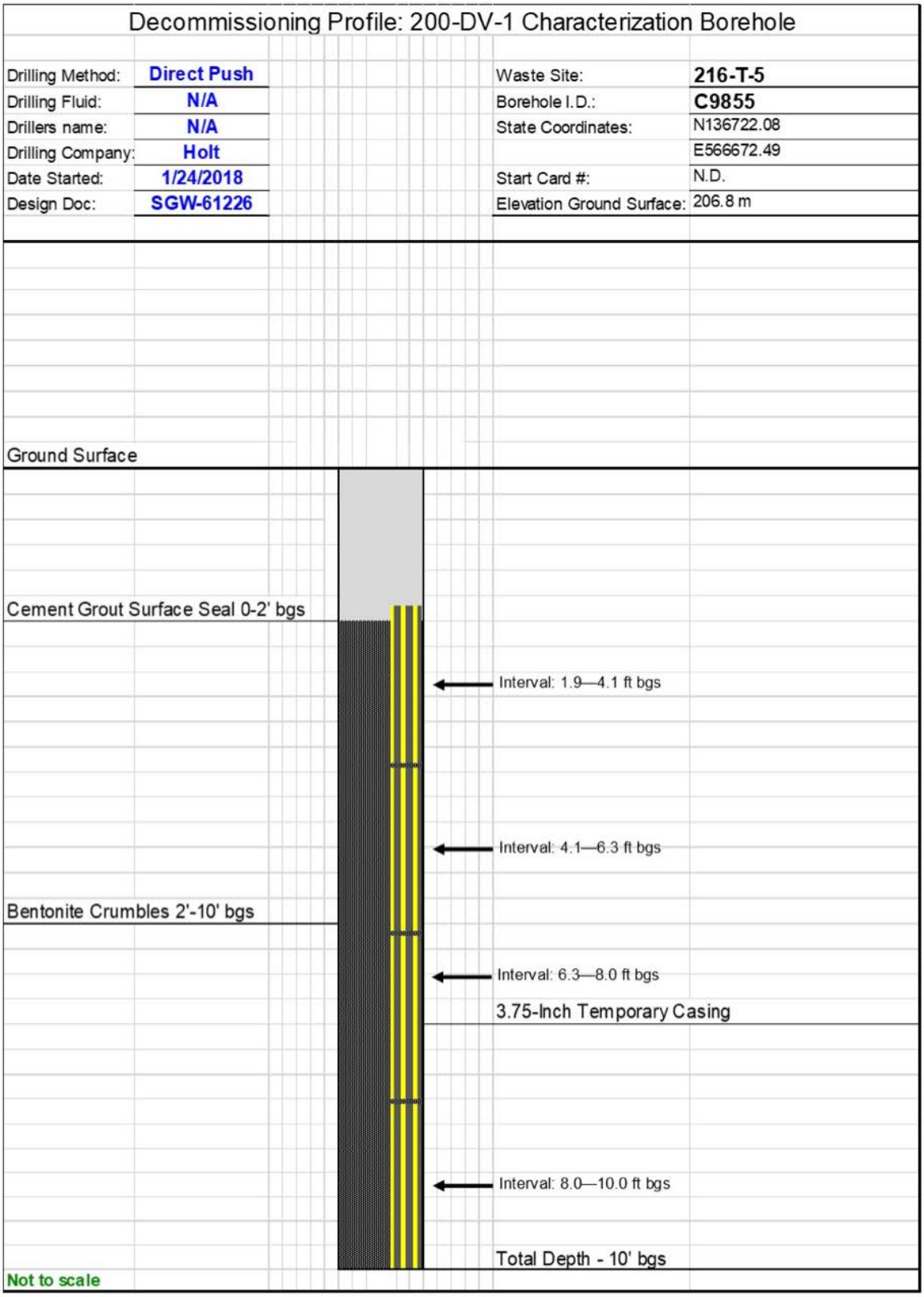

Figure 3-21. Sample Depths and Decommissioning Profile for Borehole C9855 at the 216-T-5 Trench

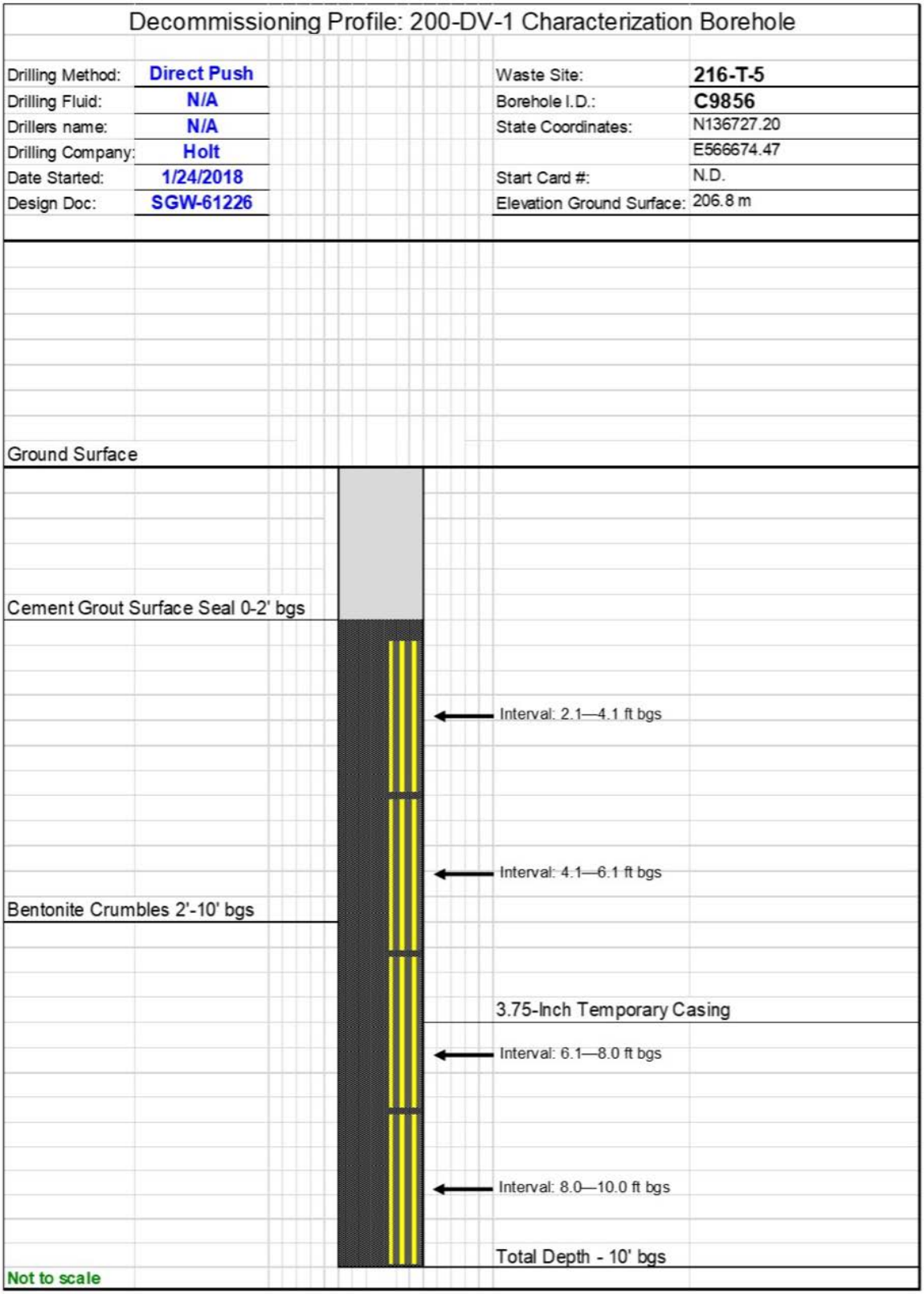

Figure 3-22. Sample Depths and Decommissioning Profile for Borehole C9856 at the 216-T-5 Trench

3.6.2 Borehole C9856

Borehole C9856 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2.1 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 to 1.2 m (2.1 to 4.1 ft) bgs, the sediment was classified as a sandy gravel and made up of 55% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape, and 45% sand varying between very fine- and coarse-grained particles. From 1.2 m (4.1 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as sand made up of 90% sand varying between very fine- and medium-grained particles, 5% gravel clasts ranging between very fine and medium pebble (2 to 16 mm in diameter) that were subangular in overall shape, and 5% silt-sized particles.

3.7 216-T Trenches

This section provides information on boreholes C9857, C9940 (replacement), C9858, C9941 (replacement), C9859, C9942 (replacement), and C9860, which were drilled in the T Trenches.

3.7.1 216-T-14 Trench

Boreholes C9857 and C9940 (replacement) are located toward the northern end of the 216-T-14 Trench waste site boundary. The GeoProbe rig drilled to a depth of approximately 3 m (10 ft) bgs at the C9857 borehole location. Sample volume was lacking at the 1.8 to 2.4 m (6 to 8 ft) sampling interval, so borehole C9940 was required to be pushed. The GeoProbe drill rig was moved 0.7 m (2.2 ft) over and drilled to 2.6 m (8.6 ft) bgs to collect the remaining required sample interval. Sediment samples were analyzed for the COPCs listed in Tables 3-22 and 3-23. Figures 3-23 and 3-24 show the sampling depths and how the boreholes were decommissioned.

3.7.1.1 Borehole C9857

Borehole C9857 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2.1 ft) bgs, the sediment consisted of Hanford formation backfill. From 0.6 m (2.1 ft) to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as sand and was made up of 85% sand varying between very fine- and medium-grained particles, and 15% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape.

3.7.1.2 Borehole C9940 (Replacement for Borehole C9857)

Borehole C9940 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to 1.6 m (5.3 ft) bgs. From 1.6 m (5.3 ft) to total depth of the borehole (2.6 m [8.6 ft] bgs), the sediment was classified as sand and consisted of 85% sand varying between very fine- and coarse-grained particles, and 15% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape.

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Table 3-22. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-14 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9857	2.1 – 4.0	B3H1B1							712 U				832 B	95.8 NU					3,290 B	1,070 U	2,030 U			2,310 B	
		B3H1B2	6,500,000 D	912 ZNH	500 BD	3,100 D	85,100 D	73 BD		8,400 D	12,800 D	120 UZH			4,300 D	399,000 D	11 U	11,100 D				1,100 BD	170 UD		410 D
	4.0 – 6.7	B3H1B4							772 B				1,130	158 NU					5,530	1,030 U	1,960 U			2,410 B	
		B3H1B5	6,540,000 D	693 ZNH	530 UD	3,400 D	79,200 D	83 BD		10,100 D	13,700 D	120 UZH			4,400 D	374,000 D	14 B	11,100 D				1,100 BD	190 UD		340 D
C9940[a]	5.3 – 8.6	B3H1C5							948 B				1,520	112 NU					7,880	1,130 U	2,140 U			3,980 B	
		B3H1C6	6,510,000 D	778 ZNH	490 UD	3,400 D	79,300 D	140 D		9,000 D	14,400 D	120 UZH			4,500 D	344,000 D	14 B	10,800 D				1,300 D	170 UD		440 D
		B3H1C8							1,280 B				1,520	108 NU					11,800	1,130 U	2,130 U			4,870	
		B3H1C9	7,060,000 D	766 ZNH	530 UD	3,700 D	86,500 D	84 BD		10,900 D	14,100 D	120 UZH			4,800 D	358,000 D	14 B	12,200 D				1,000 BD	200 UD		430 D
C9857	8.0 – 10.0	B3H1C2							1,050 B				950 B	159 NU					6,460	1,080 U	2,050 U			3,140 B	
		B3H1C3	6,970,000 D	669 ZNH	540 UD	3,700 D	91,300 D	84 BD		9,500 D	14,000 D	120 UZH			4,600 D	378,000 D	17 B	11,600 D				930 BD	180 UD		410 D

Notes: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
D = analyte was reported at a secondary dilution factor
H = laboratory holding time was exceeded before the sample was analyzed
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected
Z = indicates a result-specific comment is provided in the data report or case narrative

Table 3-23. Radiological Contaminant Concentrations in Samples Collected from the 216-T-14 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9857	2.1 – 4.0	B3H1B1	0.379 U	3.78 U	1.93	0.0258 U	0.0711 U	0.0754 U	0.0797 U	0.76 U	0.556 U	5.94 U	0.222 U	0.547 U	0.921 U	3.74 U	22.2 U	1.02	0.568 U	0.842
	4.0 – 6.7	B3H1B4	0.509 U	3.68 U	0.0584	0.0244 U	0.0551 U	0.0794 U	0.0721 XR	0.54 U	0.853 U	5.32 U	0.586 U	0.698 U	0.903 U	3.71 U	21.9 U	0.637	0.501 U	0.7
C9940[a]	5.3 – 8.6	B3H1C5	0.388 U	3.84 U	2.83	0.0325 U	0.0917 U	0.115 U	0.0756 U	0.502 U	0.519 U	5.45 U	0.529 U	0.74 U	1.26 U	4.02 U	18.5 U	0.917 U	0.799 U	0.742 U
		B3H1C8	0.492 U	3.72 U	2.21	0.0256 U	0.0708 U	0.0786 U	0.0666 U	0.641 U	0.42 U	6.6 U	0.307 U	0.422 U	1.17 U	4.01 U	18.6 U	0.731	0.454 U	0.424 U
C9857	8.0 – 10.0	B3H1C2	0.409 U	3.84 U	0.648	0.021 U	0.0505 U	0.0633 U	0.0745 XR	0.623 U	0.445 U	5.28 U	0.24 U	0.56 U	1.3 U	3.23 U	18.7 U	0.696 U	0.501 U	0.909

Notes: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

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U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

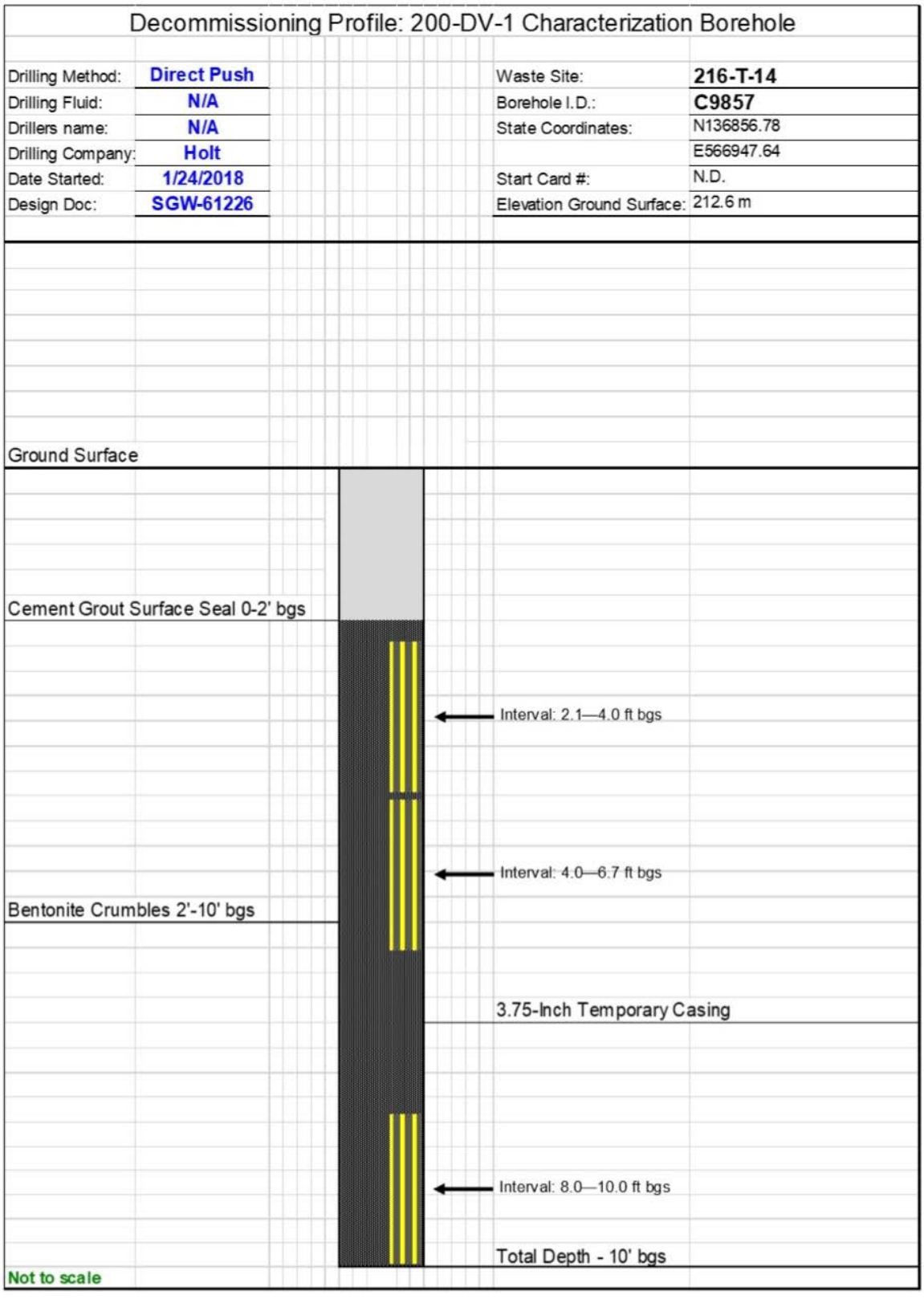

Figure 3-23. Sample Depths and Decommissioning Profile for Borehole C9857 at the 216-T-14 Trench

