Appendix B

Supporting Information for RCRA and Other Monitoring Facilities

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B Supporting Information for RCRA and Other Monitored Facilities

This chapter provides supplemental information for the *Resource Conservation and Recovery Act of 1976* (RCRA) and other regulated units on the Hanford Site that require groundwater monitoring, excluding *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) operable units (discussed in Appendix A). Site-specific information for each facility included in each chapter of the report, under the respective groundwater interest area in which the facility is located.

Groundwater monitoring under RCRA continued during the reporting period at 26 waste management areas. Estimates of groundwater velocity, hydrologic properties, and associated references are shown in Table B-1 for the RCRA sites.

To determine if a waste site has adversely affected groundwater quality under RCRA interim status regulations (WAC 173-303-400, "Dangerous Waste Regulations," "Interim Status Facility Standards"; 40 CFR 265.93, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Preparation, Evaluation, and Response"), concentrations of indicator parameters in downgradient wells are compared to statistically derived critical mean values. The indicator parameters under interim status are specific conductance, pH, total organic carbon (TOC), and total organic halides (TOX). The critical values to which the indicator parameters are compared represent 99 percent prediction limits, which are calculated for each facility based on samples from upgradient wells. The methodology used to calculate the critical value is the Student's t-test in accordance with 40 CFR 265.93(b). The formula and individual parameters for the test are provided in Section 7.1 of PNNL-13080, *Hanford Site Groundwater Monitoring: Setting, Sources and Methods*. The upper prediction limits (and lower limit in the case of pH) are also referred to as critical mean values.

Critical mean values are recalculated annually or if the number of analyses changes. Annual recalculation accounts for changing background conditions. Changes in the number of analyses are usually the result of changes in monitoring well networks (e.g., wells are added or deleted). If changes occur in a monitoring well network, critical mean values for that facility are recalculated for subsequent semiannual sampling events using the new well network. Details for the critical mean values for RCRA sites, and comparison values for other monitored facilities, are provided in ECF-Hanford-14-0043, Rev. 0, *Calculation of Critical Means for Calendar Year 2014 RCRA Groundwater Monitoring.*.

Tables B-3 through B-88 provide supporting information for the RCRA sites, including the comparison values (critical mean values and limits of quantitation) used during the reporting period.

This chapter also provides constituent lists, well network configurations, and other ancillary information for regulated facilities that fall outside of the RCRA program. Some network wells in these facilities are shared with RCRA facilities. Tables B-89 through B-94 list the constituents and/or the results summaries for these facilities.

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
116-N-1 LWDF	West-northwest	0.04 – 0.70	Darcy	6.1 – 37 (PNL-8335)	—	1.9×10^{-3}	Trend surface analysis.
120-N-1 and 120-N-2	West-northwest	0.02 – 0.36	Darcy	6.1 – 37 (PNL-8335)	—	9.6×10^{-4}	Trend surface analysis.
116-N-3 LWDF	North	0.03 – 0.48	Darcy	6.1 – 37 (PNL-8335)	—	1.3×10^{-3}	Trend surface analysis.
116-H-6 Evaporation Basins	North-northeast	0.20 – 5.5	Darcy	15 – 140 (PNL-6728)	—	3.9×10^{-3}	Trend surface analysis.
216-A-29 Ditch	South-southeast	0.0036	Darcy	18 (WHC-SD-EN-DP-047, *Borehole Completion Data Package for the 216-A-29 RCRA Facility*)	0.1	2.0×10^{-5}	Gradient and flow direction based on 2013 trend surface analysis. Low gradient well network (SGW-54165).
216-A-36B Crib	Southeast	0.0013 – 0.22	Darcy	18 – 3,000 (PNNL-11523)	0.1	7.4×10^{-6}	Gradient derived using 2013 low gradient groundwater contour map (Figure 10-3). Flow direction based on 2013 low gradient groundwater contour map and plume movement. Low gradient well network (SGW-54165).

