TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 0884	TPA CHANGE NOTICE FORM	Date: 04/21/2020
Document Number, Title, and Revision: DOE/RL-2011-104, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, Revision 0		Date Document Last Issued: January, 2012
Approved Change Notices Against this Document: TPA-CN-668, TPA-CN-724, TPA-CN-0748		
Originator Mark E. Byrnes		Phone: 509-373-3996

Description of Change:
Changes are required to the DOE/RL-2011-104, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, in order to conduct resampling and discrete analysis of shallow soil samples (0 to 15 feet bgs) from waste site 216-T-19 and waste site 216-S-13.

M. W. Cline (**DOE**) and C. Cameron/D. Goswami (**Lead Regulatory Agency**) agree that the proposed change modifies an approved workplan/document and will be processed in accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records,* and not Chapter 12.0, *Changes to the Agreement*.

Revised footnote "o" of Table 2-2 to clarify PCB analytical requirements.

Revised Table 3-1 to add the new shallow boreholes for resampling at 216-T-19 and 216-S-13. The shallow boreholes will be off-set from the original borehole locations and will be sampled for required analyses not performed in the original boreholes.

Made the following revisions to Section 3.1.2.7, 216-T-19 Crib and Tile Field

- Revised the text in Section 3.1.2.7 to include general information for the new shallow borehole for resampling
- Revised Figure 3-25 to add the new shallow borehole and sampling intervals
- Revised Table 3-14 by adding a new line for the new shallow borehole and updating the sample numbers

Made the following revisions to Section 3.1.3.2, 216-S-13 Crib

- Revised the text in Section 3.1.3.2 to include general information for the new shallow borehole for resampling
- Revised Figure 3-31 to add the new shallow borehole and sampling intervals
- Revised Table 3-17 by adding a new line for the new shallow borehole and updating the sample numbers

Additions are shown using double underline. Deletions are shown using strikeout.

Note: Include affected page number(s): 2-12, 3-2, 3-51, 3-53, 3-54, 3-63, 3-65, and 3-66

Justification and Impacts of Change:
During the initial field effort at waste sites 216 T-19 and 216-S-13 the project inadvertently failed to analyze PCB congeners as a part of the required polychlorinated biphenyl (PCB) analyses; therefore, resampling is needed. One borehole at each waste site (216-T-19 and 216-S-13) is needed to collect discrete soil samples from the shallow zone (0 to 15 ft bgs) for PCB analysis. PCBs will be evaluated in the soil samples using a phased approach. First, Aroclors (total PCBs) will be evaluated using EPA Method 8082. If Aroclors are not detected in a sample, the sample then will be analyzed by EPA Method 1668a to confirm that PCB congeners are either not present or are present at low levels. The PCB congeners will be evaluated in accordance with WAC 173-340-708(8)(f), "Human Health Risk Assessment Procedures."

Approvals:

Michael W. Cline — Digitally signed by Michael W. Cline Date: 2020.04.21 07:40:30 -07'00'	DOE Project Manager	4/21/2020 Date	[X] Approved [ ] Disapproved
CRAIG CAMERON — Digitally signed by CRAIG CAMERON Date: 2020.04.21 15:14:26 -07'00'	EPA Project Manager	4/21/2020 Date	[X] Approved [ ] Disapproved
Digitally signed by Goswami, Dib (ECY) Date: 2020.04.21 14:53:00 -07'00'	Ecology Project Manager	4/21/2020 Date	[X] Approved [ ] Disapproved

Table 2-2. Analytical Performance Requirements for Nonradionuclides

COPC	Chemical Abstracts Service No.	Preliminary Action Level[a] (mg/kg)				Hanford Site Background[e]	Name/ Analytical Technology[h]	Required Detection Limits (mg/kg)[f]		Soil[g] (%)		Water[g] (%)	
		Direct Contact, WAC 173-340[b] (mg/kg)		Groundwater Protection[c]	Ecological Indicator Concentration (mg/kg)[d]								
		Method C Industrial	Method B Unrestricted					Water (mg/L)	Soil (mg/kg)	Precision	Accuracy	Precision	Accuracy

a. The preliminary action level (from the data quality objectives process) is the regulatory or risk-based value used to determine appropriate analytical requirements (e.g., detection limits). Remedial action levels will be proposed in the feasibility study, will be finalized in the record of decision, and will drive remediation of the sites.

b. Method C industrial is WAC 173-340-745(5), "Soil Cleanup Standards for Industrial Properties," "Method C Industrial Soil Cleanup Levels," and Method B residential is WAC 173-340-740(3), "Unrestricted Land Use Soil Cleanup Standards," "Method B Soil Cleanup Levels for Unrestricted Land Use," values from Ecology Publication 94-145, *Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation; CLARC, Version 3.1*, tables, updated November 2001.