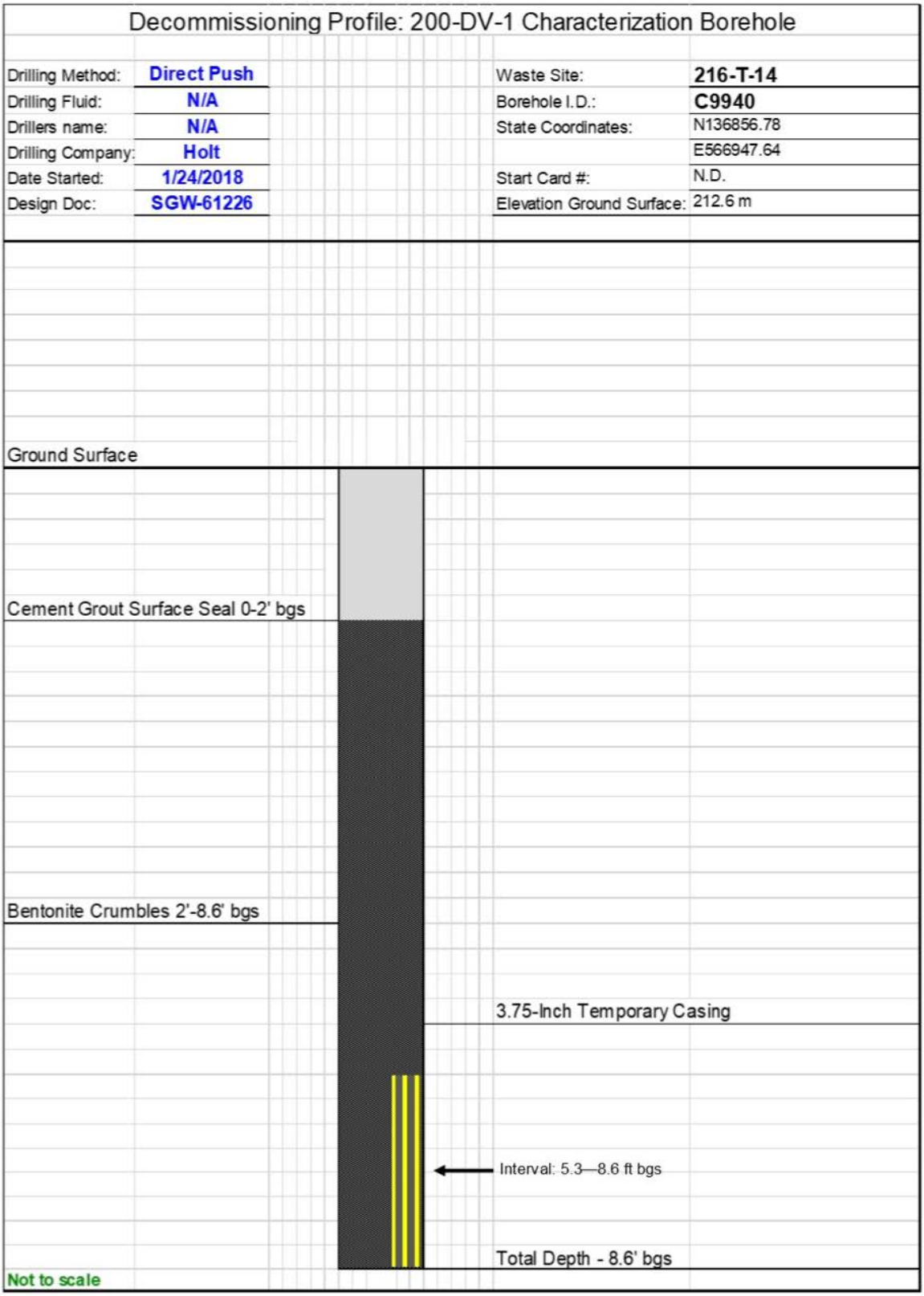

Figure 3-24. Sample Depths and Decommissioning Profile for Borehole C9940 (Replacement) at the 216-T-14 Trench

3.7.2 216-T-15 Trench

Boreholes C9858 and C9941 (replacement) are located toward the northern end of the 216-T-15 Trench waste site boundary. The GeoProbe rig drilled to a depth of approximately 3 m (10 ft) bgs at the C9858 borehole location. Sample volume was lacking at the 1.8 to 2.4 m (6 to 8 ft) and 2.4 to 3 m (8 to 10 ft) sampling intervals, so borehole C9941 (replacement) was required to be pushed. The GeoProbe drill rig was moved 0.8 m (2.5 ft) over and drilled to 3 m (10 ft) bgs to collect the remaining required sample intervals. Sediment samples were analyzed for the COPCs listed in Tables 3-24 and 3-25. Figures 3-25 and 3-26 show the sampling depths and how the boreholes were decommissioned.

3.7.2.1 Borehole C9858

Borehole C9858 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 to 1.3 m (2 to 4.2 ft) bgs, the sediment was classified as gravelly sand and was made up of 90% sand varying between very fine- and very coarse-grained particles, and 10% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape. From 1.3 to 2 m (4.2 to 6.5 ft) bgs, the sediment was classified as a sandy gravel that was made up of 55% sand varying between very fine- and very coarse-grained particles, and 45% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape. From 2 m (6.5 ft) bgs, to total depth of the borehole (3.1 m [10.1 ft] bgs), sediment was not recovered.

3.7.2.2 Borehole C9941 (Replacement for Borehole C9858)

Borehole C9941 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to 1.6 m (5.2 ft) bgs. From 1.6 m (5.2 ft) bgs to total depth of the borehole (3.1 m [10.2 ft] bgs), the sediment was classified as a sandy gravel and was made up of 60% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape, and 40% sand varying between fine- and very coarse-grained particles.

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Table 3-24. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-15 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9858	2.0 – 4.2	B3H1D3							783 B				414 B	88 NU					2,960 B	1,140 U	2,160 U			2,570 B	
		B3H1D4	6,830,000 D	948 ZNH	500 BD	3,400 D	93,700 D	92 BD		9,300 D	13,700 D	120 UZH			5,000 D	380,000 D	14 B	11,600 D				880 BD	190 UD		400 D
	4.2 – 6.5	B3H1D6							698 B				1,080	88.4 NU					3,480 B	1,050 U	1,990 U			2,980 B	
		B3H1D7	6,760,000 D	535 BZNH	460 UD	4,600 D	78,000 D	77 BD		11,800 D	16,700 D	120 UZH			4,600 D	356,000 D	15 B	13,900 D				1,300 D	190 UD		510 D
C9941[a]	5.2 – 7.9	B3H1F5		12,900 CXH					886 B			73.4 BXH	1,400	135 NU					3,110 B	1,120 U	2,130 U			5,180	
		B3H1F6	6,080,000 D		570 BD	4,300 D	70,200 D	71 BD		14,500 D	17,600 D				4,100 D	346,000 D	15 B	10,2000 D				1,200 D	190 UD		520 D
	7.9 – 10.2	B3H1F8	7,470,000 D	15,700 C	3,450 UD	14,600 D	77,800 D	86.6 BD	1,100 B	10,300 D	14,500 D	80.4 U	2,870	120 NU	4,260 D	394,000 D	4.2 B	9,780 D	8,280	1,130 U	2,130 U	979 BD	105 U	6,130	618 D

Note: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control blank
D = analyte was reported at a secondary dilution factor
H = laboratory holding time was exceeded before the sample was analyzed
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected
X = indicates a result-specific comment is provided in the data report or case narrative
Z = indicates a result-specific comment is provided in the data report or case narrative

Table 3-25. Radiological Contaminant Concentrations in Samples Collected from the 216-T-15 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 pCi/g)	C-14 pCi/g)	Cs-137 pCi/g)	Co-60 pCi/g)	Eu-152 pCi/g)	Eu-154 pCi/g)	Eu-155 pCi/g)	I-129 pCi/g)	Np-237 pCi/g)	Ni-63 pCi/g)	Pu-238 pCi/g)	Pu-239/240 pCi/g)	Sr-90 pCi/g)	Tc-99 pCi/g)	H-3 pCi/g)	U-233/234 pCi/g)	U-235 pCi/g)	U-238 pCi/g)
C9858	2.0 – 4.2	B3H1D3	0.0965 U	3.85 U	0.625	0.03 U	0.0589 U	0.0917 U	0.086 XR	0.636 XR	0.521 U	6.13 U	0.283 U	0.358 U	0.808 U	3.58 U	18.8 U	0.732 U	0.589 U	0.525 U
	4.2 – 6.5	B3H1D6	0.0241 U	3.72 U	0.255	0.0217 U	0.0477 U	0.0672 U	0.0429 U	0.499 U	0.472 U	5.26 U	0.568 U	0.568 U	1.86 U	3.33 U	19 U	0.627 U	0.322 U	0.782
C9941[a]	5.2 – 7.9	B3H1F5	0.11 U	3.71 U	1.08	0.0273 U	0.0712 U	0.0918 U	0.078 U	0.525 U	0.385 U	6.53 U	0.247 U	0.457 U	1.22 U	3.99 U	18.5 U	1.77	0.579	1.5
	7.9 – 10.2	B3H1F8	0.0988 U	3.66 U	0.412	0.0289 U	0.0671 U	0.0912 U	0.061 U	0.55 U	0.433 U	4.63 U	0.377 U	0.311 U	0.916 U	3.39 U	18.4 U	1.01	0.409 U	0.382 U

Note: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface

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Data qualifiers

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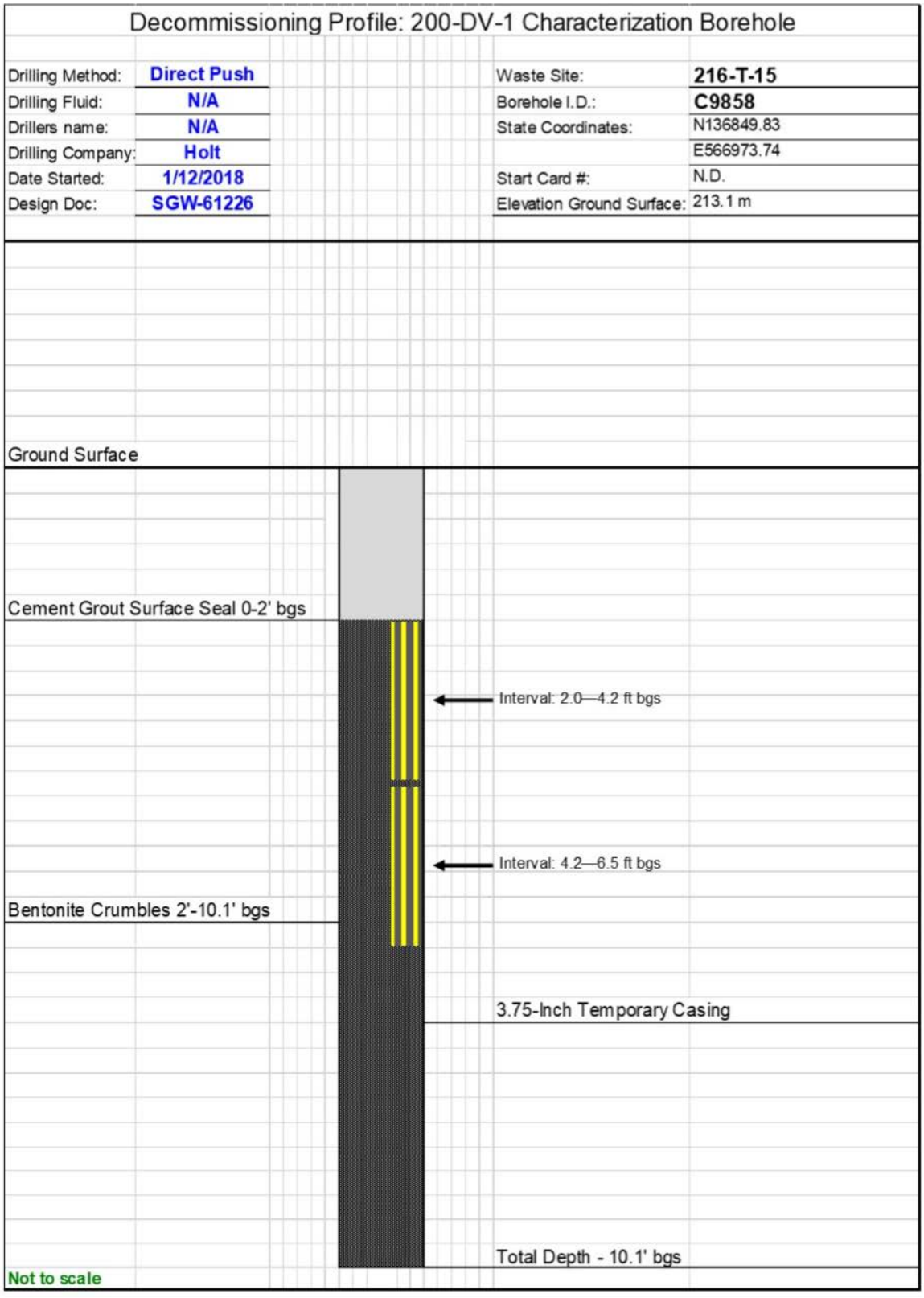

Figure 3-25. Sample Depths and Decommissioning Profile for Borehole C9958 at the 216-T-15 Trench

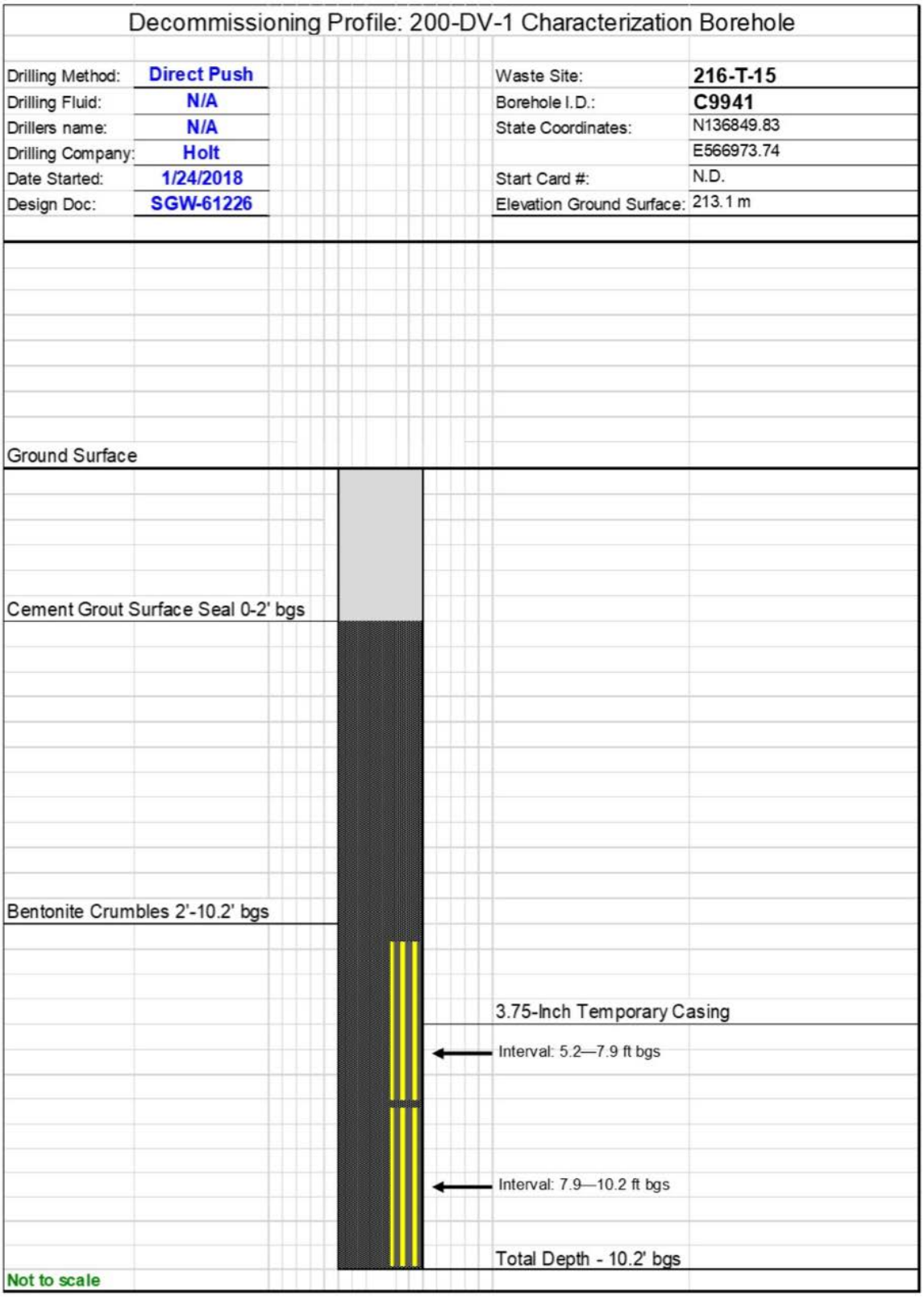

Figure 3-26. Sample Depths and Decommissioning Profile for Borehole C9941 (Replacement) at the 216-T-15 Trench

3.7.3 216-T-16 Trench

Boreholes C9859 and C9942 (replacement) are located on the southern end of the 216-T-16 Trench waste site boundary. The GeoProbe rig drilled to a depth of approximately 1.9 m (6.3 ft) bgs at the C9859 borehole location rather than the target depth of 3 m (10 ft) bgs due to refusal. Since C9859 hit refusal at a depth that was shallower than the target depth, borehole C9942 (replacement) was required to be pushed. The GeoProbe drill rig was moved 0.7 m (2.3 ft) over and drilled to 3 m (10 ft) bgs to collect the remaining required sample intervals. Sediment samples were analyzed for the COPCs listed in Tables 3-26 and 3-27. Figures 3-27 and 3-28 show the sampling depths and how the boreholes were decommissioned.

