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100 & 300 AREA UNIT MANAGERS MEETING
November 9, 2016

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100 & 300 Area Unit Manager Meeting
Attachments List
November 9, 2016

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- **TPA-CN-0743**
- **TPA-CN-0744**
- **TPA-CN-0747**
- **TPA-CN-0751**
- **TPA-CN-0752**

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Attachment A

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100/300 AREA UNIT MANAGER MEETING
ATTENDANCE
November 9, 2016

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Attachment B

100/300 Area UMM
Action Items List
November 9, 2016

Open (O)/ Closed (X)	Action No.	Co.	Actionee	Project	Action Description	Status
X	100-174	CHPRC	Bill Faught	100-N	N. Menard requested update and status of aquifer tube sampling upon receipt of sampling results and 2016 PRB performance. Action: aquifer tube data is currently reported monthly.	Open: 9/8/16 11/3/2016: Update - Information provided in Annual P&T report. Presentation on Permeable Reactive Barrier performance will be given at January UMM. Update - Add the remainder of the aquifer data to the groundwater monitoring report.

Attachment C

100/300 Area Unit Manager Meeting
November 9, 2016
2420 Stevens Center Office Building
Richland 99354
Room 308 2:00 p.m.

Administrative:

- Approval and signing of previous meeting minutes
- Update to Action Items List
- Next UMM (01/12/2017)- *CHPRC Building 2420 Stevens - Room 308*

Special Topics

- None

Open Session: Project Area Updates - Groundwater, Field Remediation, D4/ISS:

- 100-OL-1 - Orchard Lands (John Sands)
- 100-K Area (Ellwood Glossbrenner, Roger Quintero, Steve Balone)
- 100-D & 100-H Areas (Steve Balone/Ellen Dagan, John Neath)
- 100-B/C Area (Greg Sinton)
- 100-N Area (Greg Sinton, John Neath)
- 100-F & 100-IU-2/6 Areas (Greg Sinton, John Neath)
- 300 Area - 618-10/11 exclusively (Owen Robertson, John Neath, Lorna Dittmer)
- 300 Area (John Sands, Rudy Guercia)

Other

- CERCLA Five Year Review (Greg Berlin)

Closing Comments (all)

Adjourn

Attachment D

100/300 Areas Unit Managers Meeting
November 9, 2016 (September and October data)

Summary Hanford Sampling Program

Hanford's overall Site groundwater monitoring program managed by CHPRC (River Corridor and Central Plateau) coordinates collection of groundwater samples from wells and aquifer tubes, as well as surface water samples from springs. Sample trips are scheduled by target month and prioritized based on project needs. Target sample dates (months) are chosen to minimize the number of sample trips by temporally aligning requests from multiple activities for a single location into a single trip where practical.

FY 2016 Sample Trip Status by Month Scheduled (September 2016)
For Fiscal Year 2016 Hanford's overall Site groundwater monitoring program has 2,833 sample trips scheduled for collection. During August 2016 (FY 2016, month eleven) the program successfully completed 51 sample trips scheduled for September 2016, ahead of schedule. During September 2016 (FY 2016, month twelve) the program successfully completed 188 sample trips scheduled for September 2016. During October 2016 (FY 2017, month one) the program successfully completed 5 sample trips scheduled for September 2016. This brings the total of September 2016 sample trips completed to 244 of 261 scheduled. In October 2016 an additional 9 Fiscal Year 2016 sample trips scheduled prior to September 2016 were completed bringing the total of Fiscal Year 2016 sample trips completed to 2,798.

FY 2017 Sample Trip Status by Month Scheduled (October 2016)
For Fiscal Year 2017 Hanford's overall Site groundwater monitoring program has 2,630 sample trips scheduled for collection. During September 2016 (FY 2016, month twelve) the program successfully completed 80 sample trips scheduled for October 2016 ahead of schedule. During October 2016 (FY 2017, month one) the program successfully completed 216 sample trips scheduled for October 2016. This brings the total of October 2016 sample trips completed to 296 of 350 scheduled. In October 2016 an additional 55 Fiscal Year 2017 sample trips scheduled for November 2016 and December 2016 were completed. Additionally one sample trip scheduled from November 2016 was marked as completed in February 2016 (data issue) bringing the total of Fiscal Year 2017 sample trips completed to 352.

FY 2016 Sample Trip Status by Month Collected (October 2016)
During October 2016, 14 Fiscal Year 2016 sample trips were successfully completed of which 2 were scheduled for April 2016, 1 was scheduled for May 2016, 1 was scheduled for June, 3 were scheduled for July, 2 were scheduled for August, and 5 were scheduled for September.

FY 2017 Sample Trip Status by Month Collected (October 2016)
During October 2016, 271 Fiscal Year 2017 sample trips were successfully completed of which 216 were scheduled for October 2016, 45 were scheduled for November 2016, and 10 were scheduled for December.

The specific wells, aquifer tubes, and springs sampled in the river corridor areas during September 2016 are listed in Table 1. The specific wells, aquifer tubes, and springs sampled in the river corridor areas during October 2016 are listed in Table 2.

Awaiting Sample Trips
Table 3 presents the sample trips for only the river corridor <u>that were not successfully completed</u> as of October 2016. Of the Fiscal Year 2016 and 2017 sample trips scheduled for October 2016 and prior, there are 70 that are awaiting collection. Of these, 1 has access restrictions, 6 require maintenance, 7 are being reviewed for cancelation, 1 has an adjusted schedule, 3 are associated with a special study and have an adjusted schedule, 2 are to be decommissioned, 6 were unsuccessful, and 44 are awaiting collection at the month end.

Sample trips are grouped by fiscal month scheduled and groundwater interest area. The number of awaiting well trips decreases with time from the schedule date. Reasons for sample trips to be awaiting include issues such as; well maintenance, weather conditions, access restrictions, and resource limitations.

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November 9, 2016 (September and October data)

Upcoming Sample Trips

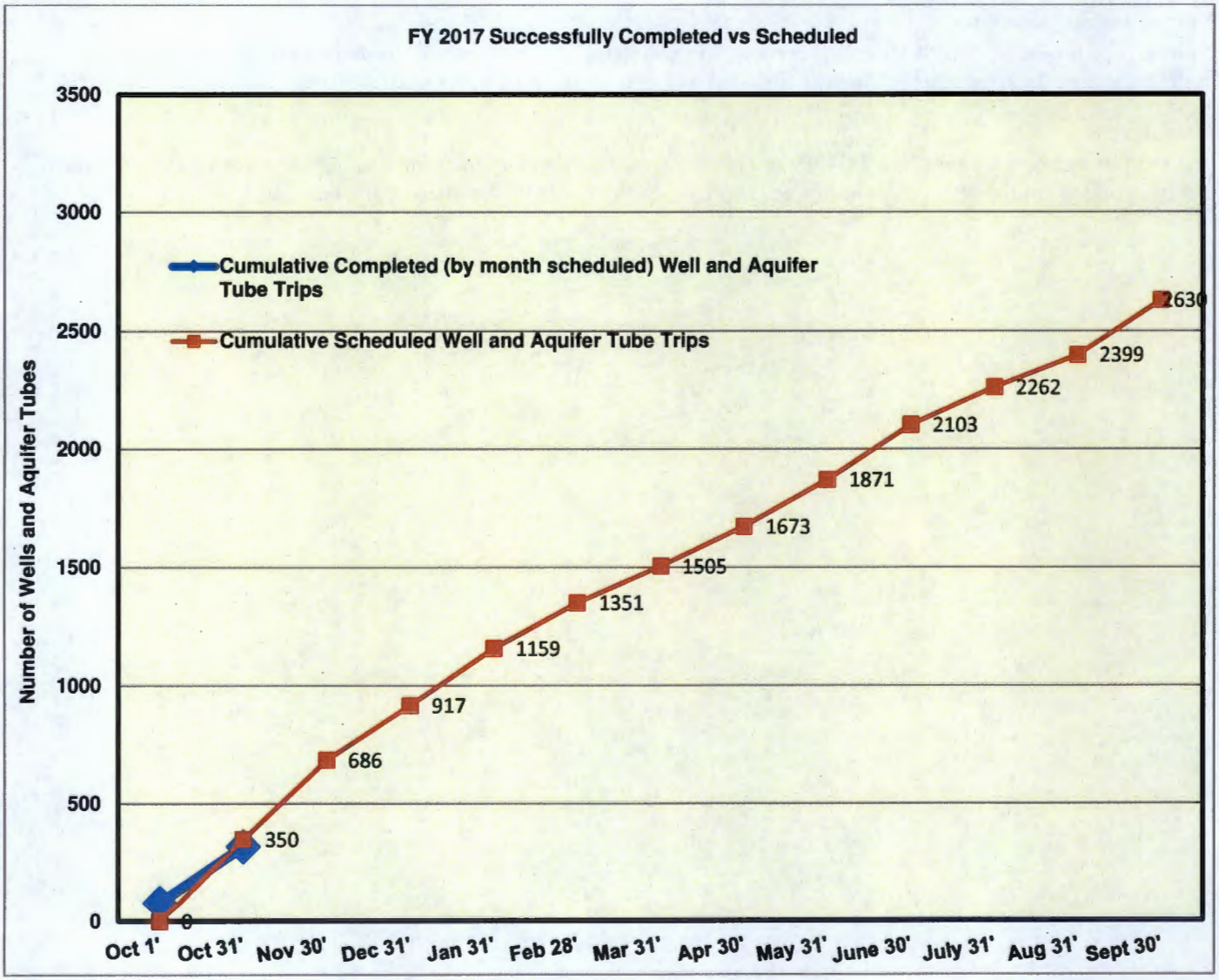
Sample trips for the river corridor only, scheduled for collection in November 2016 and December 2016 (and not collected before the target sample month) are listed in Table 4 and Table 5, respectively.

Data Access

The sampling results are available in HEIS and can be accessed from the Environmental Dashboard Application which can be accessed from the HLAN at https://ehs.chprc.rl.gov/eda/ or from the internet at https://ehs.hanford.gov/eda/.

100/300 Areas Unit Managers Meeting

November 9, 2016 (September and October data)



100/300 Areas Unit Managers Meeting
November 9, 2016 (September and October data)

Approved Change Notices

- TPA-CN-0743, dated September 19, 2016, modified the text and tables in the existing SAP (DOE/RL-2013-30 Rev. 0) for the 100-HR-3 Groundwater Operable Unit. Modifications include addition of new monitoring wells, realignment of Pump and Treat system wells, and adjustment of the sampling schedule.
- TPA-CN-0744, dated September 15, 2016, modified *Supplement to the 100-HR-3 and 100-KR-4 Remedial Design Report and Remedial Action Work plan for the Expansion of the 100-KR-4 Pump and Treat System* (DOE/RL-2006-75, Rev. 1) to include modification made to the KR4 and KX P&T systems by including 5 new extraction wells, one monitoring well, and the realignments of two monitoring wells.
- TPA-CN-0747, dated September 9, 2016, modified *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* (DOE/RL-2001-27, Rev. 2) to clarify that triple rinse of vessels, piping and manifolds during demolition of the 100-NR-2 pump and treat system is performed only if required to meet the ERDF waste acceptance criteria.
- TPA-CN-0751, dated September 30, 2016, modified the footnotes in Table 7-2, Interim RD/RAWP Schedule, of the Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit (DOEIRL-2001-27, Rev. 2) to clarify which activities are dependent on finalization of analysis in the 100-N area RI/FS.
- TPA-CN-0752, dated September 29, 2016, modified *Sampling and Analysis Plan for KW Pump and Treat System Rebound Study* (DOE/RL-2016-42, Rev. 0) sampling period from September 30, 2016 to March 31, 2017as well as update sampling frequency for wells in the network based on data collected through August 31, 2016.

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November 9, 2016 (September and October data)

Operable Unit Specifics

100-KR-4 Groundwater Operable Unit (Mike Drewett/Jason Hulstrom)

- CERCLA Process Implementation:
  - ✓ The RI/FS and PP documents are on hold pending restart of the RI/FS in FY17. The 100-K East Reactor waste site decisional draft characterization report documenting the data from new wells 199-K-221 and 199-K-222 was submitted to RL on November 2, 2016 for review.
  - ✓ Monitoring Plans: Met with DOE-RL and EPA September 21, 2016 to go over redlines in the Draft B Interim Groundwater Monitoring Plan, Draft C Interim O&M Plan and Draft B Interim RD/RAWP. EPA approved all changes to the interim documents. Documents were updated and finalized during October and Rev. 0 versions of all documents were submitted to DOE-RL on October 31, 2016 for final clearance and signature.
  - ✓ The KW pump and treat system was shut down on May 16, 2016 to start the rebound study. Sampling began on the first week of June and continued through September. Based on results collected through August, a decision was made to continue the rebound study through March 2017. TPA-CN-0752 was issued against DOE/RL-2016-42, *Sampling and Analysis Plan for KW Pump and Treat System Rebound Study*, to extend the sampling period and adjust sampling frequency at several locations. Figure K-1 gives a visual summary of the rebound of hexavalent chromium seen by the end of September 2016.
- Remedial Actions & System Modifications:
  - ✓ The volume of groundwater treated and mass of Cr(VI) removed for the 100-K P&T systems (KX, KR-4, and KW) during September and October are:

Month	Gallons Treated (mgal)	Hexavalent Chromium Removed (kg)
September	45.5	2.5
October	47.4	2.2

  - ✓ FY 2016 (Oct. 2015 through Sept. 2016) P&T performance to date:

P&T System	Treated (mgal)	Removed (kg)
KR-4	158	3.1
KW	107	5.5
KX	434	26.5
100-KR-4 OU Total	699	35.1

  - ✓ FY 2017 (Oct. 2016) P&T performance to date:

P&T System	Treated (mgal)	Removed (kg)
KR-4	12.6	0.2
KW	0	0
KX	34.9	2.0
100-KR-4 OU Total	47.4	2.2

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November 9, 2016 (September and October data)

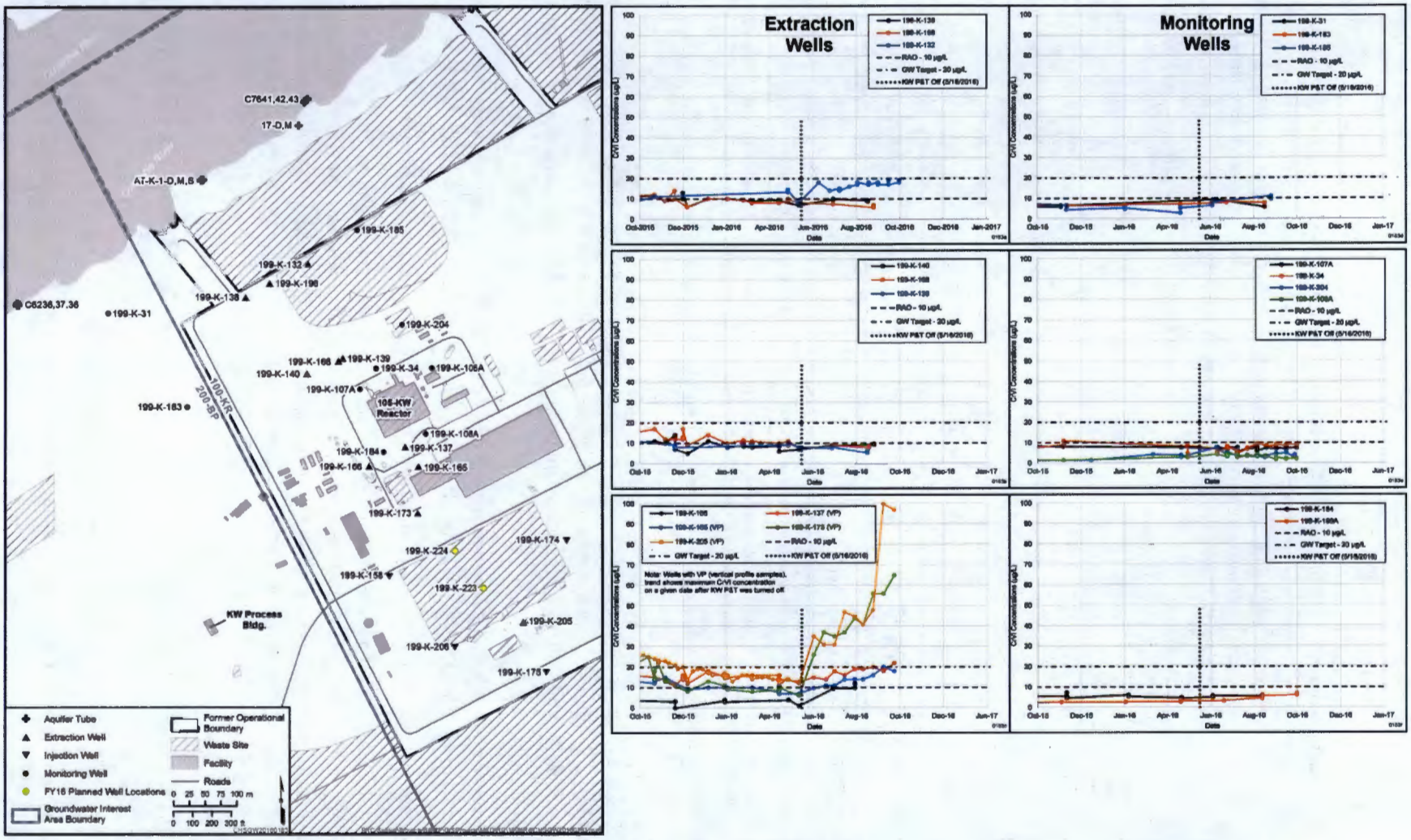

Figure K-1. Hexavalent Chromium Concentration as of September 30, 2016 under the 100-KW P&T Rebound Study

100/300 Areas Unit Managers Meeting

November 9, 2016 (September and October data)

✓ The influent and effluent Cr(VI) concentrations (measured weekly) for the three 100-K P&T systems during September and October are presented in Table K-1.

Table K-1. Monthly Summary of Influent and Effluent Concentrations at the 100-KR-4 P&T Systems

System	Month	Weekly Influent Concentrations[a] (µg/L)	Average Monthly Influent Concentration (µg/L)	Weekly Effluent Concentrations[ab] (µg/L)	Average Monthly Effluent Concentration[b] (µg/L)
100-KR4	September	2, 5, 3.4, 4, 7	4	0, 1, 1.5, 1.5, 0, -1	1
	October	3, 3, 2, 3	3	0, 0, 0, 1	0
100-KW[c]	September	--	--	--	--
	October	--	--	--	--
100-KX	September	19, 21, 17, 19, 17	19	1, 2, 1.5, 2, 0	1
	October	17, 15, 19, 15	17	1, -1, 3, 3	2

a. Concentrations provided represent samples taken during the current month and loaded into HEIS as of the publication of the UMM.

b. Concentrations reported are below detection and represent the actual instrument reading on the sample(s). The detection limit is approximately 2 µg/L hexavalent chromium. The readings indicate that the measured concentration is indistinguishable from the blank.

c. The 100-KW P&T System was shutdown May 16, 2016 to initiate the rebound study.

✓ In September 2016, the average pumping rates were 276 gpm, 0 gpm, and 787 gpm for the KR-4, KW, and KX systems, respectively. A summary of the number of extraction and injection wells in the three systems is shown in Table K-2. Figure K-2 illustrates the monthly average pumping rates for operating extraction wells across the 100-KR-4 system.

- At KR-4, the system remains in service to provide hydraulic capture of inland groundwater. During the month of September, extraction well 199-K-127 was offline for well maintenance September 3rd thru 19th.
- At KW, the system has been out of service since May 16, 2016 for the hexavalent chromium rebound study.
- At KX, the system operated at a lower capacity for the month of September. High capacity well 199-K-220 was completely offline during September to allow for the connection of new extraction well 199-K-225. Well 199-K-212, which was down for maintenance starting August 16th, was returned to service September 14th. At the end of September, 7 of 20 extraction wells exhibited hexavalent chromium concentrations that exceed 20 µg/L. These were wells 199-K-141, 199-K-144, 199-K-152, 199-K-153, 199-K-154, 199-K-182, and 199-K-210.

✓ In October 2016, the average pumping rates were 281 gpm, 0 gpm, and 787 gpm for the KR-4, KW, and KX systems, respectively.

- At KR-4, the system remains in service to provide hydraulic capture of inland groundwater.
- At KW, the system has been out of service since May 16, 2016 for the hexavalent chromium rebound study.

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- At KX, the system operated at a lower capacity for the month of October. High capacity well 199-K-220 continued to be offline during October to allow for the connection of new extraction well 199-K-225. However, by October 21st, 2016, 199-K-225 was up and running and operated between 40 and 50 gpm for the remainder of October. Well 199-K-146 was taken offline October 13th, 2016 and requires well maintenance. At the end of October, 7 of 21 extraction wells exhibited hexavalent chromium concentrations that exceed 20 µg/L. These were wells 199-K-141, 199-K-144, 199-K-152, 199-K-154, 199-K-178, 199-K-182, and 199-K-210.

Table K-2. Summary of Number of System Extraction and Injection Wells

Wells	KR4		KX		KW		TOTAL	
	2015	2016	2015	2016	2015	2016	2016	Current
Number of extraction wells	12	11	19	21	11	11 (off)	42	42
Number of injection wells	5	5	9	10	4	4 (off)	18	19

Note: KW system off for entire month of June

- ✓ Figures K-3 through K-5 present the monthly volume of groundwater treated and mass of hexavalent chromium removed though October 2016. As indicated in the figures, Cr(VI) monthly mass removal at KR-4 and KX have decreased in recent months due to continued optimization efforts. KW continue to show 0 due to the continuation of the KW rebound study.
- ✓ Assessment of soil and groundwater characterization data from boreholes in the vicinity of 105-KE Reactor continues. A review draft of the report was sent to RL on November 2, 2016.

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November 9, 2016 (September and October data)

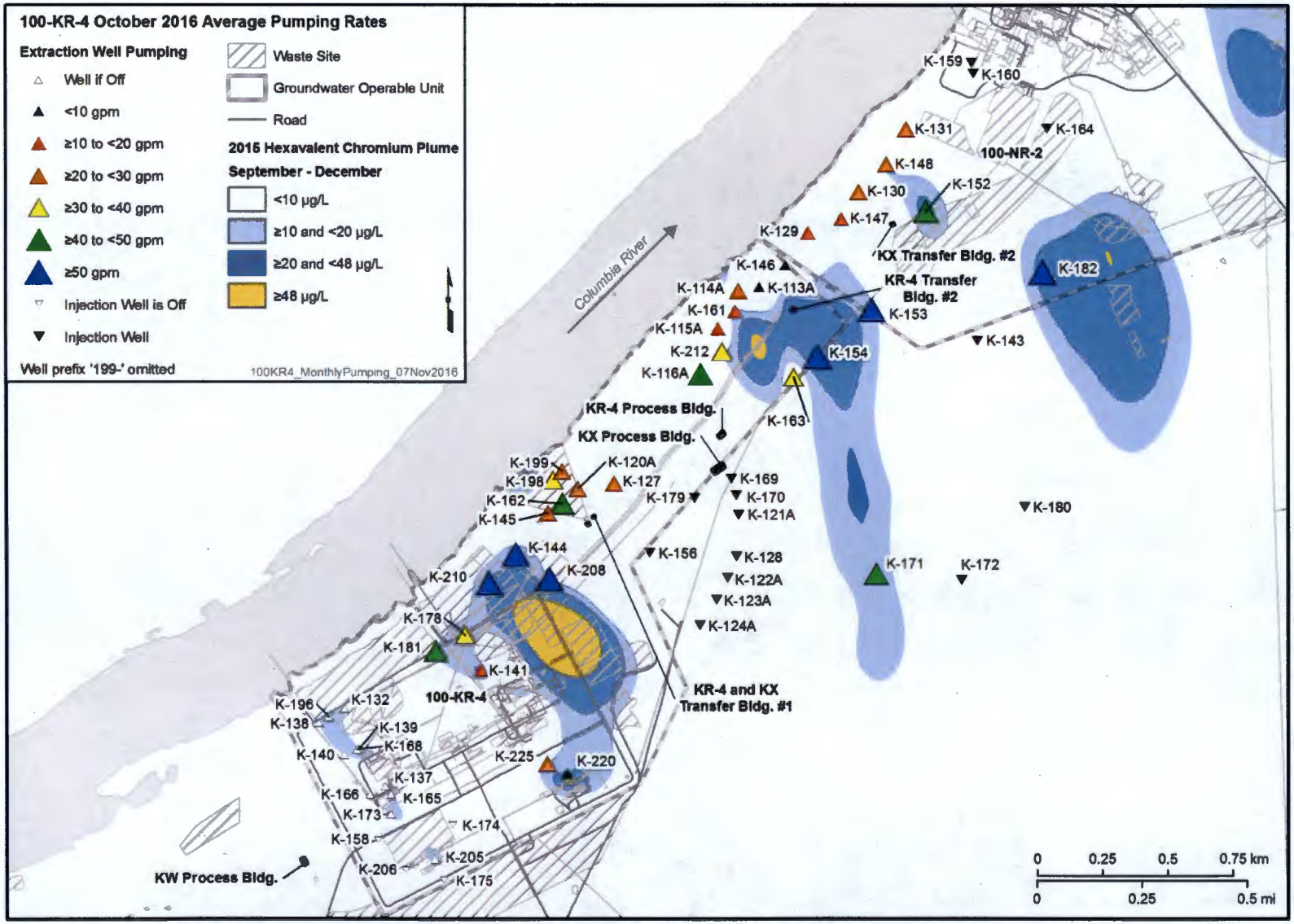

Figure K-2. October 2016 Average Pumping Rates for the 100-KR-4 P&T System

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November 9, 2016 (September and October data)

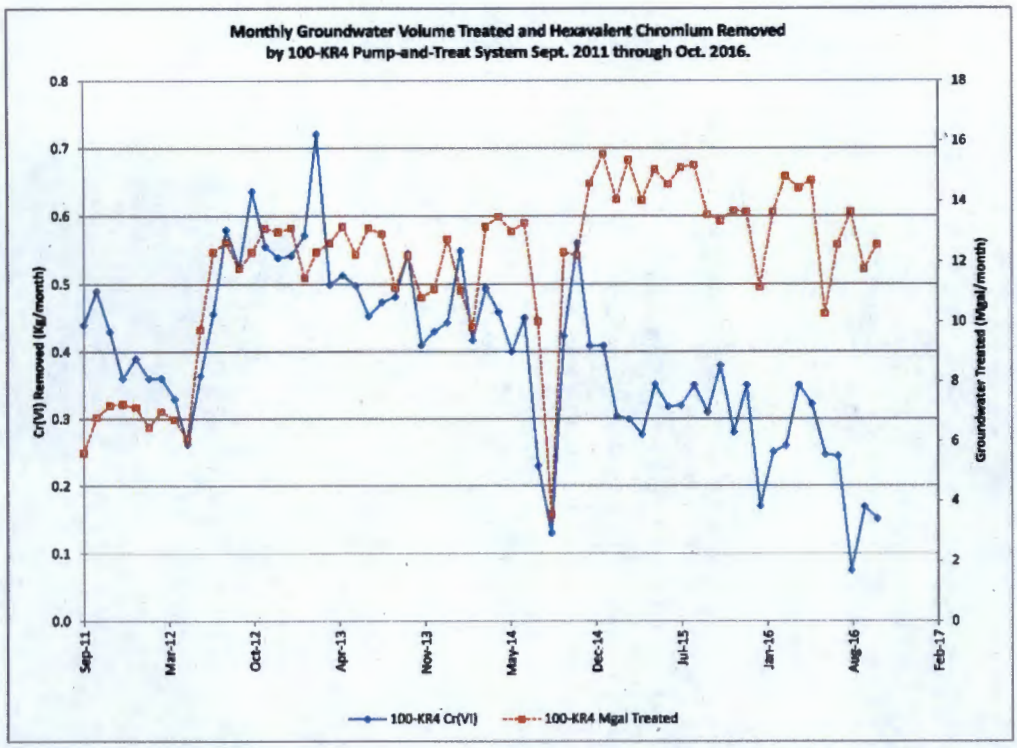

Figure K-3. Monthly Cr(VI) Removed and Groundwater Volume Treated by 100-KR-4 Pump-and-Treat, September 2011 through October 2016.