c. Calculated using WAC 173-340, "Model Toxics Control Act—Cleanup," three-phase model for soil concentrations protective of groundwater per WAC 173-340-747(4), "Deriving Soil Concentrations for Groundwater Protection," "Fixed Parameter Three-Phase Partitioning Model."

d. Value is the lowest concentration for each analyte (adjusted for background) from Tables 749-2 and 749-3 of WAC 173-340-900, "Tables," amended February 12, 2001.

e. Values are from DOE/RL-92-24, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, using the 90th percentile with a lognormal distribution.

f. Required target quantitation limit for setting laboratory detection limits generally is established using the preliminary action levels or background, whichever is lowest.

g. Precision and accuracy requirements as defined in EPA procedures and implemented by laboratory analysis and quality assurance procedures. Precision criteria for batch laboratory replicate sample analyses. Accuracy criteria for associated batch laboratory control sample percent with additional evaluations also performed for matrix spikes, tracers, and carriers as appropriate to the method.

h. All samples analyzed in accordance with SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*, or EPA Method 200.8 in EPA/600/R-94/111, *Methods for the Determination of Metals in Environmental Samples, Supplement I*, or *Standard Methods for the Examination of Water and Wastewater* (4500-CN^- Cyanide; 4500-H+ pH value) unless otherwise noted.

i. EPA Method 350.1 from EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes*.

j. EPA Method 300.7 in EPA/600/4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation*.

k. EPA Method 300.0 in EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*.

l. Based on Method A values from WAC 173-340-900, Tables 740-1 and 745-1, amended February 12, 2001.

m. Ecology Publication 94-115, *Natural Background Soil Metals Concentrations in Washington State*.

n. Because the calculated groundwater protection action level is less than the soil detection limit, the calculated value is replaced with the target quantitation limit required of the laboratory.

o. Polychlorinated biphenyls (PCBs) will be evaluated in samples from 0 to 15 ft bgs using a phased approach. Aroclors (total PCBs) will be evaluated initially using EPA Method 8082. If Aroclors are not detected above the practical quantitation limits (PQL), additional analyses will be conducted using EPA Method 1668a to confirm that PCB congeners are not present or are present at low levels. The soil PQL for PCBs by EPA method 8082 is 0.033 mg/kg for all except Aroclor-1016 which has a PQL of 0.333 mg/kg. The PCB congeners will be evaluated in accordance with WAC 173-340-708(8)(f), "Human Health Risk Assessment Procedures." For the PCB congeners, the following performance requirements apply: PQL of 0.00002 mg/kg, precision <30%, and accuracy is percent recovery statistically derived (laboratory-determined, statistically derived control limits based on historical data are used here. Control limits are reported with the data).

p. From Ecology Publication ECY 97-602, *Analytical Methods for Petroleum Hydrocarbons*. The Ecology methods use a modification to EPA Method 8015.

q. The accuracy criteria for organics is statistically derived.

ASTM = American Society for Testing and Materials
bgs = below ground level
COPC = contaminant of potential concern
DQO = data quality objective
EPA = U.S. Environmental Protection Agency
GC = gas chromatography
GC/MS = gas chromatograph/mass spectrometry
IC = ion chromatography
ICP = inductively coupled plasma
MEK = methyl ethyl ketone
MIBK = methyl isobutyl ketone
N/A = not available
NWTPH-D = Northwest total petroleum hydrocarbon diesel
RDL = required detection limit
SM = Standard Methods
TPH = total petroleum hydrocarbon
WAC = Washington Administrative Code

Table 3-1. Summary of Vadose Zone Sampling Activities for the 200-DV-1 OU Waste Sites

Waste Site/Group	200-DV-1 OU Characterization	Rationale
216-B-57 Crib	Characterization adequate.	Previous investigation drilled and sampled boreholes at 216-B-57 (DOE/RL-92-70, *Phase I Remedial Investigation Report for 200-BP-1 Operable Unit*). Prototype Hanford Barrier constructed over 216-B-57 Crib.
T Complex Area		
216-T-3 Reverse Well	One drilled borehole to groundwater, with sampling for contaminants.	Evaluate vertical distribution of contaminants.
216-T-5 Trench	Three direct-push boreholes to refusal, with geophysical logging at two and sampling for contaminants at one.	Evaluate vertical distribution of contaminants.
216-T-6 Crib	Three direct-push boreholes to refusal, with geophysical logging at two and sampling for contaminants at one.	Evaluate vertical distribution of contaminants.
216-T-7 Tile Field/ 200-W-52 Crib (WMA T)	One drilled borehole to groundwater, with sampling for contaminants.	Evaluate vertical distribution of contaminants.
T Trenches (216-T-14, 216-T-15, 216-T-16, 216-T-17)	Three direct-push boreholes to refusal, with geophysical logging at two and sampling for contaminants at one.	Evaluate vertical distribution of contaminants.
216-T-18 Crib	One direct-push borehole to refusal, with sampling for contaminants.	Supplement previous geophysical logging of drive points with samples for laboratory analysis.
216-T-19 Crib and Tile Field	One drilled borehole to groundwater, with sampling for contaminants.	Evaluate vertical distribution of contaminants.
	<u>One drilled borehole 0 to 1.85 m (0 to 6 ft) bgs, with sampling for PCBs and PCB congeners (resampling of shallow zone for borehole drilled to groundwater).</u>	<u>Evaluate vertical distribution of PCBs and PCB congeners.</u>
TX Trenches (216-T-21, 216-T-22, 216-T-23, 216-T-24, 216-T-25)	Three direct-push boreholes to refusal, with geophysical logging at two and sampling for contaminants at one.	Evaluate vertical distribution of contaminants.
216-T-26 Crib	Characterization adequate.	Previous remedial investigation drilled and sampled borehole (C3102) at 216-T-26 Crib.
216-T-32 Crib	Characterization adequate.	Existing boreholes show no contamination below CCU.
S Complex Area		
216-S-9 Crib	One direct-push borehole, with sampling for contaminants.	Evaluate vertical distribution of contaminants.
216-S-13 Crib	One drilled borehole to groundwater, with sampling for contaminants.	Evaluate vertical distribution of contaminants and evaluate uncertainty regarding chromium inventory.