3.7.3.1 Borehole C9859

Borehole C9859 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 to 1.3 m (2 to 4.2 ft) bgs, the sediment was classified as a sandy gravel and was made up of 60% sand varying between very fine- and coarse-grained particles, and 40% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape. From 1.3 m (4.2 ft) bgs to total depth of the borehole (1.9 m [6.3 ft] bgs), sediment was not recovered.

3.7.3.2 Borehole C9942 (C9859 Replacement)

Borehole C9942 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to 1.2 m (4 ft) bgs. From 1.2 to 1.9 m (4 to 6.2 ft) bgs, the sediment was classified as a sandy gravel and was made up of 60% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape, and 40% sand varying between fine- and very coarse-grained particles. From 1.9 m (6.2 ft) bgs to total depth of the borehole (3.1 m [10.1 ft] bgs), the sediment was classified as gravel and was made up of 80% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were subangular in overall shape, and 20% sand varying between medium- and very coarse-grained particles.

3.7.4 216-T-17 Trench

Borehole C9860 is located toward the middle of the 216-T-17 Trench waste site boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9860 borehole location. Sediment samples were analyzed for the COPCs listed in Tables 3-28 and 3-29. Figure 3-29 shows the sampling depths and how the borehole was decommissioned.

3.7.4.1 Borehole C9860

Borehole C9860 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2.1 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 to 2.4 m (2.1 to 7.9 ft) bgs, the sediment was classified as a sandy gravel and was made up of 60% gravel clasts ranging between very fine to very coarse pebble (2 to 64 mm in diameter) that were subangular in overall shape, and 40% sand varying between fine- and coarse-grained particles. From 2.4 m (7.9 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as gravel and was made up of 85% gravel clasts ranging between very fine pebble to small cobble (2 to 126 mm in diameter) that were subangular in overall shape, and 15% sand varying between very fine- and coarse-grained particles.

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Table 3-26. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-16 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9859	2.0 – 4.2	B3H1M9							1,800 BA				1,280 A	116 NUA					33,300 A	2,010 BA	1,990 UA			14,600 A	
		B3H1N0	6,370,000 D	644 ZNH	480 BD	2,800 D	84,100 D	87 BD		8,300 D	13,000 D	120 U			4,400 D	368,000 D	15 B	10,600 D				1,100 D	170 UD		600 D
C9942[a]	4.0 – 6.2	B3H1N2							2,170 A				1,010 BA	134 NUA					26,000 A	1,130 UA	2,150 UA			9,150A	
		B3H1N3	6,240,000 D	815 ZNH	470 BD	3,800 D	80,600 D	75 BD		9,900 D	15,400 D	120 U			4,300 D	347,000 D	14 B	10,800 D				1,100 BD	180 UD		600 D
	6.2 – 8.2	B3H1N5		7,090 A					1,260 BA				1,460 A	130 NUA					14,600 A	1,020 UA	1,940 UA			48,300 A	
		B3H1N6	5,260,000 D		490 UD	3,600 D	64,200 D	64 BD		9,400 D	13,800 D	120 U			3,800 D	303,000 D	11 B	8,300 D				1,300 D	180 UD		570 D
	8.2 – 10.1	B3H1N8							2,400 A				537 BA	129 NUA					15,700 A	1,090 UA	2,060 UA			183,000 A	
		B3H1N9	6,420,000 D	426 BZNH	690 BD	3,600 D	125,000 D	99 BD		10,300 D	18,800 D	120 U			4,400 D	603,000 D	13 B	10,100 D				1,400 D	170 UD		780 D

Note: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

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Cr(VI) = hexavalent chromium
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Data qualifiers

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N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected
Z = indicates a result-specific comment is provided in the data report or case narrative

Table 3-27. Radiological Contaminant Concentrations in Samples Collected from the 216-T-16 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9859	2.0 – 4.2	B3H1M9	0.318 UA	3.75 UA	0.411 A	0.0432 UA	0.102 UA	0.132 UA	0.0805 UXAR	0.558 UA	0.581 UA	5.01 UA	0.426 UA	0.516 UA	0.902 UA	4.2 UA	18.4 UA	0.825 UA	0.769 UA	0.733 A
C9942[a]	4.0 – 6.2	B3H1N2	0.374 UA	3.66 UA	0.139 A	0.0315 UA	0.0727 UA	0.0893 UA	0.0812 UA	0.509 UA	0.812 UA	5.88 UA	0.556 UA	0.481 UA	2.17 A	3.17 UA	18.9 UA	0.729 UA	0.671 UA	0.69 UA
	6.2 – 8.2	B3H1N5	0.338 UA	3.79 UA	0.0315 UA	0.0364 UA	0.0699 UA	0.0928 UA	0.132 XAR	0.504 UA	0.448 UA	5.9 UA	0.272 UA	0.502 UA	1.04 UA	4.59 UA	18.6 UA	0.783 A	0.378 UA	0.305 UA
	8.2 – 10.1	B3H1N8	0.399 UA	3.64 UA	0.0244 UA	0.0242 UA	0.0535 UA	0.0711 UA	0.0479 UXAR	0.478 UA	0.725 UA	5.46 UA	0.467 UA	0.707 UA	1.08 UA	3.26 UA	21.7 UA	0.985 A	0.459 UA	0.564 A

Note: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

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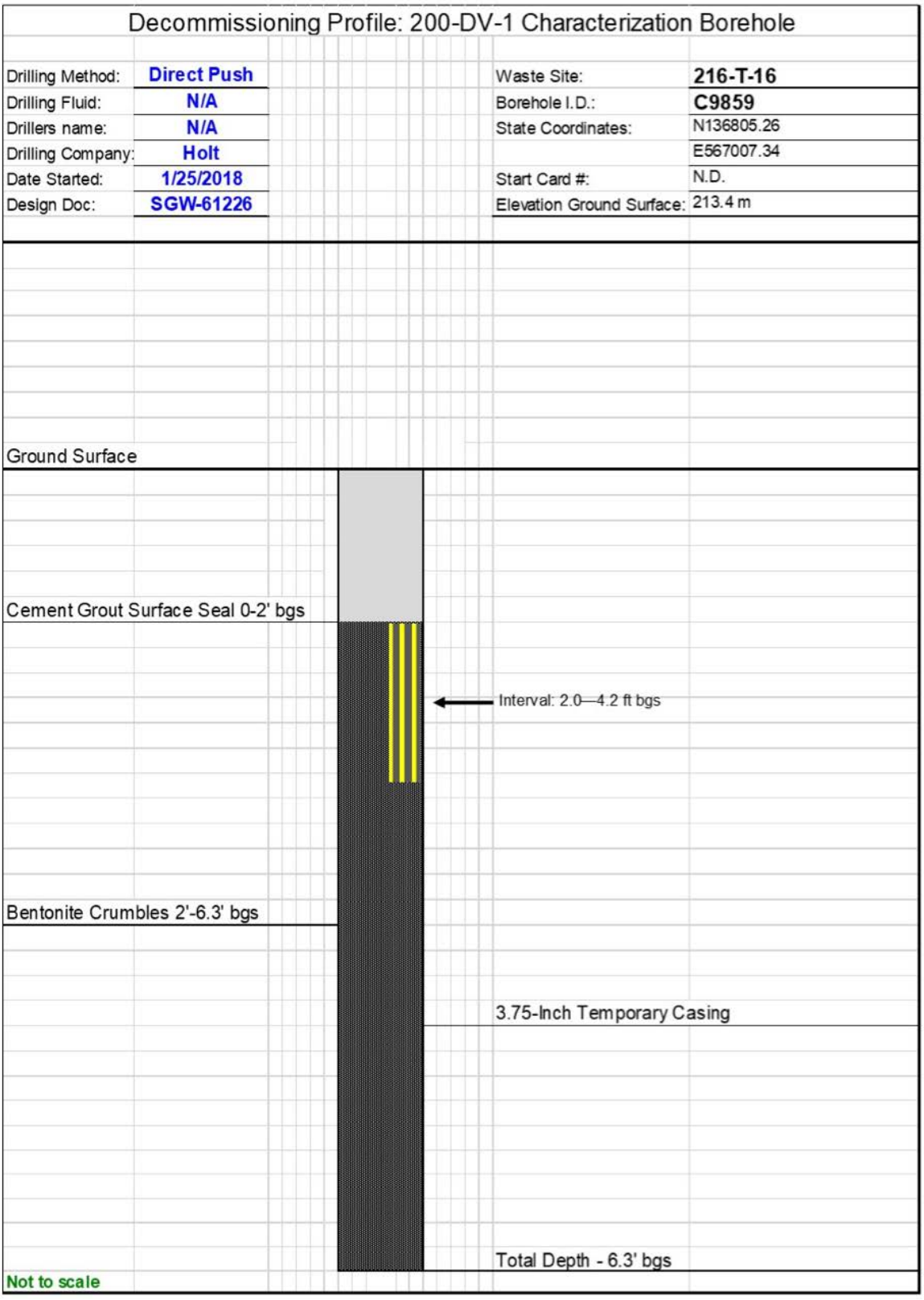

Figure 3-27. Sample Depths and Decommissioning Profile for Borehole C9859 at the 216-T-16 Trench

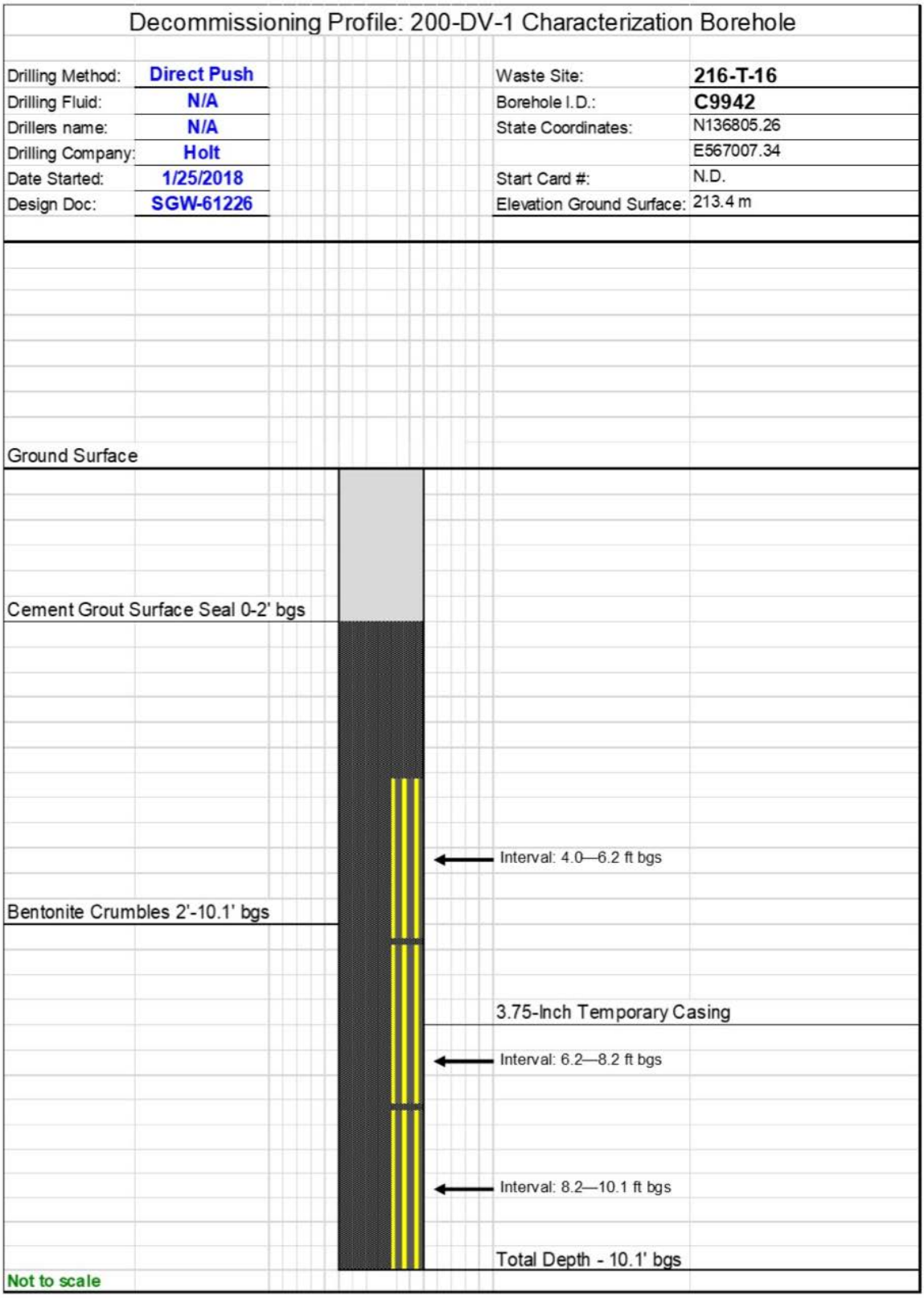

Figure 3-28. Sample Depths and Decommissioning Profile for Borehole C9942 (Replacement) at the 216-T-16 Trench

Table 3-28. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-17 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9860	2.1 – 4.1	B3H1T3							818 BA				616 BA	118 NUA					2,350 BA	1,090 UA	2,070 UA			3,180 BA	
		B3H1T4	6,700,000 D	1,340 ZNH	470 UD	4,000 D	79,600 D	84 BD		12,400 D	14,300 D	120 U			4,600 D	367,000 D	15 B	14,900 D				900 BD	190 UD		430 D
	4.1 – 6.3	B3H1T6							1,310 BA				1,450 A	111 NUA					12,500 A	1,060 UA	2,020 UA			3,920 BA	
		B3H1T7	5,640,000 D	499 BZNH	500 UD	4,100 D	79,800 D	87 BD		10,300 D	14,300 D	120 U			3,700 D	417,000 D	14 B	11,200 D				1,100 BD	180 UD		470 D
	6.3 – 7.9	B3H1T9							917 BA				451 BA	114 NUA					4,420 BA	1,100 UA	2,080 UA			4,140 A	
		B3H1V0	6,970,000 D	486 BZNH	500 UD	4,400 D	80,100 D	94 BD		10,000 D	17,300 D	180 B			4,800 D	388,000 D	15 B	11,600 D				1,100 BD	190 UD		590 D
	7.9 – 10.0	B3H1V2		27,500 A					1,260 BA			83.9 UA	393 BA	104 NUA					10,400 A	1,330 BA	2,140 UA			10,500 A	
		B3H1V3	4,220,000 D		460 UD	2,000 BD	75,600 D	57 UD		6,600 D	12,500 D				2,700 D	288,000 D	11 B	7,100 D				830 BD	180 UD		910 D

Note: Blank cells indicate no result for sample number.