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
216-A-37-1 Crib	South-southeast	0.0036 – 0.6	Darcy	18 – 3,000 (PNNL-11523)	—	2.0×10^{-5}	Gradient and flow direction based on 2013 trend surface analysis. Low gradient well network (SGW-54165).
216-B-3 Pond	Southwest	0.0056	Darcy	1.0 (WHC-SD-EN-EV-002 *Groundwater Quality Asessment for the 216-B-3 Pond*, PNL-10195)	0.25	0.00111	Gradient based on trend surface analysis using wells 699-42-42B, 699-43-44, 699-43-45, 699-44-39B, and 699-45-42. Trend surface derived by least squares regression of a plane to points in three-dimensional space (Davis, 2002, *Statistics and Data Analysis in Geology*).
216-B-63 Trench	Southeast	0.019 – 0.024	Darcy and plume movement	180 – 230, SGW-44329	0.1	1.047×10^{-5} 2014 average	Gradient (G) and flow direction based on monthly water level measurments corrected for barometric response between January and December 2014 at a 14 well low-gradient network as shown in Figure 9-45. Effective porosity (n_e) based on discussion in SGW-54508. Flow based on formula V=(K*G)/n_e (Driscoll, 1986, *Groundwater and Wells*). Flow rate correlates with nitrate and technetium-99 plume movement.

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
216-S-10 Pond and Ditch	East-southeast	0.20	Darcy	10.4 (WHC-SD-EN-DP-052)	0.15	2.9×10^{-3}	Trend surface analysis.
316-5 Process Trenches	South-southeast	17	Darcy	9,000 (ECF-300-FF-11-0151 Rev. 3 (Available in Appenix F of DOE/RL-2010-99)	0.17	3.3×10^{-4}	Trend surface analysis.
316-5 Process Trenches	Southwest	13				2.4×10^{-4} (June)	
IDF	Southeast	0.004 – 0.0045	Darcy	68 – 75 (PNNL-13652, PNNL-11957)	0.1	6×10^{-6}	Gradient derived using 2013 low gradient groundwater contour map (Figure 10-3). Flow direction based on 2013 low gradient groundwater contour map and plume movement. Low gradient well network (SGW-54165).
Liquid Effluent Retention Facility	South	0.1	Darcy	36.2 – 39.8 (PNNL-14804)	0.1	2.41×10^{-4} 2014 average	The groundwater flow direction based on January through December 2014 water-level measurements at wells 299-E26-10, 299-E26-14, 299-E26-77, and 299-E26-79 was 191 degrees from north in a clockwise direction. The groundwater gradient magnitude from the same well network produced 2.41×10^{-4}.

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
LLWMA-1	Southeast	Variable. Ranges from 0.19 near northeast corner to 0.019 near southwest corner.	Darcy	Variable. Ranges from 1,785 near northeast corner to 240 near southwest corner. (PNL-8337)	0.1	1.047×10^{-5} 2014 average	Gradient (G) and flow direction based on monthly water level measurments corrected for barometric response between January and December 2014 at a 14 well low-gradient network as shown in Figure 9-45. Effective porosity (n_e) based on discussion in SGW-54508. Flow based on formula V=(K*G)/n_e (Driscoll, 1986, *Groundwater and Wells*). Flow rate correlates with nitrate and technetium-99 plume movement.
LLWMA-2	Southeast to south	Variable. Ranges from 0.12 near west side of LLWMA-2 to 0.1 on east side.	Darcy and plume movement	1,100 – 2,100	0.1	Variable. Ranges from 1.047×10^{-5} on west side of LLWMA-2 to uncertain on east side as low-gradient network is not sufficient to derive a gradient.	Gradient (G) and flow direction on the west side of LLWMA-2 based on formula, V=(K*G)/n_e, mentioned for WMA B-BX-BY and plume movement at WMA B-BX-BY. East side of LLWMA-2 is uncertain because of lack of gradient and greater hydraulic conductivity found at well 299-E27-9 and -10 versus wells at LERF.

