100-HR-3 Groundwater Operable Unit Well Installation Sampling and Analysis Plan, Addendum 8: Wells 199-D4-102 and 199-D4-103

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

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# Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bgs</td>
<td>below ground surface</td>
</tr>
<tr>
<td>Cr(VI)</td>
<td>hexavalent chromium</td>
</tr>
<tr>
<td>P&amp;T</td>
<td>pump and treat</td>
</tr>
<tr>
<td>RUM</td>
<td>Ringold Formation upper mud</td>
</tr>
<tr>
<td>ISRM</td>
<td>in situ redox manipulation</td>
</tr>
<tr>
<td>TBD</td>
<td>to be determined</td>
</tr>
</tbody>
</table>
1 Introduction

This Addendum 8 for DOE/RL-2013-35, 100-HR-3 Groundwater Operable Unit Well Installation Sampling and Analysis Plan, contains site-specific field sampling plans for wells identified in Table 1. The wells identified in the table are planned for installation as noted, but work is dependent on actual funding and U.S. Department of Energy priorities.

Table 1. Proposed Wells

<table>
<thead>
<tr>
<th>Borehole ID</th>
<th>Well Name</th>
<th>Well Type</th>
<th>Well Diameter (cm [in.])</th>
<th>Northing</th>
<th>Easting</th>
</tr>
</thead>
<tbody>
<tr>
<td>C9613</td>
<td>199-D4-102</td>
<td>Extraction well</td>
<td>25.4 (10)</td>
<td>151459.5</td>
<td>572748.4</td>
</tr>
<tr>
<td>C9614</td>
<td>199-D4-103</td>
<td>Extraction well</td>
<td>25.4 (10)</td>
<td>151243.9</td>
<td>572746.9</td>
</tr>
</tbody>
</table>

The objectives and requirements of these wells are defined in SGW-58986, FY2016 Plume Containment and Remediation Utilization Plan, and described in general as follows. General well construction information is found in Figure 2, as well as in Section 3.2.5 of DOE/RL-2013-35. The following figures and tables are included in this addendum:

- Figure 1 presents the proposed well locations.
- Figure 2 presents the well construction diagram for 25.4 cm (10 in.) diameter wells.
- The remaining figures are associated with specific wells, as shown in Table 2.

Following completion, wells will be transitioned to the 100-HR-3 groundwater monitoring schedule for sampling on a quarterly basis 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 limit. 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 DX pump and treat system. The wells will also be added to DOE/RL-96-90, Interim Action Monitoring Plan for the 100-HR-3 and 100-KR-4 Operable Units, and DOE/RL-2013-30, Sampling and Analysis Plan for the 100-HR-3 Groundwater Operable Unit, following approval. Quality control and assessment elements and acceptance criteria associated with field samples for analysis of hexavalent chromium in water will adhere to DOE/RL-2013-30, Sampling and Analysis Plan for the 100-HR-3 Groundwater Operable Unit.

Table 2. List of Figures for Well Stratigraphy and Split Spoon Intervals

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Figure of Stratigraphy and Split Spoon Collection Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>199-D4-102</td>
<td>3</td>
</tr>
<tr>
<td>199-D4-103</td>
<td>4</td>
</tr>
</tbody>
</table>
2 Technical Justification

The technical justification for the wells is summarized in Table 3, below.

**Table 3. Technical Justification Summary**

<table>
<thead>
<tr>
<th>Proposed Well</th>
<th>Technical Justification</th>
<th>Well Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>199-D4-102</td>
<td>Increase capture and extraction flow rates upgradient of the ISRM barrier. This well is also located to address potential breakthrough of contaminants near Well 199-D4-96. Well will be 10 inches in diameter to improve flow rates as compared to nearby wells.</td>
<td>Extraction</td>
</tr>
<tr>
<td>199-D4-103</td>
<td>Increase capture and extraction flow rates upgradient of the ISRM barrier. Well will be 10 inches in diameter to improve flow rates as compared to nearby wells.</td>
<td>Extraction</td>
</tr>
</tbody>
</table>

ISRM = in situ redox manipulation

A summary of the anticipated geology for each well is presented in Table 4. Soil sample estimated depths and the analytes are presented in Table 5. There is no suspected contamination in the vadose zone, and therefore soil samples will be collected from the unconfined aquifer material and not from above the water table. Table 6 presents the locations of groundwater samples to be collected during drilling and after well development.
Figure 1. New Well Locations: 199-D4-102 and 199-D4-103
Figure 2. Generalized Well Construction Diagram for 25.4 cm (10 in.) Diameter Well
Figure 3. Well 199-D4-102 General Stratigraphy and Split Spoon Intervals
Figure 4. Well 199-D4-103 General Stratigraphy and Split Spoon Intervals
### Table 4. Summary of Geologic Information

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Well Name</th>
<th>Expected Depth to Water (m [ft] bgs)</th>
<th>Expected Depth to RUM (m [ft] bgs)</th>
<th>Expected Total Depth (m [ft] bgs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C9613</td>
<td>199-D4-102</td>
<td>25.6 (84)</td>
<td>32 (105)</td>
<td>33.5 (110)</td>
</tr>
<tr>
<td>C9614</td>
<td>199-D4-103</td>
<td>25.3 (83)</td>
<td>33.5 (110)</td>
<td>35.1 (115)</td>
</tr>
</tbody>
</table>

bgs = below ground surface  
RUM = Ringold Formation upper mud

### Table 5. Soil Sampling

<table>
<thead>
<tr>
<th>Media</th>
<th>Sample Type</th>
<th>Comments</th>
<th>Location</th>
<th>Estimated Depth (m [ft] bgs)</th>
<th>Analytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil/Geologic</td>
<td>Grab</td>
<td>Archival purposes</td>
<td>All wells</td>
<td>Every 1.5 (5) and at lithology changes</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Screen selection</td>
<td>All wells</td>
<td>Every 1.5 (5) of screened interval within unconfined aquifer</td>
<td>Grain size (field measurement)</td>
</tr>
<tr>
<td>Soil/Geologic</td>
<td>Split spoon</td>
<td>Unconfined aquifer</td>
<td>199-D4-102, C9613</td>
<td>27.4 to 28.2 (90 to 92.5)</td>
<td>Hydraulic conductivity, Cr(VI), total chromium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>199-D4-103, C9614</td>
<td>27.4 to 28.2 (90 to 92.5)</td>
<td></td>
</tr>
</tbody>
</table>

Cr(VI) = hexavalent chromium
### Table 6. Groundwater Sampling

<table>
<thead>
<tr>
<th>Media</th>
<th>Sample Type</th>
<th>Comments</th>
<th>Well Name</th>
<th>Well ID</th>
<th>Estimated Depths (m [ft] bgs)</th>
<th>Analytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>During drilling</td>
<td>Mid-depth of unconfined aquifer</td>
<td>199-D4-102</td>
<td>C9613</td>
<td>29 (95)</td>
<td>Cr(VI) (field measurement)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>199-D4-103</td>
<td>C9614</td>
<td>29 (95)</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>Post Development</td>
<td>Mid-depth of unconfined aquifer, after development</td>
<td>All wells</td>
<td>--</td>
<td>Screened interval</td>
<td>Bicarbonate, calcium, Cr(VI) (filtered and unfiltered), total chromium (filtered and unfiltered), chloride, magnesium, nitrate, potassium, phosphates, sodium, sulfate, and tritium</td>
</tr>
</tbody>
</table>

Cr(VI) = hexavalent chromium
3 References


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