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U = analyzed for but not detected
Z = indicates a result-specific comment is provided in the data report or case narrative

Table 3-29. Radiological Contaminant Concentrations in Samples Collected from the 216-T-17 Trench

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9860	2.1 – 4.1	B3H1T3	0.215 UA	3.41 UA	0.171 A	0.0241 UA	0.0584 UA	0.0751 UA	0.0804 XAR	0.437 UA	0.578 UA	5.3 UA	0.374 UA	0.474 UA	1.18 UA	3.76 UA	18.8 UA	0.715 A	0.485 UA	0.453 UA
	4.1 – 6.3	B3H1T6	0.255 UA	3.74 UA	0.0376 A	0.0334 UA	0.073 UA	0.11 UA	0.0924 XAR	0.686 UA	0.654 UA	4.84 UA	0.872 UA	0.483 UA	1.58 UA	3.47 UA	18.5 UA	0.732 A	0.319 UA	0.476 UA
	6.3 – 7.9	B3H1T9	0.467 UA	3.34 UA	0.318 A	0.0357 UA	0.0846 UA	0.113 UXAR	0.0938 UA	0.443 UA	0.557 UA	5.97 UA	0.336 UA	0.565 UA	1.38 UA	3.6 UA	19.2 UA	0.963 A	0.277 UA	0.767 A
	7.9 – 10.0	B3H1V2	0.332 UA	3.66 UA	0.0248 UA	0.0242 UA	0.0629 UA	0.0805 UA	0.0661 UA	0.652 UA	0.438 UA	6.52 UA	0.42 UA	0.447 UA	1.49 UA	3.55 UA	18.6 UA	0.641 A	0.435 UA	1.19 A

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

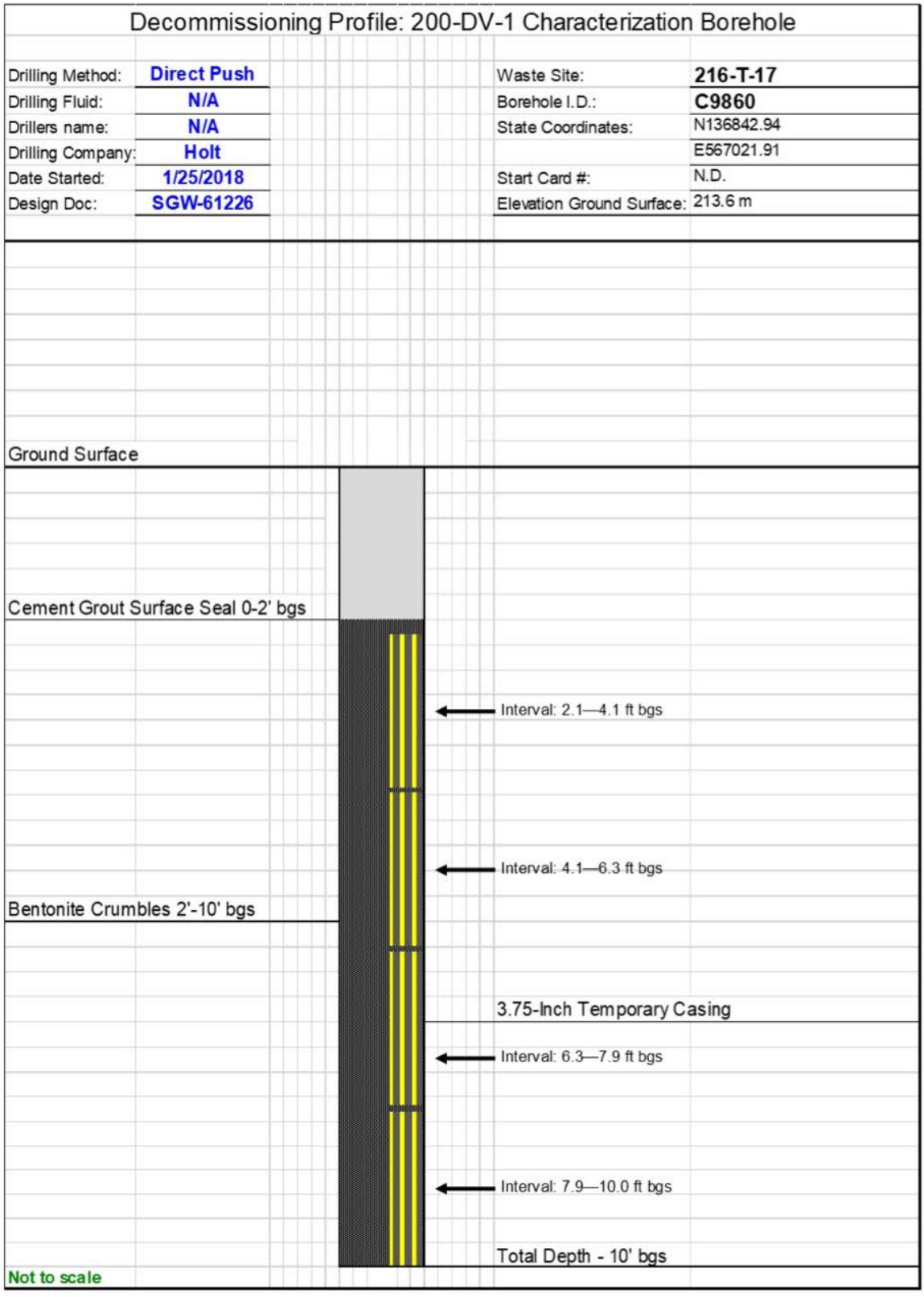

Figure 3-29. Sample Depths and Decommissioning Profile for Borehole C9860 at the 216-T-17 Trench

3.8 216-T-18 Crib

Borehole C9861 is in the northwestern corner of the 216-T-18 Crib waste site boundary. Borehole C9862 is in the southwestern corner of the crib boundary, and borehole C9863 is in the southeastern corner of the crib boundary. The GeoProbe rig drilled to a target depth of approximately 3 m (10 ft) bgs at the C9861, C9862, and C9863 borehole locations. Sediment samples were analyzed for the COPCs listed in Tables 3-30 and 3-31. Figures 3-30, 3-31, and 3-32 show the sampling depths and how the boreholes were decommissioned.

3.8.1 Borehole C9861

Borehole C9861 consisted of sediments composed of the Hf1. From ground surface to 0.8 m (2.5 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.8 to 2 m (2.5 to 6.5 ft) bgs, the sediment was classified as gravelly sand and was made up of 70% sand varying between fine- and coarse-grained particles, 20% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were angular in overall shape, and 10% silt-sized particles. From 2 m (6.5 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as sand that was made up of 85% sand varying between very fine- and coarse-grained particles, 10% silt-sized particles, and 5% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were angular in overall shape.

3.8.2 Borehole C9862

Borehole C9862 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.3 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.7 to 2 m (2.3 to 6.4 ft) bgs, the sediment was classified as sand and was made up of 91% sand and 9% silt-sized particles. From 2 m (6.4 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as slightly silty sand and was made up of 85% sand and 15% silt-sized particles.

3.8.3 Borehole C9863

Borehole C9863 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.2 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.7 to 1.4 m (2.2 to 4.6 ft) bgs, the sediment was classified as gravelly sand and was made up of 85% sand, 11% gravel, and 9% silt-sized particles. From 1.4 to 2 m (4.6 to 6.4 ft) bgs, the sediment was classified as sand and was made up of 100% sand. From 2 m (6.4 ft) bgs to total depth of the borehole (3 m [10 ft] bgs), the sediment was classified as gravelly sand and was made up of 80% sand, 15% gravels, and 5% silt-sized particles.

Table 3-30. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-18 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN (µg/kg)$^-$	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)	Kerosene (µg/kg)	TBP (µg/kg)
C9861	2.5 – 4.3	B3H1W9							1,510 B				500 B	734 N					1,530 U	1,130 U	2,420 B			3,770 B			
		B3H1X0	6,060,000 D	1,080	470 UD	3,700 D	88,000 D	94 BD		8,300 D	12,800 D	120 U			5,200 D	370,000 DN	13 U	10,600 D				1,300 D	180 UD		390 D	2,600 U	49 U
		B3H1Y0		24,300 CXH					1,600 B				428 B	102 NU					1,530 U	1,140 U	2,510 B			3,770 B			
		B3H1Y1	6,200,000 D		470 UD	3,500 D	90,300 D	89 BD		8,500 D	12,700 D				5,100 D	379,000 DN	13 U	10,300 D				1,200 D	170 UD		390 D	2,500 U	48 U
	4.25 – 6.5	B3H1X2							1,850 B				973 B	714 N					1,580 U	1,170 U	2,210 U			6,110			
		B3H1X3	6,390,000 D	547 B	470 UD	4,000 D	90,800 D	90 BD		10,800 D	13,800 D	120 U			5,200 D	339,000 DN	13 U	14,400 D				1,400 D	190 UD		460 D	2,600 U	49 U
	6.5 – 8.2	B3H1X5							1,210 B				1,030 B	800 N					1,550 U	1,150 U	2,180 U			2,830 B			
		B3H1X6	5,680,000 D	912	470 UD	5,000 D	73,300 D	81 BD		7,400 D	13,100 D	120 U			5,300 D	376,000 DN	12 U	9,500 D				1,400 D	180 UD		440 D	2,600 U	48 U
	8.2 – 10.0	B3H1X8							1,570 B				1,040 B	183 BN					5,090	1,130 U	2,150 U			4,140 B			
		B3H1X9	6,720,000 D	1,010	790 BD	8,400 D	113,000 D	130 D		8,900 D	17,100 D	130 U			8,400 D	491,000 DN	13 U	11,200 D				1,600 D	190 UD		660 D	2,800 U	53 U
C9862	2.3 – 4.3	B3H205							1,240 B				868 B	97 NU					3,800 B	1,190 U	2,250 U			3,850 B			
		B3H206	6,540,000 D	1,030	490 UD	3,700 D	85,800 D	80 BD		9,300 D	15,100 D	120 U			4,800 D	368,000 DN	13 B	11,500 D				1,600 D	190 UD		430 D	2,600 U	49 U
	4.3 – 6.4	B3H208							2,260				1,100	302 N					4,470 B	1,180 U	2,240 U			4,420 B			
		B3H209	6,100,000 D	948	500 UD	8,000 D	82,100 D	98 BD		8,000 D	13,500 D	120 U			5,900 D	369,000 DN	13 U	10,100 D				1,300 D	190 UD		710 D	2,700 U	50 U
	6.4 – 8.0	B3H211							1,220 B				827 B	122 NU					3,890 B	1,110 U	2,100 U			3,750 B			
		B3H212	5,080,000 D	559 B	490 UD	5,700 D	67,600 D	81 BD		7,900 D	19,200 D	120 U			3,500 D	350,000 DN	14 U	11,100 D				1,600 D	180 UD		500 D	2,600 U	49 U
	8.0 – 10.1	B3H214							1,790 B				1,070	124 NU					3,220 B	1,130 U	2,140 U			29,200			
		B3H215	6,520,000 D	827	510 UD	8,500 D	84,500 D	100 BD		8,500 D	20,400 D	120 U			7,600 D	448,000 DN	13 U	12,100 D				1,500 D	190 UD		620 D	2,600 U	48 U

Table 3-30. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-18 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN (µg/kg)$^-$	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)	Kerosene (µg/kg)	TBP (µg/kg)
C9863	2.2 – 4.6	B3H225							1,210 B				1,070	89.2 NU					1,550 U	1,150 U	2,190 U			2,660 B			
		B3H226	6,520,000 D	766	780 BD	6,700 D	88,600 D	120 D		9,900 D	16,500 D	130 U			6,500 D	398,000 DN	14 U	10,700 D				1,500 D	180 UD	---	650 D	2,700 U	52 U
	4.6 – 6.4	B3H228							860 B				524 B	167 NU					9,070	1,080 U	2,050 U			3,540 B			
		B3H229	5,620,000 D	681	500 UD	5,700 D	73,200 D	87 BD		8,100 D	13,500 D	120 U			8,100 D	370,000 DN	13 U	9,700 D				1,400 D	200 UD		430 D	2,600 U	49 U
	6.4 – 8.4	B3H231							993 B				468 B	115 NU					6,600	1,130 U	2,140 U			3,640 B			
		B3H232	5,950,000 D	632 B	510 UD	6,800 D	73,200 D	96 BD		7,300 D	17,000 D	120 U			6,500 D	407,000 DN	13 U	10,000 D				1,600 D	180 UD		460 D	2,600 U	48 U
	8.4 – 10.0	B3H234							1,100 B				626 B	114 BD					10,200	1,130 U	2,140 U			4,300			
		B3H235	7,150,000 D	681	540 UD	11,700 D	97,000 D	130 D		9,100 D	17,900 D	120 U			10,200 D	512,000 DN	14 U	12,000 D				1,700 D	200 UD		580 D	2,700 U	51 U

Note: Blank cells indicate no result for sample number.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification
TBP = tributyl phosphate

Data qualifiers

B = analyte was detected at less than the quantitation limit but greater than the method detection limit
D = analyte was reported at a secondary dilution factor
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected

Table 3-31. Radiological Contaminant Concentrations in Samples Collected from the 216-T-18 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9861	2.5 – 4.3	B3H1W9	0.406 U	3.94 U	0.431	0.0312 U	0.0791 U	0.0931 U	0.0749 U	0.557 U	0.653 U	6.38 U	0.308 U	0.192 U	1.07 U	3.2 U	23.6 U	0.746	0.272 U	0.554
		B3H1Y0	0.723 U	3.69 U	0.969	0.0213 U	0.0571 U	0.0671 U	0.0616 U	0.761 U	0.33 U	7.04 U	0.308 U	0.451 U	0.8 U	3.29 U	24.3 U	0.791	0.294 U	0.835
	4.25 – 6.5	B3H1X2	0.421 U	3.99 U	0.0314 U	0.0283 U	0.0799 U	0.0802 U	0.082 U	0.849 U	0.608 U	6.79 U	0.356 U	0.356 U	1.12 U	3.12 U	23.3 U	0.951	0.695 U	0.876
	6.5 – 8.2	B3H1X5	0.912 U	3.85 U	0.0309 U	0.0303 U	0.0688 U	0.0953 U	0.0803 U	0.804 U	0.521 U	7.25 U	0.543 U	0.402 U	1.07 U	3.23 U	20.4 U	0.778	0.271 U	0.42
	8.2 – 10.0	B3H1X8	0.422 U	3.98 U	0.0162 U	0.0169 U	0.0379 U	0.0561 U	0.0733 XR	0.585 U	0.438 U	7.3 U	0.666 U	0.531 U	1.29 U	3.24 U	24.3 U	1.08	0.267 U	0.847
C9862	2.3 – 4.3	B3H205	0.387 U	3.81 U	0.0681	0.0259 U	0.0473 U	0.0913 U	0.0689 XR	0.686 XR	0.389 U	6.48 U	0.465 U	0.591 U	1.32 U	3.18 U	23.9 U	0.867	0.465 U	0.632
	4.3 – 6.4	B3H208	0.292 U	3.83 U	0.0194 U	0.0222 U	0.0489 U	0.0667 U	0.0512 U	0.671 U	0.369 U	7.03 U	0.422 U	0.307 U	0.871 U	3.29 U	24.6 U	0.707	0.551 U	1
	6.4 – 8.0	B3H211	0.224 U	3.76 U	0.0265 U	0.0285 U	0.0598 U	0.0742 U	0.0911 XR	0.912 U	0.524 U	5.8 U	0.358 U	0.426 U	1.54 U	3.35 U	23.9 U	0.89 U	0.799 U	0.586 U
	8.0 – 10.1	B3H214	0.364 U	3.65 U	0.0321 U	0.0254 U	0.0647 U	0.099 U	0.108 XR	0.56 U	0.394 U	7.37 U	0.371 U	0.442 U	0.819 U	3.12 U	23.4 U	0.588 U	0.463 U	0.54
C9863	2.2 – 4.6	B3H225	0.427 U	3.84 U	0.0304 U	0.0358 U	0.0833 U	0.0998 U	0.117 XR	0.969 U	0.677 U	5.96 U	0.339 U	0.339 U	0.928 U	3.15 U	23.8 U	0.505	0.233 U	0.41
	4.6 – 6.4	B3H228	0.747 U	3.54 U	0.0295 U	0.0343 U	0.0771 U	0.0983 U	0.0845 U	0.43 U	0.846 U	7.49 U	0.307 U	0.391 U	0.714 U	3.26 U	23.7 U	0.527	0.388 U	0.439 U
	6.4 – 8.4	B3H231	0.497 U	3.73 U	0.0241 U	0.0268 U	0.0636 U	0.0921 U	0.0684 U	0.751 U	0.355 U	7.31 U	0.629 U	0.494 U	1.88 U	3.29 U	24.1 U	0.514 U	0.44 U	0.651
	8.4 – 10.0	B3H234	0.697 U	3.67 U	0.0297 U	0.0301 U	0.0716 U	0.0888 U	0.0755 U	0.469 U	0.312 U	7.99 U	0.417 U	0.417 U	0.986 U	3.43 U	24.5 U	0.816	0.296 U	0.859

Note: Undetected radionuclide value reported is the minimum detectable concentration.

bgs = below ground surface

HEIS = Hanford Environmental Information System

ID = identification

Data qualifiers

R = do not use; further review indicates the result is not valid

U = analyzed for but not detected

X = indicates a result-specific comment is provided in the data report or case narrative