Table 3-1. Summary of Vadose Zone Sampling Activities for the 200-DV-1 OU Waste Sites

Waste Site/Group	200-DV-1 OU Characterization	Rationale
	One drilled borehole 0 to 4.6 m (0 to 15 ft) bgs, with sampling for PCBs and PCB congeners (resampling of shallow zone for borehole drilled to groundwater).	Evaluate vertical distribution of PCBs and PCB congeners.
216-S-21 Crib	One direct-push borehole to refusal, with sampling for contaminants.	Evaluate vertical distribution of contaminants.

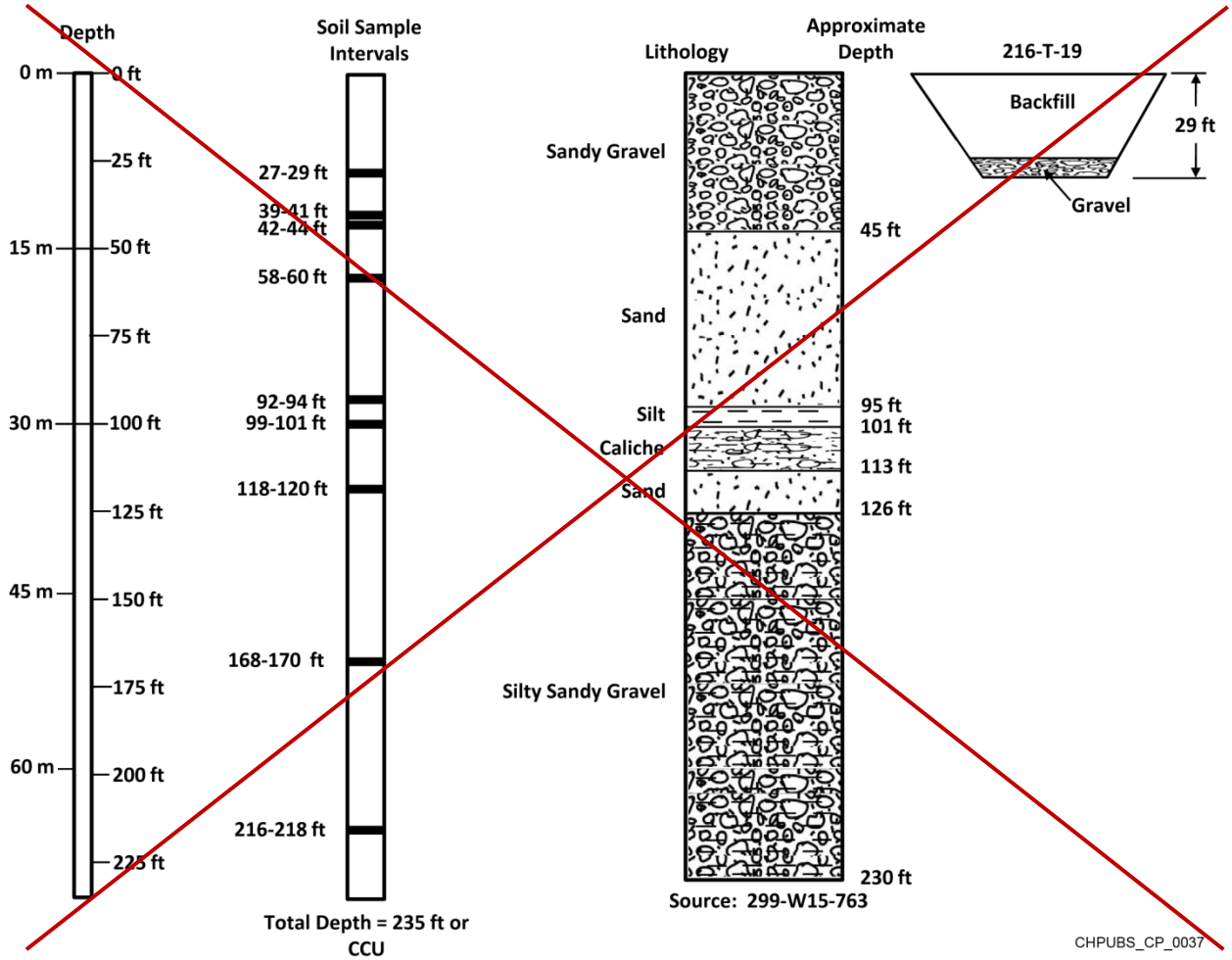
bgs = below ground surface
CCU = Cold Creek Unit
OU = operable unit

