## TRI-PARTY AGREEMENT

| Change Notice Number TPA-CN- 0902 | TPA CHANGE NOTICE FORM | Date: October 29, 2020 |
|---|---|---|
| Document Number, Title, and Revision: DOE/RL-2013-35-ADD10, *100-HR-3 Groundwater Operable Unit Well Installation Sampling and Analysis Plan, Addendum 10: 199-D1-1, 199-D7-7, 199-H1-12, 199-H3-21, 199-H3-31, 199-H3-32, 199-H7-1, 699-95-48C, and 699-97-47D*, Rev. 0 | | Date Document Last Issued: January, 2018 |
| Approved Change Notices Against this Document: TPA-CN-0865 | | |
| Originator: T.B. Hammond | | Phone: 509-373-6703 |

**Description of Change:**
This change notice amends DOE/RL-2013-35-ADD10, Rev. 0, to remove well 199-D1-1 from all text, tables, and figures.

M.W. Cline (**DOE**) and L.C. Buelow/ K. Welsch (**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*.

The following changes are made:

1. Removed references to 199-D1-1 in the Table of Contents (TOC) entry for Table 7.
2. Removed references to 199-D1-1 in Table 1.
3. Removed references to 199-D1-1 in Figure 1.
4. Removed references to 199-D1-1 in Figure 7 and its caption.
5. Removed references to 199-D1-1 in Chapter 2, 2nd paragraph. Corrected first sentence of Chapter 2, 2nd paragraph to reflect one well.
6. Removed references to 199-D1-1 in Table 2.
7. Removed references to 199-D1-1 in Table 3.
8. Removed references to 199-D1-1 in Table 7.

Additions are shown using <u>double underline</u>. Deletions are shown using ~~strikeout~~.

Note: Include affected page number(s): v, 1, 2, 8, 10, 12, and 16.

**Justification and Impacts of Change:**
New wells were identified for installation during fiscal year 2021 to address 100-HR-3 project needs. Well 199-D1-1 was added to DOE/RL-2013-35-ADD13 because the well was repurposed from injection to monitoring and its location changed. Well 199-D1-1 is removed from DOE/RL-2013-35-ADD10 because the purpose and location of that well are outdated in that document.

**Approvals:**

Michael W. Cline — Digitally signed by Michael W. Cline, Date: 2020.11.02 13:33:55 -08'00'
DOE Project Manager — Date — [X] Approved [ ] Disapproved

LAURA BUELOW — Digitally signed by LAURA BUELOW, Date: 2020.11.02 14:52:14 -08'00'
EPA Project Manager — Date — [X] Approved [ ] Disapproved

Digitally signed by Welsch, Kim (ECY), Date: 2020.11.02 13:45:06 -08'00'
Ecology Project Manager — Date — [X] Approved [ ] Disapproved

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# 1 Introduction

This Addendum 10 for DOE/RL-2013-35, *100-HR-3 Groundwater Operable Unit Well Installation Sampling and Analysis Plan*, contains site-specific field sampling plans for the wells proposed and identified in Table 1.