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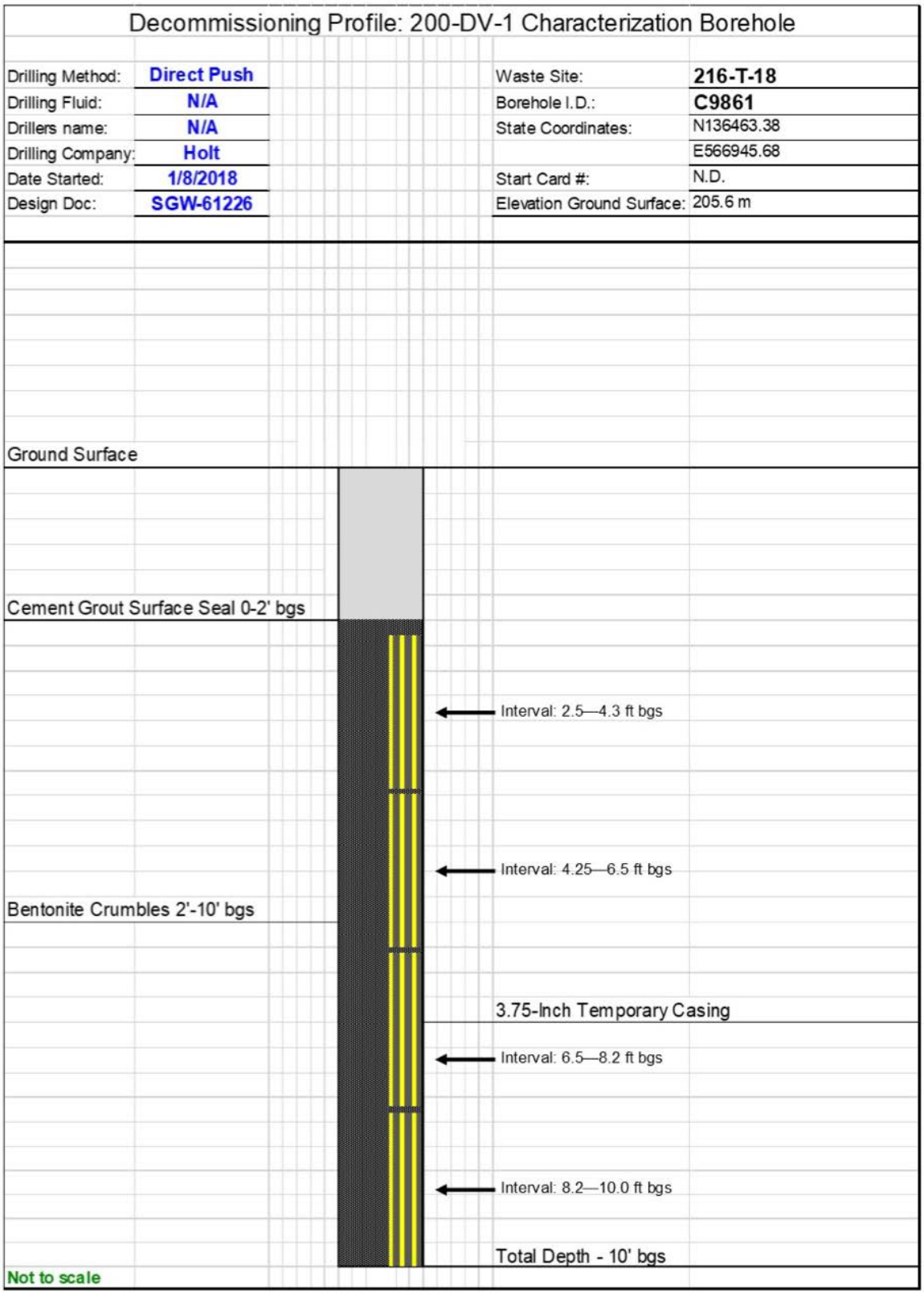

Figure 3-30. Sample Depths and Decommissioning Profile for Borehole C9861 at the 216-T-18 Crib

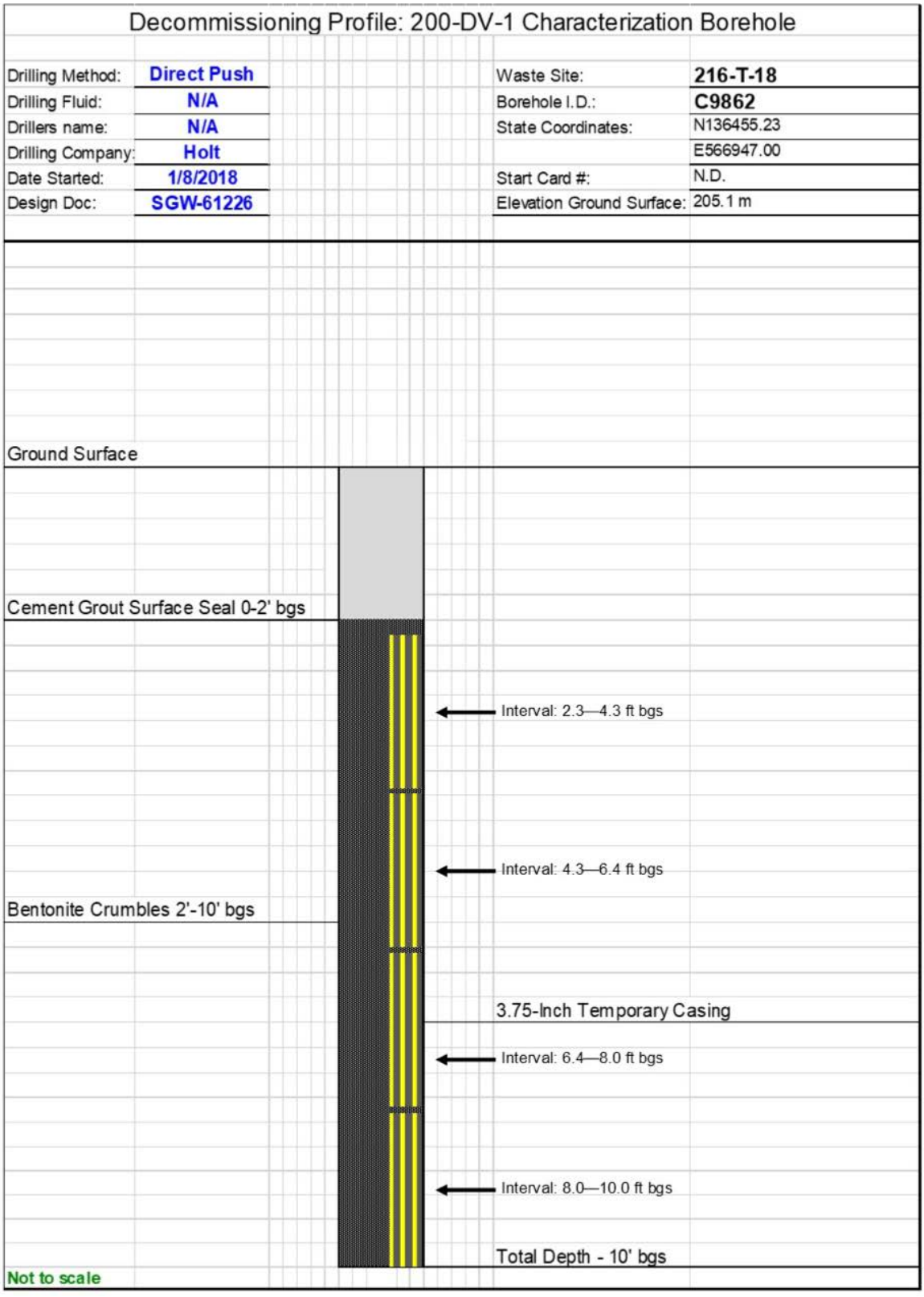

Figure 3-31. Sample Depths and Decommissioning Profile for Borehole C9862 at the 216-T-18 Crib

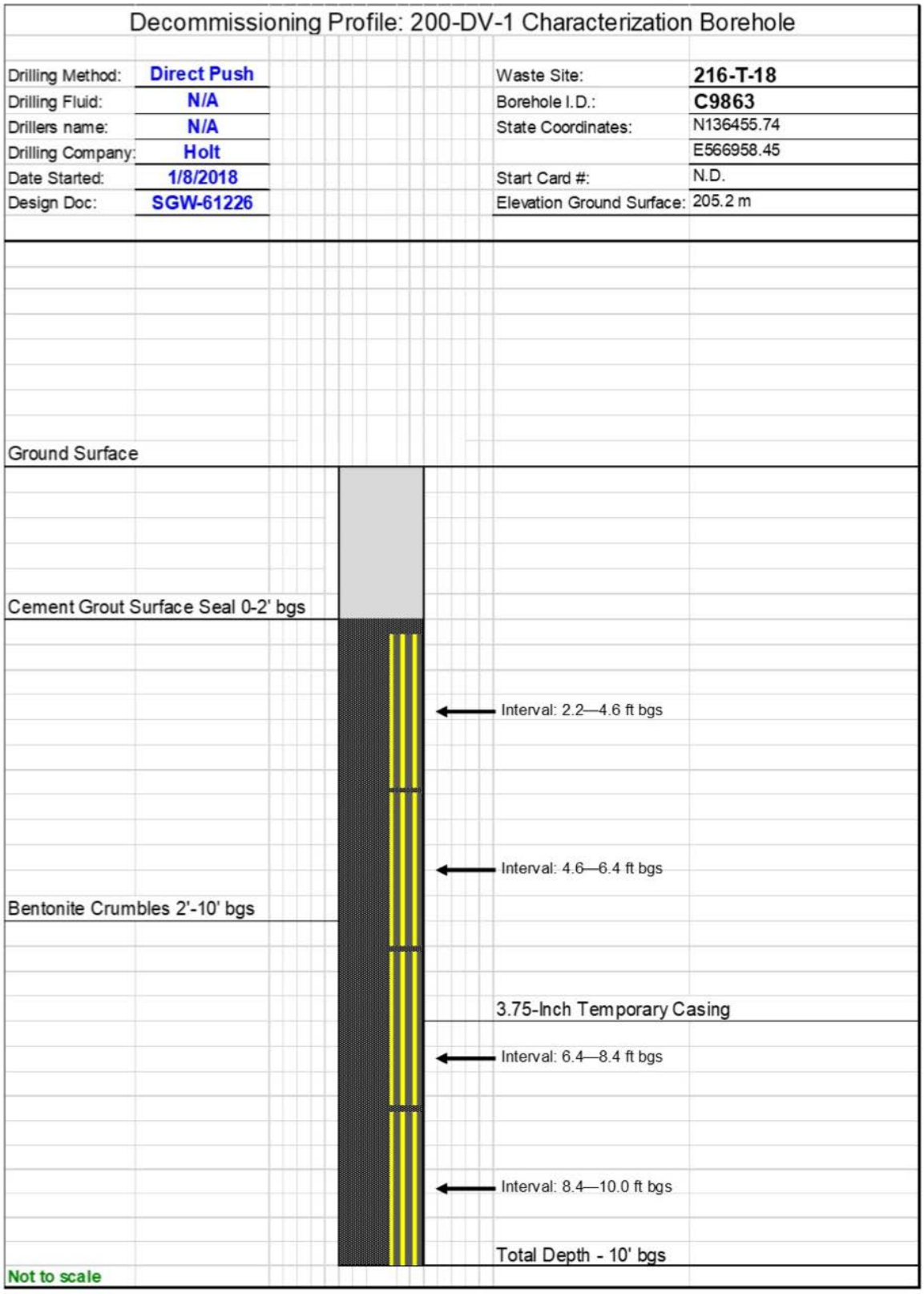

Figure 3-32. Sample Depths and Decommissioning Profile for Borehole C9863 at the 216-T-18 Crib

3.9 216-T-26 Crib

Boreholes C9864 and C9943 (replacement) are in the northwestern corner of the 216-T-26 Crib waste site boundary. Boreholes C9865 and C9944 (replacement) are on eastern side of the crib boundary, and boreholes C9866 and C9945 (replacement) are located toward the southern side of the crib boundary. The GeoProbe rig drilled to a target depth of approximately 4.6 m (15 ft) bgs at the C9864 and C9865 borehole locations. Samples at the 3 to 3.7 m (10 to 12 ft) and 4 to 4.6 m (13 to 15 ft) intervals at borehole C9864 came back lacking the necessary volume for sample analysis, which required borehole C9943 (replacement). The GeoProbe drill rig was moved 0.78 m (2.6 ft) over and drilled to a target depth of approximately 4.6 m (15 ft) bgs at the C9943 (replacement) borehole location to acquire the required sampling intervals. Samples at the 3 to 3.7 m (10 to 12 ft) and 4 to 4.6 m (13 to 15 ft) intervals at borehole C9865 also came back lacking volume for sample analysis, requiring borehole C9944 (replacement).

The GeoProbe drill rig was moved 0.7 m (2.2 ft) over and drilled to a target depth of approximately 4.6 m (15 ft) bgs at the C9944 (replacement) borehole location to acquire the required sampling intervals. The GeoProbe rig drilled to a target depth of approximately 4.6 m (15 ft) bgs at the borehole C9866 location as well; however, refusal was hit at 4.1 m (13.5 ft) bgs, requiring borehole C9945 (replacement). The GeoProbe drill rig was moved 0.9 m (2.8 ft) over and drilled to a target depth of approximately 4.7 m (15.5 ft) bgs at the C9945 (replacement) borehole location to acquire the required sampling intervals. Sediment samples were analyzed for the COPCs listed in Tables 3-32 and 3-33. Figures 3-33 through 3-38 show the sampling depth and how the boreholes were decommissioned.

3.9.1 Borehole C9864

Borehole C9864 consisted of sediments composed of the Hf1. From ground surface to 0.7 m (2.2 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.7 to 2.5 m (2.2 to 8.3 ft) bgs, the sediment was classified as gravelly sand and was made up of 80% sand varying between very fine- and very coarse-grained particles, and 15% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were angular in overall shape. From 2.5 m (8.3 ft) bgs to total depth of the borehole (4.6 m [15 ft] bgs), the sediment was classified as sand and was made up of 90% sand varying between very fine- and coarse-grained particles, and 5% gravels clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were angular in overall shape.

3.9.2 Borehole C9943 (Replacement for Borehole C9864)

Borehole C9943 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to 3.1 m (10.1 ft) bgs. From 3.1 m (10.1 ft) bgs to total depth of the borehole (4.5 m [14.9 ft] bgs), the sediment was classified as gravel, which was made up of 95% to 90% gravel, 10% to 5% sand, and trace silt-sized particles.

3.9.3 Borehole C9865

Borehole C9865 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2 ft) bgs, sediment consisted of reworked Hanford formation backfill. From 0.6 to 3.6 m (2 to 11.7 ft) bgs, the sediment was classified as gravelly sand and was made up of 85% sand, 10% gravel, and 5% silt-sized particles. From 3.6 m (11.7 ft) bgs to total depth of the borehole (4.6 m [15 ft] bgs), the sediment was classified as gravel that was made up of 100% gravel clasts.

3.9.4 Borehole C9944 (Replacement for Borehole C9865)

Borehole C9944 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to 3.2 m (10.5 ft) bgs. From 3.2 to 3.7 m (10.5 to 12 ft) bgs, the sediment was classified as gravel and was made up of 100% gravel clasts, ranging between very fine pebble and

small cobble (2 to 80 mm in diameter) and were angular to subangular in overall shape. From 3.7 m (12 ft) bgs to total depth of the borehole (4.6 m [15.1 ft] bgs), sediment was not recovered.

3.9.5 Borehole C9866

Borehole C9866 consisted of sediments composed of the Hf1. From ground surface to 0.6 m (2.1 ft) bgs, the sediment consisted of reworked Hanford formation backfill. From 0.6 to 3.7 m (2.1 to 12 ft) bgs, the sediment was classified as gravelly sand and was made up of 80% sand varying between very fine- and coarse-grained particles, 15% gravel clasts ranging between very fine and very coarse pebble (2 to 64 mm in diameter) that were angular in overall shape, and 5% silt-sized particles. From 3.7 m (12 ft) bgs to total depth of the borehole (4.1 m [13.5 ft] bgs), the sediment was classified as gravel made up of 100% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter), and the overall shape was angular to subangular.

3.9.6 Borehole C9945 (Replacement for Borehole C9866)

Borehole C9945 (replacement) consisted of sediments composed of the Hf1. At this location, sediment was not observed prior to 3.1 m (10.3 ft) bgs. From 3.1 to 3.5 m (10.3 to 11.6 ft) bgs, the sediment was classified as gravel made up of 100% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter), and the overall shape was angular to subangular. From 3.5 m (11.6 ft) bgs to total depth of the borehole (4.6 m [15 ft] bgs), the sediment was classified as sandy gravel and was made up of 70% gravel clasts ranging between very fine pebble and small cobble (2 to 126 mm in diameter) that were angular to subangular in overall shape, and 30% sand varying between very fine- and very coarse-grained particles.