3.1.2.7 216-T-19 Crib and Tile Field

The characterization planned for the 216-T-19 Crib and Tile Field includes drilling a borehole to groundwater and collecting samples and geophysical logs using this same borehole. Figure 3-24 shows the location of the borehole. The location was selected at the point of discharge to the tile field, near the overflow from the crib, where the highest volume of waste was disposed. Drilling will ensure that the vertical extent of contamination in the subsurface at this location is characterized.

The sampling intervals for the 216-T-19 Crib and Tile Field were selected to reduce the uncertainty associated with the nature and extent of contamination in the deep vadose zone that may be a source to groundwater. Because waste entered the 216-T-19 Crib and Tile Field at approximately 7.0 m (23 ft) bgs, contamination is not anticipated for the upper 4.6 m (15 ft) bgs of the vadose zone and no samples are planned for this interval. Samples will be collected at the bottom of the tile field and at changes in lithology, as depicted on Figure 3-25. The split-spoon samples will be analyzed for the COPCs presented in Table 1-2, as indicated in the 216-T-19 Crib and Tile FSP (Table 3-14). Selected grab samples may be analyzed for mobile COPCs as determined by the field geologist and technical lead, using characterization data such as geophysical logs, lithology (geologist logs), and split-spoon sample analytical results, consistent with the field sampling strategy (Section 3.2.3). Groundwater samples or other opportunistic samples may be collected if requested to support integration with other Central Plateau activities.

A second borehole will be drilled 0 to 1.85 m (0 to 6 ft) bgs adjacent (within approximately 1.5 m [5 ft] laterally) to the initial borehole. A continuous core will be collected at one discrete interval from 4 to 1.85 m (4 to 6 ft) bgs as shown in Figure 3-25. The sample will be analyzed for PCBs as noted in Table 2-2, and listed in the 216-T-19 Crib and Tile Field FSP (Table 3-14).


Depth
0 m
0 ft
25 ft
15 m
50 ft
75 ft
30 m
100 ft
125 ft
45 m
150 ft
175 ft
60 m
200 ft
225 ft
Soil Sample Intervals
27-29 ft
39-41 ft
42-44 ft
58-60 ft
92-94 ft
99-101 ft
118-120 ft
168-170 ft
216-218 ft
Total Depth = 235 ft or CCU
Lithology
Approximate Depth
Sandy Gravel
45 ft
Sand
Silt
95 ft
101 ft
Caliche
113 ft
Sand
126 ft
Silty Sandy Gravel
230 ft
Source: 299-W15-763
216-T-19
Backfill
29 ft
Gravel
CHPUBS_CP_0037