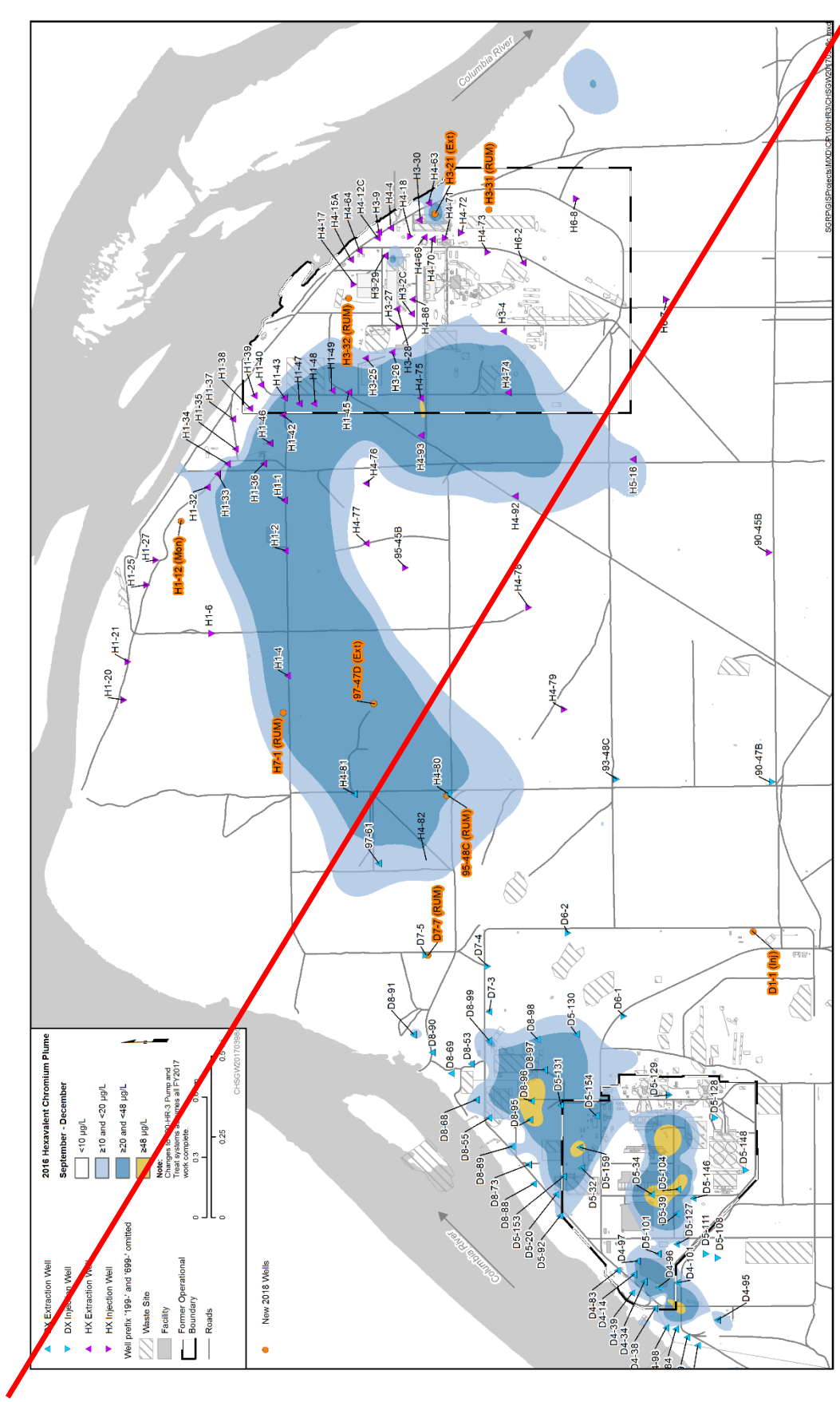
Table 1. Proposed Wells

| Borehole Identification | Well | | | Easting (X) | Northing (Y) |
|---|---|---|---|---|---|
| | Name | Type | Diameter (cm [in.]) | | |
| ~~C9935~~ | ~~199-D1-1~~ | ~~Unconfined injection well~~ | ~~15.2 (6)~~ | ~~574551~~ | ~~151048~~ |
| C9722 | 199-D7-7 | RUM monitoring well | 15.2 (6) | 574433 | 152668 |
| C9926 | 199-H1-12 | Unconfined monitoring well | 15.2 (6) | 576597.9 | 153898.8 |
| C9923 | 199-H3-21 | Unconfined extraction well | 15.2 (6) | 578130 | 152633 |
| C9723 | 199-H3-31 | RUM monitoring well | 15.2 (6) | 578151.45 | 152364.23 |
| C9724 | 199-H3-32 | RUM monitoring well | 15.2 (6) | 577710 | 153063 |
| C9719 | 199-H7-1 | RUM monitoring well | 15.2 (6) | 575643 | 153389 |
| C9930 | 699-95-48C | RUM monitoring well | 15.2 (6) | 575230.4 | 152573.6 |
| C9925 | 699-97-47D | RUM extraction well | 15.2 (6) | 575687.5 | 152937.7 |