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Table 3-32. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-26 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9864	2.2 – 4.3	B3H247							886 B				334 U	102 NU					4,300 B	1,100 U	2,080 U			2,320 B	
		B3H248	6,050,000 D	1,580	500 UD	2,700 D	79,500 D	91 BD		8,400 D	34,400 D	120 U			5,600 D	353,000 DN	13 U	11,300 D				1,200 D	180 UD		400 D
	4.3 – 6.5	B3H250							1,000 B				480 B	128 NU					6,680	1,000 U	1,900 U			3,280 B	
		B3H251	5,660,000 D	827	500 UD	4,300 D	75,600 D	77 BD		8,200 D	13,100 D	120 U			4,600 D	346,000 DN	13 U	11,900 D				1,300 D	180 UD		720 D
	6.5 – 8.3	B3H253							1,300 B				498 B	135 BN					8,770	1,020 U	1,930 U			3,180 B	
		B3H254	5,770,000 D	584 B	500 UD	4,000 D	71,100 D	80 BD		7,500 D	13,300 D	120 U			4,500 D	349,000 DN	12 U	9,600 D				1,400 D	170 UD		410 D
	8.3 – 10.0	B3H256							1,290 B				462 B	116 NU					11,100	969 U	1,840 U			4,330	
		B3H257	5,170,000 D	742	450 UD	3,200 D	55,400 D	62 BD		8,200 D	12,200 D	120 U			3,700 D	301,000 DN	13 U	9,300 D				1,200 BD	190 UD		1,900 D
C9943[a]	10.1 – 12.3	B3H265	6,820,000 DA	19,200 CXH	1,740 UDA	2,610 DA	85,500 DA	87.9 BDA	3,830 A	24,800 DA	13,800 DA	42.9 UXAH	1,670 A	1,300 A	5,950 DA	293,000 DA	4.02 UXAH	10,100 DA	9,650 A	1,160 UA	2,190 UA	1,670 DA	105 UA	50,200 A	1,340 DA
	12.3 – 14.9	B3H268	5,560,000 D	7,250 CXH	1,560 UD	1,430 D	60,000 D	62.7 BD	2,560	11,900 D	15,000 D	71.5 UXH	1,430	165 B	1,850 D	214,000 D	4.22 BXH	7,700 D	9,210	1,180 B	2,090 U	1,440 D	94.3 U	15,100	350 D
C9865	2.0 – 4.3	B3H273							1,480 B				578	131 B					4,560 B	1,190 B	2,170 U			5,800	
		B3H274	5,900,000 D	1,580	480 UD	3,900 D	72,800 D	94 BD		8,300 D	15,900 D	120 U			4,700 D	322,000 ND	13 U	10,500 D				2,900 D	180 UD		410 D
		B3H279							1,490 B				524 B	108 B					4,120 B	1,120 U	2,130 U			5,410	
		B3H280	6,450,000 D	1,700 C	510 UD	3,700 D	83,300 D	100 BD		12,100 D	15,000 D	120 U			6,000 D	377,000 ND	16 B	12,800 D				1,500 D	190 UD		520 D
	4.3 – 6.3	B3H276							1,650 B				778 B	132 B					15,500	1,170 B	2,130 U			7,970	
		B3H277	5,900,000 D	1,950 C	490 UD	5,200 D	85,700 D	95 BD		7,500 D	14,700 D	120 U			5,000 D	360,000 ND	12 U	10,900 D				2,500 D	190 UD		2,400 D
	6.3 – 9.2	B3H282							1,770 B				827 B	139 B					28,200	1,200 B	2,140 U			9,240	
		B3H283	5,830,000 D	1,340 C	490 UD	3,800 D	81,200 D	110 BD		7,700 D	16,300 D	120 U			4,200 D	353,000 ND	13 U	10,200 D				1,700 D	190 UD		390 D
	9.2 – 11.7	B3H285							1,570 B				841 B	135 B					11,900	1,230 B	2,270 B			7,180	
		B3H286	4,810,000 D	1,130 C	1,000 BD	3,600 D	50,300 D	76 BD		5,800 D	12,000 D	120 U			3,500 D	265,000 ND	12 U	8,000 D				1,300 D	190 UD		390 D

Table 3-32. Nonradiological Contaminant Concentrations in Samples Collected from the 216-T-26 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Al (µg/kg)	NH_3 (µg/kg)	Sb (µg/kg)	As (µg/kg)	Ba (µg/kg)	Cd (µg/kg)	Cl^- (µg/kg)	Cr (µg/kg)	Cu (µg/kg)	CN^- (µg/kg)	F^- (µg/kg)	Cr(VI) (µg/kg)	Pb (µg/kg)	Mn (µg/kg)	Hg (µg/kg)	Ni (µg/kg)	NO_3^- (µg/kg)	NO_2^- (µg/kg)	PO_4^{3-} (µg/kg)	Se (µg/kg)	Ag (µg/kg)	SO_4^{2-} (µg/kg)	U (µg/kg)
C9944[a]	10.5 – 12.0	B3H294	4,140,000 D	7,930 CXH	1,600 UD	2,480 D	67,800 D	47.8 BD	2,570	137,000 D	32,300 D	41.9 UXH	1,150	111 B	2,880 D	295,000 D	4.85 BXH	17,200 D	12,500	1,160 B	2,110 B	1,160 D	96.7 U	60,700	501 D
	13.0 – 15.0	***Not collected***																							
C9866	2.1 – 4.2	B3H2B2							1,420 B				569 B	102 U					3,060 B	1,130 U	2,150 U			6,030	
		B3H2B3	6,110,000 D	1,460 C	500 UD	3,700 D	71,100 D	84 BD		11,000 D	15,900 D	120 U			8,800 D	347,000 ND	13 U	11,400 D				1,600 D	190 UD		500 D
	4.2 – 6.3	B3H2B5							1,320 B				488 B	129 B					4,080 B	1,200 B	2,150 U			3,300 B	
		B3H2B6	6,090,000 D	1,580 C	500 UD	3,600 D	73,700 D	78 BD		8,100 D	14,300 D	120 U			4,400 D	377,000 ND	12 U	11,700 D				1,500 D	190 UD		440 D
	6.3 – 8.2	B3H2B8							1,170 B				792 B	120 B					9,740	1,090 U	2,310 B			4,340	
		B3H2B9	5,970,000 D	1,460 C	490 UD	4,800 D	77,400 D	94 BD		8,900 D	17,200 D	120 U			4,500 D	411,000 ND	14 U	12,500 D				1,900 D	190 UD		460 D
	8.2 – 10.1	B3H2C1							1,340 B				1,000	92.2 U					11,900	1,070 U	2,610 B			5,100	
		B3H2C2	5,810,000 D	1,460 C	510 UD	3,400 D	67,600 D	73 BD		8,000 D	13,300 D	120 U			4,100 D	323,000 ND	12 U	10,500 D				1,200 D	190 UD		370 D
C9945[a]	10.3 – 11.6	B3H2D0	6.850,000 D	3,850 CXH	1,660 UD	2,200 D	77,800 D	51.9 BD	2,290	18,800 D	15,100 D	71.9 UXH	1,510	117 B	2,910 D	245,000 D	4.02 UXH	12,600 D	6,330	946 U	2,370 B	1,610 D	101 U	41,600	493 D
	11.6 – 15.0	B3H2D3							1,260 B				788 B	137 B					9,430	1,110 U	2,100 U			85,000	
		B3H2D4	4,810,000 D	1,340 C	480 UD	4,500 D	75,700 D	71 BD		7,800 D	14,700 D	120 U			4,100 D	344,000 ND	12 U	12,900 D				1,600 D	170 UD		560 D

Notes: Blank cells indicate no result for sample number.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
Cr(VI) = hexavalent chromium
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork
B = analyte was detected at less than the quantitation limit but greater than the method detection limit
C = analyte was detected in both the sample and the quality control blank
D = analyte was reported at a secondary dilution factor
H = laboratory holding time was exceeded before the sample was analyzed
N = spike and/or spike duplicate recovery is outside control limits
U = analyzed for but not detected
X = indicates a result-specific comment is provided in the data report or case narrative

Table 3-33. Radiological Contaminant Concentrations in Samples Collected from the 216-T-26 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9864	2.2 – 4.3	B3H247	0.269 U	3.8 U	2.65	0.0318 U	0.0912 U	0.0986 U	0.0939 U	0.62 U	0.381 U	6.7 U	0.362 U	0.418 U	0.997 U	3.44 U	24 U	0.929	0.439 U	0.553
	4.3 – 6.5	B3H250	0.167 U	3.76 U	0.0637	0.0393 U	0.0849 U	0.116 U	0.162 XR	0.631 U	0.557 U	8.92 U	0.385 U	0.241 U	0.746 U	3.33 U	24.2 U	2.83	0.351	2.44
	6.5 – 8.3	B3H253	0.318 U	3.73 U	0.0639	0.0343 U	0.0723 U	0.105 U	0.0818 U	0.476 U	0.799 U	7.91 U	0.221 U	0.408 U	0.785 U	3.31 U	23.6 U	0.578	0.35 U	0.694
	8.3 – 10.0	B3H256	0.344 UA	3.86 UA	0.0456 XRA	0.0352 UA	0.0691 UA	0.106 UA	0.0727 UA	0.482 UA	0.499 UA	6.16 UA	0.303 UA	0.49 UA	1.26 UA	3.36 UA	23.3 UA	0.837 A	0.489 UA	0.754 A
C9943[a]	10.1 – 12.3	B3H265	0.857 UA	3.76 UA	0.236 A	0.0365 UA	0.0907 UA	0.105 UA	0.0834 UA	0.556 UA	0.408 UA	6.64 UA	0.273 UA	0.637 UA	1.08 UA	3.19 UA	22.5 UA	0.636 A	0.551 UA	0.711 A
	12.3 – 14.9	B3H268	0.397 U	3.46 U	0.1 XR	0.0799 U	0.119 U	0.207 U	0.0677 U	0.551 U	0.481 U	5.87 U	0.315 U	0.401 U	1.01 U	3.44 U	23.3 U	0.439 U	0.452 U	0.435 U
C9865	2.0 – 4.3	B3H273	0.308 U	3.73 U	0.277	0.025 U	0.0577 U	0.0772 U	0.0676 U	0.665 U	0.387 U	6.03 U	0.509 U	0.276 U	0.992 U	3.45 U	23.3 U	0.835	0.4 U	0.559
		B3H279	0.481 U	3.67 U	0.543	0.0365 U	0.0768 U	0.111 U	0.0869 U	0.385 U	0.631 U	5.82 U	0.514 U	0.612 U	1.42 U	3.43 U	22.2 U	0.594	0.216 U	0.859
	4.3 – 6.3	B3H276	0.318 U	3.64 U	1.92	0.0261 U	0.069 U	0.104 U	0.0781 XR	0.633 U	0.499 U	5.71 U	0.202 U	0.323 U	1.08 U	3.44 U	22.7 U	0.952	0.221 U	0.836
	6.3 – 9.2	B3H282	0.29 U	3.82 U	0.0538	0.0241 U	0.0585 U	0.0896 U	0.069 U	0.146 U	0.426 U	5.58 U	0.544 U	0.658 U	0.844 U	3.55 U	23.1 U	0.546 U	0.426 U	0.516
	9.2 – 11.7	B3H285	0.207 U	3.43 U	0.175	0.0286 U	0.0621 U	0.074 U	0.0733 U	0.446 U	0.423 U	5.87 U	0.192 U	0.354 U	1.72 U	3.61 U	23.2 U	0.703	0.226 U	1.13
C9944[a]	10.5 – 12.0	B3H294	0.267 U	3.86 U	0.348	0.0279 U	0.0662 U	0.0879 U	0.0702 U	0.492 U	0.371 U	6.41 U	0.44 U	0.56 U	1.03 U	3.46 U	21.8 U	0.713	0.358 U	0.541 U
	13.0 – 15.0	***Not collected***																		
C9866	2.1 – 4.2	B3H2B2	0.343 U	3.79 U	0.156	0.0374 U	0.0895 U	0.111 U	0.103 U	0.482 U	0.487 U	5.21 U	0.262 U	0.483 U	1.44 U	3.42 U	23.4 U	0.991	0.248 U	0.436
	4.2 – 6.3	B3H2B5	0.397 U	3.6 U	0.308	0.0237 U	0.0558 U	0.0796 U	0.0506 U	0.647 U	0.35 U	6.07 U	0.217 U	0.4 U	1.34 U	3.51 U	23.5 U	0.857	0.374 U	0.82
	6.3 – 8.2	B3H2B8	0.409 U	3.84 U	0.0336	0.029 U	0.075 U	0.109 U	0.0675 U	0.586 U	0.478 U	5.29 U	0.234 U	0.374 U	1.14 U	3.32 U	23.1 U	0.833	0.315 U	0.387
	8.2 – 10.1	B3H2C1	0.294 U	3.65 U	0.108	0.029 U	0.0728 U	0.0945 U	0.0737 U	0.671 U	0.299 U	6.4 U	0.466 U	0.403 U	1.33 U	3.35 U	22.7 U	0.599	0.393 U	0.367 U

Table 3-33. Radiological Contaminant Concentrations in Samples Collected from the 216-T-26 Crib

Borehole ID	Sample Interval (ft bgs)	Sample Number (HEIS Number)	Am-241 (pCi/g)	C-14 (pCi/g)	Cs-137 (pCi/g)	Co-60 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	I-129 (pCi/g)	Np-237 (pCi/g)	Ni-63 (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Sr-90 (pCi/g)	Tc-99 (pCi/g)	H-3 (pCi/g)	U-233/234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
C9945[a]	10.3 – 11.6	B3H2D0	0.31 U	3.59 U	0.14	0.0229 U	0.0812 BXR	0.0684 U	0.0736 XR	0.63 U	0.431 U	5.39 U	0.536 U	0.591 U	0.983 U	3.16 U	22.2 U	0.723	0.254 U	0.394
	11.6 – 15.0	B3H2D3	0.211 U	3.93 U	0.0246 U	0.0238 U	0.0619 U	0.0721 U	0.0694 U	0.106 U	0.841 U	4.47 U	0.33 U	0.453 U	0.863 U	3.3 U	22.7 U	0.926	0.458 U	0.535

Note: Undetected radionuclide value reported is the minimum detectable concentration.

a. Due to insufficient sample recovery or refusal, another borehole was required to be pushed to ensure that the sample interval depth could be collected in accordance with DOE/RL-2011-104-ADD2, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*.

bgs = below ground surface
HEIS = Hanford Environmental Information System
ID = identification

Data qualifiers

A = discrepancy in chain-of-custody paperwork
B = associated method blank has a result <2 times the minimum detectable concentration and, after corrections, the result is greater than or equal to the minimum detectable concentration for this sample
R = do not use.; further review indicates the result is not valid
U = analyzed for but not detected
X = indicates a result-specific comment is provided in the data report or case narrative

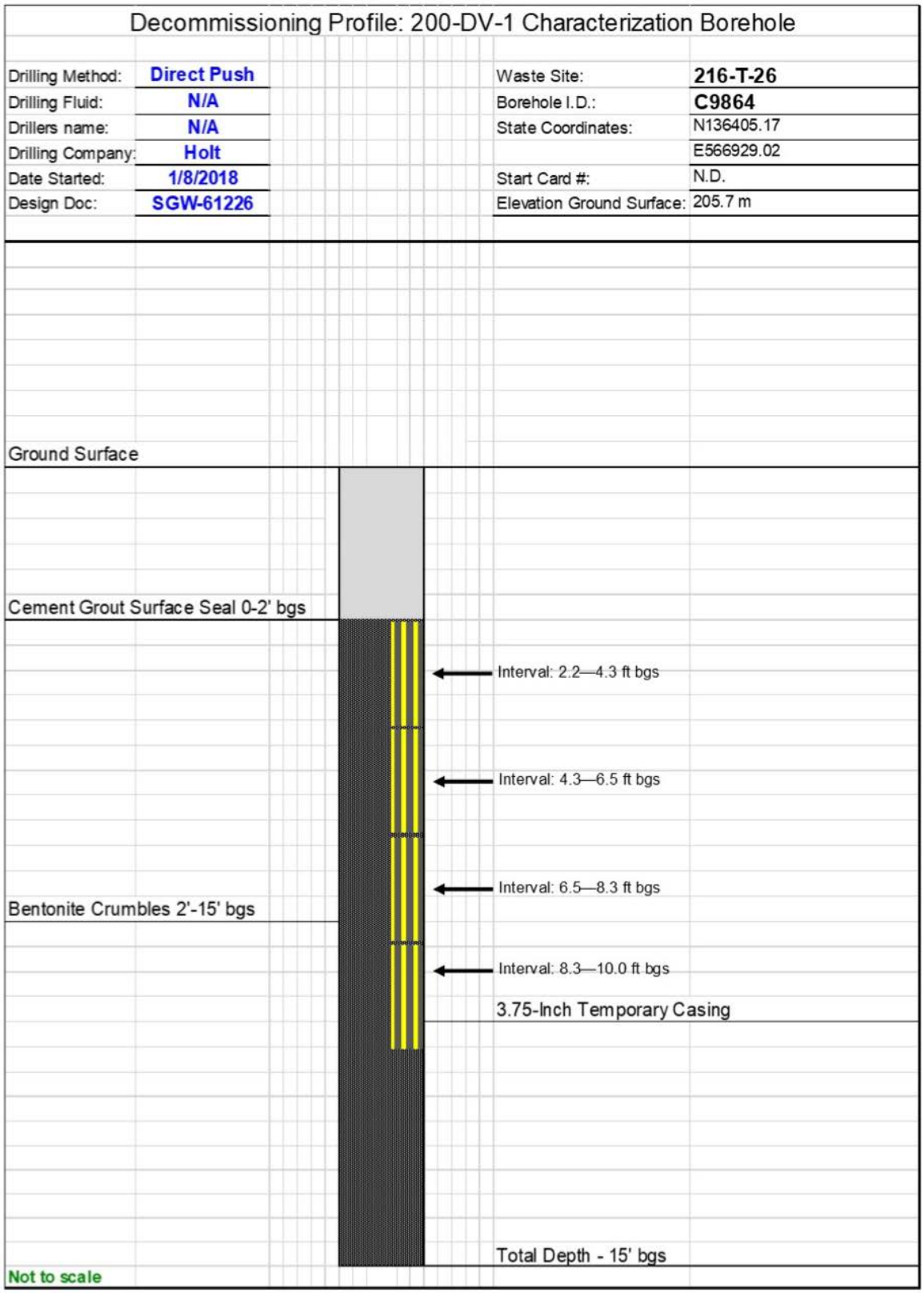

Figure 3-33. Sample Depths and Decommissioning Profile for Borehole C9864 at the 216-T-26 Crib