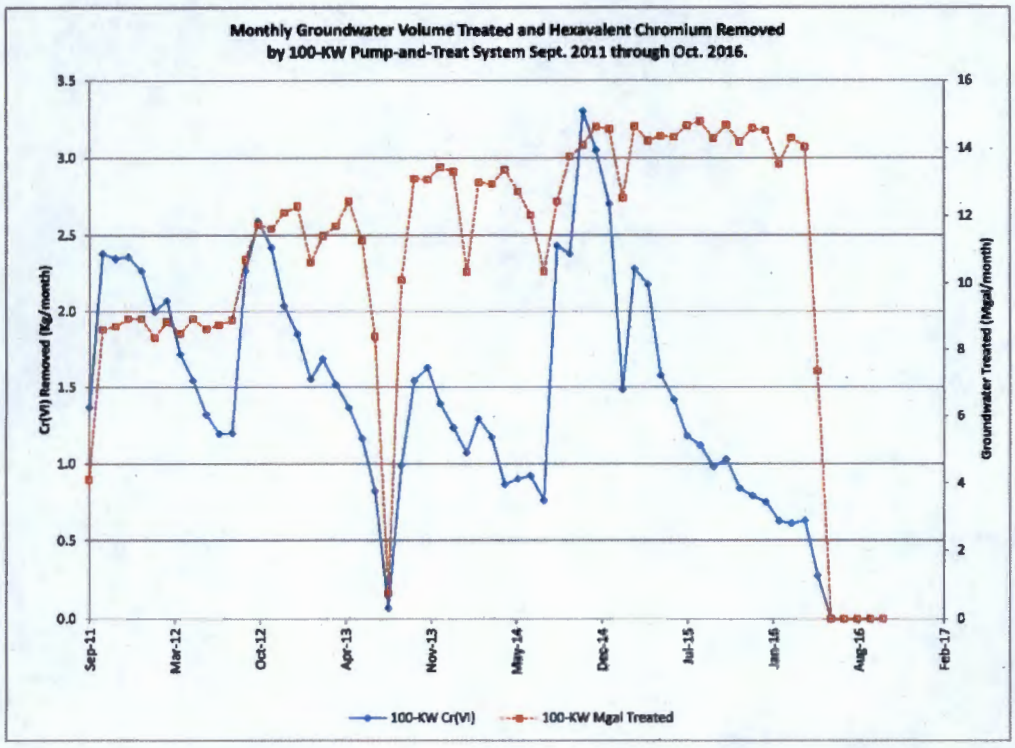

Figure K-4. Monthly Cr(VI) Removed and Groundwater Volume Treated by 100-KW Pump-and-Treat, September 2011 through October 2016.

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November 9, 2016 (September and October data)

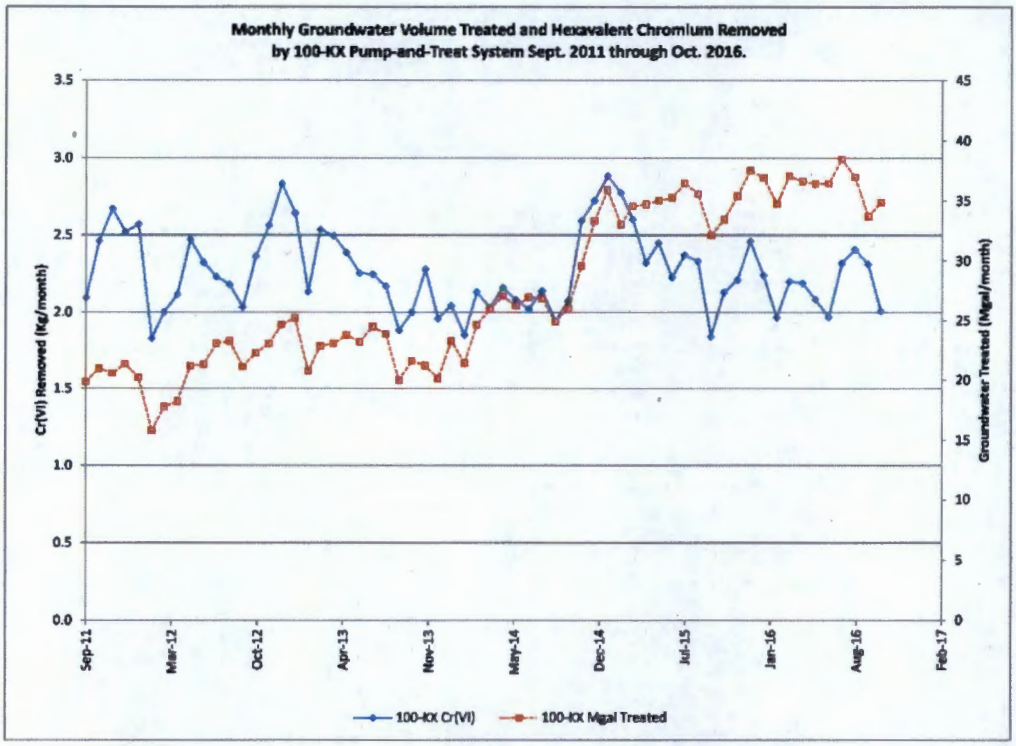

Figure K-5. Monthly Cr(VI) removed and groundwater volume treated by 100-KX pump-and-treat, September 2011 through October 2016.

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November 9, 2016 (September and October data)

100-BC-5 Groundwater Operable Unit – Robert Evans/Mary Hartman

- *Milestone M-015-79:* Due 12/15/2016 for the CERCLA RI/FS Report and Proposed Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units

- CERCLA Process Implementation:
  - ✓ Completed incorporating RL's comments into the Draft A Proposed Plan. This document is currently scheduled to be submitted to RL in early December 2016.
  - ✓ Received RL's comments on the Draft A RI/FS and initiated process to make final revisions and updates. This document is currently scheduled to be submitted to RL in early December 2016.

- Monitoring & Reporting:
  - ✓ Aquifer tubes and HSPs were sampled in late August (scheduled for September and sampled early). Data is in HEIS.
  - ✓ Monitoring wells were sampled as scheduled in October, except for one well (199-B4-4) that requires maintenance. Data received to date are discussed below.
    - Cr(VI) trends in wells screened in the upper part of the unconfined aquifer continue to indicate migration of the plume from southern 100-BC, with concentrations declining overall (Figure BC-1). In southern 100-BC concentrations ranged from <10 to 25 µg/L. The highest concentrations in northern 100-BC were 59 µg/L in aquifer tube C6230 and 49 µg/L in well 199-B3-47.
    - Cr(VI) in wells screened in the lower part of the unconfined aquifer in southern 100-BC continued to range from 25 to 40 µg/L. Concentrations in 199-B3-51 in northern 100-BC continued to be near detection limits.
    - VOCs were analyzed in all 8 wells that are screened in the lower part of the unconfined aquifer. Table BC-1 lists chloroform and TCE results; yellow highlights indicate wells that had not previously been analyzed for VOCs. The highest TCE concentration was 6.69 µg/L in well 199-B5-11. Figure BC-2 illustrates trends in three older wells where a recent risk assessment found combined concentrations greater than the MTCA risk threshold of 1×10^{-5}. Results were in line with previous data. Non-detect results in 199-B3-51 supports a previous conclusion that the TCE value of 4 µg/L in 2011 was suspect. Overall, the data suggest that low levels of chloroform and TCE are present in the lower part of the aquifer in western and southern 100-BC.

Table BC-1. Chloroform and TCE in 100-BC Wells Screened in the Lower Part of the Unconfined Aquifer (October 2016)

Well	Chloroform (ug/L)	TCE (ug/L)
199-B2-16	Pending	Pending
199-B3-51	0.3 U	0.3 U
199-B4-18	0.52 J	1.6
199-B5-5	3.0	2.8
199-B5-6	1.0	1.9
199-B5-9	1.4	2.9
199-B5-11	5.4	6.69
199-B5-13	0.32 J	0.31

U = below detection limit
J = estimated (near detection limit)
Yellow indicates wells not analyzed for VOCs before

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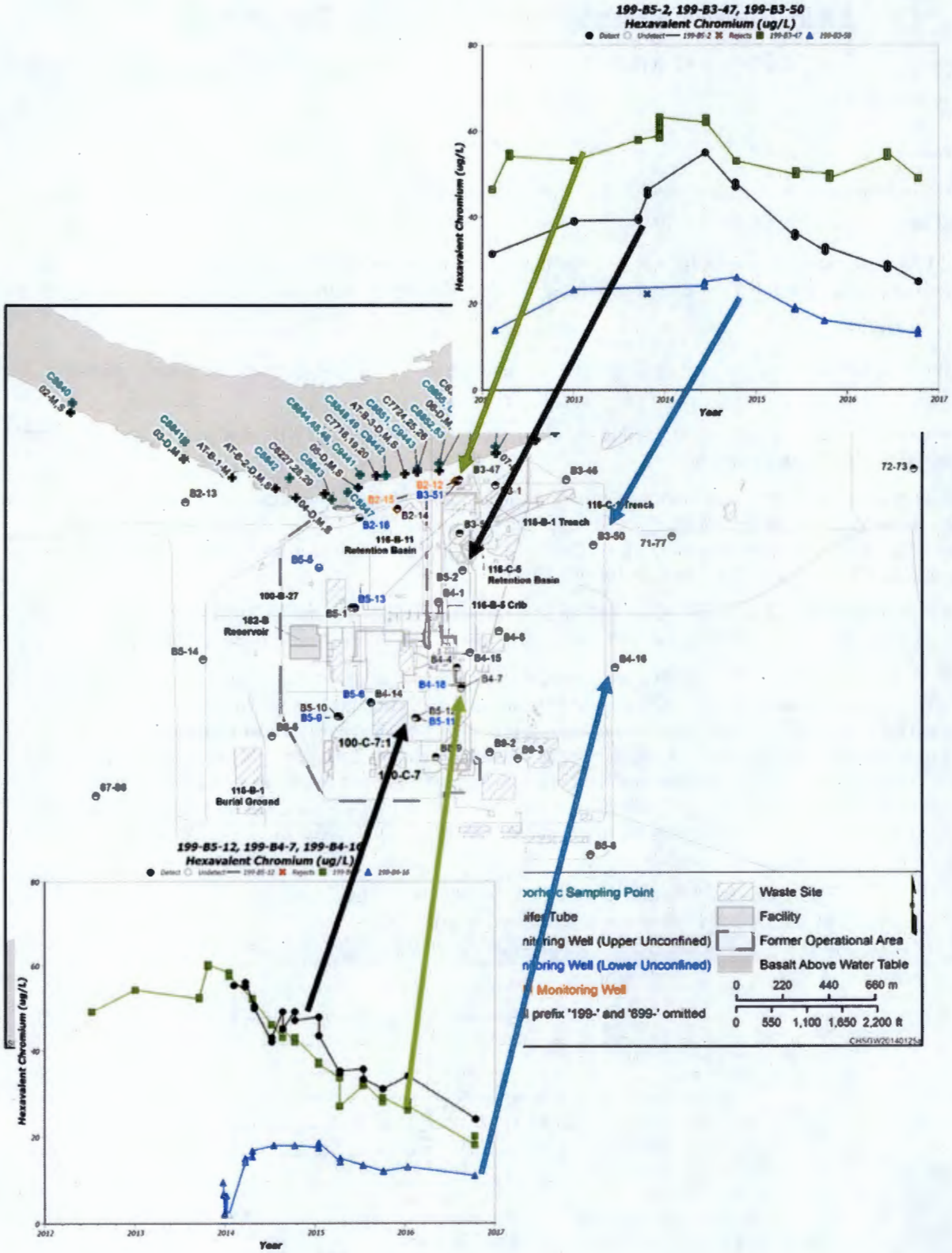

Figure BC-1. Hexavalent Chromium Trends in Selected Wells through October 2016

100/300 Areas Unit Managers Meeting
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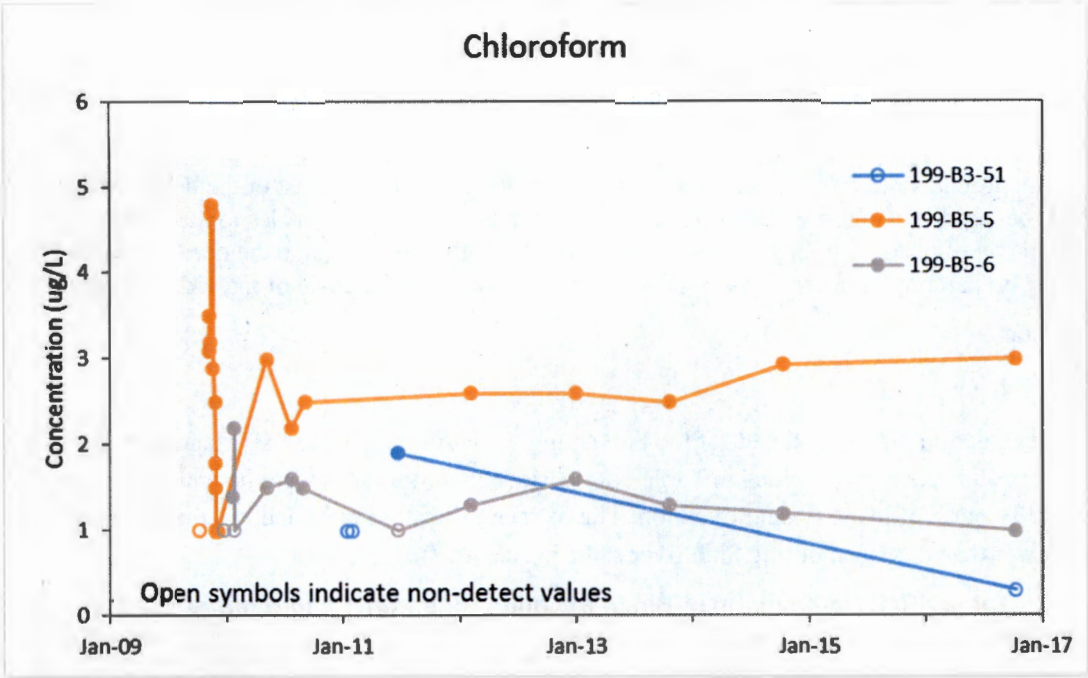

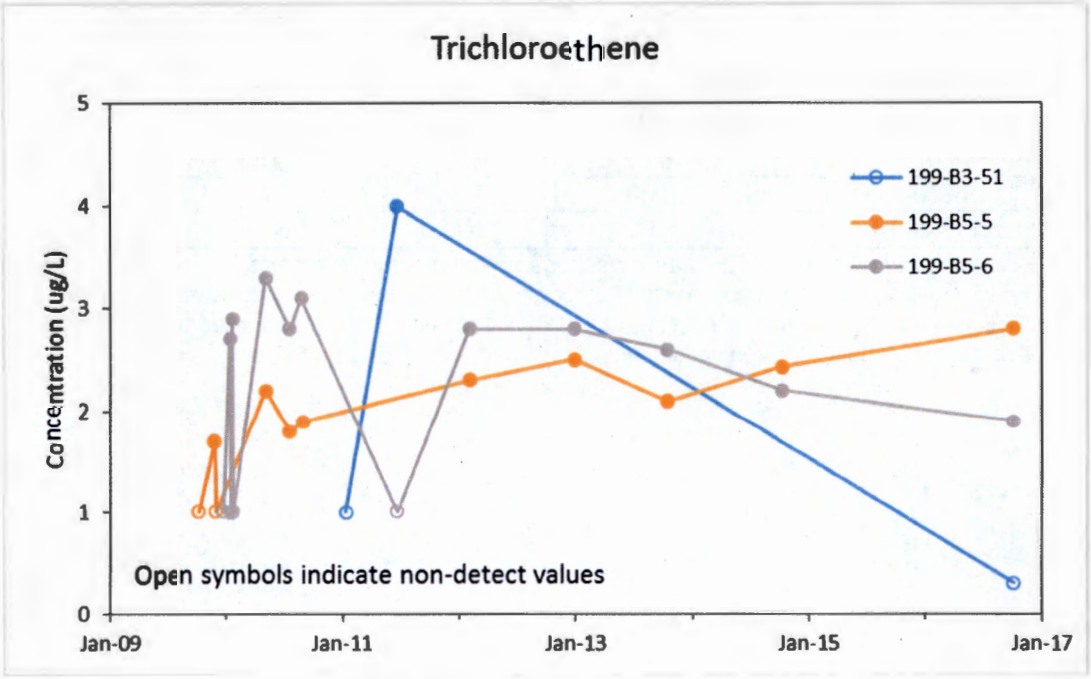

Figure BC-2. Chloroform and TCE in 100-BC Wells Screened in the Lower Part of the Unconfined Aquifer

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100-NR-1/100-NR-2 Operable Unit – Bill Faught/Virginia Rohay/Art Lee

- CERCLA Process Implementation
  - ✓ First round of quarterly groundwater samples were collected in September from the 6 new wells (Figure NR-1) near and around the reactor. Groundwater data from 6 wells will be included in the supplemental groundwater baseline risk assessment for the 100-N RI.
  - ✓ D&D of the groundwater P&T system has progressed with removal of the last of the debris from the P&T building main area being loaded out to ERDF. Preparing for removal of piping and cables to the extraction and injection wells. Removal of residual signage is being discussed with MSA to determine the need for additional cultural clearances. Preparation of necessary ground scans is proceeding for removal of the 1323-N sample shack.
- Remedial Actions:

100-NR-1 Bioventing –

- ✓ TPH biodegradation rates calculated for the bioventing wells from the high river stage respirometry test conducted in June/July are provided in Table NR-1. Biodegradation rates were not calculated for 199-N-18 and 199-N-183 because of low oxygen utilization. The oxygen utilization rates and calculated biodegradation rates are slightly lower than observed during high river stage in July 2015.

Table NR-1. Comparison of Biodegradation Rate from Respirometry Testing

Monitoring Location	Biodegradation Rate (mg/kg-day)			
	Jun-16	Jan-16	Jul-15	Dec-14
199-N-167	-0.06	-0.07	-0.06	-0.05
199-N-169	-0.07	-0.12	-0.11	-0.23
199-N-171	-0.08	-0.19	-0.13	-0.23
199-N-172	-0.02	-0.04	-0.03	-0.05
199-N-183	0.00	N/A	N/A	N/A
199-N-18	0.00	N/A	N/A	N/A

N/A = biodegradation rate not calculated because of low oxygen utilization

Note: Oxygen measurements between 19 and 22 percent represent atmospheric conditions indicating insignificant oxygen depletion at monitoring wells 199-N-183 and 199-N-18 which are furthest from the area of suspected residual TPH contamination.

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- ✓ The respirometry tests reflect that there is ongoing bioremediation occurring at well 199-N-169, even though the monthly vapor sampling doesn't show the same (minimal respiration). The lack of observed respiration at 199-N-169 is assumed to be caused by unidentified "short circuiting" in the flow pathway of injected air from the nearby injection well, 199-N-167.
- ✓ Following the recommendations from the respirometry test reports, a pulse mode of operation has been programmed into the control logic for the bioventing system. Respirometry tests indicate that 1-week of operating and 3-weeks of off-line time would provide sufficient oxygenation of the vadose soils to sustain bioremediation. If coordinated such that system down times are matched up with the regularly scheduled monthly bioventing well measurements, then the carbon dioxide and methane test results could be used to provide additional respiration data for use in on-going systems performance evaluations.
- ✓ Figure NR-2 presents bioventing well gas sample results for monitoring wells 199-N-171 and 199-N-169 and the measurement data are presented in Table NR-2. The September and October monthly vapor sample measurements were collected on September 29 and October 27, 2016, respectively. The system was operational during the September sampling and had been off for three weeks (as a test) for the October sampling. Respiration is observed in both wells in the October sample compared to no observed respiration at well 199-N-169 in the September sample. The next respirometry test planned for low-river (starting in November) will help establish pulse mode time frames.
- ✓ The draft of the annual bioventing performance report covering the time period from March 2015 through February 2016 was transmitted to Ecology on October 13, 2016.

Product Recovery

- ✓ The sponge assembly in well 199-N-18 was replaced on October 19, 2016. The removed sponge weight could not be measured because of problems with the scale. A work package is being prepared (for DOE-RL review) to add a smart sponge in well 199-N-183, located near well 199-N-18. The screen bottom of well 199-N-18 is close to the water table and may, at times, become dry with fluctuating water levels. Placing smart sponge material in well 199-N-183 may help determine if the low water availability is a reason for the limited product removal at 199-N-18.

Aquifer Tubes

- ✓ Tubes C7934, C7935, and C7936 are located adjacent to one another (Figure NR-3), with screens at depths of 14.41 ft. (C7934), 18.75 ft. (C7935), and 29.19 ft. (C7936). All three aquifer tubes were sampled on July 29, 2016, August 12, 2016, August 26, 2016 (for September), October 6, 2016, and October 26, 2016 (for November). Tritium and strontium-90 concentration trends for all three aquifer tubes through October 6, 2016 are shown in Figures NR-4 and NR-5, respectively. Tritium concentration trends have been steadily decreasing since the large spike that started in the first quarter of 2013 and peaked in the spring of 2015. Concentrations have declined by about 90% since the peak in the two shallow aquifer tubes (C7934 and C7935) and concentration levels in C7936 are near pre-spike concentrations. The declining trends indicate that the mass of tritium flushed to groundwater during soil remediation excavations of the waste sites between the reactor and the river are receding. The sample results we compared to specific conductance measurements and the finding is that the samples are from groundwater and not river water. There sample have no lab qualifiers that would indicate any analytical anomalies in the results. As of November 1, 2016, completion of the laboratory analysis for the November samples collected on October 26 are pending. These aquifer tubes are scheduled for sampling in December 2016.