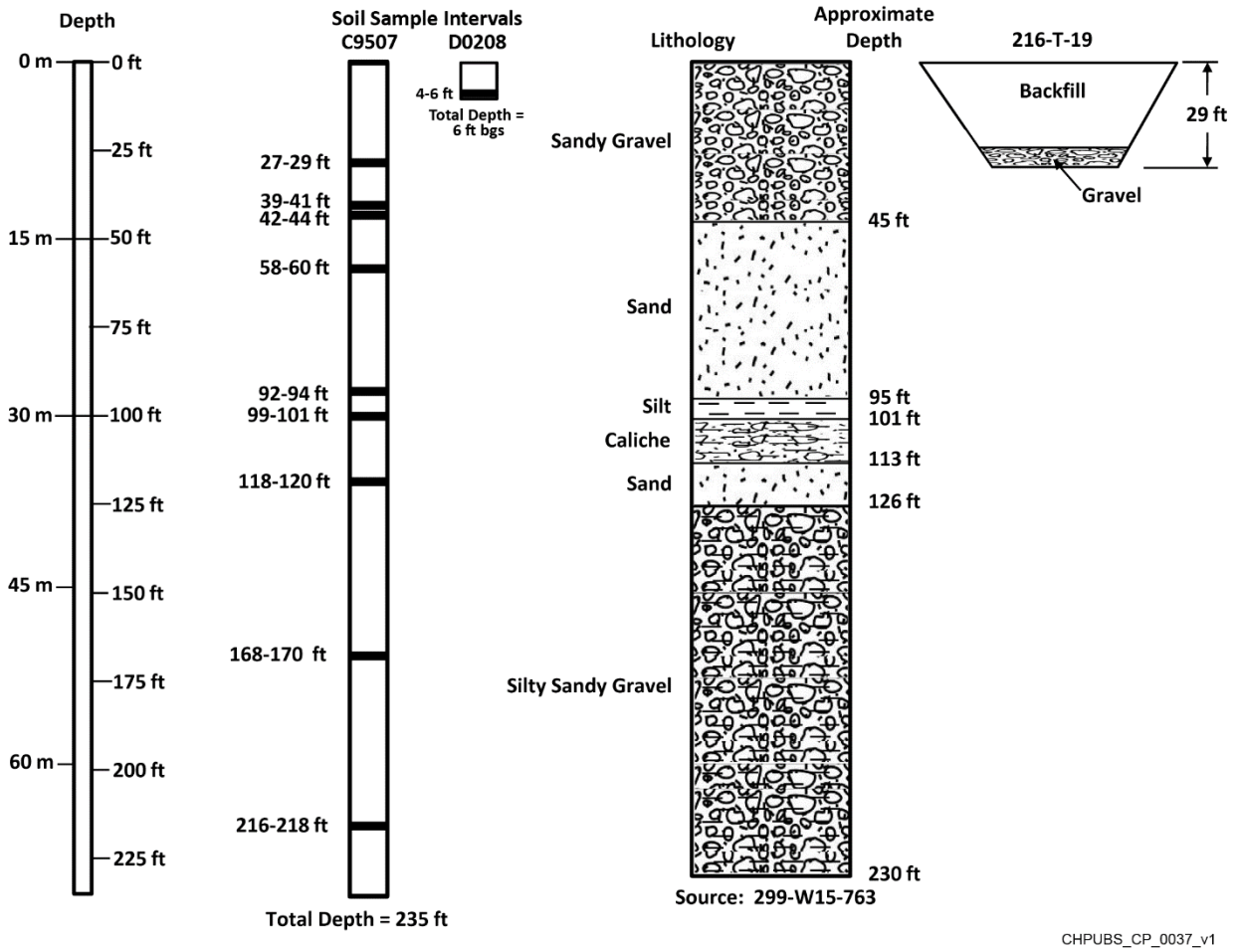


Figure 3-25. 216-T-19 Crib and Tile Field Stratigraphy and Sample-Collection Intervals

Table 3-14. 216-T-19 Crib and Tile Field Sampling Plan

Sample Collection Methodology	Sample Location	Maximum Depth of Investigation	Sample Interval Depth (ft bgs)[a,d]	Analyte List	Physical Properties	
					Sample Interval	Parameters
Borehole to groundwater with split-spoon samples.	One deep borehole near connection between crib and tile field.	To groundwater (approximately 229 ft).	Split-spoon sample at depths: 27 – 29 ft bgs 39 – 41 ft bgs 42 – 44 ft bgs 58 – 60 ft bgs 92 – 94 ft bgs 99 – 101 ft bgs 118 – 120 ft bgs 168 – 170 ft bgs 216 – 218 ft bgs Approximate depths only. Grab samples at 10 ft intervals throughout borehole.	Analytes are presented in Table 1-2.	One sample at each change in lithology or fine-grained interval (same as split-spoon sample intervals between 35 - 200 ft bgs), as shown on Figure 3-25.	pH, bulk density, moisture, particle size distribution.
Borehole to 6 ft bgs with continuous core sample.	One shallow borehole adjacent (within approximately 1.5 m [5 ft] laterally) to the initial borehole.	6 ft	Continuous core sample at depths: 4 – 6 ft bgs. Approximate depths only.	PCBs (as noted in Table 2-2).	None	None
Approximate number of ~~split-spoon~~ samples				~~9~~10		
Approximate number of field quality-control samples[b]				2		
Approximate number of physical-property samples				7		
Approximate number of grab samples				23		
Approximate total number of soil samples collected				~~41~~42		
Approximate total number of soil samples analyzed[c]				~~18~~19		
Non-Sample Data Collection				**Maximum Depth of Investigation**		
Downhole gamma-spectroscopy log and neutron moisture log. Passive neutron log may be collected on a case-by-case basis if gamma-spectroscopy log and/or process history indicates the likely presence of plutonium contamination.				Surface to TD in new borehole (approximately 230 ft bgs)		

Table 3-14. 216-T-19 Crib and Tile Field Sampling Plan

Sample Collection Methodology	Sample Location	Maximum Depth of Investigation	Sample Interval Depth (ft bgs)[a,d]	Analyte List	Physical Properties	
					Sample Interval	Parameters

a. Actual sampling depths may vary depending on the amount of backfill/overburden used in interim-stabilization activities at the waste site, field screening results, and varying subsurface conditions, consistent with the field sampling strategy (Section 3.2.3).