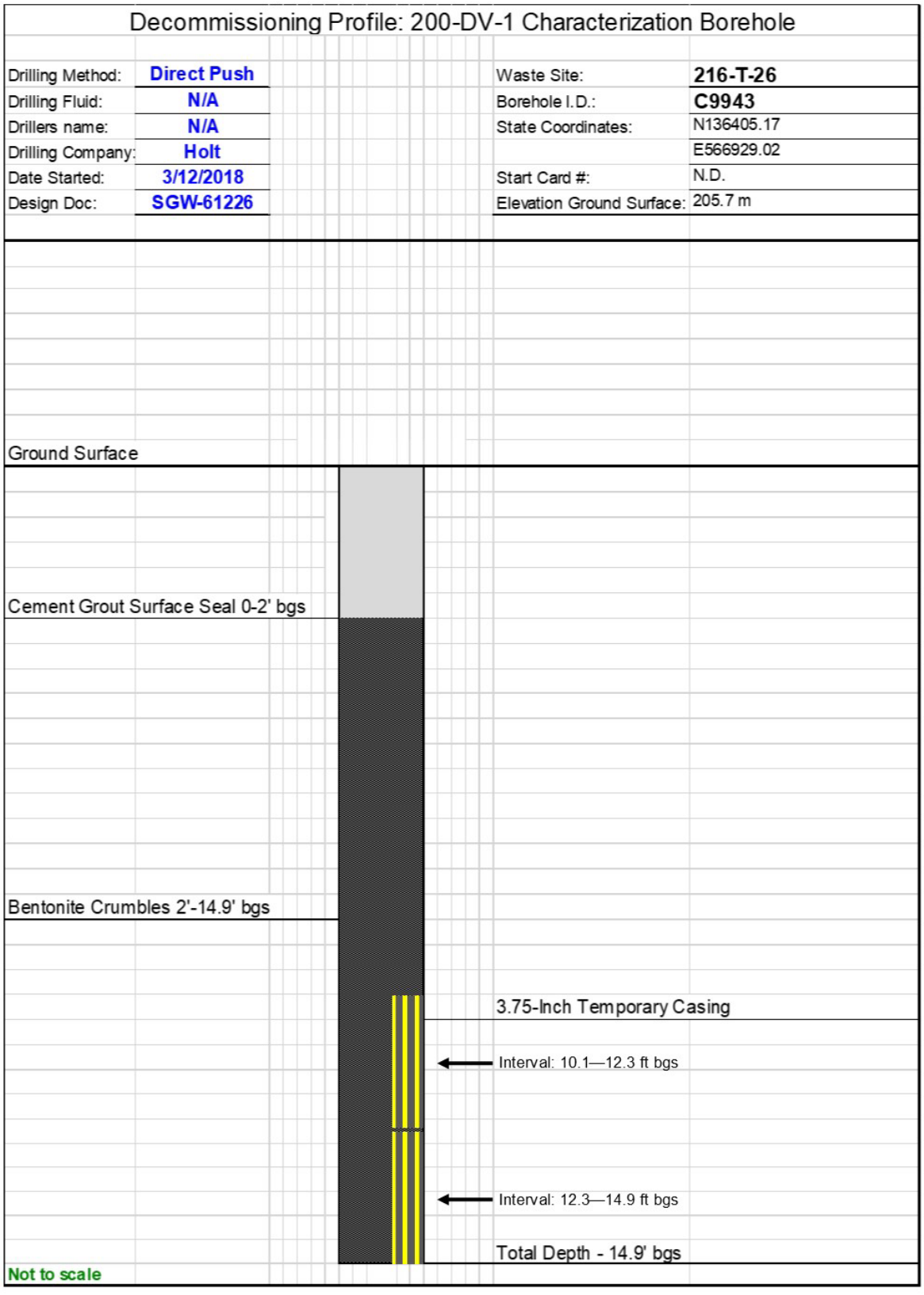

Figure 3-34. Sample Depths and Decommissioning Profile for Borehole C9943 (Replacement) at the 216-T-26 Crib

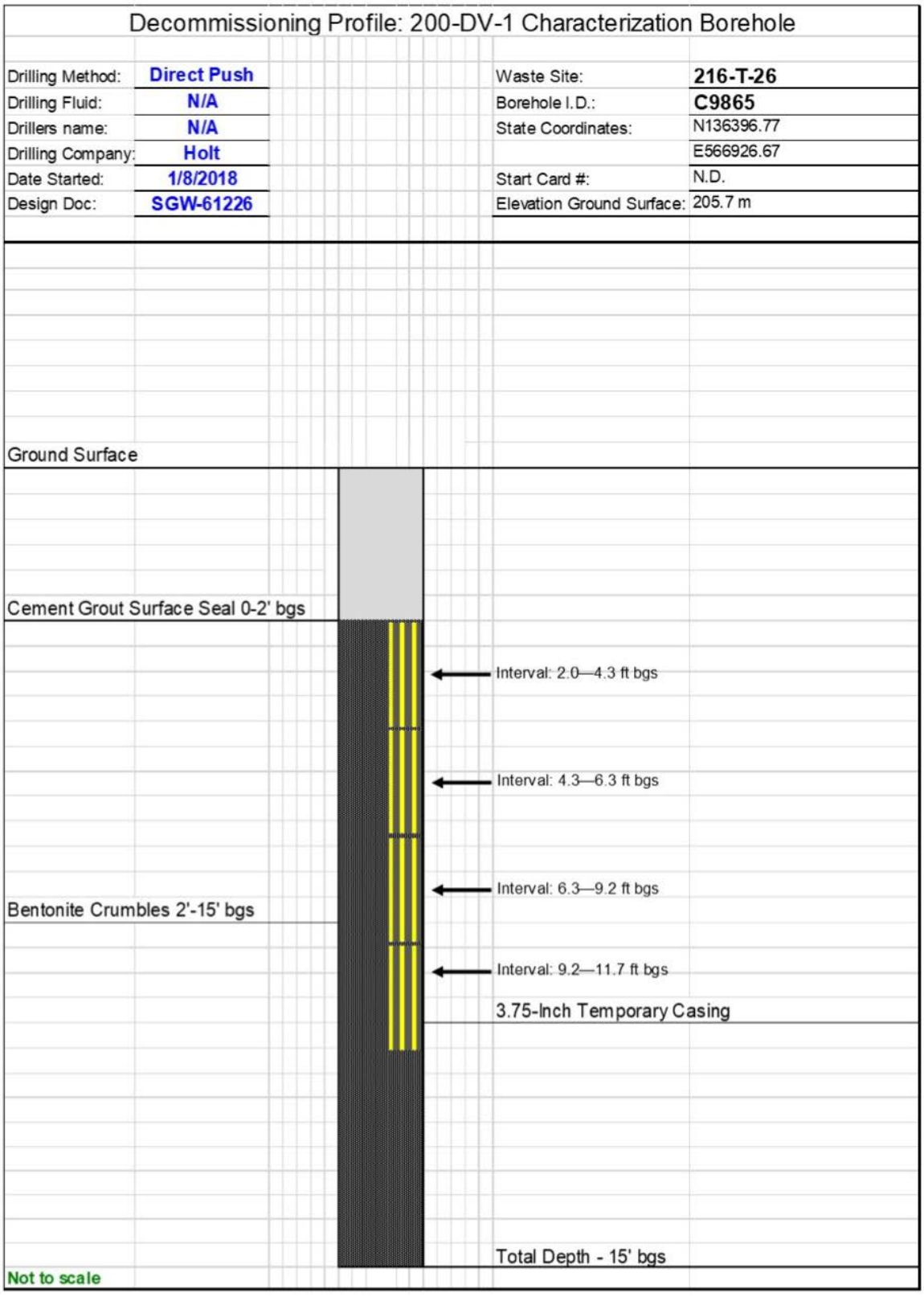

Figure 3-35. Sample Depths and Decommissioning Profile for Borehole C9865 at the 216-T-26 Crib

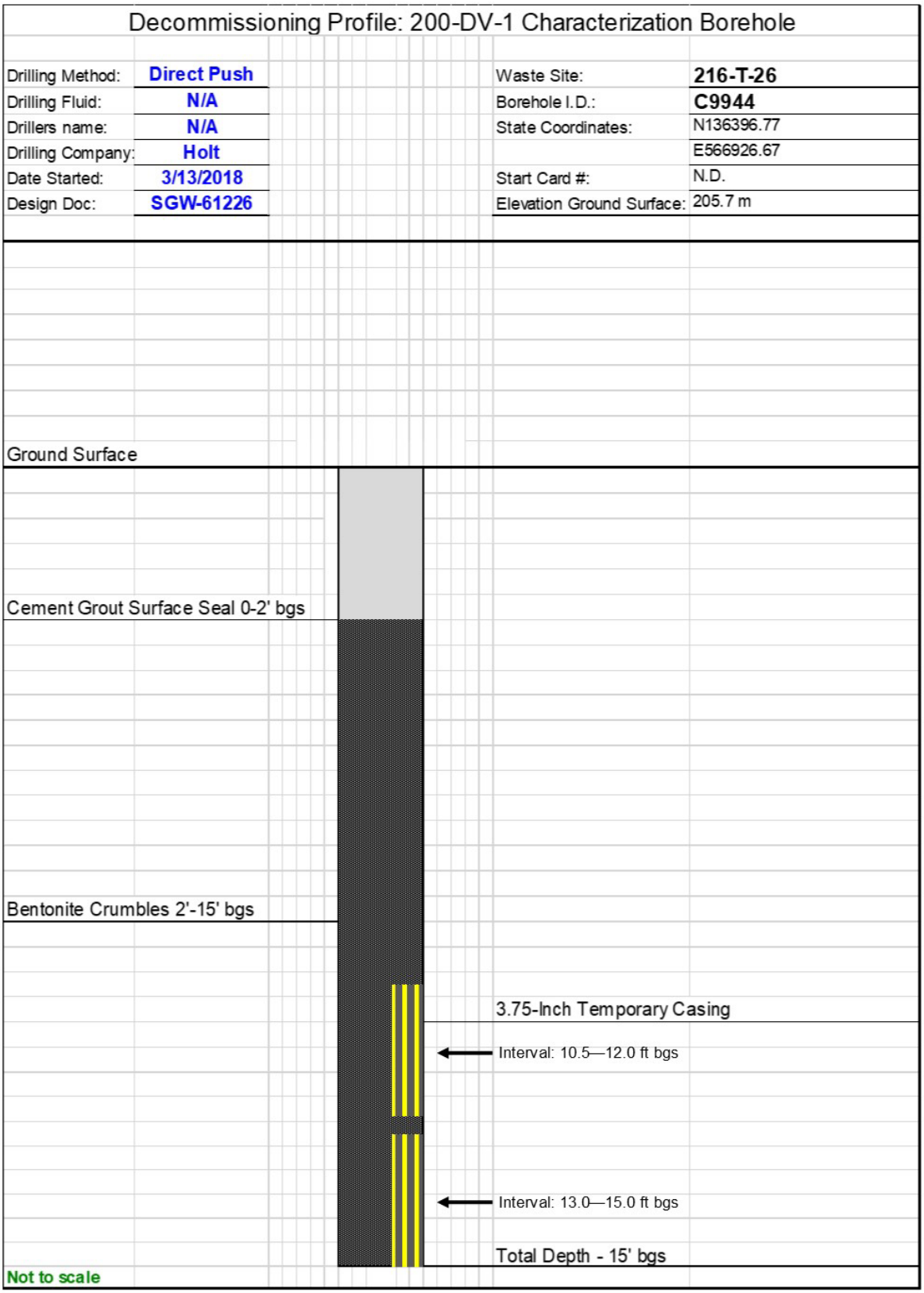

Figure 3-36. Sample Depths and Decommissioning Profile for Borehole C9944 (Replacement) at the 216-T-26 Crib

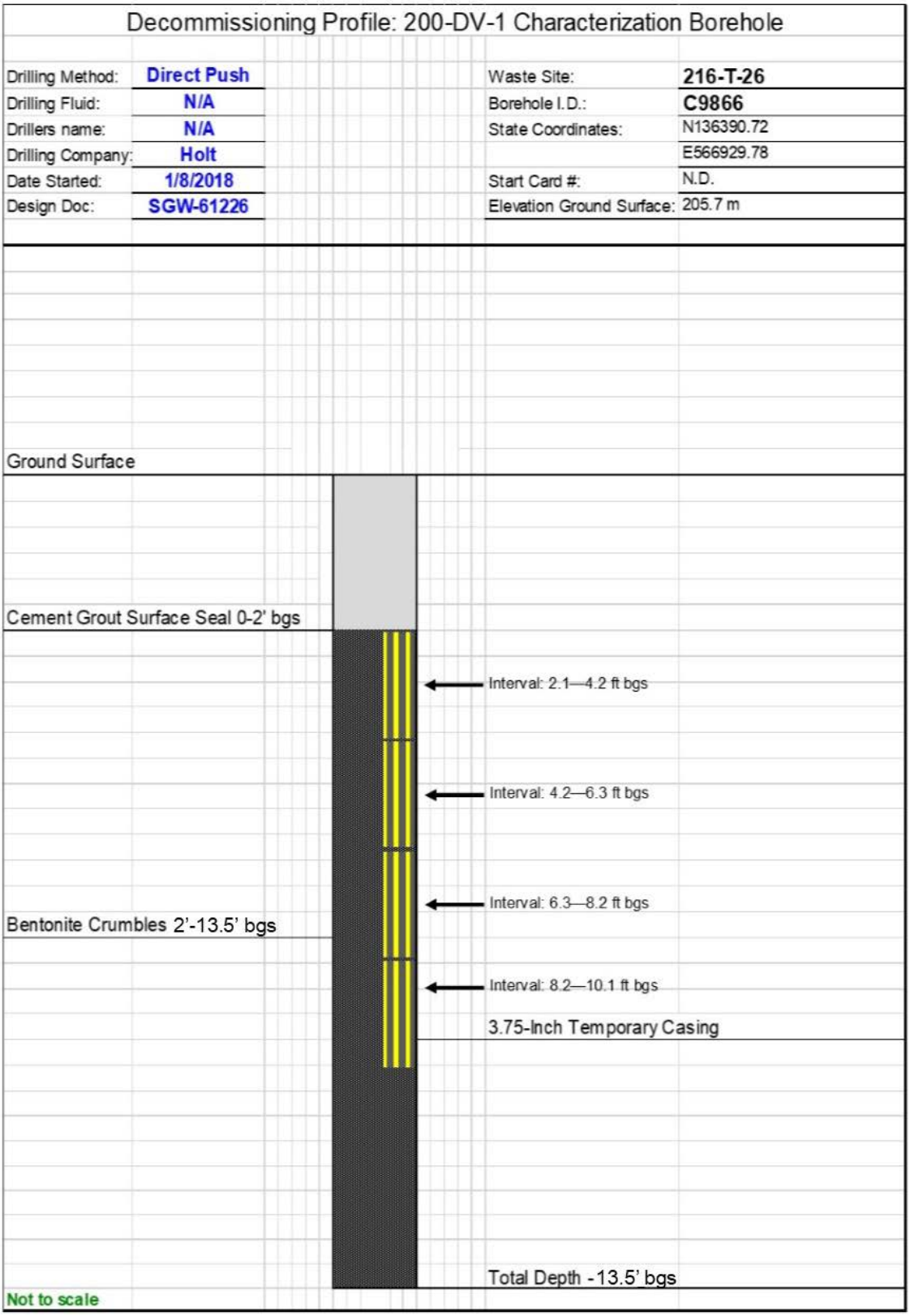

Figure 3-37. Sample Depths and Decommissioning Profile for Borehole C9866 at the 216-T-26 Crib