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
LLWMA-3	East	0.11 – 0.43	Darcy	2.5 – 10 (PNNL-14753)	0.1 (PNNL-14753)	4.3×10^{-3}	Trend surface analysis using data east of injection wells.
LLWMA-4	East-northeast	0.16 – 0.64	Darcy	2.5 – 10 (PNNL-14753)	0.1 (PNNL-14753)	6.4×10^{-3}	Trend surface analysis. General approximation from the groundwater mound west of LLWMA-4 to wells east of the LLWMA.
NRDWL/SWL	Southeast	0.12 – 0.37	Darcy	518 – 1,524 (WHC-EP-0021)	—	2.4×10^{-5}	Trend surface analysis.
WMA A-AX	Southeast	0.1	Darcy	1,981 (PNL-8337, WHC-SD-EN-TI-019)	0.1	5×10^{-6}	Gradient derived using 2014 low gradient groundwater contour map (Figure 10-4). Flow direction based on 2014 low gradient groundwater contour map and plume movement. Low gradient well network (SGW-54165)

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
WMA B-BX-BY	Southeast	0.19	Darcy and plume movement	1,785 (PNL-8337)	0.1	1.047×10^{-5} 2014 average	Gradient (G) and flow direction based on monthly water level measurments corrected for barometric response between January and December 2014 at a 14 well low-gradient network as shown in Figure 9-45. Effective porosity (n_e) based on discussion in SGW-54508. Flow based on formula V=(K*G)/n_e (Driscoll, 1986, *Groundwater and Wells*). Flow rate correlates with nitrate and technetium-99 plume movement.
WMA C	Southeast	0.006 – 0.33	See comment	100 – 2,100 based on SGW-54675	0.1	Range: 6.26×10^{-6} - 1.5×10^{-5} 2014 average 1.1×10^{-5}	Values based on information provided in quarterly reports: SGW-58242, SGW-58483, SGW-58542, and SGW-58561.
WMA S-SX	East	0.14	Darcy	6.1 (PNNL-13514, PNNL-14113, PNNL-14186)	0.12	2.8×10^{-3}	Trend surface analysis.
WMA T	East-southeast	0.34 – 0.54	Darcy	6.11 - 9.69 (PNNL-17732)	0.1	5.6×10^{-3}	Trend surface analysis.
WMA TX-TY	South	0.001 – 0.34	Darcy	0.07 - 19.9 (PNNL-18279)	0.18 (DOE/RL-2009-38)	3.1×10^{-3}	Trend surface analysis.

Table B-1. Estimates of Groundwater Flow Rates at Hanford Site RCRA Facilities

Site	Flow Direction	Flow Rate (m/d)	Method	Hydraulic Conductivity (m/day) (Source)	Effective Porosity[a]	Gradient[b]	Comments
WMA U	East-northeast	0.15	Darcy	6.12 (PNNL-13378)	0.17	4.1×10^{-3}	Trend surface analysis.

a. Effective porosity assumed to be between 0.1 and 0.3, a representative range for the unconfined aquifer system, unless otherwise noted.

b. February or March 2014, unless otherwise noted.

c. Flow direction is based on those determined on a regional basis.

IDF = Integrated Disposal Facility
LLWMA = low-level waste management area
LWDF = Liquid Waste Disposal Facility
NA = not applicable
NRDWL = Nonradioactive Dangerous Waste Landfill
RCRA = *Resource Conservation and Recovery Act of 1976*
WMA = waste management area