b. One duplicate, one split (optional), and one equipment blank. Trip blanks will accompany samples collected for volatile organic analysis, as needed. Full trip blanks and field transfer blanks will accompany samples collected for volatile organic analysis, as needed.

c. Number of samples analyzed includes ~~nine~~ten ~~split-spoon~~ samples, two field quality-control samples, and seven physical-property samples.

d. To convert feet to meters, multiply by 0.3048.

bgs = below ground surface

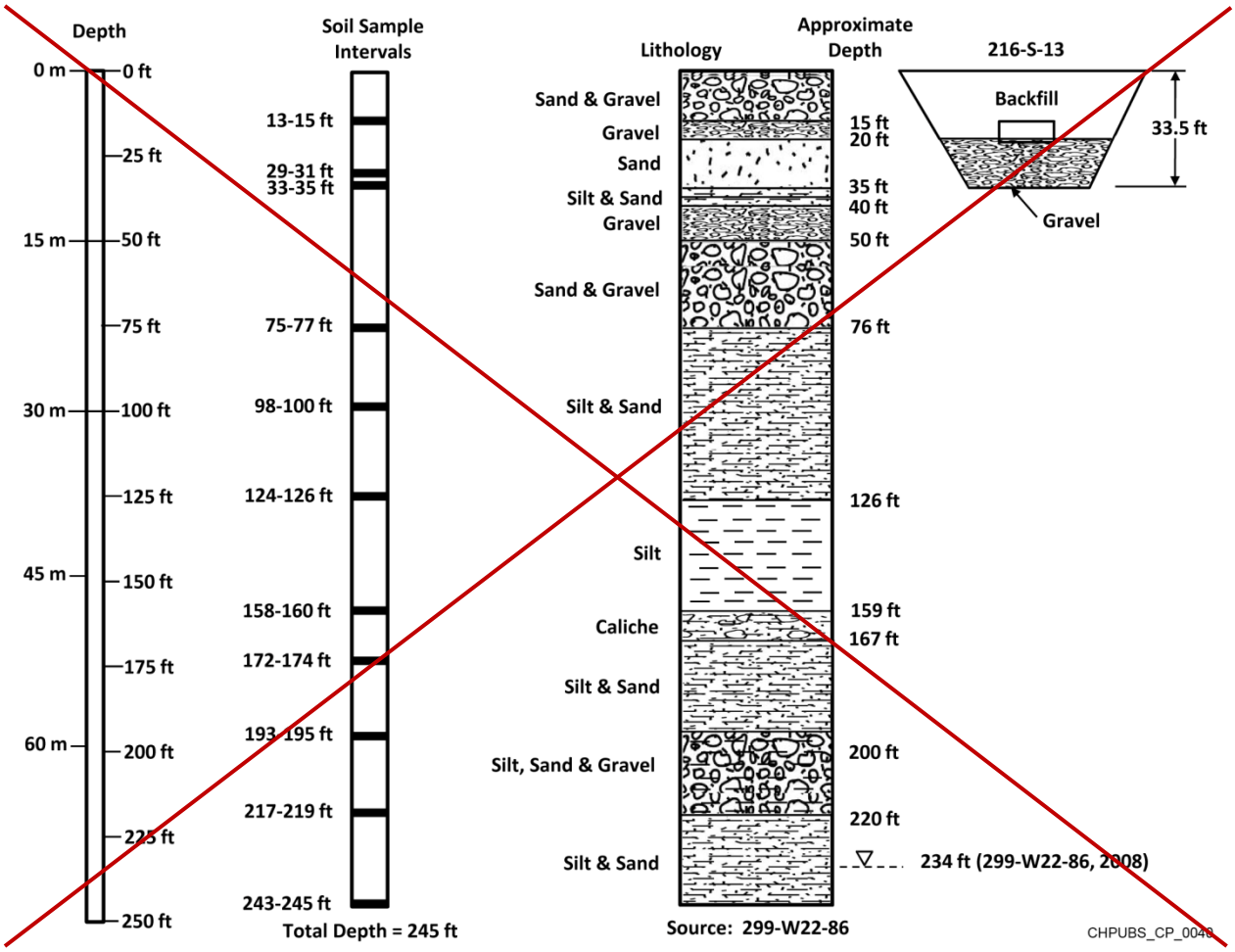
TD = total depth

3.1.3.2 216-S-13 Crib

The characterization planned for the 216-S-13 Crib includes drilling a borehole to groundwater and collecting samples and geophysical logs using this same borehole. The location of the borehole is shown on Figure 3-30. The location was selected at the influent side of the crib to address the zone of expected highest contamination. Drilling will ensure that the vertical extent of contamination in the subsurface at this location is characterized.