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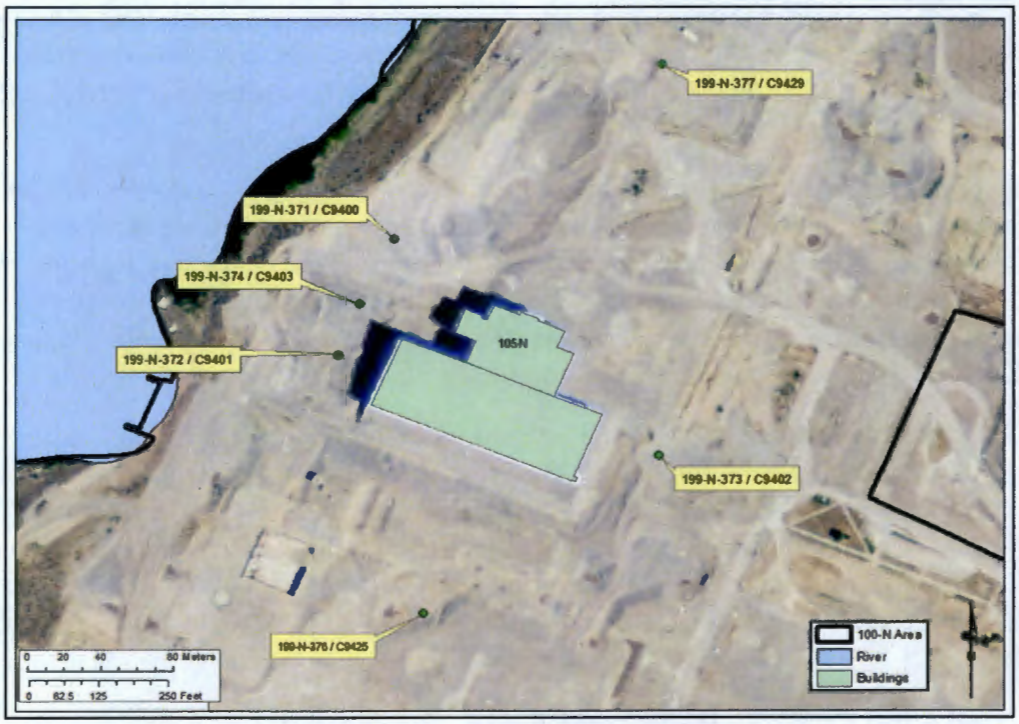

Figure NR-1. Location of Six New Wells in the 100-N Area

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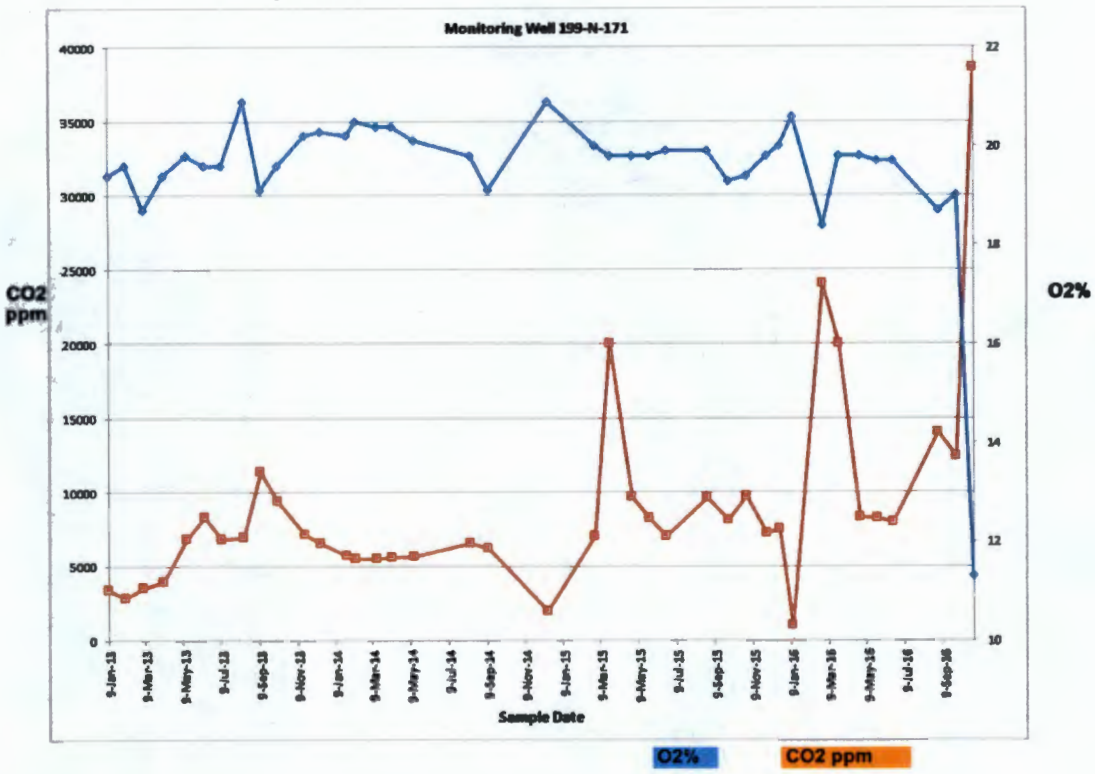

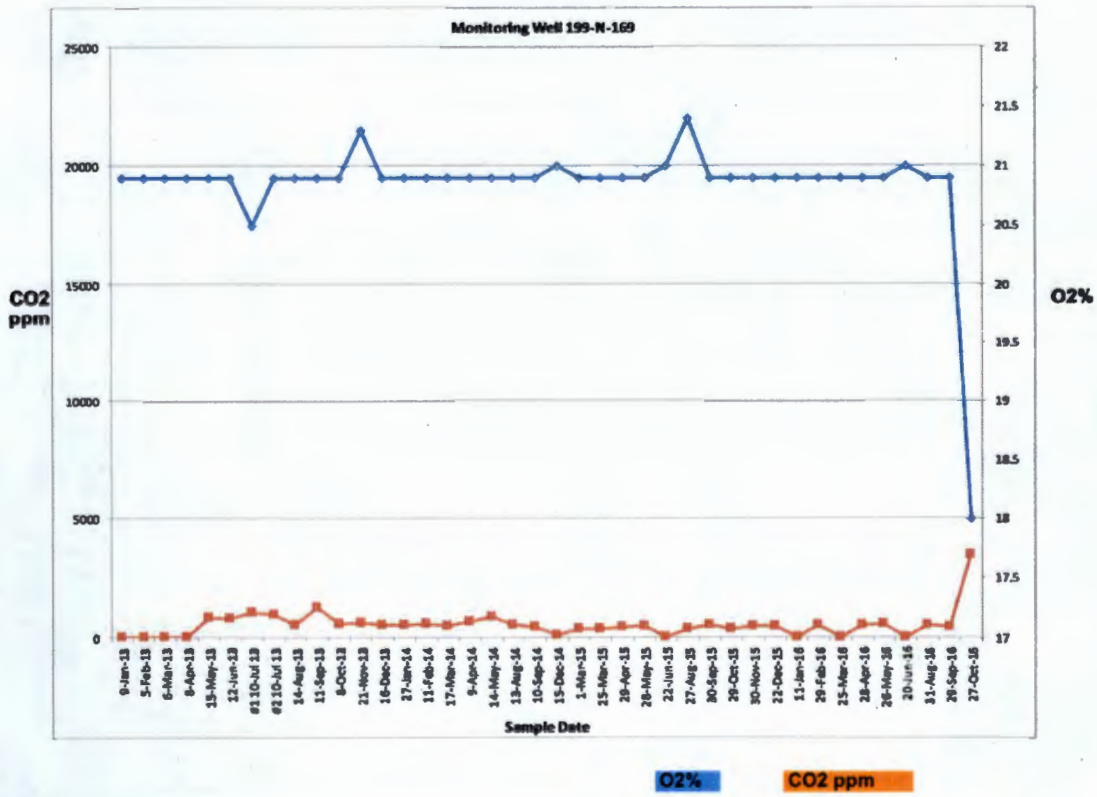

Figure NR-2. Bioventing Wells 199-N-169 and 199-N-171 Monthly Sampling Trends.

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Table NR-2. Bioventing Wells 199-N-169 and 199-N-171 Monthly Sampling Results

Date	199-N-171		199-N-169	
	O2%	CO2 ppm	O2%	CO2 ppm
9-Jan-13	19.4	3400	20.9	0
5-Feb-13	19.6	2840	20.9	0
6-Mar-13	18.7	3570	20.9	0
8-Apr-13	19.4	3960	20.9	0
15-May-13	19.8	6820	20.9	800
12-Jun-13	19.6	8290	20.9	780
10-Jul-13	19.6	6800	20.5	1020
14-Aug-13	20.9	6940	20.9	530
11-Sep-13	19.1	11400	20.9	1250
8-Oct-13	19.6	9380	20.9	550
21-Nov-13	20.2	7160	21.3	600
16-Dec-13	20.3	6520	20.9	530
27-Jan-14	20.2	5720	20.9	500
11-Feb-14	20.5	5520	20.9	550
17-Mar-14	20.4	5520	20.9	470
9-Apr-14	20.4	5560	20.9	660
14-May-14	20.1	5670	20.9	840
13-Aug-14	19.8	6520	20.9	520
10-Sep-14	19.1	6180	20.9	410
15-Dec-14	20.9	2000	21	100
1-Mar-15	20	7020	20.9	360
25-Mar-15	19.8	20000	20.9	325
29-Apr-15	19.8	9650	20.9	410
26-May-15	19.8	8260	20.9	460
22-Jun-15	19.9	7000	21	0
27-Aug-15	19.9	9620	21.4	330
30-Sep-15	19.3	8070	20.9	530
29-Oct-15	19.4	9770	20.9	360
30-Nov-15	19.8	7200	20.9	460
22-Dec-15	20	7510	20.9	490
11-Jan-16	20.6	1000	20.9	0
29-Feb-16	18.4	24000	20.9	520
25-Mar-16	19.8	20000	20.9	15.6
28-Apr-16	19.8	8290	20.9	520
26-May-16	19.7	8220	20.9	550
20-Jun-16	19.7	8000	21	0
31-Aug-16	18.7	14000	20.9	530
29-Sep-16	19	12400	20.9	430
27-Oct-16	11.3	38600	18	3400

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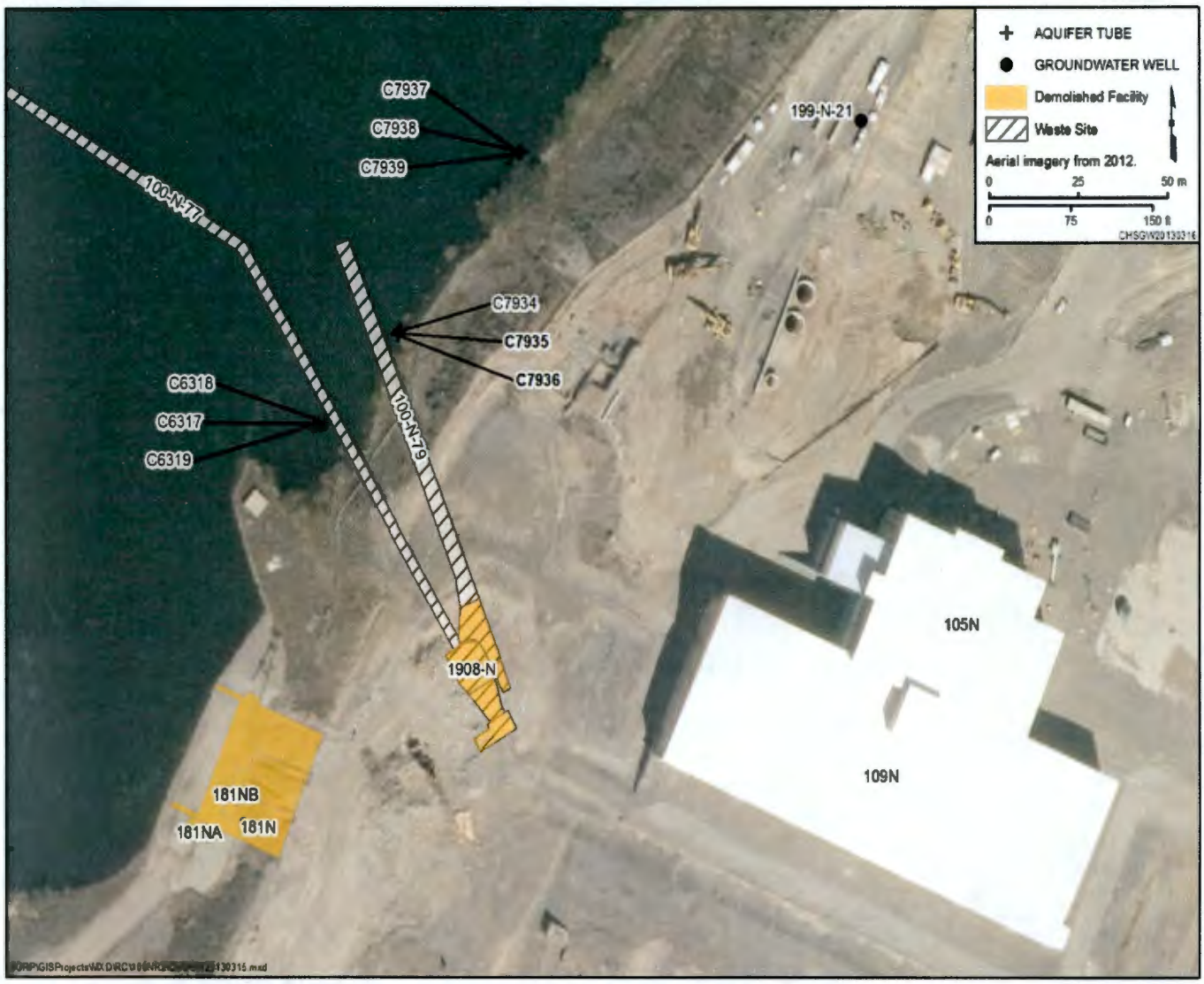

Figure NR-3. Locations of Aquifer Tubes C7934, C7935, and C7936.

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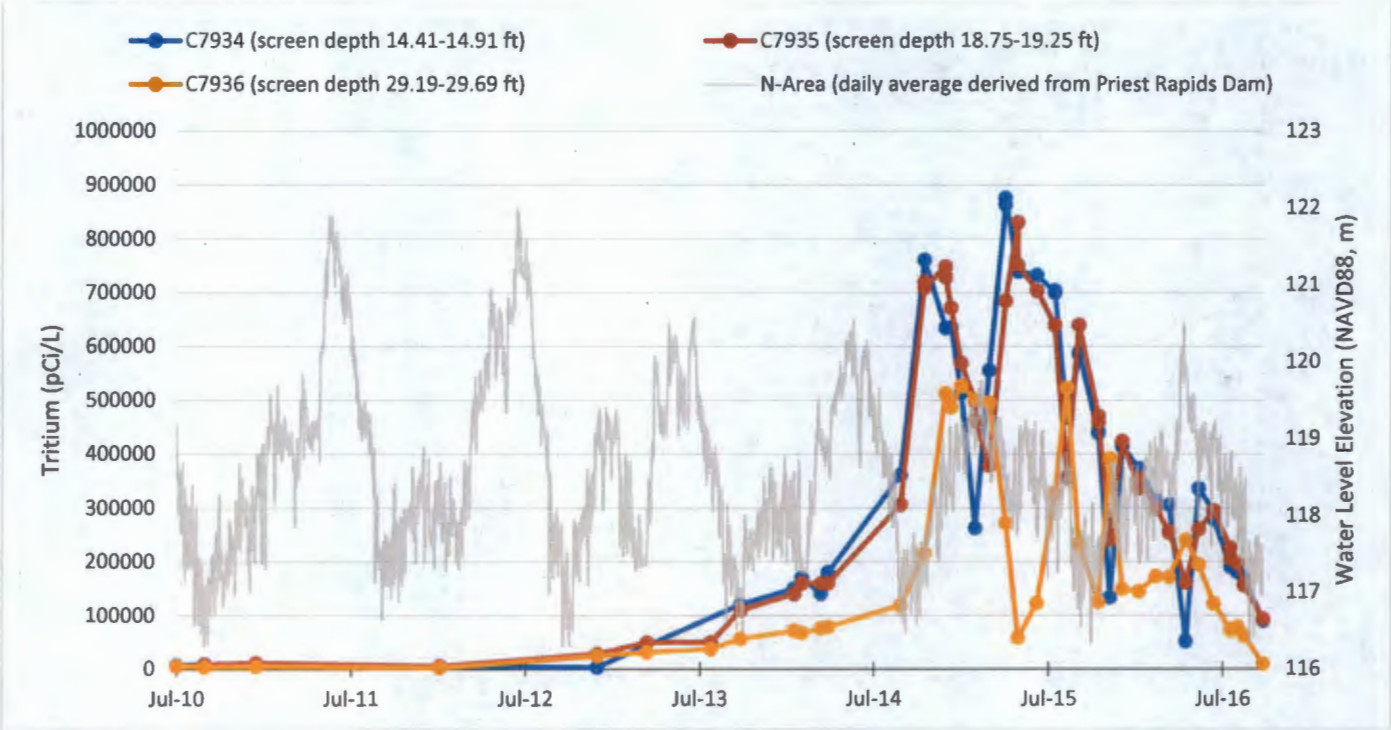

Figure NR-4. Tritium Trends through October 2016 at Aquifer Tubes C7934, C7935, and C7936.

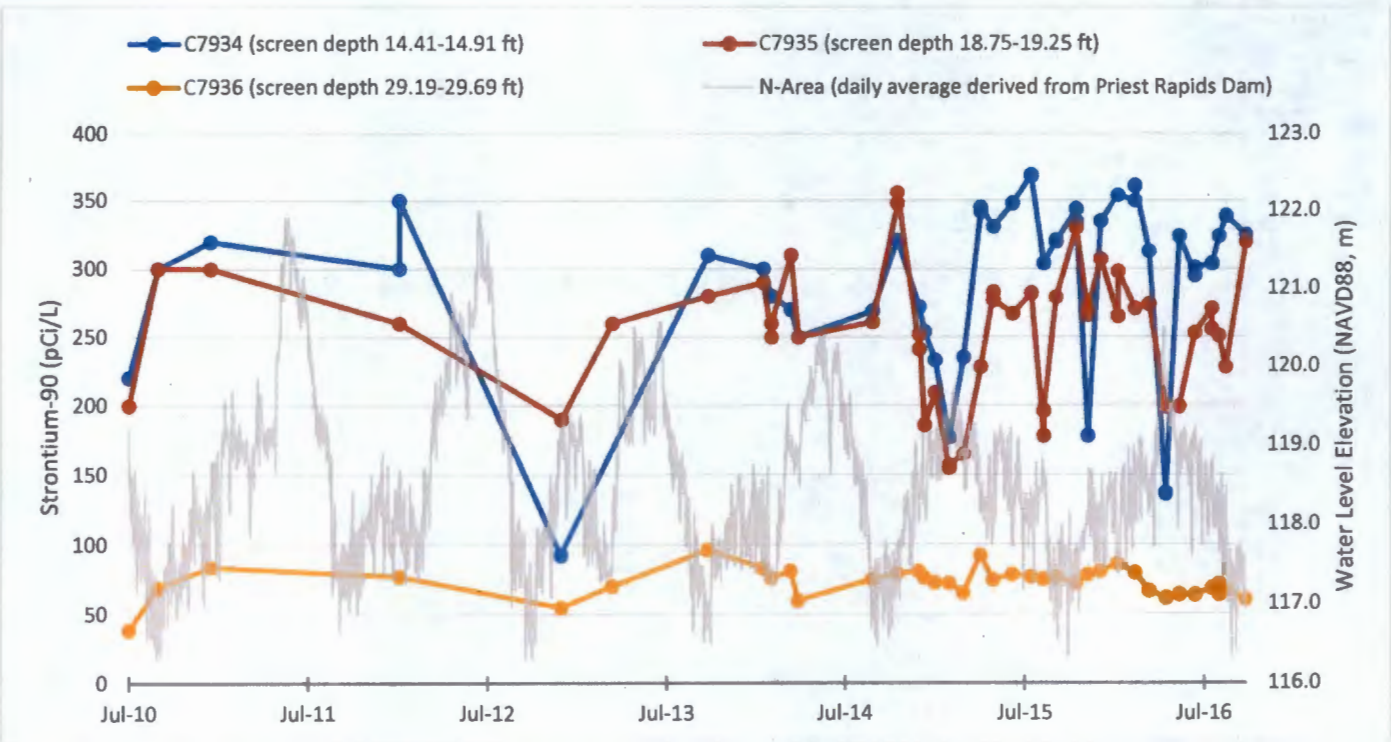

Figure NR-5. Strontium-90 Trends through October 2016 at Aquifer Tubes C7934, C7935, and C7936.

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100-HR-3 Groundwater Operable Unit – Mike Drewett/Rob Mackley

- CERCLA Process Implementation:
  - ✓ The Proposed Plan was submitted for public comment on July 26, 2016. An extension to the public comment period was granted. The review period now ends on September 16, 2016. DOE-RL, Ecology and EPA currently reviewing the draft Record of Decision (ROD) with a planned September 30, 2016 issuance date.
- Ringold Upper Mud (RUM) Aquifer Pump Test
  - ✓ Completed and submitted a status summary report containing an initial analysis on September 21, 2016 (CHPRC-03054).
- Remedial Actions & System Modifications
  - ✓ The volume of groundwater treated and mass of Cr(VI) removed from the 100-HR-3 P&T systems during September and October 2016 are:

Month	Gallons Treated (in millions)	Hexavalent Chromium Removed (kg)
September	53.7	7.0
October	53.1	5.8

  - ✓ FY 2016 (Oct. 2015 through Sept. 2016) P&T performance to date:

P&T System	Treated (mgal)	Removed (kg)
DX	389	70.3
HX	290	26.0
Total 100-HR-3	679	96.3

  - ✓ FY 2017 (Oct. 2016) P&T performance to date:

P&T System	Treated (mgal)	Removed (kg)
DX	29.9	3.7
HX	23.2	2.2
Total 100-HR-3	53.1	5.8

  - ✓ The influent and effluent Cr(VI) concentrations (measured weekly) for the 100-HR-3 systems during September and October are presented in Table H-1.

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Table H-1. Monthly Summary of Influent and Effluent Concentrations at the 100-HR-3 P&T Systems

System	Month	Weekly Influent Concentrations[a] (µg/L)	Average Monthly Influent Concentration (µg/L)	Weekly Effluent Concentrations[ab] (µg/L)	Average Monthly Effluent Concentration[b] (µg/L)
100-DX	September	36, 30, 31, 48, 18	33	2, 2, 1.5, 1.5, 4, -13	2.2[c]
	October	34, 34, 40, 33	35	-3, -4, 3, -2	-1.5
100-HX	September	25, 17, 24, 21, 27	23	0, 0, 1.5, 1.5, 0, 1	1
	October	24, 24, 26, 24	25	0, -1, -1, 0	0

a. Concentrations provided represent samples taken during the current month and loaded into HEIS as of the publication of the UMM.

b. Concentrations reported are below detection and represent the actual instrument reading on the sample(s). The detection limit is approximately 2 µg/L hexavalent chromium. The readings indicate that the measured concentration is indistinguishable from the blank.

c. Value presented averaged excluding the -13. Using that value, the average effluent concentration would be 0.

- ✓ A summary of the number of extraction and injection wells in the DX and HX P&T systems is shown in Table H-2. Figure H-1 illustrates the monthly average pumping rates for operating extraction wells across the DX and HX P&T systems. River levels are increasing, and therefore pumping rates have also increased.

Table H-2. Summary of the Number of Extraction and Injection Wells in the 100-HR-3 Systems

Wells	DX		HX		Total
	2014	2015	2014	2015	Current
Number of extraction wells	44	46	31	34	80
Number of injection wells	14	11	14	16	27

Note:
The FY16 well realignments are in progress. The number of operational wells for 2016 will be updated following completion of the planned realignments.

- ✓ Summaries of the volume of groundwater treated and Cr(VI) removed for the 100-DX and 100-HX pump and treat systems are shown in figures H-2 and H-3, respectively.
- ✓ A general reduction in Cr(VI) mass removal over time, a function of progress of remediation with associated reduction in groundwater contaminant concentration, is exhibited at both DX and HX. The drop in concentrations is more pronounced at DX, where concentrations were previously at very high levels. Influent concentrations at DX continue to decline as remediation progresses.

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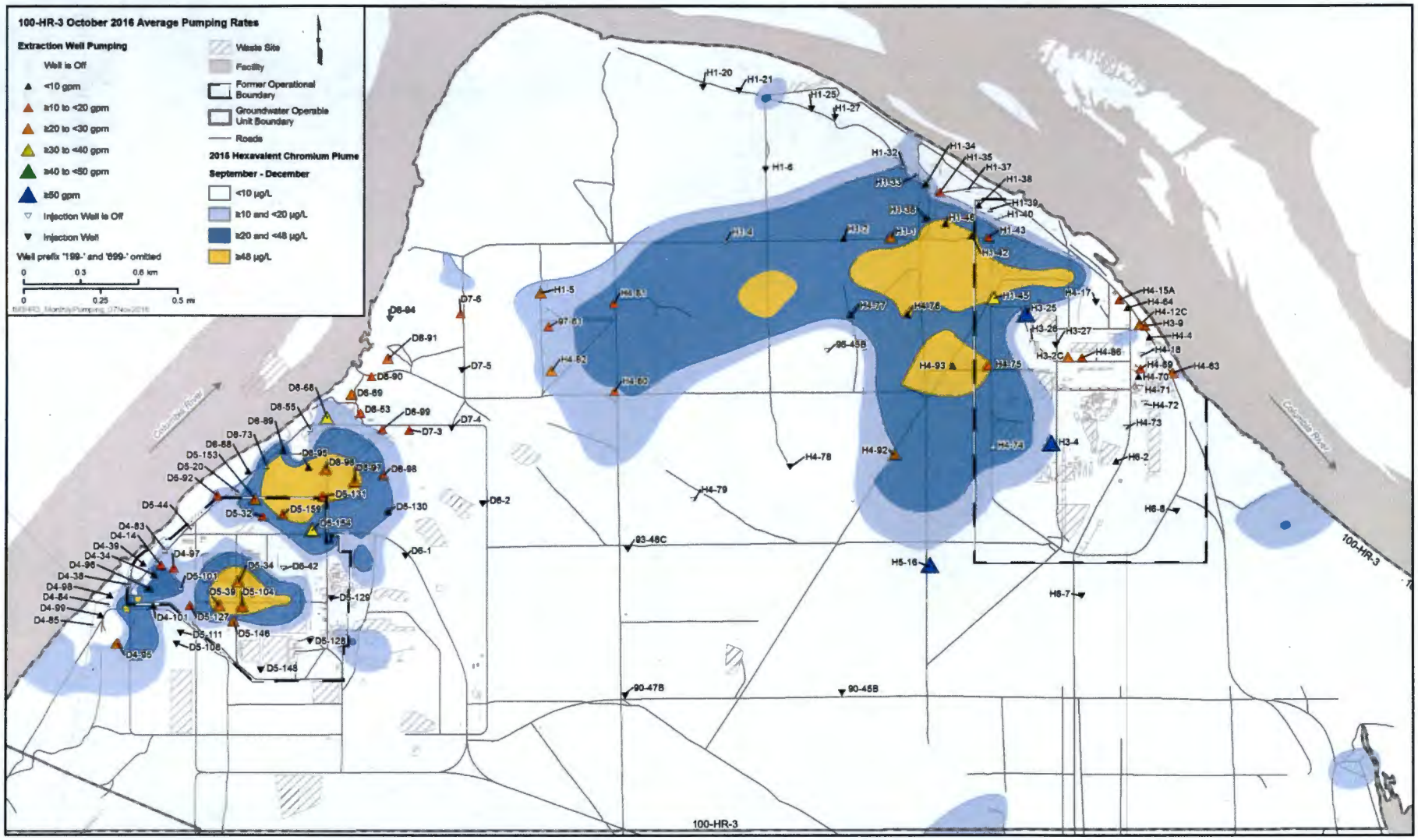

Figure H-1. October 2016 Average Pumping Rates for the 100-HR-3 P&T System.