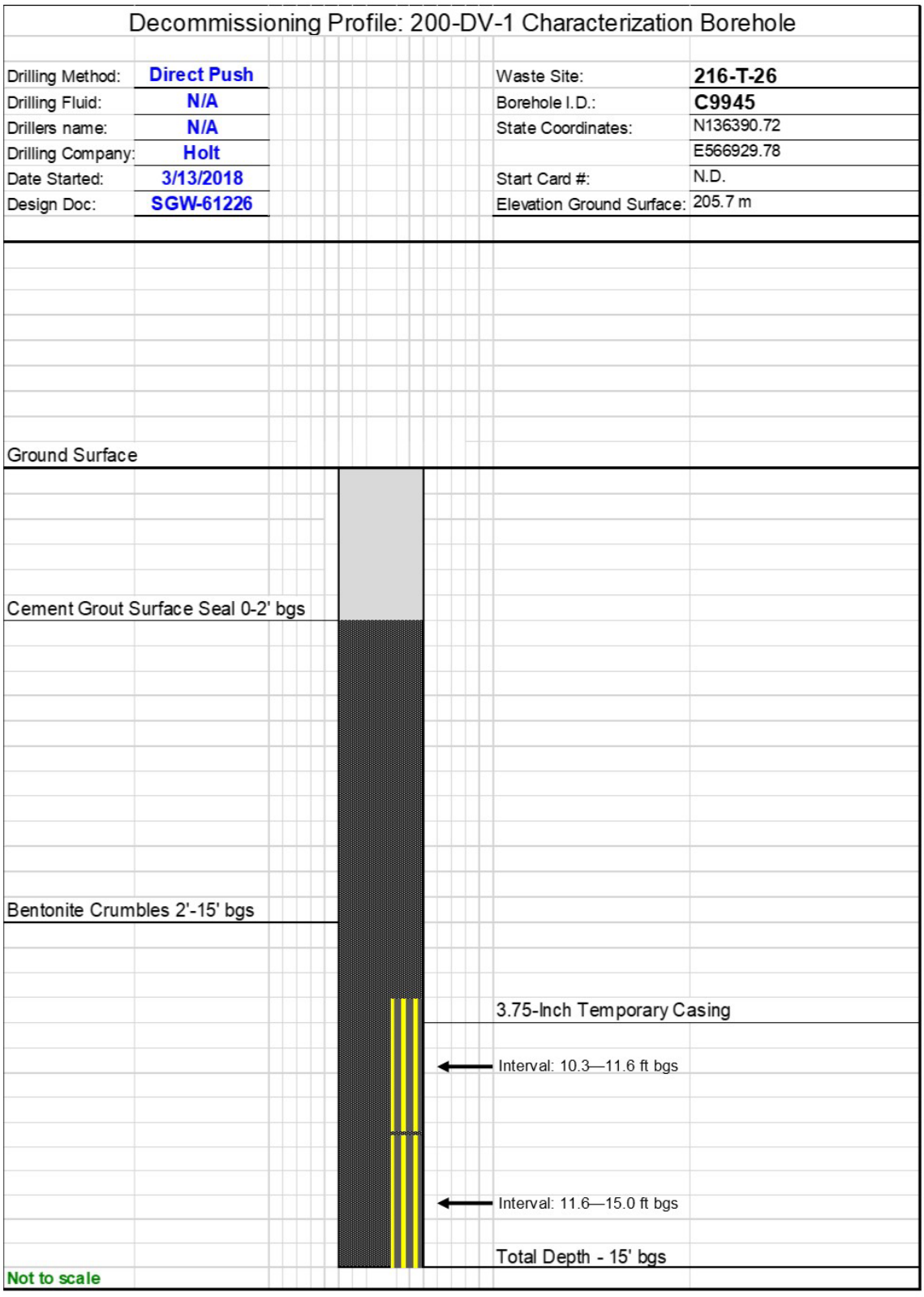

Figure 3-38. Sample Depths and Decommissioning Profile for Borehole C9945 (Replacement) at the 216-T-26 Crib

4 Conclusions

The purpose of the shallow characterization is to supplement the characterization activities for the waste sites identified in DOE/RL-2011-104. After DOE/RL-2011-104 was approved, the need for additional samples from 0 to 3 m (10 ft) bgs and 0 to 4.6 m (15 ft) bgs was identified. Data collected in accordance with DOE/RL-2011-104 in FYs 2015 and 2016 included samples from within the 0 to 3 m (10 ft) bgs and 0 to 4.6 m (15 ft) bgs. However, an insufficient number of samples was available at some of the waste sites to calculate the 95% upper confidence level on the mean concentration. The 95% upper confidence level is needed to characterize the risks to human health and the environment in the 0 to 3 m (10 ft) bgs and 0 to 4.6 m (15 ft) bgs interval; therefore, supplemental characterization was needed. In FY 2018, 28 shallow characterization boreholes and 10 replacement boreholes were drilled at 16 waste sites in the B Complex, T Complex, and S Complex areas as part of the 200-DV-1 OU remedial investigation.

A GeoProbe direct-push technology drill rig was used to drill the shallow boreholes to 3 to 4.6 m (10 to 15 ft) bgs. Sediment samples were collected using a LEXAN liner. The sediment samples were analyzed for COPCs in accordance with the SAP (DOE/RL-2011-104-ADD2). This shallow characterization data will be integrated and interpreted with shallow data collected in FYs 2015, 2016, and 2017 (SGW-60265, *200-DV-1 Operable Unit BY Cribs Field Summary Report*; SGW-61384, *200-DV-1 Operable Unit B-Complex Field Summary Report*; SGW-61595, *200-DV-1 Operable Unit T-Complex Field Summary Report*; and SGW-61596, *200-DV-1 Operable Unit S-Complex Field Summary Report*) to accomplish the following tasks:

- Ecological risk assessment
- Human health risk assessment

The ecological and human health risk assessments are components of the Remedial Investigation/ Feasibility Study and *Resource Conservation and Recovery Act of 1976* Facility Investigation/Corrective Measures Study process for the 200-DV-1 OU.

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5 References

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Appendix A

Borehole Drilling Summaries

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Tables

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Table A-1. B Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
C9839	1/9/2018	2.0 – 5.3	100	Grab	sG	0910	B3FL00, B3FL03
		5.3 – 6.3	100	Grab	sG	0924	B3FL05, B3FL08
		6.3 – 8.3	100	Grab	sG	0940	B3FL10, B3FL13
C9558*	1/15/2018	8.4 – 10.1	100	Grab	sG	1406	B3FL34, B3FL37
C9839	1/9/2018	10.0 – 13.9	100	Grab	sG	1050	B3FL20, B3FL23, B3FL24, B3FL27
		13.9 – 14.5	100	Grab	sG	1120	B3FL29, B3FL32
C9840	1/9/2018	1.6 – 4.0	65	Grab	sG	1350	B3FL51, B3FL48
		4.0 – 6.0	100	Grab	sG	1355	B3FL56, B3FL53
		6.0 – 8.0	100	Grab	sG	1400	B3FL61, B3FL58
C9559*	1/15/2018	8.1 – 10.0	5	Grab	G	1515	B3FL68
C9841	1/10/2018	1.8 – 4.5	100	Grab	sG	1025	B3FL83, B3FL82
		4.5 – 6.6	90	Grab	sG	1040	B3FL86, B3FL85, B3FL88, B3FL87
		6.6 – 8.6	100	Grab	sG	1050	B3FL91, B3FL90
		8.6 – 10.0	1.5	Grab	G	1105	B3FL94, B3FL93
C9842	1/10/2018	1.8 – 4.3	100	Grab	sG	0820	B3FLB5, B3FLB4
		4.3 – 6.0	2	Grab	G	0845	B3FLB7
		6.0 – 8.3	3	Grab	sG	0913	B3FLC1, B3FLC0
		8.3 – 10.0	3	Grab	sG	0930	B3FLC4, B3FLC3
C9843	1/10/2018	2.3 – 4.6	100	Grab	sG	1455	B3FLD5, B3FLD4
		4.6 – 6.6	100	Grab	sG	1503	B3FLD8, B3FLD7
		6.6 – 8.6	100	Grab	sG	1510	B3FLF1, B3FLF0
	1/11/2018	8.6 – 10.1	0.5	Grab	sG	0810	B3FLF4
C9844	1/11/2018	2.1 – 4.0	100	Grab	sG	1055	B3FLH4, B3FLH5
		4.0 – 6.0	100	Grab	sG	1135	B3FLH8, B3FLH7
		6.0 – 8.0	100	Grab	sG	1145	B3FLJ1, B3FLJ0
		8.0 – 10.2	100	Grab	sG	1145	B3FLK7, B3FLK6

Table A-1. B Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
C9845	1/11/2018	2.3 – 4.5	100	Grab	sG	1322	B3FLM9, B3FLH5
C9560*		5.1 – 6.6	95	Grab	sG	1410	B3FLN2, B3FLN1
		6.6 – 8.7	1	Grab	sG	1420	B3FLN4
		8.7 – 10.1	1.5	Grab	sG	1430	B3FLN7
C9846	1/15/2018	2.1 – 4.4	100	Grab	sG	0927	B3FLV0, B3FLV1
		4.4 – 6.8	100	Grab	sG	0937	B3FLV5, B3FLV6
		6.8 – 8.5	100	Grab	sG	0946	B3FLV8, B3FLV9
		8.5 – 10.0	5	Grab	sG	0957	B3FLW1
C9847	1/15/2018	2.3 – 4.5	100	Grab	sG	1050	B3FMC2, B3FMC3
		4.5 – 6.9	100	Grab	sG	1103	B3FMC5, B3FMC6
		6.9 – 8.3	100	Grab	sG	1113	B3FMC8, B3FMC9
		8.3 – 10.0	100	Grab	sG	1120	B3FMD1, B3FMD2

*Replacement borehole.

G = gravel
HEIS = Hanford Environmental Information System
ID = identification
sG = sandy gravel

Table A-2. S Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
C9848	1/16/2018	3.0 – 4.4	100	Grab	sG	0909	B3FMF2, B3FMF3
		4.4 – 6.2	100	Grab	gS	0918	B3FMF5, B3FMF6
		6.2 – 8.3	100	Grab	gS	0928	B3FMF8, B3FMF9
		8.3 – 10.0	100	Grab	gS	0935	B3FMH1, B3FMH2
		10.0 – 12.2	100	Grab	gS	0946	B3FMH4, B3FMH5

Table A-2. S Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
	1/18/2018	13.0 – 15.0	100	Grab	gS	1041	B3FMH8, B3FMH7
C9849	1/18/2018	2.2 – 4.4	100	Grab	sG	1211	B3FMK0, B3FMK1
		4.4 – 6.6	100	Grab	sG	1220	B3FMK3, B3FMK4
		6.6 – 8.3	100	Grab	gS	1230	B3FMK6, B3FMK7
		8.3 – 10.1	100	Grab	gS	1235	B3FMK9, B3FML0
C9939*		10.1 – 12.0	100	Grab	gS	1350	B3FML8, B3FML9
		13.0 – 15.0	100	Grab	gS	1355	B3FMM1, B3FMM2
C9850	1/22/2018	1.9 – 4.5	100	Grab	sG	0915	B3FMM7, B3FMM6
		4.5 – 6.6	100	Grab	sG	0925	B3FMN0, B3FMM9
		6.6 – 8.4	100	Grab	sG	0945	B3FMN3, B3FMN2
		8.4 – 10.1	100	Grab	sG	0955	B3FMN6, B3FMN5
		10.1 – 12.0	100	Grab	sG	0958	B3FMP1, B3FMP0
		13.0 – 15.1	100	Grab	sG	1000	B3FMP4, B3FMP3
C9851	1/22/2018	1.9 – 4.0	100	Grab	sG	1140	B3FMR5, B3FMR4
		4.0 – 6.5	100	Grab	sG	1158	B3FMR8, B3FMR7
		6.5 – 8.0	100	Grab	gS	1205	B3FMT1, B3FMT0
		8.0 – 10.1	100	Grab	gS	1207	B3FMT4, B3FMT3
		10.1 – 12.5	100	Grab	gS	1215	B3FMT7, B3FMT6

Table A-2. S Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
		12.5 – 15.1	100	Grab	gS	1217	B3FMV0, B3FMT0
C9852	1/22/2018	2.2 – 4.2	100	Grab	sG	1318	B3FMW0, B3FMW1
		4.2 – 6.4	100	Grab	gS	1325	B3FMW3, B3FMW4
		6.4 – 8.0	100	Grab	gS	1333	B3FMW6, B3FMW7
		8.0 – 10.0	100	Grab	gS	1335	B3FMW9, B3FMX0
		10.0 – 12.5	100	Grab	gS	1345	B3FMX2, B3FMX3
		12.5 – 15.2	100	Grab	gS	1348	B3FMX5, B3FMX6
C9853	1/23/2018	2.1 – 4.2	100	Grab	sG	0801	B3H0F8, B3H0F7, B3H0H6, B3H0H5
		4.2 – 6.4	100	Grab	gS	0810	B3H0H1, B3H0F9
		6.4 – 8.0	100	Grab	gS	0818	B3H0H4, B3H0H3
		8.0 – 10.0	100	Grab	gS	0819	B3H0H9, B3H0H8
C9854	1/23/2018	1.8 – 4.4	100	Grab	gS	1002	B3H0K0, B3H0J9
		4.4 – 7.2	100	Grab	gS	1009	B3H0K3, B3H0K2
		7.2 – 8.0	100	Grab	gS	1010	B3H0K6, B3H0K5
		8.0 – 10.1	100	Grab	gS	1012	B3H0K9, B3H0K8

*Replacement borehole.

gS = gravelly sand
HEIS = Hanford Environmental Information System
ID = identification
sG = sandy gravel

Table A-3. T Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
C9855	1/24/2018	1.9 – 4.1	100	Grab	sG	0811	B3H0M0, B3H0L9
		4.1 – 6.3	100	Grab	gS	0818	B3H0M3, B3H0M2
		6.3 – 8.0	100	Grab	S	0825	B3H0M6, B3H0M5
		8.0 – 10.0	100	Grab	S	0827	B3H0M9, B3H0M8
C9856	1/24/2018	2.1 – 4.1	100	Grab	sG	0942	B3H179, B3H180
		4.1 – 6.1	100	Grab	S	0950	B3H182, B3H183, B3H184, B3H185
		6.1 – 8.0	100	Grab	S	0955	B3H187, B3H188
		8.0 – 10.0	100	Grab	S	0957	B3H190, B3H191
C9857	1/24/2018	2.1 – 4.0	100	Grab	gS	1218	B3H1B1, B3H1B2
		4.0 – 6.7	100	Grab	gS	1224	B3H1B4, B3H1B5
C9940*		5.3 – 8.6	100	Grab	gS	1310	B3H1C5, B3H1C6, B3H1C8, B3H1C9
C9857		8.0 – 10.0	100	Grab	gS	1232	B3H1C2, B3H1C3
C9858	1/24/2018	2.0 – 4.2	100	Grab	gS	1355	B3H1D3, B3H1D4
		4.2 – 6.5	100	Grab	sG	1402	B3H1D6, B3H1D7
C9941*		5.2 – 7.9	20	Grab	sG	1445	B3H1F5, B3H1F6
		7.9 – 10.2	2	Grab	sG	1450	B3H1F8
C9859	1/25/2018	2.0 – 4.2	100	Grab	sG	1029	B3H1N0, B3H1M9
		4.0 – 6.2	100	Grab	sG	1103	B3H1N3, B3H1N2
C9942*		6.2 – 8.2	90	Grab	G	1116	B3H1N6, B3H1N5
		8.2 – 10.1	100	Grab	G	1123	B3H1N9, B3H1N8

Table A-3. T Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
C9860	1/25/2018	2.1 – 4.1	100	Grab	sG	0906	B3H1T4, B3H1T3
		4.1 – 6.3	100	Grab	sG	0910	B3H1T7, B3H1T6
		6.3 – 7.9	100	Grab	sG	0917	B3H1V0, B3H1T9
		7.9 – 10.0	75	Grab	G	0922	B3H1V3, B3H1V5
C9861	3/12/2018	2.5 – 4.3	50	Grab	sG	0917	B3H1W9, B3H1X0
		4.25 – 6.5	50	Grab	sG	0931	B3H1X2, B3H1X3
		6.5 – 8.2	15	Grab	S	0938	B3H1X5, B3H1X6
		8.2 – 10.0	50	Grab	S	0941	B3H1X8, B3H1X9, B3H1Y0, B3H1Y1
C9862	3/12/2018	2.3 – 4.3	75	Grab	S	1017	B3H205, B3H206
		4.3 – 6.4	100	Grab	S	1021	B3H208, B3H209
		6.4 – 8.0	80	Grab	S	1027	B3H211, B3H212
		8.0 – 10.1	75	Grab	gS	1052	B3H214, B3H215
C9863	3/12/2018	2.2 – 4.6	100	Grab	gS	1122	B3H225, B3H226
		4.6 – 6.4	80	Grab	S	1127	B3H228, B3H229
		6.4 – 8.4	90	Grab	gS	1134	B3H231, B3H232
		8.4 – 10.0	90	Grab	gS	1134	B3H234, B3H235
C9864	3/12/2018	2.2 – 4.3	100	Grab	gS	1316	B3H247, B3H248
		4.3 – 6.5	100	Grab	gS	1321	B3H250, B3H251
		6.5 – 8.3	100	Grab	gS	1325	B3H253, B3H254
		8.3 – 10.0	100	Grab	S	1329	B3H256, B3H257
C9943*	3/13/2018	10.1 – 12.3	50	Grab	G	0744	B3H265
		12.3 – 14.9	90	Grab	G	0800	B3H268

Table A-3. T Complex Boreholes

Borehole ID	Sample Date	Interval Footage	Recovery %	Sample Type	Soil Classification	Sample Time	HEIS Number
C9865	3/13/2018	2.0 – 4.3	100	Grab	gS	0833	B3H273, B3H274
		4.3 – 6.3	100	Grab	gS	0839	B3H276, B3H277
		6.3 – 9.2	100	Grab	gS	0846	B3H282, B3H283
		9.2 – 11.7	95	Grab	gS	0854	B3H285, B3H286
C9944*		10.5 – 12.0	60	Grab	G	1004	B3H294
		Cobbles	35	Grab	G	—	—
C9866	3/13/2018	2.1 – 4.2	100	Grab	gS	1057	B3H2B2, B3H2B3
		4.2 – 6.3	100	Grab	gS	1102	B3H2B5, B3H2B6
		6.3 – 8.2	100	Grab	gS	1109	B3H2B8, B3H2B9
		8.2 – 10.1	90	Grab	gS	1116	B3H2C1, B3H2C2
C9945*		10.3 – 11.6	50	Grab	G	1326	B3H2D0
		11.6 – 15.0	100	Grab	sG	1340	B3H2D3, B3H2D4

*Replacement borehole.

G = gravel
gS = gravelly sand
HEIS = Hanford Environmental Information System
ID = identification
S = sand
sG = sandy gravel

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