RUM = Ringold Formation upper mud

The objectives and requirements of these wells are defined in SGW-60843, *FY2018 Plume Containment and Remediation Utilization Plan*, and described in general in this report. The following figures are included in this addendum:

- Figure 1 presents the proposed well locations.
- Figure 2 presents the well construction diagram for wells completed in the unconfined aquifer. General well construction can also found in Section 3.2.5 of DOE/RL-2013-35.
- Figure 3 presents the construction diagram for wells completed in the first water-bearing unit of the Ringold Formation upper mud (RUM). Wells encountering separate aquifers will use multiple casing strings as needed.
- Figures 4 through 8 show the sample intervals and general lithology for each well.


2016 Hexavalent Chromium Plume
September - December
<10 µg/L
≥10 and <20 µg/L
≥20 and <48 µg/L
≥48 µg/L
Well prefix '199-' and '699-' omitted
Waste Site
Facility
Former Operational Boundary
Roads
New 2018 Wells
Columbia River
H1-12 (Mon)
H7-1 (RUM)
97-47D (Ext)
97-61
95-48C (RUM)
D7-7 (RUM)
D7-5
H3-32 (RUM)
H3-31 (RUM)
H3-21 (Ext)
D1-1 (Inj)
H1-32
H1-4
H1-2
H1-1
H1-6
H1-20
H1-21
H1-25
H1-27
H1-33
H1-34
H1-35
H1-36
H1-37
H1-38
H1-39
H1-40
H1-42
H1-43
H1-45
H1-46
H1-47
H1-48
H1-49
H3-25
H3-26
H3-27
H3-28
H3-29
H3-30
H4-1
H4-4
H4-12C
H4-15A
H4-17
H4-18
H4-63
H4-64
H4-69
H4-70
H4-72
H4-73
H4-74
H4-75
H4-76
H4-77
H4-79
H4-80
H4-81
H4-82
H4-86
H4-92
H4-93
H5-16
H6-2
H6-8
95-45B
90-45B
93-48C
90-47B
D6-1
D6-2
D7-3
D7-4
D8-53
D8-55
D8-68
D8-69
D8-88
D8-89
D8-90
D8-91
D8-95
D8-96
D8-97
D8-98
D8-99
D5-20
D5-32
D5-34
D5-92
D5-101
D5-104
D5-108
D5-111
D5-127
D5-128
D5-129
D5-130
D5-131
D5-146
D5-148
D5-153
D5-154
D5-159
D4-14
D4-34
D4-38
D4-39
D4-83
D4-95
D4-96
D4-97
D4-101
Columbia River
Note:
Changes to HR-3 Pump and Treat systems and areas all FY2017 work complete.
0
0.15
0.3
0
0.25
0.5
CHSGW20170305
SGRP/GISProjects/MXD/CR100HR3/CHSGW20170305.mxd