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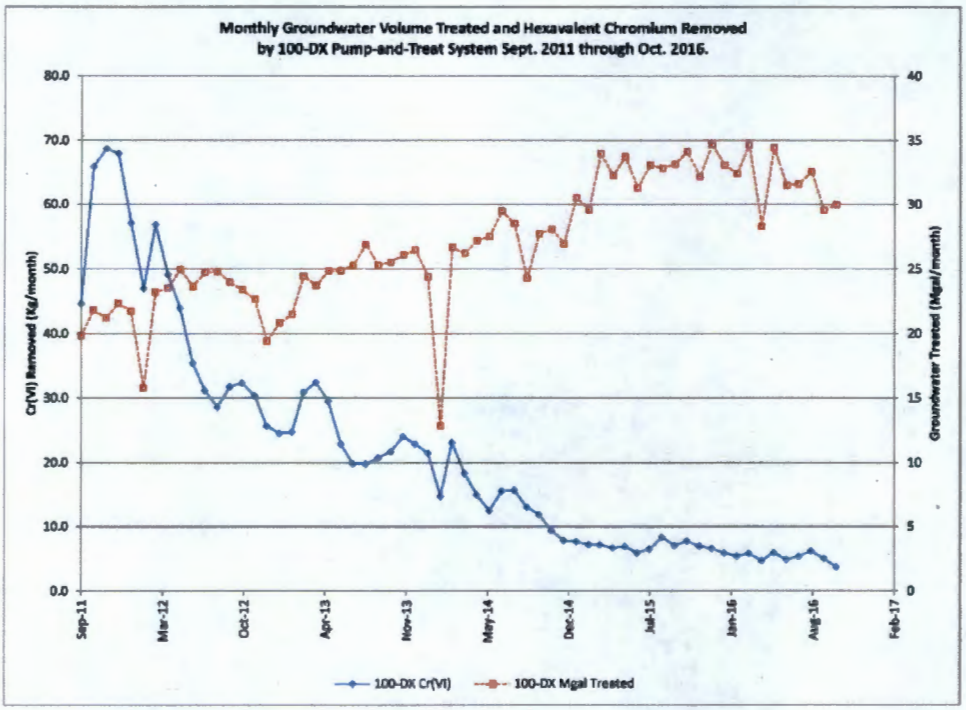

Figure H-2. Monthly Cr(VI) Removed and Groundwater Volume Treated by 100-DX Pump-and-Treat, September 2011 through October 2016.

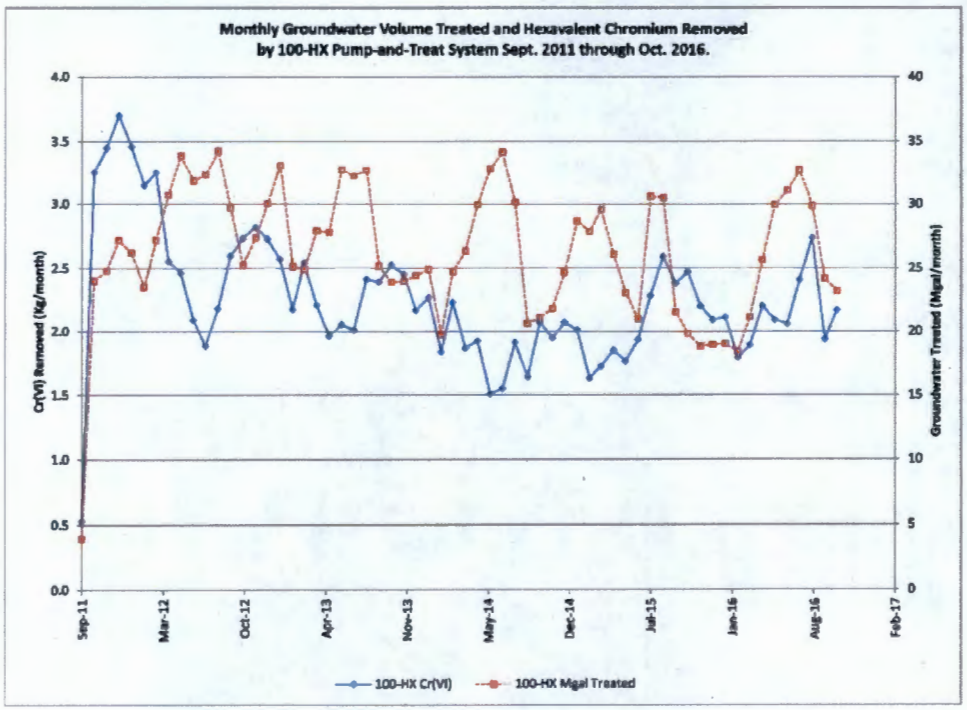

Figure H-3. Monthly Cr(VI) Removed and Groundwater Volume Treated by 100-HX Pump-and-Treat, September 2011 through October 2016.

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100-FR-3 Groundwater Operable Unit – Robert Evans/Mary Hartman

- CERCLA Process Implementation:
  - ✓ Complete
- Monitoring & Reporting:
  - ✓ TPA-CN-0736, which revises DOE/RL-2014-44-ADD2, Rev. 0, *Remedial Design Report/Remedial Action Work Plan Addendum for 100-F/IU Groundwater,* was transmitted to EPA on August 31, 2016; it has not yet been approved. The change notice updates the well network to account for changes caused by drilling conditions (2 wells could not be completed). If approved, it will also eliminate the requirement for the 100-F river gauging station. A river stage model based on data from the USGS gauging station downstream of Priest Rapids Dam provides data of equivalent or superior quality to a site-specific gauging station.
  - ✓ Aquifer tubes and monitoring wells were sampled in late September through early November; one well has pending maintenance. Results have been received for the 6 new wells (Table F-1) and the aquifer tubes. Figure F-1 shows well locations.
  - ✓ Nitrate concentrations in the new wells were similar to those detected in grab samples during well development, and are consistent with the previous plume interpretation.
  - ✓ TCE exceeded the cleanup level of 4 µg/L in new well 699-75-34B. The concentration in October was 11 µg/L, similar to what was detected during well development (15 µg/L). The contamination in this well is part of the known TCE plume in southwestern 100-BC. New wells located to the east (699-75-31) and south (699-71-34) had no detectable TCE.
  - ✓ Cr(VI), nitrate, and Sr-90 concentrations remained below cleanup levels in aquifer tubes in the recent samples.
  - ✓ Several items of interest were observed in new well 699-66-32 (farthest southwest): the sulfate concentration (320 mg/L) and specific conductance (1,285 µS/cm) are much higher than other wells, and the water level elevation is much higher than in other wells. Other anions, pH, and dissolved oxygen are comparable to other wells. The well is sampled only for anions and field parameters. The high water level is related to the steep hydraulic gradient located to the west. The unconfined aquifer is just 1 m thick at this well. The significance of the high sulfate is not yet known.
    - Spectral gamma geophysical logging was performed in several of the old wells in the monitoring network to determine whether the Hanford/RUM contact is within their perforated intervals. Some of the wells may require rehabilitation to limit the perforated interval to the unconfined aquifer.
    - The map of the top of the RUM is being updated based on geologic data from the new wells and boreholes. Information from the geophysical logs mentioned above will also be incorporated. The new map will affect the interpretation of the nitrate plume in the region south of 100-F, particularly in the locations where the RUM is present at or above the water table (i.e., decommissioned boreholes C9474 and C9479; Figure F-1).

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Table F-1. Nitrate and TCE in New 100-FR-3 Wells, September-October 2016

Well Name	Nitrate (mg/L)	TCE (µg/L)
699-66-32	53.1	Not analyzed
699-67-26	3.4	Not analyzed
699-71-34	42.1	0.25 U
699-75-28	38.1	Not analyzed
699-75-31	84.1	0.30 U
699-75-34B	48.7	11.0
U = undetected		

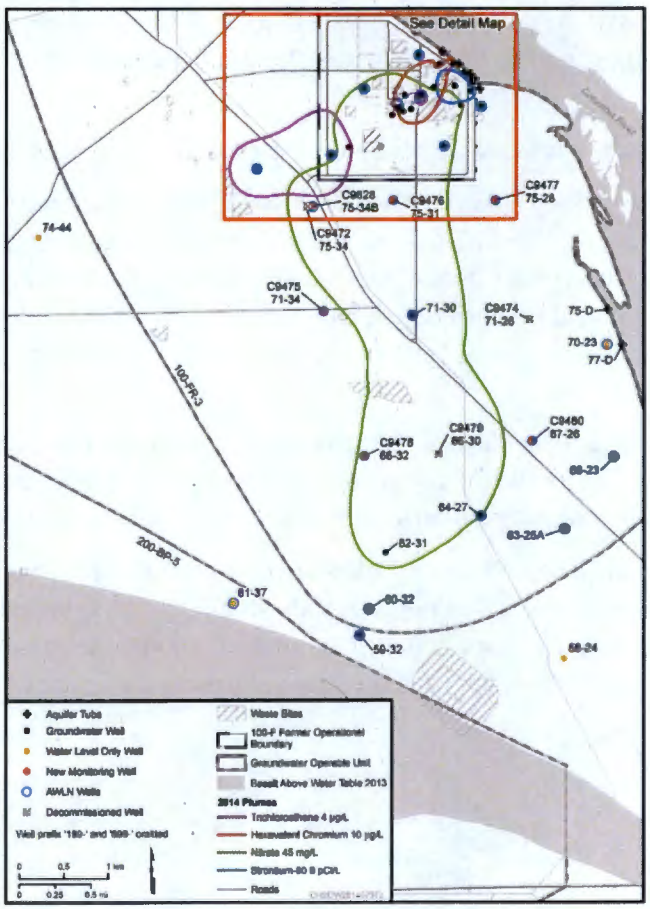

Figure F-1. 100-FR-3 Well Locations

100/300 Areas Unit Managers Meeting

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300-FF-5 Groundwater Operable Unit – Patrick Baynes/Virginia Rohay/Farah Elloy

- CERCLA Process Implementation:
  - ✓ Nothing new to report
- Remedial Actions:
  - ✓ Nothing new to report
- Monitoring & Reporting:
  - ✓ 300 Area Industrial Complex: The well scheduled for sampling in September was sampled on November 6, 2016. Sampling was delayed because access to the well had been blocked by a temporary fence. The next sampling event is scheduled for December 2016.
  - ✓ 618-10 Burial Ground/316-4 Crib: The next sampling event is scheduled for November 2016, prior to remediation of the 316-4 Crib.
  - ✓ 618-11 Burial Ground: The next sampling event is scheduled for October 2017.
  - ✓ 300 Area Process Trenches (316-5) RCRA Monitoring: All 8 wells scheduled for sampling in September 2016 were sampled on September 6 or on September 7, 2016. The next sampling event is scheduled for December 2016. *Note, the 8 wells are sampled semiannually with 4 independent samples collected per semiannual period; the 4 independent samples are collected on a monthly sampling interval. As a result, the 8 wells are sampled 8 months per year.*

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Hanford Sampling Program Information

Table 1 Wells, Aquifer Tubes, and springs in the River Corridor Areas Successfully Sampled in September 2016

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
	64-M	199-D5-127	199-H1-1	100-K SPRING 63-1	199-N-103A		399-1-10A
	699-66-32	199-D5-149	199-H1-2	100-K SPRING 82-2	199-N-104A		399-1-10B
	699-67-26	199-D5-150	199-H1-34	17-D	199-N-105A		399-1-16A
	699-71-34	199-D8-88	199-H1-36	17-D	199-N-106A		399-1-16B
	699-75-28	199-D8-89	199-H1-43	17-D	199-N-122		399-1-17A
	C6302	199-H1-5	199-H1-45	17-M	199-N-123		399-1-17B
	C6303	199-H4-80	199-H3-25	17-M	199-N-136		399-1-18A
	C6306	199-H4-81	199-H3-2C	199-K-106A	199-N-14		399-1-18B
	C6309	199-H4-82	199-H4-63	199-K-106A	199-N-146		
			199-H4-69	199-K-106A	199-N-147		
			199-H4-70	199-K-107A	199-N-159		
			199-H4-75	199-K-107A	199-N-165		
			199-H4-76	199-K-107A	199-N-173		
			199-H4-77	199-K-108A	199-N-182		
				199-K-132	199-N-183		
				199-K-132	199-N-184		
				199-K-137	199-N-185		
				199-K-137	199-N-186		
				199-K-165	199-N-187		
				199-K-165	199-N-188		
				199-K-173	199-N-19		
				199-K-173	199-N-2		
				199-K-185	199-N-21		
				199-K-203	199-N-27		
				199-K-204	199-N-28		
				199-K-204	199-N-3		
				199-K-204	199-N-32		
				199-K-205	199-N-332		
				199-K-205	199-N-34		
				199-K-223	199-N-346		
				199-K-224	199-N-347		
				199-K-34	199-N-348		
				199-K-34	199-N-349		
				199-K-34	199-N-350		
				19-D	199-N-351		
				19-M	199-N-352		
				21-S	199-N-353		
				22-D	199-N-354		

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100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
				22-M	199-N-355		
				23-M	199-N-356		
				AT-K-1-D	199-N-357		
				AT-K-1-D	199-N-358		
				AT-K-1-M	199-N-359		
				AT-K-1-M	199-N-360		
				AT-K-1-S	199-N-361		
				AT-K-1-S	199-N-362		
				AT-K-2-D	199-N-363		
				AT-K-3-D	199-N-364		
				AT-K-3-M	199-N-365		
				AT-K-3-S	199-N-366		
				AT-K-4-M	199-N-367		
				AT-K-4-S	199-N-371		
				AT-K-5-D	199-N-372		
				AT-K-5-M	199-N-373		
				AT-K-5-S	199-N-374		
				C6239	199-N-376		
				C6240	199-N-377		
				C6241	199-N-41		
				C6242	199-N-46		
				C6243	199-N-50		
				C6244	199-N-51		
				C6245	199-N-56		
				C6246	199-N-57		
				C6247	199-N-64		
				C6248	199-N-71		
				C6249	199-N-72		
				C6250	199-N-73		
				C6251	199-N-74		
				C6252	199-N-75		
				C6253	199-N-76		
				C6254	199-N-77		
				C6255	199-N-80		
				C6256	199-N-81		
				C6258	199-N-92A		
				C6259	199-N-96A		
				C6260	199-N-99A		
				C6261	25-D		
				C7641	26-D		
				C7641	26-M		
				C7641	26-S		

100/300 Areas Unit Managers Meeting

November 9, 2016 (September and October data)

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
				C7642	AT-K-6-D		
				C7642	AT-K-6-M		
				C7642	AT-K-6-S		
				C7643	C6263		
				C7643	C6264		
				C7643	C6265		
				SK-057-3			
				SK-077-1			

100/300 Areas Unit Managers Meeting

November 9, 2016 (September and October data)

Table 2 Wells, Aquifer Tubes, and springs in the River Corridor Areas Successfully Sampled in October 2016

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
199-B2-12	199-F5-1	199-D4-13	199-H4-84	18-S	199-K-151		103mArray-US25
199-B2-13	199-F5-42	199-D4-5	199-H4-85	199-K-117A	199-N-67		699-S3-E12
199-B2-14	199-F5-43A	199-D4-6	199-H4-88	199-K-130	C7934		AT-3-1-M
199-B2-16	199-F5-44	199-D4-86	199-H4-92	199-K-132	C7934		AT-3-2-M
199-B3-1	199-F5-45	199-D4-95	199-H4-93	199-K-152	C7935		AT-3-4-M
199-B3-46	199-F5-46	199-D4-96	45-M	199-K-173	C7935		AT-3-5-S
199-B3-47	199-F5-47	199-D4-97	47-D	199-K-18	C7936		AT-3-6-S
199-B3-50	199-F5-48	199-D4-98	47-M	199-K-20	C7936		AT-3-7-S
199-B3-51	199-F5-52	199-D4-99	48-M	199-K-202			AT-3-8-S
199-B3-52	199-F5-54	199-D5-127	50-M	199-K-205			C6341
199-B4-1	199-F5-55	199-D5-13	52-D	199-K-207			C6347
199-B4-14	199-F5-56	199-D5-130	54-M	199-K-21			C6350
199-B4-15	199-F5-6	199-D5-131	699-91-46A	199-K-221			C6368
199-B4-16	199-F6-1	199-D5-141	699-94-43	199-K-222			C6374
199-B4-18	199-F7-1	199-D5-151	699-95-45	199-K-223			C6378
199-B4-7	199-F7-2	199-D5-152	699-98-43	199-K-224			C6380
199-B4-8	199-F7-3	199-D5-153	699-99-41	21-M			
199-B5-10	199-F8-2	199-D5-154	699-99-44	AT-K-1-D			
199-B5-11	199-F8-3	199-D5-160	AT-H-1-M	AT-K-1-M			
199-B5-12	199-F8-4	199-D5-17	AT-H-2-D	AT-K-1-S			
199-B5-13	199-F8-7	199-D5-19	AT-H-3-D	C6257			
199-B5-2	699-62-31	199-D5-32	C5633	C7641			
199-B5-5	699-63-25A	199-D5-36	C5636	C7642			
199-B5-6	699-64-27	199-D7-3	C5638	C7643			
199-B5-9	699-75-31	199-D7-6	C5641				
199-B8-6	699-75-34B	199-D8-101	C5678				
199-B8-9	75-D	199-D8-102	C5682				
199-B9-3	77-D	199-D8-90	C6293				
699-63-90	AT-F-1-S	199-D8-91	C6301				
699-66-103	C6315	199-D8-95	C7649				
699-68-105		199-D8-96	C7650				
699-71-77		199-D8-97					
699-71-77		199-D8-98					
		36-M					
		38-M					
		699-101-48B					
		699-93-48A					
		699-95-48					
		699-95-51					
		699-97-48B					

100/300 Areas Unit Managers Meeting

November 9, 2016 (September and October data)

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
		699-97-51A					
		AT-D-1-M					
		AT-D-3-D					
		AT-D-4-D					
		C6278					
		C7647					
		DD-10-3					
		DD-12-2					
		DD-15-2					
		DD-15-3					
		DD-15-4					
		DD-16-4					
		DD-17-2					
		DD-17-3					
		DD-41-3					
		DD-44-4					
		DD-49-3					
		DD-50-3					
		DD-50-4					
		Redox-1-6.0					
		Redox-3-3.3					

100/300 Areas Unit Managers Meeting

November 9, 2016 (September and October data)

Table 3 Fiscal Year 2016 and 2017 Sample Trips in the River Corridor Areas awaiting at the end of October 2016

Qtr Sched	GWIA	SAMP SITE_TYPE	SITE_NAME	SCHEDULE DATE	Frequency	Months Remain	Status	Comment
FY 2016 Q1	100-KR	AQUIFER TUBE	AT-K-4-M	10/1/2015	Annual	11		Review for Cancelation, Sampled 9-12-2016
FY 2016 Q3	100-HR-H	WELL	199-H4-83	6/1/2016	3 Times Annually	0	Late	Review for Cancelation
FY 2016 Q4	100-HR-D	WELL	199-D5-92	8/1/2016	Quarterly	1		
		WELL	199-D8-73	9/1/2016	Quarterly	2		
	100-HR-H	WELL	199-H1-3	9/1/2016	Quarterly	1		
		WELL	199-H1-39	9/1/2016	Quarterly	1		
		WELL	199-H1-4	9/1/2016	Quarterly	1		
		WELL	199-H1-42	9/1/2016	Quarterly	1		
		WELL	199-H3-26	9/1/2016	Quarterly	1		
		WELL	199-H4-64	9/1/2016	Quarterly	1		
		WELL	199-H4-74	9/1/2016	Quarterly	1		
	100-KR	WELL	199-K-204	9/1/2016	Quarterly	1		Review for Cancelation, Sampled 9-15-2016 and 9-27-2016
		WELL	199-K-224	9/9/2016	Other	1		Special Study, Schedule Adjusted
	100-NR	AQUIFER TUBE	C9586	9/1/2016	2 Times Annually	7		
		AQUIFER TUBE	N116mArray-0A	9/1/2016	Quarterly	1		Maintenance Required; Review for Cancelation
		AQUIFER TUBE	N116mArray-10A	9/1/2016	2 Times Annually	7		Maintenance Required; Review for Cancelation
FY 2017 Q1	100-BC	WELL	199-B4-4	10/1/2016	Annual	11		
	100-FR	WELL	199-F5-4	10/1/2016	2 Times Annually	7		
	100-HR-D	WELL	199-D5-101	10/1/2016	Quarterly	2		
		WELL	199-D5-159	10/1/2016	Quarterly	2		
		WELL	199-D5-161	10/1/2016	Quarterly	2		
		WELL	199-D5-20	10/1/2016	Quarterly	2		
		WELL	699-90-47B	10/1/2016	Quarterly	2		
		WELL	699-98-49A	10/1/2016	Annual	11		
	100-HR-H	WELL	699-100-43B	10/1/2016	Annual	11		
		WELL	699-90-45B	10/1/2016	Quarterly	2		
	100-KR	SPRING	100-K SPRING 68-1	10/1/2016	Annual	11		
		WELL	199-K-165	10/1/2016	2 Times Annually	5		
		WELL	199-K-166	10/1/2016	Quarterly	2		
		WELL	199-K-173	10/1/2016	Quarterly	2		Schedule Adjusted
		WELL	199-K-204	10/24/2016	Other	1		Special Study, Schedule Adjusted
		WELL	199-K-205	10/1/2016	Quarterly	2		Special Study, Schedule Adjusted
	300-FF	WELL	699-12-2C	10/1/2016	Annual	11		

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Qtr Sched	GWIA	SAMP SITE_TYPE	SITE_NAME	SCHEDULE DATE	Frequency	Months Remain	Status	Comment
		WELL	699-13-0A	10/1/2016	Annual	11		
		WELL	699-13-1C	10/1/2016	Annual	11		
		WELL	699-13-1E	10/1/2016	Annual	11		
		WELL	699-13-2D	10/1/2016	Annual	11		
		WELL	699-13-3A	10/1/2016	Annual	11		

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Table 4 Groundwater Sampling Location in the River Corridor Areas Scheduled to be sampled in November 2016

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
		199-D2-11	199-H1-32	17-D	199-K-131	699-S34-E15	699-S6-E4E
		199-D2-6	199-H1-33	17-M	199-K-149		699-S6-E4K
		199-D3-2	199-H1-35	199-K-106A	199-K-150		
		199-D3-5	199-H1-37	199-K-106A	199-K-160		
		199-D4-1	199-H1-38	199-K-107A	199-N-165		
		199-D4-101	199-H1-40	199-K-107A	199-N-41		
		199-D4-102	199-H1-7	199-K-108A	199-N-71		
		199-D4-103	199-H2-1	199-K-108A	199-N-72		
		199-D4-14	199-H3-10	199-K-11	199-N-73		
		199-D4-15	199-H3-11	199-K-110A	199-N-77		
		199-D4-19	199-H3-2A	199-K-111A	199-N-81		
		199-D4-20	199-H3-3	199-K-112A			
		199-D4-22	199-H3-4	199-K-113A			
		199-D4-23	199-H3-6	199-K-114A			
		199-D4-25	199-H3-7	199-K-115A			
		199-D4-34	199-H3-9	199-K-116A			
		199-D4-38	199-H4-11	199-K-118A			
		199-D4-39	199-H4-12A	199-K-119A			
		199-D4-83	199-H4-12C	199-K-120A			
		199-D4-84	199-H4-13	199-K-124A			
		199-D4-85	199-H4-15A	199-K-125A			
		199-D5-103	199-H4-15CP	199-K-127			
		199-D5-104	199-H4-15CQ	199-K-129			
		199-D5-132	199-H4-15CR	199-K-13			
		199-D5-133	199-H4-15CS	199-K-132			
		199-D5-134	199-H4-16	199-K-132			
		199-D5-14	199-H4-4	199-K-132			
		199-D5-142	199-H4-46	199-K-133			
		199-D5-143	199-H4-47	199-K-134			
		199-D5-145	199-H4-49	199-K-135			
		199-D5-146	199-H4-65	199-K-136			
		199-D5-149	199-H4-8	199-K-137			
		199-D5-150	199-H4-83	199-K-137			
		199-D5-151	199-H4-84	199-K-138			
		199-D5-152	199-H4-85	199-K-138			
		199-D5-18	199-H4-86	199-K-139			
		199-D5-34	199-H4-87	199-K-139			
		199-D5-39	199-H4-88	199-K-140			
		199-D5-40	199-H4-89	199-K-140			
		199-D5-41	199-H4-90	199-K-141			

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November 9, 2016 (September and October data)

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
		199-D5-92	199-H4-91	199-K-142			
		199-D5-97	199-H5-1A	199-K-144			
		199-D6-3	199-H6-1	199-K-145			
		199-D8-4	199-H6-3	199-K-146			
		199-D8-53	43-M	199-K-147			
		199-D8-55	51-D	199-K-148			
		199-D8-68	699-97-43B	199-K-153			
		199-D8-69	699-97-43C	199-K-154			
		199-D8-71	699-97-45B	199-K-157			
		699-97-48C	699-97-60	199-K-158			
		699-97-61	699-98-46	199-K-161			
			699-99-42B	199-K-162			
			SH-144-1	199-K-163			
				199-K-165			
				199-K-166			
				199-K-168			
				199-K-168			
				199-K-171			
				199-K-173			
				199-K-173			
				199-K-174			
				199-K-175			
				199-K-178			
				199-K-181			
				199-K-182			
				199-K-184			
				199-K-184			
				199-K-185			
				199-K-185			
				199-K-186			
				199-K-187			
				199-K-189			
				199-K-19			
				199-K-190			
				199-K-191			
				199-K-192			
				199-K-193			
				199-K-194			
				199-K-196			
				199-K-196			
				199-K-197			
				199-K-198			

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November 9, 2016 (September and October data)

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
				199-K-199			
				199-K-200			
				199-K-201			
				199-K-204			
				199-K-205			
				199-K-205			
				199-K-206			
				199-K-208			
				199-K-209			
				199-K-210			
				199-K-212			
				199-K-22			
				199-K-220			
				199-K-223			
				199-K-223			
				199-K-224			
				199-K-224			
				199-K-23			
				199-K-32A			
				199-K-34			
				199-K-34			
				199-K-36			
				199-K-37			
				699-78-62			
				AT-K-1-D			
				AT-K-1-M			
				AT-K-1-S			
				C7641			
				C7642			
				C7643			

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Table 5 Groundwater Sampling Location in the River Corridor Areas Scheduled to be sampled in December 2016