The sampling intervals for the 216-S-13 Crib were selected to reduce the uncertainty associated with the nature and extent of contamination in the shallow vadose zone above 4.6 m (15 ft) bgs that may pose a risk to human health and the environment, and in the deep vadose zone that may be a source to groundwater. The samples also are planned to reduce the uncertainty associated with differences in the chromium inventory between the current Soil Inventory Model (SIM) and historical estimates (e.g., DOE/RL-91-60, *S Plant Aggregate Area Management Study Report*). Samples will be collected at the bottom of the crib and at changes in lithology, as depicted on Figure 3-31. The split-spoon samples will be analyzed for the COPCs presented in Table 1-2, as indicated in the 216-S-13 Crib Sampling Plan (Table 3-17). Selected grab samples may be analyzed for mobile COPCs as determined by the field geologist and technical lead, using characterization data such as geophysical logs, lithology (geologist logs), and split-spoon sample analytical results, consistent with the field sampling strategy (Section 3.2.3). Groundwater samples or other opportunistic samples may be collected if requested to support integration with other Central Plateau activities.

A second borehole will be drilled 0 to 4.6 m (0 to 15 ft) bgs adjacent (within approximately 1.5 m [5 ft] laterally) to the initial borehole. Continuous core samples will be collected at seven discrete intervals from 0 to 4.6 m (0 to 15 ft) bgs as shown in Figure 3-31. The samples will be analyzed for PCBs as noted in Table 2-2, and listed in the 216-S-13 Crib FSP (Table 3-17).


Depth
0 m
0 ft
25 ft
15 m
50 ft
75 ft
30 m
100 ft
125 ft
45 m
150 ft
175 ft
60 m
200 ft
225 ft
250 ft
Soil Sample Intervals
13-15 ft
29-31 ft
33-35 ft
75-77 ft
98-100 ft
124-126 ft
158-160 ft
172-174 ft
193-195 ft
217-219 ft
243-245 ft
Total Depth = 245 ft
Lithology
Approximate Depth
Sand & Gravel
Gravel
Sand
Silt & Sand
Gravel
Sand & Gravel
Silt & Sand
Silt
Caliche
Silt & Sand
Silt, Sand & Gravel
Silt & Sand
15 ft
20 ft
35 ft
40 ft
50 ft
76 ft
126 ft
159 ft
167 ft
200 ft
220 ft
234 ft (299-W22-86, 2008)
Source: 299-W22-86
216-S-13
Backfill
33.5 ft
Gravel
CHPUBS_CP_0040