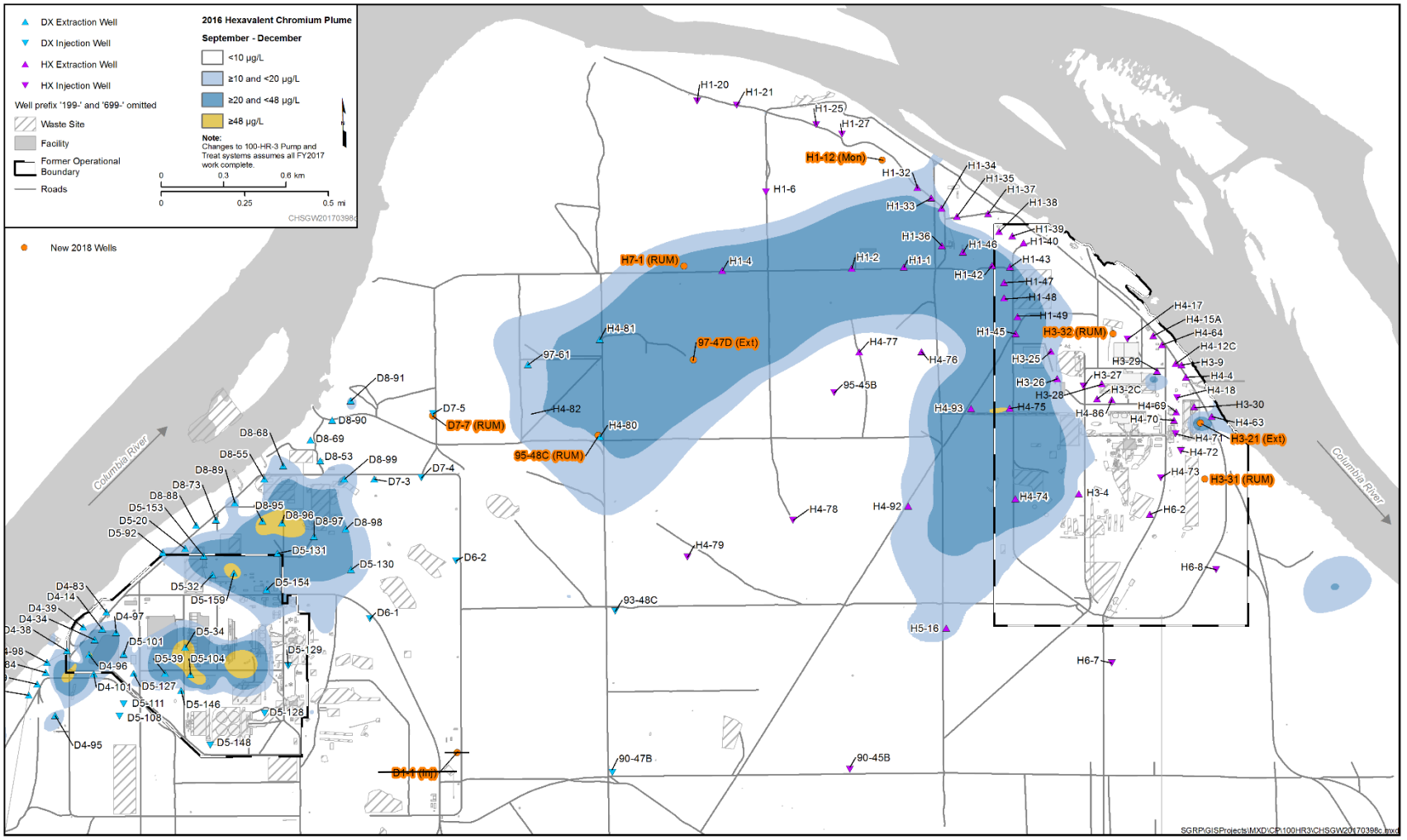