100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
		199-D5-123	199-H1-1	199-K-106A	199-N-165	699-S30-E10A	399-1-1
		199-D5-125	199-H1-2	199-K-107A	199-N-167	699-S30-E15A	399-1-10A
		199-D5-151	199-H1-3	199-K-108A	199-N-169	699-S31-E10A	399-1-10B
		199-D5-152	199-H1-34	199-K-132	199-N-171	699-S31-E10C	399-1-16A
		199-D5-16	199-H1-36	199-K-132	199-N-172	699-S31-E10D	399-1-16B
		199-D5-38	199-H1-39	199-K-137	199-N-173	699-S31-E8A	399-1-16C
		199-D5-43	199-H1-4	199-K-138	199-N-18	699-S32-E13B	399-1-17A
		199-D8-5	199-H1-42	199-K-139	199-N-183	699-S36-E13A	399-1-17B
		199-D8-54A	199-H1-43	199-K-140	199-N-19	699-S37-E14	399-1-17C
		199-D8-54B	199-H1-45	199-K-158	199-N-3	699-S41-E12	399-1-18A
		199-D8-70	199-H1-46	199-K-165	199-N-371	699-S42-E8A	399-1-18B
		199-D8-72	199-H3-25	199-K-166	199-N-372		399-1-18C
		199-D8-73	199-H3-26	199-K-168	199-N-373		399-1-23
		199-D8-88	199-H3-2C	199-K-173	199-N-374		399-1-56
		199-D8-89	199-H4-10	199-K-173	199-N-376		399-1-57
		199-H1-5	199-H4-45	199-K-174	199-N-377		399-1-62
		199-H4-80	199-H4-5	199-K-175	199-N-56		399-1-63
		199-H4-81	199-H4-63	199-K-184	199-N-71		399-1-67
		199-H4-82	199-H4-64	199-K-185	199-N-96A		399-1-7
			199-H4-69	199-K-196	C6132		399-1-9
			199-H4-70	199-K-203	C6135		399-2-1
			199-H4-74	199-K-204	C7934		399-2-2
			199-H4-75	199-K-204	C7935		399-2-3
			199-H4-76	199-K-205	C7936		399-2-32
			199-H4-77	199-K-205	N116mArray-0A		399-3-1
			199-H4-88	199-K-206			399-3-10
				199-K-223			399-3-33
				199-K-223			399-3-37
				199-K-224			399-3-38
				199-K-224			399-3-6
				199-K-34			399-3-9
				AT-K-1-D			399-4-1
				AT-K-1-M			399-4-10
				AT-K-1-S			399-4-11
				C7641			399-4-12
				C7642			399-4-14
				C7643			399-4-7
							399-4-9
							399-5-4B
							399-6-3

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100-BC	100-FR	100-HR-D	100-HR-H	100-KR	100-NR	1100-EM	300-FF
							399-6-5
							399-8-1
							399-8-2
							399-8-3
							399-8-5A
							399-8-5C
							699-S19-E13
							699-S27-E14
							699-S27-E9A
							699-S28-E12
							699-S29-E11
							699-S29-E16A
							699-S30-E11A
							699-S6-E4D
							699-S6-E4F

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Documents for AR Submission

Number	Title	Referencing Doc/Driver
DOE/RL-2013-33, DA	100-KR-4 Groundwater Operable Unit Remedial Design/Remedial Action Work Plan	FY2016 SAP Configuration Status Report CHPRC-03094
16-AMRP-0086, 2016	"CONTRACT NO. DE-AC06-08RL14788 – SUBMITTAL THAT NO CHANGES ARE NECESSARY TO GROUNDWATER QUALTIY ASSESSMENT PLANS" (letter to J. A. Ciucci, CH2M HILL Plateau Remediation Company, Richland, Washington, from S. A. Sieracki, U.S. Department of Energy, Richland Operations Office, Richland, Washington), February 4.	FY2016 SAP Configuration Status Report CHPRC-03094
DOE/RL-2013-48, DA, 2015	100-KR-4 Pump and Treat System Operations and Maintenance Plan	FY2016 SAP Configuration Status Report CHPRC-03094
DOE/RL-2013-48, DB, 2015	100-KR-4 Pump and Treat System Operations and Maintenance Plan	FY2016 SAP Configuration Status Report CHPRC-03094
DOE/RL-2015-28, R0, 2016	Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins	FY2016 SAP Configuration Status Report CHPRC-03094
ECF-Hanford-13-0028, R1, 2016	Columbia River Stage Correlation for the Hanford Area	Cleared October 2016
DOE/RL-2016-34, R0, 2016	Annual Operations and Monitoring Report for UPR-100-N-17: March 2015- February 2016	Cleared September 2016
SGW-60038, R0, 2016	100-KR-4 and 100-HR-3 Groundwater Operable Units Aquifer Tracer Study Work Plan	Cleared September 2016
CHPRC-03054, R0, 2016	Initial Analysis of the 100-HR-3 RUM Aquifer Test	Cleared September 2016
SGW-59936, R0, 2016	FY2017 Plume Containment and Remediation Utilization Plan	Cleared September 2016
CHPRC-02625, R0, 2016	Compilation of Information Regarding Extraction and Injection Wells of the 100 Areas Pump and Treat (P&T) Systems	Cleared August 2016
ECF-Hanford-14-0038	Calculation of Groundwater Sample Limits of Detection and Limits of Quantitation for Total Organic Carbon and Total Organic Halides for Calendar Year 2013	Cleared July 2014
SGW-59495	Borehole Summary Report for the Installation of Two Characterization, Monitoring, and Extractions Wells in the 100-KR-4 Groundwater Operable Unit, FY 2015	K East Boreholes Report
SGW-60243, R0	300-FF-5 Operable Unit Stage B Uranium Sequestration Functional Requirements	Cleared October 2016
WCH-610, Draft A, 2015	1301-N and 1325-N TSD Unit Closure Evaluation	FY2016 SAP Configuration Status Report CHPRC-03094

100/300 Areas Unit Managers Meeting
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Number	Title	Referencing Doc/Driver
WCH-592, Draft A, 2014	1324-N/NA TSD Closure Evaluation	FY2016 SAP Configuration Status Report CHPRC-03094
ECF-Hanford-16-0082, Rev. 0	Calculation of Groundwater Sample Limits of Detection and Limits of Quantitation for Total Organic Carbon and Total Organic Halides for Calendar Year 2015	Cleared October 2016
ECF-300FF5-16-0130, Rev. 0	Calculation of Concentration Trends, Means, and Confidence Limits for cis-1,2-Dicloroethene, Gross Alpha, Nitrate	Cleared October 2016
SGW-58552, R2	Description of Work for the Characterization 200-DV-1 Operable Unit	SGW-60265 R0
SGW-59465, R1	BOREHOLE SUMMARY REPORT FOR THE INSTALLATION OF NINE INJECTION WELLS AND TWENTY-ONE MONITORING WELLS IN THE 300-FF-5 OPERABLE UNIT FY 2015	SGW-59614 R0
ECF-Hanford-16-0060, Rev. 0	Description of Groundwater Calculations and Assessments for the Calendar Year 2015 (CY2015) 100 Areas Pump and Treat Report	Cleared October 2016

TPA Compliance Note:
The DOE Project Managers have not identified outstanding issues with the preceding month's Environmental Performance Report for this scope.

Attachment E

100K Area Report
100/300 Area Unit Manager Meeting
November 9, 2016

RL-0012 Sludge Treatment Project

TPA Milestone **M-016-177**, *Complete 105-KW sludge transfer equipment installation.* **(9/30/17)** – On Schedule

- **Equipment Procurement/Fabrication**
  - Completed fabrication and testing of 105K West Annex Stack Monitoring System. Hardware to be installed in first quarter of FY17.
  - Worked with ABW Technologies to establish a sufficient level of cleanliness that will be achieved to render Sludge Transport & Storage Container (STSC) 402-413 acceptable for use to store sludge at T Plant. The presence of internal iron contamination has resulted in the need for all 12 STSCs to be tested for iron contamination and cleaned, as required, to achieve the contractual cleanliness acceptance criteria. STSC 410-413 were cleaned and verified acceptable in September.
- **MASF Preoperational Acceptance Testing (MPAT)**
  - Test is 100% Complete as of August 11, 2016
  - Completed resolution, retest, & closure of 160 of 160 Testing Disposition Reports (TDRs) Test Report preparation is in progress.
- **Construction**
  - **Annex**
    - Completed installation of Sand Filter Shielding Box, Sand Filter Skid and Shielding
    - Completed installation of the Decant Bump Box, Overfill Recovery Pump Skid, and Flocculant Skid.
    - Completed staging multiple panels and junction boxes.
- **In-Basin Construction**
  - Completed installation of Flocculant Skid, XAGO Pump Skid and associated panel.
  - Installed hoses for IXM & Air System Supply
  - Installed Transfer System Booster Pumps
  - Completed staging multiple panels and junction boxes.

TPA Milestone **M-016-175**, *Begin sludge removal from 105-KW Fuel Storage Basin* **(9/30/18)** – On Schedule

- Completed review and approval of the KW Basin Documented Safety Analysis and Technical Safety Requirement documents and forwarded to CHPRC President's office for transmittal to DOE RL. These documents combined the ECRTS PDSA R2 and the current KW Basin safety basis documents into an integrated safety basis set. Formal submittal to DOE-RL is forecast for mid-October of 2016.

- Continued development of the One Time Request for Shipment (OTRS) that will be used for shipping the sludge from 100K Area to T Plant
- Continued development of Training Lesson Guides and Exam Banks
- Continued to develop ECRTS operations and maintenance procedures
- Advanced 100K Area Readiness Activities
  - ARP and RSAs are complete with formal approval forecastin 2017.
  - Completed development of the Plan of Action (POA). POA will be approved by management in 2017
- Completed removal of North Loadout Pit equipment at T Plant
- Continued installation of Electrical, Water Addition, and sludge storage hardware at T Plant
- Continued development of Work Package to install Nitrogen Purge System
- Advanced T Plant Readiness Activities
  - Completed development of ARP and the majority of RSAs - formal approval forecast in 2017
  - Prepared POA with formal approval forecast in 2017.

TPA Milestone **M-016-176**, *Complete sludge removal from 105-KW Fuel Storage Basin* (**12/31/19**) – On Schedule

- Initiation of this milestone follows completion of Milestone M-016-175

TPA Milestone **M-016-173,** *Select K Basin sludge treatment and packaging technology and propose new interim sludge treatment and packaging milestones.* (**9/30/22**) – On Schedule

- DOE/RL-2011-15, *Remedial Design/ Remedial Action Work Plan for the K Basins Interim Remedial Action: Treatment and Packaging of K Basins Sludge* is being revised to include specific provisions for the safe storage of sludge at T-Plant. The document is with EPA for review.

RL-0041 100K Closure Project

TPA Milestone **M-016-143**, *Complete the interim response actions for 100 K Area within the perimeter boundary and to the Columbia River for Phase 2 actions. Phase 2 is defined in the 100 K Area RD/RA Work Plans.* (**9/30/24**) – On Schedule

- **100-K AB Waste Site Area**
  - Excavation completed on 18 chemical waste sites in the month of October
  - Remaining Site Verification Package preparation in progress for waste sites 126-KE-2, 100-K-14, 100-K-50 and 1607-K
- **100-K AF Waste Site Area**
  - Excavation commenced in October following the completion of 100-K AB Waste Site Area
- **165-KE Power House Asbestos Abatement:**
  - Negative Pressure Enclosure installation in the lower boiler level completed.

- Insulators and the Field Work Supervisors were deployed to PFP to perform higher priority work in October. Current plans are to stand down 165-KE for the remainder of FY 2017.

TPA Milestone **M-093-28**, *Submit a change package for proposed interim milestones for 105-KE and 105-KW Reactor Interim Safe Storage*
(12/31/19) - On Schedule

TPA Milestone **M-093-27**, *Complete 105-KE and 105-KW Reactor Interim Safe Storage in Accordance with the Removal Action Work Plan.*
(9/30/24) - On Schedule

TPA Milestone **M-016-00C**, *Complete all response actions for the 100 K Area*
(9/30/24) - On Schedule

TPA Milestone **M-016-178**, *Initiate deactivation of 105-KW Fuel Storage Basin.*
(12/31/19) – On Schedule

- The following pre-deactivation actions are underway:
  - Work continues to retrieve high dose debris material in the KW Basin center bay for placement into SCS-CON-210. A single piece of material has been identified as a fuel fragment measuring approximately 1.5 inches by 1.5 inches. The fuel piece was managed according to procedure and was placed in inventory with the existing scrap fragments for future shipment to PNNL for Phase 2 sludge testing.
  - Dose to curie modeling of below-water debris in the center bay of KW Basin is temporarily on-hold until the high dose material has been containerized for later transfer into SCS-CON-210
  - The formal calculation of east bay below-water debris activity is in review for approval

TPA Milestone **M-016-181,** *Complete deactivation, demolition and removal of 105-KW Fuel Storage Basin* **(9/30/23)** – On Schedule

- CHPRC has prepared a draft long range plan (LRP) for the deactivation and demolition of KW Fuel Storage Basin. The LRP includes a relative order of magnitude cost estimate and critical path schedule which will be presented to RL in mid-November.

TPA Milestone M-016-186, Initiate soil remediation under the 105-KW Fuel Storage Basin.
(12/31/23) – On Schedule

300 Area Demolition and Soil Remediation

TPA Milestone M-016-85A, *Complete remote excavation of the 300-296 waste site in accordance with an approved RD/RA Work Plan.*

- **300-296 Soil Remediation Activity**:

- CHPRC continues to progress design completion with near-term focus on preparing the mock-up for equipment installation. Equipment drawings and specifications are being prepared for procuring equipment.
- The design is also progressing for structural reinforcement to the 324 Building.
- Acquisition of staff is progressing to support cleanout of loose debris from the 324 Building Airlock and Radiochemical Engineering Complex cells.

Attachment F

TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 0743	TPA CHANGE NOTICE FORM	Date: September 15, 2016
Document Number, Title, and Revision: DOE/RL-2013-30, Rev. 0, Sampling and Analysis Plan for 100-HR-3 Groundwater Operable Unit Monitoring		Date Document Last Issued: May 2016
Approved Change Notices Against this Document: N/A		
Originator: K. Ivarson / R. Mackley		Phone: 376-1941

Description of Change:
Addition of new monitoring wells, realignment of Pump and Treat system wells, and adjustment of the sampling schedule.

M. W. Cline (**DOE**) and N.M. Menard/R.A. Lobos (**Ecology/EPA**) agree that the proposed change modifies an approved sampling and analysis plan 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.*

Text within DOE/RL-2013-30 Rev. 0 is updated to reflect the addition of new wells and realignment of current DX and HX Pump and Treat system wells.

Modifications were made to text on pages 3-2 and 3-6, and the contents of Table 3-3 (comprising pages 3-7 to 3-44) of the original document. The entire table is provided.

Note: Added text is denoted by <u>double underline</u>. Deleted text is denoted by ~~strike-through.~~

Justification and Impacts of Change:
Fifteen (15) new groundwater wells were installed in 100-HR-3 and fourteen (14) well realignments were made to the DX and HX pump-and-treat systems during FY16. The text and tables of the document are edited to reflect these changes and adjust the sampling schedule accordingly.

Other changes to the SAP include the following:

- Wells removed from the sampling schedule that cannot sustain adequate flow to purge the extraction well piping and produce a representative groundwater sample.
- The text of the SAP is clarified to specify that the ISRM barrier wells are to be sampled on a rotating basis. Each group of three wells is to have one well sampled once every third year, rotating through each group.
- Combines the sampling schedule for pump and treat extraction wells from Table 3-4 into Table 3-3, for clarity.
- Increased the sampling frequency for wells downgradient of the ISRM barrier from an annual to triannual schedule due to their proximal location to the river.
- Increased sampling frequency of well 199-H1-7 due to increasing contaminant concentrations.

Approvals:

DOE Project Manager	9/15/16 Date	[X] Approved [ ] Disapproved
EPA Project Manager	9-15-16 Date	[X] Approved [ ] Disapproved
Ecology Project Manager	9/19/16 Date	[X] Approved [ ] Disapproved

Table 3-1. Status of 100-HR-3 Interim Action Compliance Wells

Well Number	Original Use	Status (September 30, 2014)

a. Compliance well is identified in DOE/RL-96-84, *Remedial Design Report and Remedial Action Work Plan for the 100-HR-3 and 100-KR-4 Groundwater Operable Units' Interim Action.*

b. Compliance well is identified in DOE/RL-99-51, *Remedial Design Report and Remedial Action Work Plan for the 100-HR-3 Groundwater Operable Unit In Situ Redox Manipulation.*

ISRM = in situ redox manipulation

3.2 Sample Location, Frequency, and Constituents to Be Monitored

The DQO process was used to identify sample locations, frequencies for collection, and constituents for monitoring. The detailed process is presented in Appendix A. Five problem statements were used to identify PSQs that can be answered using data inputs to satisfy specific data needs. Available groundwater monitoring locations within the 100-HR-3 OU are shown on Figures A-2 and A-3 (Appendix A).

The following subsections present a brief summary of the criteria used in the DQO process for each PSQ, with the results of the DQO selection process presented in Table 3-3. Sample collection will include measurement of field parameters (dissolved oxygen, oxidation reduction potential, pH, specific conductance, temperature, turbidity, and depth to groundwater).

Monitoring conducted for the PSQs also use data generated for P&T system O&M. O&M monitoring is described in DOE/RL-2013-49. These data include monthly (or more frequent) Cr(VI) measurements from extraction wells, which are collected to monitor P&T system performance; quarterly effluent tank co-contaminant and Cr(VI) samples; quarterly influent tank samples; and water level measurements in system wells. Wells in the ISRM barrier will be sampled on triennial (once every three years) frequency according to a rotating schedule with the associated sample start year (e.g. year 1, 2, or 3) noted in Table 3-3. Sitewide surveillance (*Atomic Energy Act of 1954* [AEA]) groundwater monitoring is not addressed in this plan; however, Table 3-2 provides an overview of this monitoring program and is included here for reference.

3.2.1 PSQ 1: Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?

Wells for monitoring were selected based on proximity to the Columbia River, distance between wells, and historical Cr(VI) distribution. Aquifer tubes for sampling were selected based on distance downgradient from a well, Cr(VI) distribution, and specific conductance data indicating the location represents groundwater. Historical groundwater data and evaluation of Cr(VI) discharge relative to river stage indicate the highest concentrations are observed during low river stage in wells near the river. Low river stage, which typically occurs from September to December, was identified for annual Cr(VI) sampling. Triennial (once every three years) monitoring in lower aquifer (RUM and basalt) unit wells will also be performed to assess potential vertical migration of contaminant plumes.

3.2.2 PSQ 2: Is the remedy effectively reducing the groundwater Cr(VI) plume?

Wells for monitoring were selected based on calendar year 2013 Cr(VI) plume geometry and concentration contours. Data from P&T system monitoring, which provides monthly Cr(VI) concentration data, also will be used in the evaluation of plume geometry and mass reduction. Aquifer tubes for sampling were selected based on Cr(VI) distribution and specific conductance data indicating the location represents groundwater. An annual sampling frequency was selected for Cr(VI) remedy evaluation.

3.2.5 PSQ 5a: Are infrequently detected analytes confirmed not to be contaminants of potential concern?

and

3.2.6 PSQ 5b: Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?

Infrequently detected analytes and analytes, with detection limits above action levels, are referred to as "analytes with uncertainty." The monitoring locations for the analytes with uncertainty were selected to provide spatial representativeness, based on the highest number of previous detections of the identified analytes within the exposure area (Section A.7.1, Appendix A). The analytes for monitoring include antimony, cadmium, cobalt, copper, fluoride, iron, lead, manganese, nitrite, silver, sulfate, and zinc. A triannual sampling frequency, until nine samples are collected at each monitoring location, was selected.

3.2.7 PSQ 5c: Are potential source areas confirmed not to be continuing sources of COPCs in groundwater?

Wells for monitoring potential source areas were selected from downgradient locations. Analytes for monitoring are Cr(VI) at 100-D-100 and Cr(VI), nitrate, and uranium at 183-H. A triannual sampling frequency, until nine samples are collected at each monitoring location, was selected. Monitoring results will be evaluated to identify whether there is a potential continuing source and if additional sampling is warranted.

3.3 Operational Sampling

Samples are collected from the P&T facilities and analyzed for Cr(VI) to monitor system performance. Process sampling is conducted on a routine basis as described in the O&M plan (DOE/RL-2013-49, Table 4-2) and is not included herein. Additional samples are collected from the influent and effluent tanks. Treatment process water monitoring is presented in Table 3-4. The treatment process monitoring of extraction wells is also included in Table 3-3 for completeness and consistency with the remainder of the sample locations. Sampling for co-contaminants strontium-90 and uranium was limited to those areas near known plumes or downgradient of those areas with historical detections, as described in the following subsections.

3.3.1 Strontium-90 Sampling

No extraction wells are currently located within the strontium-90 groundwater plume at 100-D. Strontium-90 is present above the 8 pCi/L DWS at Wells 199-D5-132 and 199-D5-142, located near the 105-D Reactor (Figure 3-1). To evaluate if strontium-90 is migrating from that area and extracted downgradient, samples will be collected for strontium-90 analysis from the nearest downgradient extraction wells (199-D5-32, 199-D5-154 and 199-D5-159) from the known plume. Strontium-90 was detected historically near the 116-DR-1&2 trench and in downgradient aquifer tubes. In downgradient aquifer tubes C6278, DD-15-3, and DD-16-4, concentrations increased following the startup of DX. Extraction wells near the 116-DR-1&2 trench (Wells 199-D8-68, 199-D8-69, and 199-D8-55) were, therefore, included in the sampling for strontium-90 to ensure that concentrations in the DX system influent remained below 8 pCi/L. Figure 3-1 presents the wells that have, at one time in their history, had a detection of strontium-90 at 100-D.

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D2-6	Unconfined Aquifer		A			A	TE						X	X					
199-D2-10	Unconfined Aquifer	~~DX Injection~~ Not in use	~~Eff~~										~~Eff~~						
199-D2-11	Unconfined Aquifer		A						Yes	A-SO4			X		X				
199-D2-12	Unconfined Aquifer	~~DX Injection~~ Not in use	~~Eff~~										~~Eff~~						
199-D3-2	Unconfined Aquifer	ISRM well/no injection	~~A~~ TE-vr 1				TE		Yes	TE-SO4	TA	X	X	X	X				
199-D3-3	Unconfined Aquifer	ISRM well																	
199-D3-4	Unconfined Aquifer	ISRM well																	
199-D3-5	Unconfined Aquifer		A										X						
199-D4-1	Unconfined Aquifer	ISRM well/no injection	~~A~~ TE-vr 1							beta emitters (once)	A	X		X					
199-D4-2	Unconfined Aquifer	ISRM well/no injection																	
199-D4-3	Unconfined Aquifer	ISRM well/no injection																	

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-4	Unconfined Aquifer	ISRM well/no injection																	
199-D4-5	Unconfined Aquifer	ISRM well/no injection	~~A~~ TE- vr3							beta emitters (once)	A		X	X					
199-D4-6	Unconfined Aquifer	ISRM well/no injection	~~A~~ TE- vr3										X						
199-D4-7	Unconfined Aquifer	ISRM well																	
199-D4-8	Unconfined Aquifer	ISRM well/no injection																	
199-D4-9	Unconfined Aquifer	ISRM well	TE – vr3									X		X					
199-D4-10	Unconfined Aquifer	ISRM well																	
199-D4-11	Unconfined Aquifer	ISRM well																	
199-D4-12	Unconfined Aquifer	ISRM well	TE – vr2									X		X					
199-D4-13	Unconfined Aquifer	ISRM well/no injection				A	A		Yes	beta emitters (once)	A			X	X				

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-14	Unconfined Aquifer	DX Extraction/ISRM	~~A~~ Q	Q		Q	A					X	X	X					
199-D4-15	Unconfined Aquifer		TA				A		Yes	TA (Sb, Cd, Co, Cu, Pb, Ag)				X	X		X	X	
199-D4-16	Unconfined Aquifer	ISRM well																	
199-D4-17	Unconfined Aquifer	ISRM well																	
199-D4-18	Unconfined Aquifer	ISRM well																	
199-D4-19	Unconfined Aquifer	ISRM well/no injection	~~A~~ TE – vr2						Yes	beta emitters (once)	TA	X		X	X				
199-D4-20	Unconfined Aquifer		A			A	TA		Yes				X	X	X				
199-D4-21	Unconfined Aquifer	ISRM well							Yes						X				
199-D4-22	Unconfined Aquifer	ISRM well/no injection				A	TA							X					
199-D4-23	Unconfined Aquifer	ISRM compliance	A						Yes			X	X		X				

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-24	Unconfined Aquifer	ISRM well	TE – vr2									X	X	X					
199-D4-25	Unconfined Aquifer	ISRM well/ZVI test	A							beta emitters (once)	A			X					
199-D4-26	Unconfined Aquifer	ISRM well/ZVI test																	
199-D4-27	Unconfined Aquifer	ISRM well/ZVI test	TE – vr3									X		X					
199-D4-28	Unconfined Aquifer	ISRM well																	
199-D4-29	Unconfined Aquifer	ISRM well	TE – vr1									X		X					
199-D4-30	Unconfined Aquifer	ISRM well																	
199-D4-31	Unconfined Aquifer	ISRM well	TE – vr2									X		X					
199-D4-32	Unconfined Aquifer	ISRM well	TE – vr3									X		X					
199-D4-33	Unconfined Aquifer	ISRM well																	
199-D4-34	Unconfined Aquifer	DX Extraction/ISRM	~~A~~ Ω	Ω		Ω							X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-35	Unconfined Aquifer	ISRM well																	
199-D4-36	Unconfined Aquifer	ISRM well	TE – vr1									X		X					
199-D4-37	Unconfined Aquifer	ISRM well																	
199-D4-38	Unconfined Aquifer	~~DX Extraction~~/ISRM compliance	A							A –SO4		X	X						
199-D4-39	Unconfined Aquifer	DX Extraction	A							A –SO4		X	X						
199-D4-40	Unconfined Aquifer	ISRM well	TE – vr2									X		X					
199-D4-41	Unconfined Aquifer	ISRM well																	
199-D4-42	Unconfined Aquifer	ISRM well																	
199-D4-43	Unconfined Aquifer	ISRM well	TE – vr1									X		X					
199-D4-44	Unconfined Aquifer	ISRM well																	
199-D4-45	Unconfined Aquifer	ISRM well	TE – vr2									X		X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-46	Unconfined Aquifer	ISRM well																	
199-D4-47	Unconfined Aquifer	ISRM well																	
199-D4-48	Unconfined Aquifer	ISRM well	TE – yr3									X		X					
199-D4-49	Unconfined Aquifer	ISRM well																	
199-D4-50	Unconfined Aquifer	ISRM well	TE – yr1									X		X					
199-D4-51	Unconfined Aquifer	ISRM well																	
199-D4-52	Unconfined Aquifer	ISRM well	TE – yr3									X		X					
199-D4-53	Unconfined Aquifer	ISRM well																	
199-D4-54	Unconfined Aquifer	ISRM well	TE – yr2									X		X					
199-D4-55	Unconfined Aquifer	ISRM well																	
199-D4-56	Unconfined Aquifer	ISRM well	TE – yr1									X		X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[a]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-57	Unconfined Aquifer	ISRM well																	
199-D4-58	Unconfined Aquifer	ISRM well	TE – vr3									X		X					
199-D4-59	Unconfined Aquifer	ISRM well																	
199-D4-60	Unconfined Aquifer	ISRM well	TE – vr2									X		X					
199-D4-61	Unconfined Aquifer	ISRM well																	
199-D4-62	Unconfined Aquifer	ISRM well	TE – vr1									X		X					
199-D4-63	Unconfined Aquifer	ISRM well																	
199-D4-64	Unconfined Aquifer	ISRM well	TE – vr3									X		X					
199-D4-65	Unconfined Aquifer	ISRM well																	
199-D4-66	Unconfined Aquifer	ISRM well	TE – vr2									X		X					
199-D4-67	Unconfined Aquifer	ISRM well																	