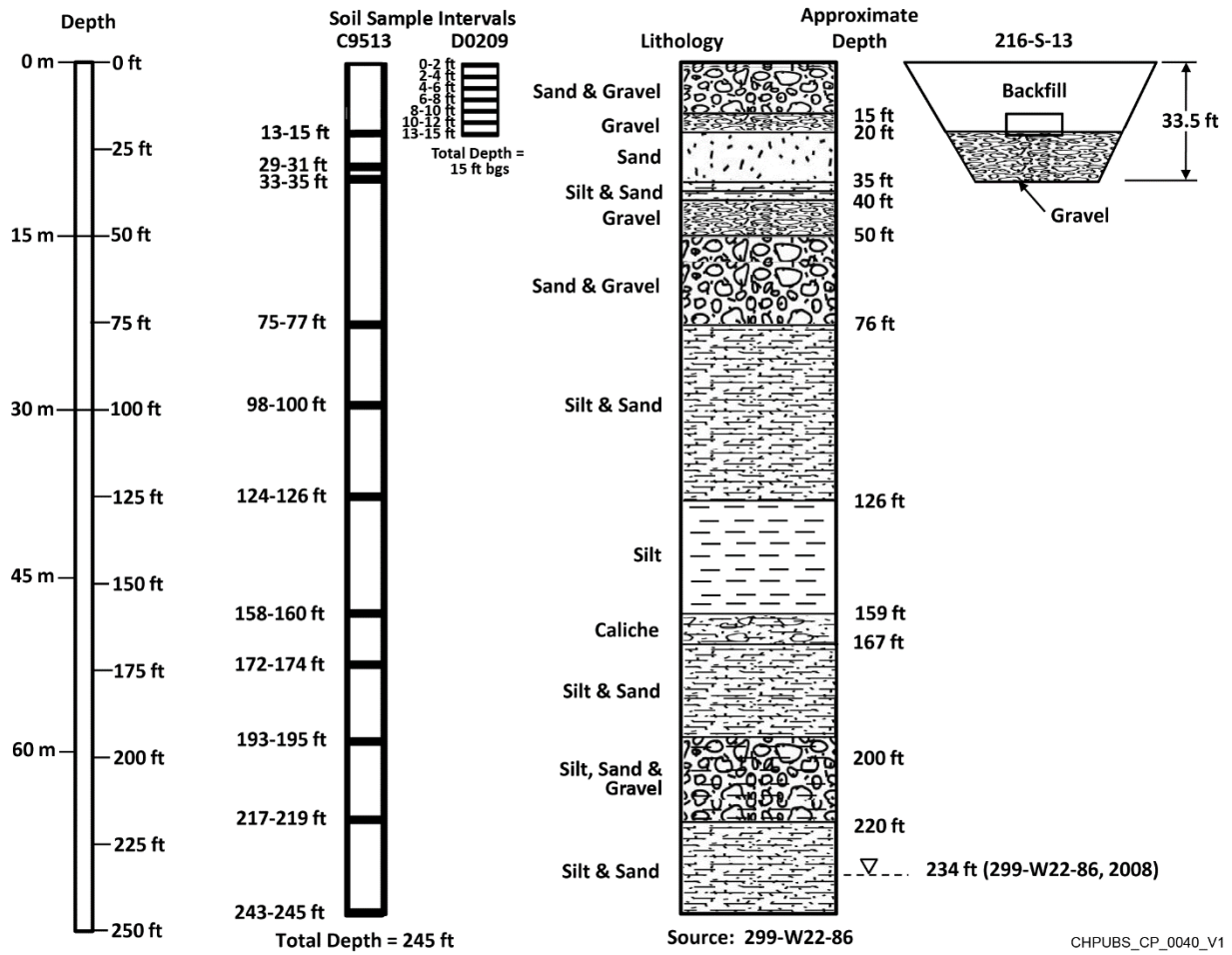


Figure 3-31. 216-S-13 Crib Stratigraphy and Sample-Collection Intervals

Table 3-17. 216-S-13 Crib Field Sampling Plan

Sample Collection Methodology	Sample Location	Maximum Depth of Investigation	Sample Interval Depth (ft bgs)[a,d]	Analyte List	Physical Properties	
					Sample Interval	Parameters
Borehole to groundwater with split-spoon samples.	One deep borehole as close as feasible to the crib, but outside of the crib footprint.[e]	To groundwater (approximately 245 ft).	Split-spoon sample at depths: 13 – 15 ft bgs 29 – 31 ft bgs 33 – 35 ft bgs 75 – 77 ft bgs 98 – 100 ft bgs 124 – 126 ft bgs 158 – 160 ft bgs 172 – 174 ft bgs 193 – 195ft bgs 217 – 219 ft bgs 243 – 245 ft bgs Approximate depths only. Grab samples at 10 ft intervals throughout borehole.	Analytes are presented in Table 1-2.	One sample at each change in lithology or fine-grained interval (same as split-spoon sample intervals below 32 ft bgs), as indicated in Figure 3-31.	pH, bulk density, moisture, particle size distribution.
Borehole to 15 ft bgs with continuous core samples.	One shallow borehole adjacent (within approximately 1.5 m [5 ft] laterally) to the initial borehole.	15 ft	Continuous core sample at depths: 0 – 2 ft bgs 2 – 4 ft bgs 4 – 6 ft bgs 6 – 8 ft bgs 8 – 10 ft bgs 10 – 12 ft bgs 13 – 15 ft bgs Approximate depths only.	PCBs (as noted in Table 2-2).	None	None

Approximate number of ~~split-spoon~~ samples	~~11~~18
Approximate number of field quality-control samples[b]	3
Approximate number of physical-property samples	6
Approximate number of grab samples	24
Approximate total number of soil samples collected	~~44~~51
Approximate total number of soil samples analyzed[c]	~~20~~27
Non-Sample Data Collection	**Maximum Depth of Investigation**
Downhole gamma-spectroscopy log and neutron moisture log. Passive neutron log may be collected on a case-by-case basis if gamma-spectroscopy log and/or process history indicates the likely presence of plutonium contamination.	Surface to TD in new borehole (approximately 245 ft bgs)

Table 3-17. 216-S-13 Crib Field Sampling Plan

Sample Collection Methodology	Sample Location	Maximum Depth of Investigation	Sample Interval Depth (ft bgs)[a,d]	Analyte List	Physical Properties	
					Sample Interval	Parameters

a. Actual sampling depths may vary depending on the amount of backfill/overburden used in interim-stabilization activities at the waste site, field screening results, and varying subsurface conditions, consistent with the field sampling strategy (Section 3.2.3).

b. One duplicate, one split (optional), and one equipment blank. Full trip blanks and field transfer blanks will accompany samples collected for volatile organic analysis, as needed.

c. Number of samples analyzed includes ~~eleven~~eighteen ~~split-spoon~~ samples, three field quality-control samples, and six physical-property samples.

d. To convert feet to meters, multiply by 0.3048.

e. The crib was constructed using wooden timbers and presents a cave-in potential. For safety purposes, the borehole will be outside of the wood construction footprint.

bgs = below ground surface

TD = total depth