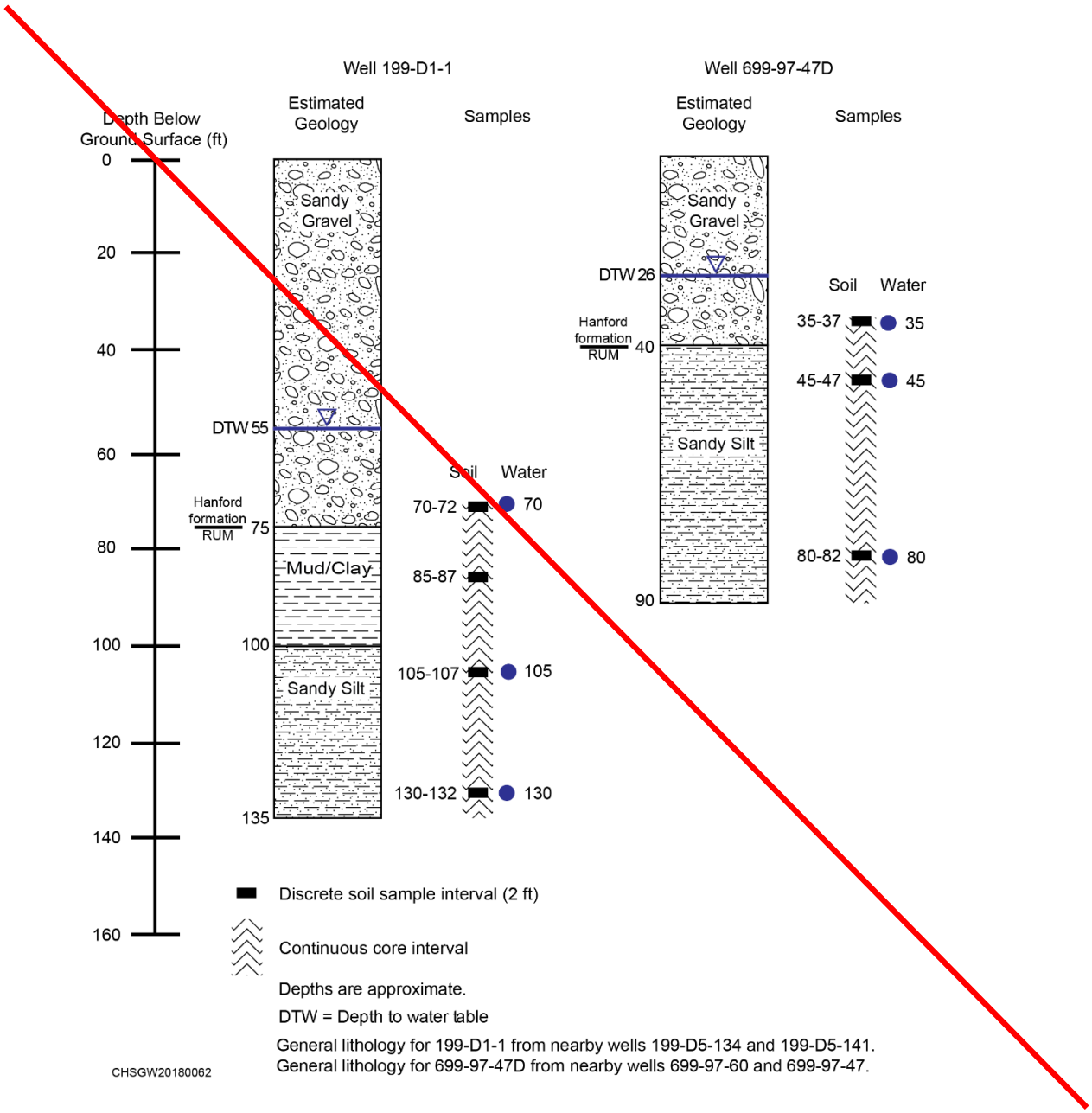