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-68	Unconfined Aquifer	ISRM well	TE – yr1									X		X					
199-D4-69	Unconfined Aquifer	ISRM well																	
199-D4-70	Unconfined Aquifer	ISRM well	TE – yr3									X		X					
199-D4-71	Unconfined Aquifer	ISRM well																	
199-D4-72	Unconfined Aquifer	ISRM well																	
199-D4-73	Unconfined Aquifer	ISRM well	TE – yr1									X		X					
199-D4-74	Unconfined Aquifer	ISRM well																	
199-D4-75	Unconfined Aquifer	ISRM well	TE – yr3									X		X					
199-D4-76	Unconfined Aquifer	ISRM well																	
199-D4-77	Unconfined Aquifer	ISRM well	TE – yr2									X		X					
199-D4-78	Unconfined Aquifer	ISRM well																	

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-79	Unconfined Aquifer	ISRM well	TE – yr1									X		X					
199-D4-80	Unconfined Aquifer	ISRM well																	
199-D4-81	Unconfined Aquifer	ISRM well	TE – yr3									X		X					
199-D4-82	Unconfined Aquifer	ISRM well	TE – yr2									X		X					
199-D4-83	Unconfined Aquifer	DX Extraction/ISRM compliance	~~A~~ Q	Q		Q	TE			A –SO4		X	X	X					
199-D4-84	Unconfined Aquifer	~~DX Extraction/~~ISRM compliance	A				A					X	X	X					
199-D4-85	Unconfined Aquifer	~~DX Extraction/~~ISRM compliance	A				TE			A-SO4		X	X	X					
199-D4-86	Unconfined Aquifer	ISRM compliance	A				TE		Yes	A-SO4		X	X	X	X				
199-D4-87	Unconfined Aquifer	ISRM well																	
199-D4-88	Unconfined Aquifer	ISRM well																	
199-D4-89	Unconfined Aquifer	ISRM well																	

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-90	Unconfined Aquifer	ISRM well																	
199-D4-91	Unconfined Aquifer	ISRM well																	
199-D4-92	Unconfined Aquifer	ISRM well/ZVI test																	
199-D4-93	Unconfined Aquifer	ISRM well/ZVI test																	
199-D4-94	Unconfined Aquifer	ISRM well																	
199-D4-95	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-D4-96	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q	A						X	X					
199-D4-97	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-D4-98	Unconfined Aquifer	~~DX Extraction~~	TA									X	X						
199-D4-99	Unconfined Aquifer	~~DX Extraction~~	TA									X	X						
199-D4-101	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q	TA						X	X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D4-102	Unconfined Aquifer	DX Extraction	Q	Q		Q	Q			Q[f]			X						
199-D4-103	Unconfined Aquifer	DX Extraction	Q	Q		Q	Q			Q[f]			X						
199-D5-13	Unconfined Aquifer		A										X						
199-D5-14	Unconfined Aquifer		A			A			Yes	TA (Sb, Cd, Co, Cu, Pb, Ag)			X	X	X		X	X	
199-D5-15	Unconfined Aquifer																		
199-D5-16	Unconfined Aquifer		A			A	A						X	X					
199-D5-17	Unconfined Aquifer		A			A			Yes				X	X	X				
199-D5-18	Unconfined Aquifer		A				TE						X	X					
199-D5-19	Unconfined Aquifer		A				A		Yes				X	X	X				
199-D5-20	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q						X	X						
199-D5-32	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q	~~A~~ Q	~~A~~ Q							X	~~EXT~~ X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-33	Unconfined Aquifer								Yes						X				
199-D5-34	Unconfined Aquifer	DX Extraction	~~TA~~ Q	Q		~~A~~ Q							X	X					X
199-D5-36	Unconfined Aquifer		A						Yes			X			X				
199-D5-37	Unconfined Aquifer								Yes						X				
199-D5-38	Unconfined Aquifer		A						Yes				X		X				
199-D5-39	Unconfined Aquifer	DX Extraction	~~TA~~ Q	Q		~~A~~ Q	A						X	X					X
199-D5-40	Unconfined Aquifer		A			A	A						X	X					
199-D5-41	Unconfined Aquifer		A										X						
199-D5-42	Unconfined Aquifer	~~DX Injection~~	~~Eff~~ TA									X	~~Eff~~						
199-D5-43	Unconfined Aquifer		A				A		Yes					X	X				
199-D5-44	Unconfined Aquifer	~~DX Injection~~	~~Eff~~ A										~~Eff~~ X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-92	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q						X	X						
199-D5-97	Unconfined Aquifer		TA						Yes				X		X				X
199-D5-101	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q	A						X	X					
199-D5-103	Unconfined Aquifer		TA						Yes				X		X				X
199-D5-104	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						X
199-D5-106	Unconfined Aquifer								Yes						X				
199-D5-107	Unconfined Aquifer	Molasses Inj Test/ Injection Well																	
199-D5-108	Unconfined Aquifer	DX Injection / Vegetable Oil Inj Test~~/Injection Well~~	Eff										Eff						
199-D5-109	Unconfined Aquifer	Molasses Inj Test																	
199-D5-110	Unconfined Aquifer	Molasses Inj Test																	
199-D5-111	Unconfined Aquifer	DX Injection / Molasses Inj Test	Eff										Eff						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-112	Unconfined Aquifer	Molasses Inj Test																	
199-D5-113	Unconfined Aquifer	Molasses Inj Test																	
199-D5-114	Unconfined Aquifer	Vegetable Oil Inj Test																	
199-D5-115	Unconfined Aquifer	Vegetable Oil Inj Test																	
199-D5-116	Unconfined Aquifer	Vegetable Oil Inj Test																	
199-D5-117	Unconfined Aquifer	Vegetable Oil Inj Test																	
199-D5-118	Unconfined Aquifer	Vegetable Oil Inj Test																	
199-D5-123	Unconfined Aquifer		A		A		A							X					
199-D5-125	Unconfined Aquifer		A										X						
199-D5-126	Unconfined Aquifer								Yes						X				
199-D5-127	Unconfined Aquifer	DX Extraction	~~TA~~ Ω	Ω		~~A~~ Ω							X	X					X

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-128	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D5-129	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D5-130	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					
199-D5-131	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					
199-D5-132	Unconfined Aquifer		A		TA	A							X	X					
199-D5-133	Unconfined Aquifer		TA						Yes				X		X				X
199-D5-134	Unconfined Aquifer								Yes						X				
~~199-D5-141~~	~~Unconfined Aquifer~~																		
199-D5-142	Unconfined Aquifer		A		TA	A				TA (Sb, Cd, Co, Cu, Pb, Ag)			X	X			X	X	
199-D5-143	Unconfined Aquifer		A										X						
199-D5-145	Unconfined Aquifer		TA										X						X

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-146	Unconfined Aquifer	DX Extraction	~~TA~~ Q	Q		Q							X						X
199-D5-147	Unconfined Aquifer																		
199-D5-148	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D5-149	Unconfined Aquifer		Q	A	A	A				A[g]	A, plus gross alpha		X						X
199-D5-150	Unconfined Aquifer		Q	A	A	A				A[g]	A, plus gross alpha		X						X
199-D5-151	Unconfined Aquifer		M	M	A	M				M[g]	A, plus gross alpha		X						X
199-D5-152	Unconfined Aquifer		M	M	A	M				M[g]	A, plus gross alpha		X						X
199-D5-153	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					
199-D5-154	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q	~~A~~ Q	Q							X	~~EXT~~ X					
199-D5-159	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q	~~A~~ Q	Q							X	~~EXT~~ X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-160	Unconfined Aquifer		Q	Q		Q	Q			Q[f]	Q, plus gross alpha		X						X
199-D6-1	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D6-2	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D6-3	Unconfined Aquifer		A										X						
199-D7-3	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-D7-4	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D7-5	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D7-6	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-D8-4	Unconfined Aquifer		TA			A							X	X					
199-D8-5	Unconfined Aquifer		A						Yes			X	X		X				
199-D8-6	Unconfined Aquifer		TA										X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D8-53	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω							X						
199-D8-54A	Unconfined Aquifer		A		A				Yes			X		X	X				
199-D8-55	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω	~~A~~ Ω	Ω						X	X	~~EXT~~ X					
199-D8-68	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω	~~A~~ Ω	~~A~~ Ω	TE					X	X	~~EXT~~ X					
199-D8-69	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω	~~A~~ Ω	Ω						X	X	~~EXT~~ X					
199-D8-70	Unconfined Aquifer		A						Yes			X	X		X				
199-D8-71	Unconfined Aquifer		A						Yes			X	X		X				
199-D8-72	Unconfined Aquifer		A									X							
199-D8-73	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω						X	X						
199-D8-88	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω						X	X						
199-D8-89	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω						X	X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[a]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D8-90	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-D8-91	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q						X	X						
199-D8-93	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D8-94	Unconfined Aquifer	DX Injection	Eff										Eff						
199-D8-95	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-D8-96	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					
199-D8-97	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					
199-D8-98	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					
199-D8-99	Unconfined Aquifer	DX ~~Injection~~ Extraction	~~Eff~~ Q	Q		Q							~~Eff~~						
199-D8-101	Unconfined Aquifer		A			A							X	X					
199-D8-102	Unconfined Aquifer		Q	Q	Q	Q	Q				Q plus gross alpha		X	X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H1-1	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-H1-2	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-H1-3	Unconfined Aquifer	~~HX Extraction~~ Not in use																	
199-H1-4	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-H1-5	Unconfined Aquifer	DX Extraction	~~A~~ Q	Q		Q							X						
199-H1-6	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H1-7	Unconfined Aquifer		~~A~~ TA	TA					Yes			X			X				
199-H1-20	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H1-21	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H1-25	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H1-27	Unconfined Aquifer	HX Injection	Eff										Eff						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H1-32	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-33	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-34	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-35	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-36	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω							X						
199-H1-37	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-38	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-39	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-40	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω						X	X						
199-H1-42	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω							X						
199-H1-43	Unconfined Aquifer	HX Extraction	▲Ω	Ω		Ω							X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H1-45	Unconfined Aquifer	HX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H1-46	Unconfined Aquifer	HX Extraction	~~A~~ Ω	Ω	Ω	Ω				Ω[f]			X						
199-H3-2A	Unconfined Aquifer		A							TA (Sb, Cd, Co, Cu, Pb, Ag)							X	X	
199-H3-2B	Unconfined Aquifer								Yes						X				
199-H3-3	Unconfined Aquifer		A										X						
199-H3-4	Unconfined Aquifer	HX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H3-5	Unconfined Aquifer																		
199-H3-6	Unconfined Aquifer		A		TA	A						X	X	X					
199-H3-7	Unconfined Aquifer		A			A							X	X					
199-H3-11	Unconfined Aquifer		A										X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-~~H~~3-25	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-~~H~~3-26	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-~~H~~3-27	Unconfined Aquifer	HX Injection	Eff										Eff						
199-~~H~~4-2	~~Unconfined Aquifer~~ Basalt Confined																		
199-~~H~~4-4	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q	~~A~~ Q	~~A~~ Q		~~TA~~ SA			TE	X	X	~~EXT~~ X					X
199-~~H~~4-5	Unconfined Aquifer		A						Yes			X	X		X				
199-~~H~~4-6	Unconfined Aquifer																		
199-~~H~~4-8	Unconfined Aquifer	RCRA	A			A		A	Yes			X	X	X	X				X
199-~~H~~4-10	Unconfined Aquifer		A						Yes			X	X		X				
199-~~H~~4-11	Unconfined Aquifer		A		TA				Yes			X	X	X	X				
199-~~H~~4-12A	Unconfined Aquifer	RCRA	TA			A		TA				X	X	X	X				X

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H4-12B	Unconfined Aquifer								Yes						X				
199-H4-13	Unconfined Aquifer		A		TA				Yes	TA (Sb, Cd, Co. Cu, Pb, Ag)	A	X	X	X	X		X	X	
199-H4-15A	Unconfined Aquifer	HX Extraction	~~A~~ Ω	Ω		Ω						X	X						
199-H4-15B	Unconfined Aquifer								Yes						X				
199-H4-16	Unconfined Aquifer																		
199-H4-17	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-18	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-45	Unconfined Aquifer		A		A							X	X	X					
199-H4-46	Unconfined Aquifer		A			A							X	X					
199-H4-47	Unconfined Aquifer																		

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H4-49	Unconfined Aquifer		A										X						
199-H4-63	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q	~~TA~~ Q	Q		~~TA~~ SA			A	X	X	~~EXT~~ X					
199-H4-64	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q		~~TA~~ SA				X	X	~~EXT~~ X					
199-H4-65	Unconfined Aquifer		A									X	X						X
199-H4-69	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q	A	Q							X	X					
199-H4-70	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-H4-71	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-72	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-73	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-74	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-H4-75	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		~~A~~ Q							X	X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H4-76	Unconfined Aquifer	HX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H4-77	Unconfined Aquifer	HX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H4-78	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-79	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H4-80	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H4-81	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H4-82	Unconfined Aquifer	DX Extraction	~~A~~ Ω	Ω		Ω							X						
199-H4-83	Unconfined Aquifer		A		TA				Yes	beta emitters (once)	TA		X	X	X				
199-H4-84	Unconfined Aquifer	RCRA	TA			TA		TA	Yes	TA (Sb, Cd, Co, Cu, Pb, Ag)	A		X	X	X		X	X	X
199-H4-85	Unconfined Aquifer		TA			TA		TA		beta emitters (once)	A	X	X	X	X				X

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H4-86	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q							X						
199-H4-87	Unconfined Aquifer		Q	A	A	A				A[g]	A plus gross alpha		X						X
199-H4-88	Unconfined Aquifer		M	M	A	M		TA		M[g]	A plus gross alpha		X						X
199-H4-89	Unconfined Aquifer		A	A	A	A		TA		A[g]	A plus gross alpha		X						X
199-H4-92	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q	Q	Q	Q			Q[f]			X						
199-H4-93	Unconfined Aquifer	HX Extraction	~~A~~ Q	Q		Q				Q[f]			X						
199-H5-1A	Unconfined Aquifer	ISRM Field Test Piezometer	A						Yes				X		X				
199-H5-2	Unconfined Aquifer	ISRM Field Test/ Injection Well																	
199-H5-3O	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-3P	Unconfined Aquifer	ISRM Field Test Piezometer																	

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H5-4O	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-4P	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-5O	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-5P	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-6	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-7	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-8	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-9	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-10	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-11	Unconfined Aquifer	ISRM Field Test Piezometer																	
199-H5-12	Unconfined Aquifer																		

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H5-13	Unconfined Aquifer																		
199-H5-14	Unconfined Aquifer																		
199-H5-16	Unconfined Aquifer	HX Extraction	Q	Q	Q	Q				Q[f]			X						
199-H6-1	Unconfined Aquifer		A		A	A							X	X					
199-H6-2	Unconfined Aquifer	~~HX Extraction~~ Not in use	~~A~~										X						
199-H6-3	Unconfined Aquifer		A			A							X	X					
199-H6-4	Unconfined Aquifer																		
199-H6-7	Unconfined Aquifer	HX Injection	Eff										Eff						
199-H6-8	Unconfined Aquifer	HX Injection	Eff										Eff						
699-88-41	Unconfined Aquifer		A										X						
699-88-41A	Unconfined Aquifer		Q	Q		Q				Q[f]			X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
699-89-35	Unconfined Aquifer																		
699-90-34	Unconfined Aquifer																		
699-90-37B	Unconfined Aquifer		A										X						
699-90-38	Unconfined Aquifer	To be Decommissioned – Dry Well																	
699-90-45	Unconfined Aquifer		A										X						
699-90-45B	Unconfined Aquifer	HX Injection	Eff										Eff						
699-90-47B	Unconfined Aquifer	DX Injection	Eff										Eff						
699-91-46A	Unconfined Aquifer		A										X						
699-92-49	Unconfined Aquifer																		
699-93-37A	Unconfined Aquifer		Q	Q		Q				Q[f]			X						
699-93-48A	Unconfined Aquifer		A										X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
699-93-48C	Unconfined Aquifer	DX Injection	Eff										Eff						
699-93-50	Unconfined Aquifer																		
699-94-41	Unconfined Aquifer		A										X						
699-94-43	Unconfined Aquifer		A										X						
699-95-45	Unconfined Aquifer		A										X						
699-95-45B	Unconfined Aquifer	HX Injection	Eff										Eff						
699-95-48	Unconfined Aquifer		A										X						
699-95-51	Unconfined Aquifer		A						Yes				X		X				
699-96-43	Unconfined Aquifer																		
699-96-44	Unconfined Aquifer																		
699-96-45	Unconfined Aquifer																		

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
699-96-52B	Unconfined Aquifer		A						Yes			X	X		X				
699-97-41	Unconfined Aquifer		A						Yes				X		X				
699-97-43B	Unconfined Aquifer		A							TA (Sb, Cd, Co. Cu, Ag)			X				X	X	
699-97-45	Unconfined Aquifer		A						Yes				X		X				
699-97-47B	Unconfined Aquifer		TA										X						
699-97-48B	Unconfined Aquifer		A						Yes				X		X				
699-97-51A	Unconfined Aquifer		A										X						
699-98-43	Unconfined Aquifer		A						Yes				X		X				
699-98-46	Unconfined Aquifer		A							TA (Sb, Cd, Co. Cu, Ag)			X				X	X	
699-98-49A	Unconfined Aquifer		A										X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[a]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
699-98-51	Unconfined Aquifer		TA						Yes						X				
699-99-41	Unconfined Aquifer		A						Yes			X			X				
699-99-42B	Unconfined Aquifer		A						Yes	TA (Sb, Cd, Co, Cu, Ag)		X	X		X		X	X	
699-99-44	Unconfined Aquifer		A						Yes				X		X				
699-100-43B	Unconfined Aquifer		A						Yes			X	X		X				
699-101-45	Unconfined Aquifer								Yes						X				
699-101-48B	Unconfined Aquifer		TE									X							
C7647	Aquifer Tube – 100-D Area		A									X	X						
DD-10-3	Aquifer Tube – 100-D Area		A									X	X						
DD-12-2	Aquifer Tube – 100-D Area		A									X	X						
DD-15-3	Aquifer Tube – 100-D Area		A		A							X	X	X					

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
DD-16-4	Aquifer Tube – 100-D Area		A		A							X	X	X					
DD-17-2	Aquifer Tube – 100-D Area		A									X							
C6278	Aquifer Tube – 100-D Area		A		A									X					
DD-41-3	Aquifer Tube – 100-D Area		A									X	X						
DD-44-4	Aquifer Tube – 100-D Area		A									X	X						
DD-49-3	Aquifer Tube – 100-D Area		A				TE					X	X	X					
DD-50-3	Aquifer Tube – 100-D Area		A				A							X					
DD-50-4	Aquifer Tube – 100-D Area		A				TE					X	X	X					
Redox-1-6.0	Aquifer Tube – 100-D Area		A									X	X						
Redox-3-3.3	Aquifer Tube – 100-D Area		A									X	X						
36-M	Aquifer Tube – 100-D Area		A									X	X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

												PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
38-M	Aquifer Tube – 100-D Area		A									X	X						
AT-D-1-M	Aquifer Tube – 100-D Area		A									X	X						
AT-D-3-D	Aquifer Tube – 100-D Area		A									X	X						
AT-D-4-D	Aquifer Tube – 100-D Area		A									X	X						
43-M	Aquifer Tube – 100-H Area		A									X	X						
45-M	Aquifer Tube – 100-H Area		A									X	X						
47-D	Aquifer Tube – 100-H Area		A		A									X					
47-M	Aquifer Tube – 100-H Area		A									X	X						
48-M	Aquifer Tube – 100-H Area		A									X	X						
50-M	Aquifer Tube – 100-H Area		A									X	X						
51-D	Aquifer Tube – 100-H Area		A									X	X						

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-D5-134	RUM First Water Bearing Unit		A										X			X			
199-D5-141	RUM First Water Bearing Unit		A	TE			TE	TE		TE[g]	TE, plus gross alpha		X			X			
199-D8-54B	RUM First Water Bearing Unit		A	TE					Yes			X	X			X			
199-H2-1	RUM First Water Bearing Unit		TA			TA			Yes			X	X	X		X			
199-H3-10	RUM First Water Bearing Unit		A						Yes				X			X			
199-H3-2C	RUM First Water Bearing Unit	HX Extraction	~~A~~ Q	Q		~~TA~~ Q	TE	TE		TE[g]	TE, plus gross alpha		X	X		X			
199-H3-9	RUM First Water Bearing Unit	HX Extraction	~~A~~ Q	Q		Q	TE	TE		beta emitters (once); TE[g]	TE, plus gross alpha	X	X	X		X			
199-H4-12C	RUM First Water Bearing Unit	HX Extraction/RCRA	~~A~~ Q	Q		~~TA~~ Q	TE	TE		TE[g]	TE, plus gross alpha	X	X	X		X			X

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
199-H4-15CP	Basalt Confined		TE	TE			TE	TE		TE[f]	TE, plus gross alpha	X							
199-H4-15CQ	Ringold Confined Unit A		TE	TE			TE	TE		TE[f]	TE, plus gross alpha	X							
199-H4-15CR	Ringold Confined Unit B		TE	TE			TE	TE		TE[f]	TE, plus gross alpha	X							
199-H4-15CS	RUM First Water Bearing Unit		A	A	A		A	TE		TE[f]	A, plus gross alpha	X							
199-H4-90	RUM First Water Bearing Unit		TA			TA							X	X		X			
199-H4-91	RUM First Water Bearing Unit		TA			TA							X	X		X			
699-97-43C	RUM First Water Bearing Unit		TA				TE						X	X		X			
699-97-45B	RUM First Water Bearing Unit		TA				TE						X	X		X			

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[e] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d] 1 Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	2 Is the remedy effectively reducing the groundwater Cr(VI) plume?	3[e] Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	4a What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	4b What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	5a Are infrequently detected analytes confirmed not to be contaminants of potential concern?	5b Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	5c Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?
699-97-48C	RUM First Water Bearing Unit		TA				TE		Yes				X	X		X			
699-97-60	RUM First Water Bearing Unit		TA	TA		TA	TE			TA[f]			X	X		X			
699-97-61	RUM First Water Bearing Unit	DX Extraction	~~TA~~ Q	Q		Q	TE			beta emitters (once), Q[f]	TE		X	X		X			
D River Gauge									Yes						X				
H River Gauge									Yes						X				

a. Data for extraction and injection wells will be collected as identified in DOE/RL-2013-49, *100-HR-3 Pump and Treat System Operations and Maintenance Plan*, and Table 3-4.

b. AWLN = automated water level network; yes = transducers at these locations are set up to collect measurements hourly.

c. Listed ~~Other~~ – analytes are as follows: Sb - antimony; Cd – cadmium; Co – cobalt; Cu – copper; F – fluoride; Fe – iron; PB – lead; Mn – manganese; NO2 – nitrite; Ag – silver; SO4 – sulfate; Zn – zinc.

d. Field parameters will be collected from sample location when a laboratory sample is collected. Field parameters include pH, temperature, conductivity, and turbidity. Additional field parameters that may be included are dissolved oxygen and oxygen reduction potential.

e. PSQ 3 includes operational sampling from extraction wells

f. Analyte list includes: bicarbonate, calcium, chloride, magnesium, potassium, sodium, and sulfate. Samples are to establish baseline conditions and are to be re-evaluated after two years.

g. Analyte list includes: alkalinity, calcium, chloride, fluoride, nitrate, nitrite, sulfate, antimony, barium, beryllium, cadmium, copper, cobalt, iron, magnesium, manganese, potassium, nickel, sodium, silver, strontium, vanadium, and zinc.

Note: total chromium will be collected in conjunction with Cr(VI) on a periodic basis, where a schedule is not specified.

A = annual monitoring

Eff = Effluent

Table 3-3. Summary of Monitoring Locations, Frequencies, and Constituents

Monitoring Location	Well Type or Aquifer Tube	Treatment System[a]	Hexavalent Chromium (filtered and unfiltered)	Total Chromium[a] (filtered and unfiltered)	Strontium-90	Nitrate	Tritium	Uranium	AWLN[b]	Other[c]	Gross Beta	PSQ Addressed[d]							
												1	2	3[e]	4a	4b	5a	5b	5c
												Is Cr(VI) discharging to the river at concentrations greater than 10 µg/L?	Is the remedy effectively reducing the groundwater Cr(VI) plume?	Are other contaminant plumes that exceed risk-based/applicable or relevant and appropriate requirement (ARAR) levels decreasing as predicted?	What are the direction and magnitude of groundwater hydraulic gradients in the unconfined aquifer?	What are the direction and magnitude of groundwater hydraulic gradients in the confined aquifer?	Are infrequently detected analytes confirmed not to be contaminants of potential concern?	Are analytes with detection limits above action levels confirmed not to be contaminants of potential concern?	Are potential source areas confirmed not to be continuing sources of contaminants of potential concern in groundwater?