Table B-2. Monitoring Wells and Constituents for 100-N Area Units

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Parameters			Sampled as Scheduled in 2014?
			Specific Condition (Field)	pH (Field)	TOC	TOX	Alkalinity	Anions	Metals (Filtered)	
116-N-1 (1301-N) Liquid Waste Disposal Facility										
199-N-105A	—	C	S	S	S	S	A	A	A	Yes
199-N-2	—	P	S	S	S	S	A	A	A	Yes
199-N-3	—	P	S	S	S	S	A	A	A	Yes
199-N-34	—	P	S	S	S	S	A	A	A	Yes
199-N-57	—	C	S	S	S	S	A	A	A	Yes
120-N-1 and 120-N-2 (1324-N/NA) Facilities										
199-N-71	—	C	S	S	S	S	A	A	A	Yes
199-N-72	—	C	S	S	S	S	A	A	A	Yes
199-N-73	—	C	S	S	S	S	A	A	A	Yes
199-N-77	Bottom of aquifer; no statistics	C	S	S	S	S	A	A	A	Yes
199-N-165	—	C	S	S	S	S	A	A	A	Yes
116-N-3 (1325-N) Liquid Waste Disposal Facility										
199-N-28	Information only; no statistics	P	S	S	S	S	A	A	A	Yes
199-N-32	—	P	S	S	S	S	S	S	S	Yes
199-N-41	—	P	S	S	S	S	A	A	A	Yes
199-N-74	—	C	S	S	S	S	A	A	A	Yes
199-N-81	—	C	S	S	S	S	A	A	A	Yes

Notes: Requirements are from *Groundwater Monitoring Plan for the 1301-N, 1324-N/NA, and 1325-N RCRA Facilities* (PNNL-13914) and the Hanford Facility RCRA Permit modification (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italics*** indicates upgradient well.

b. Quadruplicate samples collected during each sampling event except at wells not included for statistical evaluation, as noted.

Table B-2. Monitoring Wells and Constituents for 100-N Area Units

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Parameters			Sampled as Scheduled in 2014?
			Specific Condition (Field)	pH (Field)	TOC	TOX	Alkalinity	Anions	Metals (Filtered)	

A = to be sample annually
C = constructed as a resource protection well in accordance with WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"
P = constructed prior to WAC requirements
S = to be sampled semiannually
TOC = total organic carbon
TOX = total organic halides
WAC = *Washington Administrative Code*

Table B-3. 116-N-1 (1301-N) Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
199-N-105A	1995	70.8	10/3/2014	39	94	23.2	Downgradient
199-N-2	1964	75.2	10/3/2014	34	95	19.8	Downgradient
199-N-3	1964	75.7	10/3/2014	34	95	19.3	Downgradient
199-N-34	1983	73.0	10/3/2014	34	78	5.0	Upgradient
199-N-57	1987	71.5	10/3/2014	58	73	1.5	Upgradient

Table B-4. 116-N-1 (1301-N) Liquid Waste Disposal Facility Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	5.83 – 9.65	7.00 – 8.19	No	None
Specific conductance (µS/cm)	1,825	444 – 1029	No	None
Total organic carbon (µg/L)	2,584	306 – 1,062	No	None
Total organic halides (µg/L)	33.06	3.0 – 14.9	No	None

Table B-5. 116-N-1 (1301-N) Liquid Waste Disposal Facility Water Quality Parameter Results

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride (mg/L)	9.34 – 86.7	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<12.8 – 827	300	Secondary MCL	Yes	199-N-57 (upgradient)
Iron (unfiltered)	22.3 – 926	300	Secondary MCL	Yes	199-N-57 (upgradient)
Manganese (filtered) (µg/L)	1.0 – 110	50	Secondary MCL	Yes	199-N-3, 199-N-57 (upgradient)
Manganese (unfiltered)	<1.0 – 66.4	50	Secondary MCL	Yes	199-N-3, 199-N-57 (upgradient)
Sodium (filtered) (mg/L)	4.53 – 45.7	None	NA	—	None
Sodium (unfiltered)	4.53 – 42.9	None	NA	—	None
Sulfate (mg/L)	38.4 – 139.0	250	Secondary MCL	No	None

Table B-6. 120-N-1 and 120-N-2 (1324-N/NA) Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
199-N-165	2008	72.4	9/16/2014	67.89	82.89	10.49	Downgradient
199-N-71	1991	74.6	10/3/2014	63.8	84.5	9.9	Upgradient
199-N-72	1991	71.7	10/3/2014	61.22	82	10.3	Downgradient
199-N-73	1991	75.5	10/3/2014	65.6	86.1	10.6	Downgradient
199-N-77	1992	72.0	10/3/2014	84.36	94.3	22.3	Supporting information