Figure 1. New Well Locations


Well 199-D1-1
Well 699-97-47D
Depth Below Ground Surface (ft)
Estimated Geology
Samples
Sandy Gravel
DTW 55
Hanford formation RUM
75
Mud/Clay
100
Sandy Silt
135
Soil
Water
70-72
70
85-87
105-107
105
130-132
130
DTW 26
40
90
35-37
35
45-47
45
80-82
80
0
20
40
60
80
100
120
140
160
Discrete soil sample interval (2 ft)
Continuous core interval
Depths are approximate.
DTW = Depth to water table
General lithology for 199-D1-1 from nearby wells 199-D5-134 and 199-D5-141.
General lithology for 699-97-47D from nearby wells 699-97-60 and 699-97-47.
CHSGW20180062

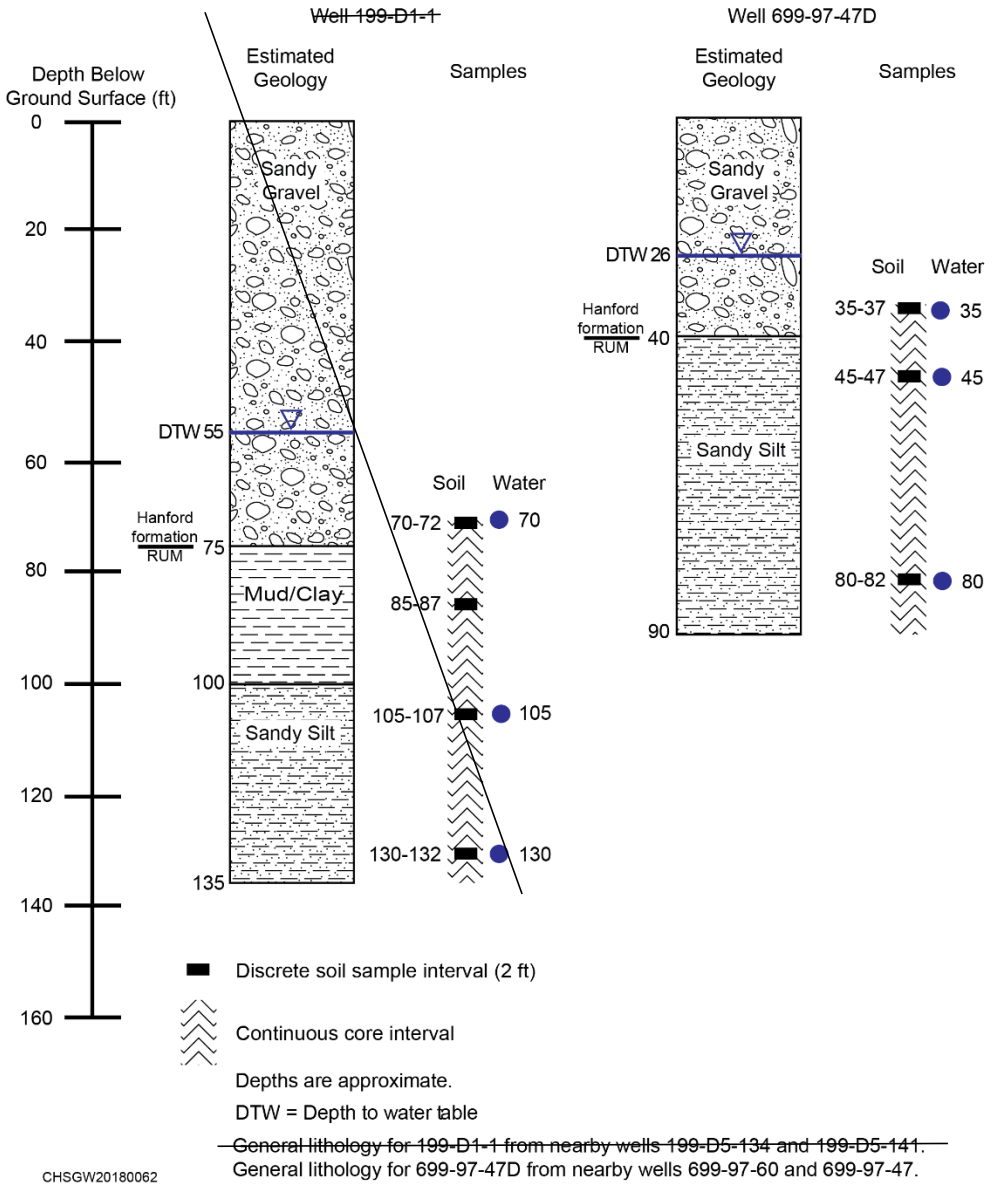



Figure 2. General Stratigraphy and Sample Locations for Well~~s 199-D1-1 and~~ 699-97-47D