M = Monthly for one year
RUM = Ringold Formation upper mud
SA = semiannual monitoring (two times per year)
Sr-90 = strontium-90
TA = triannual monitoring (three times per year)
TE = triennial monitoring (once every three years); ISRM Wells are sampled on a rotating schedule with the associated year in the rotation indicated
Yes = location is part of the automated water level network
X = location selected to address PSQ

TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 0744	TPA CHANGE NOTICE FORM	Date: September 14, 2016

Document Number, Title, and Revision:	Date Document Last Issued:
DOE/RL-2006-75, Supplement to the 100-HR-3 and 100-KR-4 Remedial Design Report and Remedial Action Workplan for the Expansion of the 100-KR-4 Pump and Treat System, Rev. 1	September 30, 2008

Approved Change Notices Against this Document: TPA-CN-250, TPA-CN-273, TPA-CN-359, TPA-CN-505, and TPA-CN-674

Originator: S.N. Balone	Phone: 376-0236

Description of Change:
This change notice adds 5 extraction wells, one monitoring well, and realigns 2 monitoring wells to the KR4 and KX pump and treat systems.

Michael W. Cline (**DOE**) and Rod Lobos (**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*.

Added text is denoted by double underline. Deleted text is denoted by ~~strikethrough~~.

Note: Include affected page number(s) NA

Justification and Impacts of Change:
Remediation process optimization is an ongoing process that is used to evaluate active remediation systems with the overall objective of identifying design or operations modifications to improve remedy performance. This evaluation occurs on a yearly basis and identifies potential changes to the existing pump and treat systems. Based on this process, specific document revisions to incorporate ongoing RPO activities are as follows:

- Section 1.3, "Modifications to the 100-KR-4 Pump-and-Treat Network Since 1997." - Update KR4 and KX well list table to add 5 new extraction wells (199-K-208, 199-K-210, 199-K-212, 199-K-220, and 199-K-225), one new monitoring well (199-K-226), and realign 2 monitoring wells (199-K-181 as extraction; 199-K-124A as injection). Bullets added to break out modifications made in a given calendar year. Specific changes are included in Attachment 1.
- Table 5-1, and Table A-2, "100-KR-4 Pump-and-Treat Monitoring Schedule." - Added wells 199-K-208, 199-K-210, 199-K-212, 199-K-220, 199-K-225, and 199-K-226 to tables and adjusted updated table to reflect the change in purpose for wells 199-K-124A and 199-K-181 as updated in Attachment 2.

Approvals:

DOE Project Manager	Date 9/12/2016	[X] Approved [ ] Disapproved
EPA Project Manager	Date 9-15-16	[X] Approved [ ] Disapproved
NA Ecology Project Manager	Date	[ ] Approved [ ] Disapproved

ATTACHMENT 1
RDR/RAWP, DOE/RL-2006-75, Rev. 1
Update Well List in Section 1-3

KR4 AND KX WELLS		
Extraction Wells	**Injection Wells**	**Monitoring /Performance Wells**
199-K-113	199-K-121A	199-K-11
199-K-114A	199-K-122A	199-K-18
199-K-115A	199-K-123A	199-K-19
199-K-116A	199-K-124A	199-K-20
199-K-120A	199-K-128	199-K-21
199-K-127	199-K-143	199-K-22
199-K-129	199-K-156	199-K-23
199-K-130	199-K-159	199-K-32A
199-K-131	199-K-160	199-K-32B
199-K-141	199-K-164	199-K-36
199-K-144	199-K-169	199-K-37
199-K-145	199-K-170	199-K-110A
199-K-146	199-K-172	199-K-111A
199-K-147	199-K-179	199-K-119A
199-K-148	199-K-180	~~199-K-124A~~
199-K-152		199-K-125A
199-K-153		199-K-126
199-K-154		199-K-142
199-K-161		199-K-149
199-K-162		199-K-150
199-K-163		199-K-151
199-K-171		199-K-157
199-K-178		~~199-K-181~~
199-K-181		199-K-197
199-K-182		199-K-226
199-K-198		
199-K-199		
199-K-208		
199-K-210		
199-K-212		
199-K-220		
199-K-225		

- CY2013 – Convert monitoring well 199-K-181to an extraction well for the KX P&T to enhance downgradient capture of Cr(VI) plume near the 105-KE Reactor.
- CY2014 – Three new extraction wells were connected to the KX P&T system. Extraction wells 199-K-210 and 199-K-212 were added to improve river protection by enhancing capture of the Cr(VI) plume in the near-river vicinity downgradient of the 105-KE Reactor (199-K-210), and along the 116-K-2 Trench (199-K-212). Extraction well 199-K-220 was installed near the 183-KE Head House to provide mass removal from that source area.
- CY2015 – Well 199-K-208 was connected to the KX P&T system as an extraction well to improve river protection by enhancing Cr(VI) plume capture in the near-river area downgradient of the 105-KE Reactor, as well as to improve mass removal. Also, monitoring well 199-K-124A was realigned to the KR4 P&T system as an injection well to enhance plume capture.
- Through September 30, 2016 – New extraction well 199-K-225, was connected to the KX P&T to improve mass removal downgradient of the 183-KE Head House; New monitoring well 199-K-226 is planned to become an extraction well during fiscal year 2017 to enhance mass removal of Cr(VI) down gradient of the 105-KE Reactor. Current injection well 199-K-179 was realigned from KR4 to the KX P&T system to increase potential throughput of the KX P&T system. Also, KR4 extraction well 199-K-144 was realigned to the KX P&T system.

ATTACHMENT 2

RDR/RAWP, DOE/RL-2006-75, Rev. 1
Updated Table 5-1 and Table A-2

100-KR-4 OU Monitoring Schedule for Combined KR-4 and KX Pump and Treat Systems. (4 pages)

Sample Group	System Pre-Startup (Baseline)[e]			System Start Up[d]			System Operation		
	Water Level	Cr[b,c]	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]
Extraction/Compliance Wells									
199-K-113A	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-114A	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-115A	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-116A	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-120A	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-127	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-129	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-130	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-131	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-144	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-145	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-146	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-147	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-148	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-152	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-161	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-162	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-171	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-178	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-181	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-182	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-198	T	X	X	T	W/Q	SA	T	M/SA	SA

100-KR-4 OU Monitoring Schedule for Combined KR-4 and KX Pump and Treat Systems. (4 pages)

Sample Group	System Pre-Startup (Baseline)[e]			System Start Up[d]			System Operation		
	Water Level	Cr[b,c]	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]
199-K-199	T	X	X	T	W/Q	SA	T	M/SA	SA
199-K-208	=	=	=	T	W/Q	SA	T	M/SA	SA
199-K-210	=	=	=	T	W/Q	SA	T	M/SA	SA
199-K-212	=	=	=	T	W/Q	SA	T	M/SA	SA
199-K-220	=	=	=	T	W/Q	SA	T	M/SA	SA
199-K-225	=	=	=	T	W/Q	SA	T	M/SA	SA
Compliance Wells [f]									
199-K-18	–	–	–	T	–/Q	SA	T	–/Q	SA
199-K-19	–	–	–	T	–/Q	SA	T	–/Q	SA
199-K-20	–	–	–	T	–/Q	SA	T	–/Q	SA
199-K-32A	–	–	–	T	–/Q	SA	T	–/Q	SA
199-K-119A	–	–	–	T	–/Q	SA	T	–/Q	SA
199-K-125A	–	–	–	T	–/Q	SA	T	–/Q	SA
~~199-K-181~~	~~–~~	~~–~~	~~–~~	~~T~~	~~–/Q~~	~~SA~~	~~T~~	~~–/Q~~	~~SA~~
Extraction Wells									
199-K-141	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-153	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-154	–	–	–	T	W/Q	SA	T	M/SA	SA
199-K-163	–	–	–	T	W/Q	SA	T	M/SA	SA
Injection Wells									
199-K-121A	–	–	–	T	–	–	T	–	–
199-K-122A	–	–	–	T	–	–	T	–	–
199-K-123A	–	–	–	T	–	–	T	–	–
199-K-124A	=	=	=	T	=	=	T	=	=
199-K-128	–	–	–	T	–	–	T	–	–

100-KR-4 OU Monitoring Schedule for Combined KR-4 and KX Pump and Treat Systems. (4 pages)

Sample Group	System Pre-Startup (Baseline)[e]			System Start Up[d]			System Operation		
	Water Level	Cr[b,c]	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]
199-K-143	–	–	–	T	–	–	T	–	–
199-K-156	–	–	–	T	–	–	T	–	–
199-K-159	–	–	–	T	–	–	T	–	–
199-K-160	–	–	–	T	–	–	T	–	–
199-K-164	–	–	–	T	–	–	T	–	–
199-K-169	–	–	–	T	–	–	T	–	–
199-K-170	–	–	–	T	–	–	T	–	–
199-K-172	–	–	–	T	–	–	T	–	–
199-K-179	T	X	X	T	–	–	T	–	–
199-K-180	T	X	X	T	–	–	T	–	–
Performance Wells [f]									
199-K-19	–	–	–	T	–/SA	A	T	–/SA	A
199-K-21	–	–	–	T	–/SA	A	T	–/SA	A
199-K-22	–	–	–	T	–/SA	A	T	–/SA	A
199-K-32A	–	–	–	T	–/SA	A	T	–/SA	A
199-K-37	–	–	–	T	–/SA	SA	T	–/SA	SA
199-K-111A	–	–	–	T	–/SA	SA	T	–/SA	SA
~~199-K-124A~~	~~–~~	~~–~~	~~–~~	~~T~~	~~–/SA~~	~~SA~~	~~T~~	~~–/SA~~	~~SA~~
199-K-149	–	–	–	T	–/M	M	T	–/SA	SA
199-K-150	–	–	–	T	–/M	M	T	–/SA	SA
199-K-151	–	–	–	T	–/SA	A	T	–/SA	A
199-K-157	–	–	–	T	–/SA	SA	T	–/SA	SA
199-K-197	T	X	X	T	–/SA	SA	T	–/SA	SA
199-K-226	–	–	–	T	–/SA	SA	T	–/SA	SA
Treatment System									
Influent	–	–	–	–	W/SA	SA	–	M/SA	SA

100-KR-4 OU Monitoring Schedule for Combined KR-4 and KX Pump and Treat Systems. (4 pages)

Sample Group	System Pre-Startup (Baseline)[e]			System Start Up[d]			System Operation		
	Water Level	Cr[b,c]	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]	Water Level	Cr[b,c] Field/ Laboratory	Co-Contaminants and Target Analytes [a,c]
Effluent	–	–	–	–	W/SA	SA	–	M/SA	SA

[a] Co-contaminants, in accordance with the *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units at the Hanford Site (Interim Remedial Actions)* (EPA et al. 1996), are strontium-90 and tritium. Nitrate, carbon-14 and technetium-99 are target analytes.

[b] Groundwater samples associated with routine pump-and-treat operations are analyzed for hexavalent chromium by operators using a Hach® (registered trademark of the Hach Company, Loveland, Colorado) kit. All other samples are analyzed at the Waste Sampling and Characterization Facility (WSCF) using U.S. Environmental Protection Agency (EPA) Method 7196.

[c] Specific conductance, temperature, pH, turbidity, and dissolved oxygen will be measured for all laboratory samples.

[d] Startup duration is approximately 5 months and consists of Acceptance and Operational Testing. Estimated start February, 2010.

[e] System Pre-startup includes construction activities up to start of Acceptance Testing

[f] Except for new wells, System Start-Up sampling requirements for compliance and performance wells are specified only to insure that System Operation samples are maintained during Phase 2 realignment activities.

A = annual M = monthly Q = quarterly SA = semi-annually

T = hourly transducer or Tape During Sampling W = weekly X = one-time event Y = vertical profiling using Solinst™ sampler or similar.

TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 0747	TPA CHANGE NOTICE FORM	Date: 9/8/2016
Document Number, Title, and Revision: DOE/RL-2001-27, *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit*, Rev. 2		Date Document Last Issued: July 2016
Approved Change Notices Against this Document: N/A		
Originator: Art Lee		372-1763

Description of Change:
Modify Section 3.1.3.2 of the *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* as shown in the attached pages to provide clarification that triple rinsing is performed only if required to meet the ERDF waste acceptance criteria. This change constitutes request for concurrence from the Washington State Department of Ecology.

M.W. Cline (**DOE**) and N.M. Menard (**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 *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* (DOE/RL-2001-27, Rev. 2) is updated to clarify that triple rinse of vessels, piping and manifolds during demolition of the 100-NR-2 pump and treat system is performed only if required to meet the ERDF waste acceptance criteria.

Added text is shown with double underline. Deleted text is shown with ~~strikethrough~~.

Note: Original affected pages are pages 3-33 and 3-34.

Justification and Impacts of Change:

Triple rinsing of 100-NR-2 pump and treat system vessels, piping and manifolds as stated *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* would result in unnecessary work, waste generation, and increased worker risk if the waste profile already meets in the ERDF waste acceptance criteria. Triple rinsing of 100-NR-2 pump and treat system vessels, piping and manifolds is not required if the waste profile for the components already meet the ERDF waste acceptance criteria.

Approvals:

Michael W. Cline DOE Project Manager	9/8/16 Date	[X] Approved [ ] Disapproved
N/A EPA Project Manager	Date	[ ] Approved [ ] Disapproved
Nina M. Menard Ecology Project Manager	9/9/16 Date	[X] Approved [ ] Disapproved

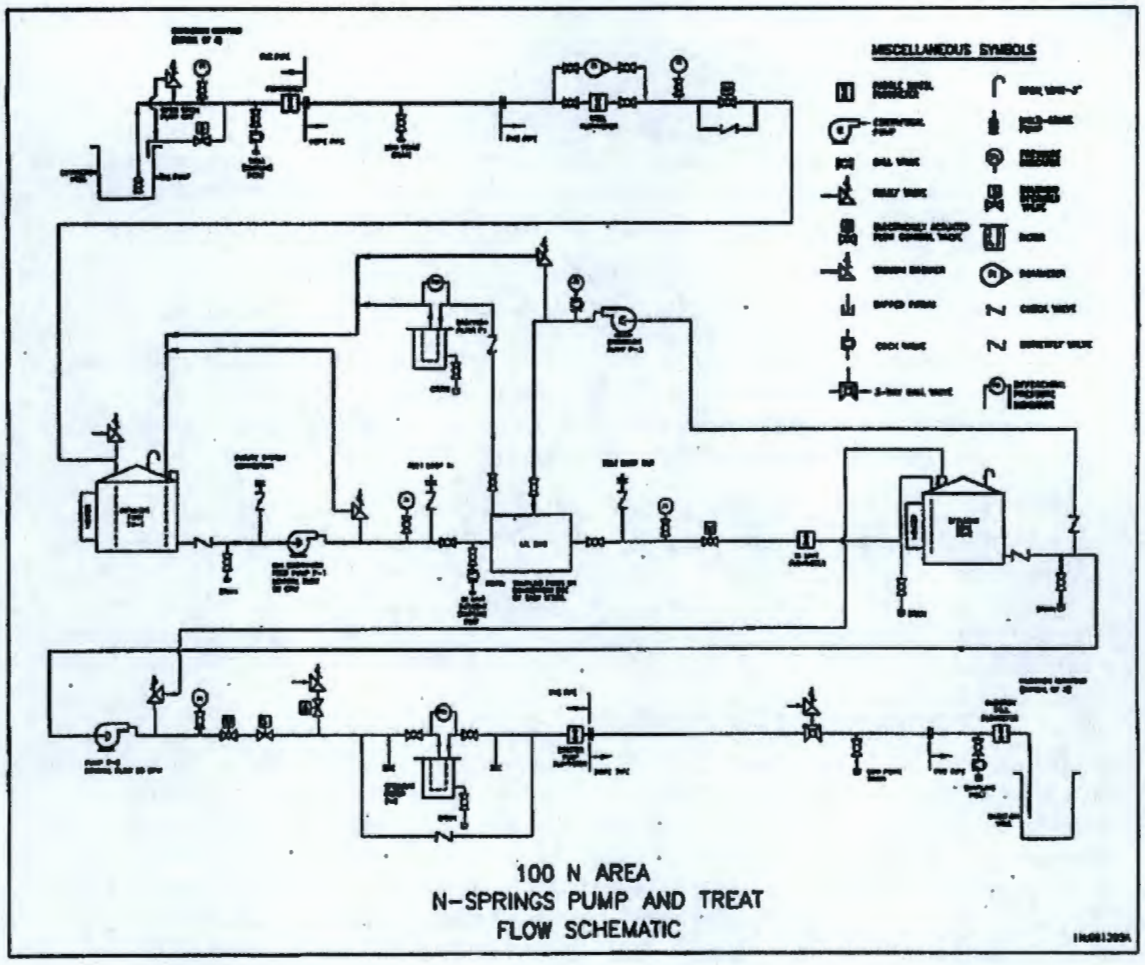

Figure 3-25. P&T Facility Flow Diagram

3.1.3.2 Shutdown Plan

The 100-NR-2 OU P&T system was placed in cold-standby status on March 9, 2006, in support of TPA (Ecology et al., 1989a) Milestone M-16-06-01, "Complete a Permeable Reactive Barrier at 100-N." Treatability testing for an apatite PRB began in April 2006. The system shutdown was required to allow equilibration before placement of the PRB.

The P&T system is scheduled to be permanently shut down, which will include the following:

- Residual IX media will be removed and disposed at ERDF. The IX vessels will be triple-rinsed if required to meet the ERDF waste acceptance criteria, and disposed at ERDF. If flushing is required to meet the ERDF waste acceptance criteria, ~~All~~ rinse/flushwater will be supplied by a portable tank or purgewater truck. The flushwater will be sent to the Purgewater Storage and Treatment Facility or the Effluent Treatment Facility, as appropriate, in accordance with DOE/RL-2000-41. All noncontact treatment system hardware will be dismantled and reused or salvaged. The shed also will be dismantled and reused or salvaged.

- Aboveground extraction piping will be triple-flushed with clean water if required to meet the ERDF waste acceptance criteria, disconnected at the wellhead tees, and disposed at ERDF.

- Manifolds and influent storage vessels that contacted untreated groundwater containing COCs will be triple-flushed with clean water if required to meet the ERDF waste acceptance criteria, disconnected, and disposed at ERDF.
- The down-well equipment in the extraction wells (e.g., pump, piping, and level transducer) will be disconnected where attached to the wellhead. The wellhead will be blanked and secured to meet Washington State regulations. The down-well equipment will be disposed in accordance with DOE/RL-2000-41.
- Pipe downstream from the IX skid has only been contacted by treated water and does not need to be flushed. The lines will be drained or blown out with air and then isolated by closing the valves.
- Extraction wells 199-N-75, 199-N-103A, 199-N-105A, and 199-N-106A will be maintained as monitoring wells in the 100-N Area groundwater monitoring network. The well completions (including surface seal, cap, and protective casing or monument) will be altered, if required, to comply with Washington State regulations for monitoring well construction.
- Injection well 199-N-104A will be maintained for use as a monitoring well in the 100-N Area groundwater monitoring network. Injection well 199-N-29 and backup injection well 199-N-31 will be maintained as potential monitoring wells. The well completions (including surface seal, cap, and protective casing or monument) will be altered, if required, to comply with Washington State regulations for monitoring well construction. Any well rack equipment located at the injection wells will be disconnected and disposed in accordance with DOE/RL-2000-41.

3.1.4 Petroleum Hydrocarbon Contamination

The Interim Action ROD, as amended (EPA, 2010), requires any free-floating product observed in any 100-N Area wells to be remediated. Petroleum hydrocarbon contamination as free product has occasionally been observed at wells 199-N-17 and 199-N-18. Well 199-N-17 went dry and was taken out of service and decommissioned. A passive removal method (Smart Sponge) was initiated in 2003 to remove the small amount of free product in Well 199-N-18. This approach was taken because the layer of floating petroleum was too thin for removal by active methods. The average mass removal rate in 2004 was 0.4 kg per month. Any additional wells with observed free product will be subject to this remediation approach.

The apatite barrier is located downgradient of the TPH-D source area and cuts across a relatively dilute, dissolved-phase plume that spreads from the TPH source area to the Columbia River (Figure 1-7). TPH-D was detected in samples from a number of wells in the upriver section of the PRB that were installed during implementation of the shoreline SAP and as reported in the borehole summary report (SGW-47791) (see Section 1.3.1 and Table 1-2). The apatite barrier injections have the potential to displace and dilute the dissolved-phase TPH mass located downgradient of the apatite barrier injection wells. Any TPH contaminant mass potentially mobilized upgradient (i.e., away from the river) will be spread into the surrounding aerobic zones where it is susceptible to aerobic biodegradation.

Along the shoreline, groundwater samples collected annually from the following monitoring wells and the aquifer tubes will continue to be analyzed for TPH-D: 199-N-173, 199-N-346, 199-N-96A, 199-N-347, 199-N-348, 199-N-349, 199-N-123, N116mArray-0A, and N116mArray-2A.

If additional groundwater monitoring or remediation is required for the petroleum release sites, the change control procedures specified in Chapter 4 will be used to amend this document.

TRI-PARTY AGREEMENT

Change Notice Number TPA-CN-0751	TPA CHANGE NOTICE FORM	Date: 9/29/16
Document Number, Title, and Revision: DOE/RL-2001-27, *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit*, Rev. 2		Date Document Last Issued: July 2016
Approved Change Notices Against this Document: TPA-CN-0747		
Originator: Art Lee		372-1763

Description of Change:
Modify Table 7-2 of the *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* as shown in the attached pages to delineate which activities are dependent on finalization of analysis in the 100-N area RI/FS. This change constitutes request for concurrence from the Washington State Department of Ecology.

M.W. Cline (DOE) and N.M. Menard (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 footnotes in Table 7-2, Interim RD/RAWP Schedule, of the *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* (DOE/RL-2001-27, Rev. 2) are updated to clarify which activities are dependent on finalization of analysis in the 100-N area RI/FS.

Added text is shown with double underline. Deleted text is shown with ~~strikethrough~~.

Note: Original affected page is page 7-2.

Justification and Impacts of Change:

Schedule in Table 7-2 modified to clarify footnotes related to which activities are dependent on finalization of analysis in the 100-N area RI/FS.

Approvals:

Michael W. Cline DOE Project Manager	9/29/2016 Date	[X] Approved [ ] Disapproved
N/A EPA Project Manager	Date	[ ] Approved [ ] Disapproved
Nina M. Menard Ecology Project Manager	9/30/16 Date	[X] Approved [ ] Disapproved

"Assessment of Adverse Effects") have deemed the project to have an "adverse effect" on the traditional cultural property, as defined in 36 CFR 800.5(b). As such, the work involved in completion of the barrier and the facility decommissioning and demolition is dependent upon completion of the NHPA Section 106 reviews and is subject to schedule delays pending establishment of a memorandum of understanding to conduct the project activities deemed to have an adverse effect on the traditional cultural property.

Table 7-1. 100-NR-2 OU Interim Action Cost Estimate (2014 through 2018)

Activity	Estimated Cost ($)
Project support	2,739,460
PRB performance monitoring	2,138,564
Groundwater monitoring and reporting	6,371,949
Operations and maintenance	2,429,371
Saturated zone injections	5,363,769
Vadose zone injections	7,494,890
TPH removal	175,385
Pump and treat decommissioning and demolition	1,601,124
Saturated zone injections (reinjections)	1,610,791
Total estimated cost	**$27,882,422**

Table 7-2. Interim RD/RAWP Schedule

Activity	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Initiate and complete work to expand groundwater PRB to 579 m (1,900 ft)	X[a]			X[b,c]	X[b,c]
Initiate and complete work to expand groundwater PRB to 762 m (2,500 ft)	X[a]			X[b,c]	X[b,c]
Initiate and complete work for vadose zone jet injection 305 m (1,000 ft)	X[a]			X[b]	X[b]
Pump and treat facility decommissioning planning	X				
Pump and treat decommissioning and demolition			X	X	
PRB monitoring	X	X	X	X	X
PRB reinjections, as needed				X[b]	X[b]

a. Activity initiated but then suspended to complete cultural resources reviews associated with revision of traditional cultural property boundary.

b. Anticipated period of performance ~~following~~including completion of *National Historic Preservation Act of 1966* Section 106 reviews.

c. Anticipated period of performance following ~~and~~ confirmation of PRB placement based on finalization of analysis in the 100-N Area RI/FS (DOE/RL-2012-15, Rev 0 pending).

FY = fiscal year

PRB = permeable reactive barrier

A second set of PRB injections will occur within 5 years of the first injections, if necessary (as described in Section 3.1.1.4). Monitoring will be conducted until the preliminary remediation goal has been achieved along the length of the PRB at the river boundary, which, according to the groundwater modeling presented in the 100-N Area RI/FS (DOE/RL-2012-15, Draft A), is approximately the

TRI-PARTY AGREEMENT

Change Notice Number TPA-CN-0751	TPA CHANGE NOTICE FORM	Date: 9/29/16
Document Number, Title, and Revision: DOE/RL-2001-27, *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit*, Rev. 2		Date Document Last Issued: July 2016
Approved Change Notices Against this Document: TPA-CN-0747		
Originator: Art Lee		372-1763

Description of Change:
Modify Table 7-2 of the *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* as shown in the attached pages to delineate which activities are dependent on finalization of analysis in the 100-N area RI/FS. This change constitutes request for concurrence from the Washington State Department of Ecology.

M.W. Cline (**DOE**) and N.M. Menard (**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 footnotes in Table 7-2, Interim RD/RAWP Schedule, of the *Remedial Design/Remedial Action Work Plan for the 100-NR-2 Operable Unit* (DOE/RL-2001-27, Rev. 2) are updated to clarify which activities are dependent on finalization of analysis in the 100-N area RI/FS.

Added text is shown with double underline. Deleted text is shown with ~~strikethrough~~.

Note: Original affected page is page 7-2.

Justification and Impacts of Change:

Schedule in Table 7-2 modified to clarify footnotes related to which activities are dependent on finalization of analysis in the 100-N area RI/FS.