Table B-7. 120-N-1 and 120-N-2 Facilities (1324-N/NA) Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.76 – 8.43	7.87 – 8.52	No[a]	None
Specific conductance (µS/cm)	596	378 – 860	Yes	199-N-72 199-N-73 199-N-165
Total organic carbon (µg/L)	1,257	276 – 885	No	None
Total organic halides (µg/L)	12.51 (LOQ = 18.3 1st quarter; NC[b] 2nd quarter; 17.5 3rd quarter, 14.7 4th quarter)	4.28 – 13.8	No[a]	None

a. Average of quadruplicates is below critical mean value.

b. Insufficient data to calculate an LOQ.

LOQ = limit of quantitation

NC = not calculated

Table B-8. 120-N-1 and 120-N-2 (1324-N/NA) Facilities Water Quality Summary

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride (mg/L)	13.8 – 23.5	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<30 – 101	300	Secondary MCL	No	None
Iron (unfiltered)	<30 – 149	300	Secondary MCL	No	None
Manganese (filtered) (µg/L)	0.7 – 5*	50	Secondary MCL	No	None
Manganese (unfiltered)	1.0 – 5	50	Secondary MCL	No	None
Sodium (filtered) (mg/L)	25.2 – 161	None	NA	—	None
Sodium (unfiltered)	25.0 – 165	None	NA	—	None
Sulfate	53 – 213	250	Secondary MCL	No	None

* Nondetects range from <1 µg/L to <5 µg/L.

Table B-9. 116-N-3 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
199-N-28	1983	77.0	10/3/2014	47	83	6.0	Supporting information
199-N-32	1983	75.6	10/3/2014	44	80	4.4	Downgradient
199-N-41	1984	73.4	10/3/2014	53	73	-0.4	Downgradient
199-N-74	1991	69.3	10/3/2014	59	79.3	10.0	Upgradient
199-N-81	1993	76.3	10/3/2014	69.7	89.5	13.2	Downgradient

Table B-10. 116-N-3 (1325-N) Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.65 – 8.56	7.65 – 8.32	No	None
Specific conductance (µS/cm)	465	398 – 668	Yes	199-N-32 199-N-41 199-N-74 (upgradient) 199-N-81
Total organic carbon (µg/L)	1,156	195 – 750	No	None
Total organic halides (µg/L)	9.54 (LOQ = 18.3 1st quarter; NC 2nd quarter; 17.5 3rd quarter; 14.7 4th quarter)	<3.33 – 8.9	No	None

LOQ = limit of quantitation
NC = not calculated because proportion non-detects is greater than 50%

Table B-11. 116-N-3 (1325-N) Water Quality Parameter Results

Constituent (units)	2013 Range	DWS	Standard Type	2013 Exceedance?	Wells Exceeded
Chloride (mg/L)	11.0 – 43.5	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<12.8 – 662	300	Secondary MCL	Yes	199-N-32
Iron (unfiltered)	33.5 – 737	300	Secondary MCL	Yes	199-N-32
Manganese (filtered) (µg/L)	<1 – 42.0	50	Secondary MCL	No	None
Manganese (unfiltered)	1.6 – 40.7	50	Secondary MCL	No	None
Sodium (filtered) (mg/L)	7.19 – 22.8	None	NA	—	None
Sodium (unfiltered)	7.36 – 16.1	None	NA	—	None
Sulfate (mg/L)	72.2 – 155	250	Secondary MCL	No	None

Table B-12. Monitoring Wells and Constituents for 183-H (116-H-6) Evaporation Basins