Post-development samples will be analyzed on an expedited turnaround time to ensure that the contaminant concentrations are as expected prior to connection to the HX or DX pump and treat (P&T) system. The wells will be added to DOE/RL-2013-30, *Sampling and Analysis Plan for 100-HR-3 Groundwater Operable Unit Monitoring*, through a Tri-Party Agreement (TPA) (Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order*) Change Notice. Quality control and assessment elements and acceptance criteria associated with field samples for analysis of hexavalent chromium (Cr[VI]) in water will adhere to DOE/RL-2013-30.

Following completion, wells will be transitioned to the 100-HR-3 groundwater monitoring schedule for 2 years of quarterly sampling to establish baseline conditions. Samples will be collected for the same list of parameters as described for post-development unless the contaminant is below the detection limits. After the establishment of baseline conditions, the well sampling schedule will be re-evaluated and modified through a TPA Change Notice for DOE/RL-2013-30, as needed.

# 2 Technical Justification

P&T and monitoring wells planned for drilling in FY 2018 will help remediate known groundwater contamination in the unconfined aquifer and provide critical information on the nature and extent of Cr(VI) contamination in the RUM water-bearing unit. Characterization and monitoring samples from the water-bearing and confining layers of the RUM will provide a deeper and necessary understanding of the hydraulic and lithologic properties of this lower aquifer along with its relationships with the unconfined aquifer and Columbia River.

~~Two of the three~~One well~~s~~ planned for completion as an unconfined aquifer well~~s~~ (~~199-D1-1, and~~ 199-H1-12) will be drilled into the RUM aquifer to collect soil and water samples in this deeper aquifer. The RUM section of the boreholes will be sealed and decommissioned prior to final completion as unconfined aquifer wells. The technical justification for the wells is summarized in Table 2.

Table 2. Technical Needs and Justification Summary

| Proposed Well | Technical Justification | Well Use (Aquifer) |
|---|---|---|
| ~~199-D1-1~~ | ~~This well will be completed in the unconfined aquifer to increase injection capacity in the 100-D Area. Samples collected during drilling and post-development will provide characterization of contaminants on the southeastern margin of 100-D and southern boundary of 100-HR-3. Characterization samples in the RUM aquifer collected during drilling will provide additional characterization of the lower aquifer.~~ | ~~Injection (unconfined)~~ |
| 199-D7-7 | This well will be completed in the uppermost RUM aquifer as a monitoring well to help define the extent of the Cr(VI) plume in the RUM aquifer between the 100-D Area and the Horn. It will also help provide additional characterization of this lower aquifer. | Monitoring (RUM) |
| 199-H1-12 | This well will be completed in the unconfined aquifer as a monitoring well to help evaluate the degree of hydraulic containment and river shoreline protection of the Cr(VI) plume at the northeastern extent of 100-HR-3. Samples collected in the RUM aquifer during drilling provide additional characterization of the lower aquifer. | Monitoring (unconfined) |