Approvals:

Michael W. Cline DOE Project Manager	9/29/2016 Date	[X] Approved [ ] Disapproved
N/A EPA Project Manager	Date	[ ] Approved [ ] Disapproved
Nina M. Menard Ecology Project Manager	9/30/16 Date	[X] Approved [ ] Disapproved

"Assessment of Adverse Effects") have deemed the project to have an "adverse effect" on the traditional cultural property, as defined in 36 CFR 800.5(b). As such, the work involved in completion of the barrier and the facility decommissioning and demolition is dependent upon completion of the NHPA Section 106 reviews and is subject to schedule delays pending establishment of a memorandum of understanding to conduct the project activities deemed to have an adverse effect on the traditional cultural property.

Table 7-1. 100-NR-2 OU Interim Action Cost Estimate (2014 through 2018)

Activity	Estimated Cost ($)
Project support	2,739,460
PRB performance monitoring	2,138,564
Groundwater monitoring and reporting	6,371,949
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Pump and treat decommissioning and demolition	1,601,124
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Total estimated cost	**$27,882,422**

Table 7-2. Interim RD/RAWP Schedule

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Initiate and complete work to expand groundwater PRB to 579 m (1,900 ft)	X[a]			X[b,c]	X[b,c]
Initiate and complete work to expand groundwater PRB to 762 m (2,500 ft)	X[a]			X[b,c]	X[b,c]
Initiate and complete work for vadose zone jet injection 305 m (1,000 ft)	X[a]			X[b]	X[b]
Pump and treat facility decommissioning planning	X				
Pump and treat decommissioning and demolition			X	X	
PRB monitoring	X	X	X	X	X
PRB reinjections, as needed				X[b]	X[b]

a. Activity initiated but then suspended to complete cultural resources reviews associated with revision of traditional cultural property boundary.

b. Anticipated period of performance ~~following~~including completion of *National Historic Preservation Act of 1966* Section 106 reviews.

c. Anticipated period of performance following ~~and~~ confirmation of PRB placement based on finalization of analysis in the 100-N Area RI/FS (DOE/RL-2012-15, Rev 0 pending).

FY = fiscal year

PRB = permeable reactive barrier

A second set of PRB injections will occur within 5 years of the first injections, if necessary (as described in Section 3.1.1.4). Monitoring will be conducted until the preliminary remediation goal has been achieved along the length of the PRB at the river boundary, which, according to the groundwater modeling presented in the 100-N Area RI/FS (DOE/RL-2012-15, Draft A), is approximately the

TRI-PARTY AGREEMENT

Change Notice Number	TPA CHANGE NOTICE FORM	Date:
TPA-CN- 0752		September 22, 2016

Document Number, Title, and Revision:	Date Document Last Issued:
DOE/RL-2016-42, Sampling and Analysis Plan for KW Pump and Treat System Rebound Study, Rev. 0	May 2016

Approved Change Notices Against this Document: N/A

Originator: S.N. Balone	Phone: 509-376-0236

Description of Change:
This change notice adjusts the sampling period as well as updates the sampling frequency for the well network based on data collected through August 31, 2016.

Michael W. Cline (**DOE**) and Rod Lobos (**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*.

- Page v, Executive Summary, Line 11 - Change September 2016 to March 2017.
- Page 3-1, Section 3.1 Constituent List and Sampling Frequency, Line 35 - Change September 2016 to March 2017.
- Pages 3-3 through 3-5, Table 3-1, - Reduce monitoring frequency based on current measurements and observations and update table notes.
- Page 3-9, Table 3-2 - Update well attributes for wells 199-K-223 and 199-K-224.
- Page 3-13, Table 3-5 - Reduce monitoring frequency based on current measurements and observations and update table notes.
- Appendix C, page C-2 & C-3, Table C-2 - Update well attributes for wells 199-K-223 and 199-K-224 and update footnotes.

Added text is denoted by double underline. Deleted text is denoted by ~~strikethrough~~.

Note: Include affected page number(s). v, 3-1, 3-3, 3-4, 3-5, 3-9, 3-13, C-2, C-3

Justification and Impacts of Change:
At the beginning of January 2016, all groundwater monitoring locations associated with the KW pump and treat system exhibited hexavalent chromium concentrations below the 20 µg/L interim remedial action groundwater target concentration. Based on this observation, the KW pump and treat system was shut down May 16, 2016 to initiate a rebound study. At the time, the monitoring period identified in DOE/RL-2016-42 was identified to end September 30, 2016. As of September 1, 2016, the only wells with noticeable increases in hexavalent chromium concentrations are 199-K-205 and 199-K-173. These wells are at or immediately down gradient of the former 183-KW Head house. Concentrations at these locations have increased from approximately 10 µg/L to 40 µg/L over the course of 4 months.

Based on current observations, it is appropriate to continue the KW rebound study with modifications to sampling requirements. The general approach to changes in the rebound sampling is to reduce the sampling and analysis frequency in locations that have not exhibited changes in hexavalent chromium concentration over the past four months, while maintaining sampling frequency in wells that have exhibited change. It is also important to maintain a level of understanding in the distal portions of the plume in case a decision is made to restart the KW pump and treat system in focused areas. Monitoring locations that have exhibited changes in concentration of other analytes (e.g., strontium-90, carbon-14, tritium, nitrate, or trichloroethene) will be modified based on the change in concentration over the preceding 4 month period.

Approvals:

Michael W. Cline DOE Project Manager	9/29/2016 Date	[X] Approved [ ] Disapproved
EPA Project Manager	9-28-16 Date	[X] Approved [ ] Disapproved
N/A Ecology Project Manager	Date	[ ] Approved [ ] Disapproved

Executive Summary

This document presents a groundwater sampling and analysis plan to support a hexavalent chromium rebound study at the KW pump and treat system located within the 100-KR-4 Groundwater Operable Unit on the Hanford Site.

Groundwater in the area affected by the KW pump and treat system has exhibited hexavalent chromium concentration below the interim remedial action target concentration of 20 µg/L at all monitoring locations since January 2016. This area has been selected for performing a rebound study to assess the completion of the interim remedial action. The pump and treat system will be shut down, the wells configured for groundwater monitoring, and sampling activities will be conducted between May and ~~September 2016~~March 2017. During the course of the study, groundwater conditions and monitoring results will be assessed and a path forward will be identified.

A total of 37 wells and nearby aquifer tubes will be included in the KW pump and treat rebound study sampling activity. All available monitoring locations associated with the KW pump and treat system will be used for sample collection.

3 Groundwater Sampling Program

This chapter describes the Cr(VI) rebound groundwater sampling and analysis activity for the KW pump and treat affected area which consists of a monitoring well network, parameters used as indicators of groundwater contamination, parameters establishing groundwater quality, and sampling and analysis protocols. The monitoring program presented herein is intended to specifically apply to the Cr(VI) rebound study conducted in the vicinity of the KW pump and treat system over a duration of several months.

Groundwater monitoring in the 100-KR-4 Groundwater OU is currently specified in DOE/RL-2006-52. New wells for extraction, injection, or monitoring purposes added to the 100-KR-4 interim action are installed in accordance with DOE/RL-2013-36, *100-KR-4 Groundwater Operable Unit Well Installation Sampling and Analysis Plan*, through well-specific addenda (i.e., DOE/RL-2013-36-ADD1, *100-KR-4 Groundwater Operable Unit Well Installation Sampling and Analysis Plan Addendum 1: 199-K-202, 199-K-205, 199-K-206, and 199-K-220*; DOE/RL-2013-36-ADD2, *100-KR-4 Groundwater Operable Unit New Well Installation Sampling and Analysis Plan Addendum 2: 199-K-203, 199-K-204, 199-K-207, 199-K-208, 199-K-209, 199-K-210, 199-K-211, and 199-K-212*; and DOE/RL-2013-36-ADD3, *100-KR-4 Groundwater Operable Unit New Well Installation Sampling and Analysis Plan Addendum 3: 199-K-223, 199-K-224, 199-K-225, and 199-K-226*), which also provide the proposed sampling schedules. Changes in the monitoring schedule or analytes will be made through Tri-Party Agreement (Ecology et al., 1989) change notices or revision to this SAP.

3.1 Constituent List and Sampling Frequency

Table 3-1 presents the selected monitoring locations (i.e., wells and aquifer tubes), parameters analyzed, and sampling frequency for sampling during the KW pump and treat rebound study. Specific contaminant measurements identified to support the KW pump and treat rebound study are Cr(VI) in groundwater, along with measurement of the co-contaminants nitrate, trichloroethene, tritium, strontium-90, and carbon-14. Additional measurements include aquifer physical properties (i.e., pH, specific conductance, temperature, and dissolved oxygen) and major ions for geochemical evaluation (i.e., calcium, magnesium, sodium, potassium, chloride, bicarbonate, sulfate).

Groundwater samples will be collected on a schedule based on the relative proximity of monitoring locations to the apparent secondary source areas, with the monitoring locations within the source areas being sampled most frequently (e.g., every other week) and locations more distant from the source areas sampled less frequently (e.g., monthly, bi-monthly, quarterly). Groundwater elevation will be measured manually during each groundwater sampling event; existing AWLN stations will remain in service and will record hourly groundwater elevation measurements. The rebound study sampling is anticipated to begin after a planned shutdown of the KW pump and treat system in May 2016. The rebound sampling will continue through ~~September 2016~~March 2017. In August 2016, the sampling data will be evaluated and a decision made regarding the need to restart the pump and treat system or to continue sampling.

Table 3-1. Monitoring Well Network for the KW Pump and Treat Rebound Study, Target Analytes, and Monitoring Frequency

				Contaminants of Concern							Groundwater Geochemistry (All Filtered Aliquots)							Groundwater Properties						
Location Name	Well ID	Plant ID	Location Type	Hexavalent Chromium (Filtered Aliquot)	Total Chromium (Filtered and Unfiltered)	Nitrate	Carbon-14	Strontium-90	Tritium	Trichloroethene	Calcium	Potassium	Magnesium	Sodium	Sulfate	Chloride	Bicarbonate	Dissolved Oxygen	Temperature	Turbidity	pH	Oxidation-Reduction Potential	Specific Conductance	Water-Level Measurement
199-K-106A	A9842	N/A	Groundwater well, C-14 source area	~~BiW~~M	~~BiM~~ 2x	~~BiW~~ M	~~BiW~~ M	~~BiM~~ 2x	~~BiW~~ M	M2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-107A	A9843	N/A	Groundwater well, Sr-90 source area	~~BiW~~M	~~BiM~~ 2x	2x	2x	~~BiW~~ M	~~BiW~~ M	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	AWLN[a]
199-K-108A	A9844	N/A	Groundwater well, peripheral Cr(VI) plume	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	AWLN[a]
199-K-132	C4670	WE1	Converted extraction well, High C-14 plume area	BiW	BiM	BiW	BiW	~~BiM~~ 2x	~~BiW~~ BiM	M	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-137	C5112	WE8	Converted extraction well, Cr(VI) source area	~~BiW~~M	~~M~~2x	2x	2x	2x	2x	2x	BiM	BiM	BiM	BiM	BiM	BiM	BiM	a	a	a	a	a	a	a
199-K-138	C5113	WE2	Converted extraction well, distal Cr(VI) plume area	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-139	C5114	WE3	Converted extraction well, distal Cr(VI) plume, Sr-90 plume	BiM	BiM	2x	2x	BiM	BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-140	C5115	WE4	Converted extraction well, distal Cr(VI) plume.	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-158	C5484	WJ1	Converted injection well	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-165	C6451	WE7	Converted extraction well, Cr(VI) source area	~~BiW~~M	M	2x	2x	2x	2x	2x	BiM	BiM	BiM	BiM	BiM	BiM	BiM	a	a	a	a	a	a	a
199-K-166	C6452	WE6	Converted extraction well, Cr(VI) peripheral plume	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-168	C6454	WE5	Converted extraction well, Cr(VI) plume, deep screen	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-173	C7016	WE10	Converted extraction well, Cr(VI) source area	BiW	M	2x	2x	2x	2x	2x	BiM	BiM	BiM	BiM	BiM	BiM	BiM	a	a	a	a	a	a	a
199-K-174	C7061	WJ3	Converted injection well	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-175	C7062	WJ4	Converted injection well	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-183	C7683	N/A	Groundwater well, peripheral Cr(VI) plume	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	AWLN[a]
199-K-184	C7684	N/A	Groundwater well, peripheral Cr(VI) plume	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	AWLN[a]
199-K-185	C7685	N/A	Groundwater well, peripheral Cr(VI) plume, distal C-14 plume	~~BiM~~M	BiM	M	M	~~BiM~~ 2x	M	M	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	AWLN[a]
199-K-196	C7696	WE9	Converted extraction well, distal Cr(VI) plume	BiM	BiM	2x	2x	2x	2x	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a

Table 3-1. Monitoring Well Network for the KW Pump and Treat Rebound Study, Target Analytes, and Monitoring Frequency

				Contaminants of Concern							Groundwater Geochemistry (All Filtered Aliquots)							Groundwater Properties						
Location Name	Well ID	Plant ID	Location Type	Hexavalent Chromium (Filtered Aliquot)	Total Chromium (Filtered and Unfiltered)	Nitrate	Carbon-14	Strontium-90	Tritium	Trichloroethene	Calcium	Potassium	Magnesium	Sodium	Sulfate	Chloride	Bicarbonate	Dissolved Oxygen	Temperature	Turbidity	pH	Oxidation-Reduction Potential	Specific Conductance	Water-Level Measurement
199-K-204	C8291	N/A	Groundwater well, peripheral Cr(VI) plume, peripheral C-14 plume	~~BiW~~M	BiM	~~BiW~~ M	~~BiW~~ M	~~M~~2x	~~BiW~~ BiM	M	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-205	C8292	WE11	Converted extraction well, Cr(VI) source area	BiW	M	2x	2x	2x	2x	2x	BiM	BiM	BiM	BiM	BiM	BiM	BiM	a	a	a	a	a	a	a
199-K-206	C8293	WJ2	Converted injection well	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-31	A4656	N/A	Groundwater well, distal plume bounding	BiM	BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	AWLN[a]
199-K-34	A4660	N/A	Groundwater well, distal Cr(VI) plume, Sr-90 plume	~~BiW~~M	BiM	~~BiW~~ M	~~BiW~~ M	~~BiW~~ M	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
199-K-223[b]	C9595	N/A	Planned groundwater well, Cr(VI) source area	BiW	M	2x	2x	2x	2x	2x	BiM	BiM	BiM	BiM	BiM	BiM	BiM	a	a	a	a	a	a	~~AWLN[a]~~
199-K-224[b]	C9596	N/A	Planned groundwater well, Cr(VI) source area	BiW	M	2x	2x	2x	2x	2x	BiM	BiM	BiM	BiM	BiM	BiM	BiM	a	a	a	a	a	a	~~AWLN[a]~~
17-D	B8161	N/A	Aquifer tube, distal Cr(VI) and C-14 plume boundary	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
17-M	B8162	N/A	Aquifer tube, distal Cr(VI) and C-14 plume boundary	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
AT-K-1-D[c]	C4339	N/A	Aquifer tube, distal Cr(VI) boundary	~~2x~~BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
AT-K-1-M[c]	C4340	N/A	Aquifer tube, distal Cr(VI) boundary	~~2x~~BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
AT-K-1-S[c]	C4341	N/A	Aquifer tube, distal Cr(VI) boundary	~~2x~~BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
C6236	C6236	N/A	Aquifer tube, distal Cr(VI) boundary	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
C6237	C6237	N/A	Aquifer tube, distal Cr(VI) boundary	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
C6238	C6238	N/A	Aquifer tube, distal Cr(VI) boundary	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
C7641	C7641	N/A	Aquifer tube, distal Cr(VI) and C-14 plume boundary	~~2x~~BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
C7642	C7642	N/A	Aquifer tube, distal Cr(VI) and C-14 plume boundary	~~2x~~BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a
C7643	C7643	N/A	Aquifer tube, distal Cr(VI) and C-14 plume boundary	~~2x~~BiM	~~2x~~ BiM	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	a	a	a	a	a	a	a

Table 3-1. Monitoring Well Network for the KW Pump and Treat Rebound Study, Target Analytes, and Monitoring Frequency

				Contaminants of Concern							Groundwater Geochemistry (All Filtered Aliquots)							Groundwater Properties						
Location Name	Well ID	Plant ID	Location Type	Hexavalent Chromium (Filtered Aliquot)	Total Chromium (Filtered and Unfiltered)	Nitrate	Carbon-14	Strontium-90	Tritium	Trichloroethene	Calcium	Potassium	Magnesium	Sodium	Sulfate	Chloride	Bicarbonate	Dissolved Oxygen	Temperature	Turbidity	pH	Oxidation-Reduction Potential	Specific Conductance	Water-Level Measurement

a. Groundwater properties and water levels will be measured during every well trip. Water level at aquifer tube locations will be derived from Columbia River stage elevation.

~~b. Drilling for identified wells is planned to start May 25th, 2016. Sampling will commence once the well is constructed.~~

~~c. Aquifer tubes AT-K-1-D, AT-K-1-M, and AT-K-1-S are configured for sampling during both high and low river stages. Sampling will be conducted in June and September 2016.~~

AWLN = automated water-level network

C-14 = carbon-14

Cr(VI) = hexavalent chromium

ID = identification

N/A = not applicable

Sr-90 = strontium-90

Monitoring frequency legend:

2x = During the initial KW pump and treat rebound study, two sampling events will occur at the identified location for the given contaminant. The study begins May 30 and ends September 30; aquifer tubes should be sampled during early and late September 2016. Wells identified for 2x sampling should be sampled in June and September. The rebound study continues starting October 1, 2016 and end March 31, 2017. All locations identified for 2x sampling should be sampled November 2016 and February 2017.

BiM = Contaminant will be sampled every other month, starting in June (sample in June, August, ~~and~~ September, October, and December) 2016, and February 2017).

BiW = Contaminant will be sampled every other week starting May 30, with last weekly sampling event the week of ~~September 23, 2016~~March 31, 2017.

M = Contaminant will be sampled on a monthly basis starting in June 2016.

Table 3-2. Attributes for Wells in the KW Pump and Treat Rebound Study Network

Monitoring Location Name	Construction Date	Easting[a]	Northing[a]	Ground Surface Elevation[b] (m amsl)	Top of Screen (m [ft] bgs)	Bottom of Screen (m [ft] bgs)	Depth to Water (m [ft] bgs)	Depth to Water Date
199-K-204	10/22/2014	568648.34	146572.85	142.476	19.0 (62.2)	47.9 (157.2)	22.8 (74.9)	Aug. 2014
199-K-205	2/3/2014	568845.67	146090.86	148.034	24.4 (80.1)	54.9 (180.1)	26.5 (87.1)	Sept. 2013
199-K-206	3/31/2014	568734.33	146049.54	150.207	24.5 (80.3)	54.9 (180.3)	29.1 (95.6)	Feb. 2014
199-K-223[c]	~~TBD~~9/8/2016	568781.31	146145.49	~~TBD~~144.6	~~TBD~~21.9 (72.0)	~~TBD~~52.4 (172.0)	~~TBD~~24.0 (78.7)	~~TBD~~Sept. 2016
199-K-224[c]	~~TBD~~8/24/2016	568734.73	146205.99	~~TBD~~145.7	~~TBD~~23.9 (78.3)	~~TBD~~54.3 (178.3)	~~TBD~~25.4 (83.4)	~~TBD~~Aug. 2016
17-D	10/10/1997	568480.00	146895.93	--	--	--	--	--
17-M	10/10/1997	568480.00	146895.93	--	--	--	--	--
AT-K-1-D	2/3/2004	568327.31	146807.11	--	--	--	--	--
AT-K-1-M	2/3/2004	568325.50	146806.94	--	--	--	--	--
AT-K-1-S	2/3/2004	568324.62	146805.78	--	--	--	--	--
C6236	8/24/2008	568031.67	146606.75	--	--	--	--	--
C6237	8/24/2008	568031.5	146603.73	--	--	--	--	--
C6238	8/24/2008	568033.65	146604.18	--	--	--	--	--
C7641	3/31/2010	568489.16	146934.31	--	--	--	--	--
C7642	3/31/2010	568490.69	146936.42	--	--	--	--	--
C7643	4/1/2010	568494.19	146939.5	--	--	--	--	--

a. Coordinates are in NAD83, *North American Datum of 1983*.

b. Elevations are in NAVD88, *North American Vertical Datum of 1988*.

c. Well construction information is based on daily reports and subject to change. ~~Identified location has not been drilled.~~

-- = data are not applicable due to monitoring location type.

amsl = above mean sea level

bgs = below ground surface

Table 3-5. KW Pump and Treat Rebound Study Wells for Vertical Sampling

Well Name	Well ID	Plant ID	Screen Size (in.)	Slot Size (in.)	Screened Interval (m [ft] bgs)	Sample Frequency	Sample Depths	Analyte
199-K-137	C5112	WE8	6	0.03	15 – 30 (50 – 100)	~~BiW~~[a]M	0.6 m (2 ft) below estimated WL 29 m (95 ft) bgs	Cr(VI)
199-K-165	C6451	WE7	6	0.02	17 – 50.6 (56 – 166)	~~BiW~~[a]M	0.6 m (2 ft) below estimated WL 35 m (115 ft) bgs 47 m (155 ft) bgs	Cr(VI)
199-K-173	C7016	WE10	6	0.02	19 – 37.5 (63 – 123)	~~BiW~~[a]M	0.6 m (2 ft) below estimated WL 30 m (100 ft) bgs	Cr(VI)
199-K-205	C8292	WE11	6	0.04	24.4 – 54.9 (80.1 - 180.1)	BiW[a]	0.6 m (2 ft) below estimated WL 41 m (135 ft) bgs 51.8 m (170 ft) bgs	Cr(VI)
199-K-223[b]	C9595	N/A	6	0.04	~~TBD (30 m [100 ft] screen~~ 21.9 – 52.4 (72.0 – 172.0)	BiW[a]	0.6 m (2 ft) below estimated WL ~~TBD~~41 m (135 ft) bgs ~~TBD~~52 m (170 ft) bgs	Cr(VI)
199-K-224[b]	C9596	N/A	6	TBD	~~TBD (30 m [100 ft] screen)~~ 23.9 – 54.3 (78.3 – 178.3)	BiW[a]	0.6 m (2 ft) below estimated WL ~~TBD~~40 m (130 ft) bgs ~~TBD~~53 m (175 ft) bgs	Cr(VI)

a. Identified wells will have vertical sampling at the depths specified on alternate weeks.

b. Well construction information is based on daily reports and subject to change.

~~b. Drilling for identified wells is planned to start May 25th, 2016. Sampling will commence once the well is constructed. Sample depths will be determined based on sample results collected during drilling.~~

bgs = below ground surface
Cr(VI) = hexavalent chromium
ID = identification
N/A = not applicable
TBD = to be determined
WL = water level

Table C-2. Sampling Interval Information for Wells Within the KW Pump and Treat Rebound Study Area

Well or Aquifer Tube Name	Hydrogeologic Unit Monitored	Reference Elevation (m)	Elevation Top of Open Interval (m)	Elevation Bottom of Open Interval (m)	Open Interval Length (m)	Water-Level Elevation (m)	Water-Level Date
199-K-108A	TU	142.77	121.64	115.43	6.20	119.58	3/01/2016
199-K-132	TU	135.96	120.71	113.09	7.62	Ext	N/A*
199-K-137	UU	142.40	127.16	111.92	15.24	Ext	N/A*
199-K-138	TU	134.22	119.48	108.82	10.67	Ext	N/A*
199-K-139	TU	142.81	123.42	112.75	10.67	Ext	N/A*
199-K-140	TU	142.56	123.36	112.69	10.67	Ext	N/A*
199-K-158	UU	145.50	126.57	112.86	13.72	Inj	N/A*
199-K-165	U	145.46	128.39	94.86	33.53	Ext	N/A*
199-K-166	U	144.54	124.43	93.95	30.48	Ext	N/A*
199-K-168	LU	142.59	111.91	93.69	18.22	Ext	N/A*
199-K-173	U	145.63	126.42	108.14	18.29	Ext	N/A*
199-K-174	U	148.19	127.43	109.14	18.29	Inj	N/A*
199-K-175	U	152.47	126.89	108.61	18.29	Inj	N/A*
199-K-183	U	140.33	126.00	107.72	18.29	119.96	03/01/2016
199-K-184	LU	142.84	106.94	93.22	13.72	119.54	02/05/2016
199-K-185	U	134.62	122.88	93.93	28.96	118.96	03/01/2016
199-K-196	U	133.96	122.98	94.03	28.95	Ext	N/A*
199-K-204	U	142.48	123.52	94.56	28.95	Inj	N/A*
199-K-205	U	148.03	123.62	93.13	30.48	Ext	N/A*
199-K-206	U	150.21	125.75	95.26	30.48	Inj	N/A*
199-K-223[a]	~~TBD~~ U	~~TBD~~ 144.6	~~TBD~~ 122.66	~~TBD~~ 92.19	~~TBD~~ 30.48	~~TBD~~ 120.61	~~N/A*~~ 9/8/2016
199-K-224[a]	~~TBD~~ U	~~TBD~~ 145.7	~~TBD~~ 121.85	~~TBD~~ 91.37	~~TBD~~ 30.48	~~TBD~~ 120.32	~~N/A*~~ 8/24/2016
17-D	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
17-M	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
AT-K-1-D	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
AT-K-1-M	N/A	(-)	(-)	(-)	(-)	(-)	N/A*

Table C-2. Sampling Interval Information for Wells Within the KW Pump and Treat Rebound Study Area

Well or Aquifer Tube Name	Hydrogeologic Unit Monitored	Reference Elevation (m)	Elevation Top of Open Interval (m)	Elevation Bottom of Open Interval (m)	Open Interval Length (m)	Water-Level Elevation (m)	Water-Level Date
AT-K-1-S	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
C6236	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
C6237	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
C6238	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
C7641	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
C7642	N/A	(-)	(-)	(-)	(-)	(-)	N/A*
C7643	N/A	(-)	(-)	(-)	(-)	(-)	N/A*

Notes:

a – Information is based on daily reports and subject to change.

*	=	static water level not available
(-)	=	data are not applicable due to monitoring location type
Ext	=	pump and treat extraction well; water level is dynamic during operation
Inj	=	pump and treat injection well; water level is dynamic during operation
LU	=	lower unconfined
N/A	=	not applicable
TBD	=	to be determined; well is not yet constructed
TU	=	top of unconfined
U	=	undifferentiated unconfined
UU	=	upper unconfined