Well Name	Comment	WAC Compliant	Permit-Specified					Other Parameters			Sampled as Scheduled in 2014?
			Chromium (Filtered)	Nitrate	Technetium-99*	Fluoride	Uranium*	Alkalinity	Anions	Metals (Filtered)	
199-H4-12A	Monitoring well	C	A	A	A	A	A	A	A	A	Yes
199-H4-12C	Extraction well; Ringold formation upper mud	C	A	A	A	A	A	A	A	A	Yes
199-H4-84	Monitoring well	C	A	A	A	A	A	A	A	A	Yes
199-H4-8	—	C	A	A	A	A	A	A	A	A	Yes

Notes:

Requirements are from *Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins* (PNNL-11573) and the 2008 Hanford Facility RCRA Permit modification (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

* Radionuclides are not typically subject to RCRA monitoring but are included in the current Hanford Facility RCRA Permit (WA7890008967) for this facility.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

WAC = *Washington Administrative Code*

Table B-13. 183-H Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
199-H4-8	1986	46.2	11/5/2014	38	48	1.8	Downgradient
199-H4-84	2011	43.5	11/23/2014	37.7	47.7	4.2	In waste site
199-H4-12A	1986	38.2	11/5/2014	33	48	9.8	Downgradient
199-H4-12C	1986	NA	Extraction well	72	82	NA	Downgradient

Table B-14. 183-H Permit Required Consistuent Summary

Constituent (units)	2014 Range	DWS	Permit Limit	Standard Type	2014 Exceedance?	Wells Exceeded Permit Limit
Hexavalent chromium (µg/L)	<1.5 – 121	100	122	Dangerous waste	No	None
Total chromium (µg/L)	2.8 – 120	100	122	Dangerous waste	No	None
Nitrate (mg/L)	1.64 – 34.7	45	45	Dangerous waste*	No	None
Fluoride (µg/L)	117 – 180	4,000	1,400	Waste indicator	No	None
Technetium-99 (pCi/L)	<6.5 – 32	900	900	Waste indicator	No	None
Uranium (µg/L)	0.72 – 52.1	30	20	Waste indicator	Yes	199-H4-84

* Nitrate is not considered a dangerous waste constituent under RCRA (WAC 173-303-9905, “Dangerous Waste Regulations,” “Dangerous Waste Constituents List”).

Table B-15. Monitoring Wells and Constituents for 216-A-29 Ditch

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Parameters				Sampled as Scheduled in 2014?
			Specific Conductance (Field)	pH (Field)	TOC	TOX	Alkalinity	Anions	Metals	Phenols	
299-E25-26	—	C	S	S	S	S	S	S	A	A	Yes
299-E25-28	Deep unconfined; no statistical evaluation	C	A	A	A	A	A	A	A	A	Yes
299-E25-32P	—	C	S	S	S	S	S	S	A	A	Yes
299-E25-34	—	C	A	A	A	A	A	A	A	A	No[c]
299-E25-35	—	C	S	S	S	S	S	S	A	A	Yes
299-E25-48	—	C	S	S	S	S	S	S	A	A	Yes
299-E26-12	—	C	A	A	A	A	A	A	A	A	Yes
299-E26-13	—	C	S	S	S	S	S	S	A	A	No[d]
699-43-45	—	C	S	S	S	S	S	S	A	A	Yes

Notes: Requirements are from *Interim Status Groundwater Monitoring Plan for the 216-A-29 Ditch* (DOE/RL-2008-58, Rev. 0).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. Upgradient well(s) are noted in ***bold italics***.

b. Quadruplicate samples were collected during each sampling event for contamination indicator parameters.

c. Sampling for April event delayed until October.

d. Sampling for October event delayed until November because well not accessable, road needed work.