Table 3. Expected Hydrogeologic and Drilling Depths

| Well | | Expected Depth (m [ft] bgs) | | | Expected Screened Interval (m [ft] bgs) | Well Completion Depth (m [ft] bgs) | Expected Number of Samples | |
|---|---|---|---|---|---|---|---|---|
| ID | Name | To Water | To RUM | Total Drilled | | | Groundwater | Soil |
| ~~C9935 [a]~~ | ~~199-D1-1~~ | ~~16.8 (55)~~ | ~~22.9 (75)~~ | ~~41.4 (135)~~ | ~~15.2 to 22.9 (50 to 75)~~ | ~~22.9 (75)~~ | ~~3~~ | ~~4~~ |
| C9722 | 199-D7-7 | 13.4 (44) | 16.5 (54) | 32.0 (105) | 27.4 to 30.5 (90 to 100) | 32.0 (105) | 2 | 3 |
| C9926 [a] | 199-H1-12 | 10.4 (34) | 13.1 (43) | 25.9 (85) | 8.5 to 11.6 (28 to 43) | 14.6 (48) | 2 | 3 |
| C9923 | 199-H3-21 | 10 (33) | 15.2 (50) | 16.7 (55) | 9.1 to 15.2 (30 to 50) | 16.7 (55) | 1 | 2 |
| C9723 | 199-H3-31 | 13.1 (43) | 17 (56) | 27.4 (90) | 21.3 to 25.9 (70 to 85) | 27.4 (90) | 2 | 3 |
| C9724 | 199-H3-32 | 11.9 (39) | 13.7 (45) | 28.9 (95) | 21.3 to 27.4 (70 to 90) | 28.9 (95) | 3 | 4 |
| C9719 | 199-H7-1 | 9.4(31) | 12.2 (40) | 32.0 (105) | 27.4 to 30.5 (90 to 100) | 32.0 (105) | 3 | 4 |
| C9930 | 699-95-48C | 11.6 (38) | 20.4(67) | 61.0(200) [b] | 22.9 to 28.9 (75 to 95) | 30.5 (100) | 5 | 6 |
| C9925 | 699-97-47D | 8(26) | 12.2 (40) | 27.4 (90) | 13.7 to 16.8 (45 to 55) | 18.3 (60) | 3 | 3 |

a. Well will be drilled into the first water-bearing unit of the RUM for deeper characterization but completed in the unconfined aquifer.

b. Well will be drilled through the full thickness of the RUM and into the Ringold Formation unit B immediately above the Ringold Formation lower mud unit. The estimated depth and number of samples is poorly constrained because there are no nearby boreholes that penetrate this deeply.

bgs = below ground surface

Table 4. Unconfined Completion Wells ~~199-D1-1,and~~ 199-H1-12 Sample Analytes

| **Sample Location** | ~~199-D1-1, and~~ 199-H1-12 | | | |
|---|---|---|---|---|
| **Estimated Depth to Water (m [ft] bgs)** | ~~199-D1-1~~ | ~~16.8 (55)~~ | | |
| | 199-H1-12 | 10.4 (34) | | |
| **Projected Total Depth (m [ft] bgs)** | ~~199-D1-1~~ | ~~41.4 (135)~~ | | |
| | 199-H1-12 | 25.9 (85) | | |
| **Media** | **Sample Type** | **Comments** | **Estimated Depth (ft bgs)** | **Analytes** |
| **Soil/Geologic** | Grab | Archival purposes | Every 5 ft and at lithologic changes | None |
| | | Screen selection | Every 5 ft of screened interval* | Particle-size distribution (field analysis) |
| | Continuous core | Begin 5 ft above RUM surface to total depth | ~~D1-1 (70)~~ H1-12 (38) | None |
| | | Unconfined aquifer | | Particle-size distribution (laboratory analysis), total chromium, and Cr(VI) chromium |
| | | Confining units in the RUM | ~~D1-1 (85)~~ H1-12 (48) | Particle-size distribution (laboratory analysis), total chromium, and Cr(VI) chromium |
| | | Water-bearing units of the RUM | ~~D1-1 (105, 130)~~ H1-12 (80) | |
| **Water** | During drilling | Middle of unconfined aquifer | ~~D1-1 (70)~~ H1-12 (40) | Bicarbonate, carbonate, calcium, Cr(VI) (both filtered and unfiltered), total chromium (both filtered and unfiltered), chloride, fluoride, magnesium, manganese, nitrate, potassium, sodium, strontium-90, sulfate, technetium-99, and uranium |
| | | Water-bearing units of the RUM | ~~D1-1 (105, 130)~~ H1-12 (80) | |
| | Pumped | After well development | Screened interval | |

*See Table 3 for estimated screen intervals.