A = to be sampled annually

C = constructed as a resource protection well in accordance with WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-16. 216-A-29 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E25-26	1985	272.6	10/03/2014	270	290	17.4	Downgradient
299-E25-28	1985	264.4	10/15/2014	320	340	20	Downgradient
299-E25-32P	1988	271.7	10/23/2014	259.4	279.4	7.7	Downgradient
299-E25-34	1988	264.8	12/22/2014	251.6	271.6	6.8	Downgradient
299-E25-35	1988	275.1	12/22/2014	260.5	281	5.9	Downgradient
299-E25-48	1992	283.5	10/3/2014	274.3	294.6	11.1	Downgradient
299-E26-12	1991	231.1	10/15/2014	217.6	238.6	7.5	Upgradient
299-E26-13	1991	205.5	12/22/2014	191.7	212.3	6.8	Upgradient
699-43-45	1989	198.3	10/23/2014	183	203.3	4.99	Downgradient

Table B-17. 216-A-29 Ditch Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.80 – 8.74	7.73 – 8.64	Yes	299-E26-13[a] (low)
Specific conductance (µS/cm)	388	223 – 596	Yes	299-E25-35 299-E25-48 299-E25-32P
Total organic carbon (µg/L)	949	132 – 1,200	Yes	299-E25-26[b]
Total organic halides (µg/L)	1st quarter: WSCF (LOQ = 18.3) 2nd quarter: TASL (insufficient data) GEL (insufficient data) 3rd quarter: TASL (LOQ = 17.5) GEL (insufficient data) 4th quarter: TASL (LOQ = 14.7) GEL (LOQ = 5.6)	<1.8 – 18.3	No	None

Table B-17. 216-A-29 Ditch Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded

a. Upgradient network well not subject to verification resampling.

b. Reported value was less than 3rd quarter TASL limit of quantitation (LOQ).

GEL = Geotechnical Engineering Laboratory

LOQ = limit of quanitation

NC = not calculated because proportion non-detects is greater than 50 percent

TASL = Test America St. Louis

WSCF = Waste Sampling and Characterization Facility

Table B-18. 216-A-29 Groundwater Quality Parameter Results

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride (mg/L)	3.1 – 22.7	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<30 – <40	300	Secondary MCL	No	None
Iron (unfiltered)	<40 – 353	300	Secondary MCL	Yes	299-E25-32P
Manganese (filtered) (µg/L)	<1 – <4	50	Secondary MCL	No	None
Manganese (unfiltered)	1.3 – 9.0	50	Secondary MCL	No	None
Phenol (µg/L)	<0.9	2,400	MTCA Method B	No	None
Sodium (filtered) (mg/L)	9.3 – 28.9	None	NA	—	None
Sodium (unfiltered)	9.1 – 28.8	None	NA	—	None
Sulfate (mg/L)	14.0 – 136	250	Secondary MCL	No	None

Table B-19. Monitoring Wells and Constituents for 216-A-36B Crib

Well Name[a]	WAC Compliant	Contamination Indicator Parameters[b]				Supporting Constituents				Sampled as Scheduled in 2014?
		pH (field)	Specific Conductance (field)	TOC	TOX	Anions[c]	Metals[c]	Alkalinity	Phenols	
299-E17-14	C	S	S	S	S	A	A	A	A	Yes
299-E17-16	P	S	S	S	S	A	A	A	A	Yes
299-E17-18	C	S	S	S	S	A	A	A	A	Yes
299-E17-19	C	S	S	S	S	A	A	A	A	Yes

Notes: Requirements for 216-A-36B Crib are from *Interim Status Groundwater Monitoring Plan for the 216-A-36B PUREX Plant Crib* (DOE/RL-2010-93, Rev. 1).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italic*** indicates upgradient well.

b. Quadruplicate replicates were collected during each sampling event for contamination indicator parameters.

c. Anions analysis includes, at a minimum, nitrate and the groundwater quality parameters chloride and sulfate. Metals analysis includes, at a minimum, calcium, magnesium, potassium, and sodium, as well as the groundwater quality parameters iron and manganese.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-20. 216-A-36B Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E17-14	1988	323.4	7/7/2014	309.5	331.5	8.1	Downgradient
299-E17-16	1988	322.3	7/7/2014	310	330	7.7	Downgradient
299-E17-18	1988	321.8	12/21/2014	308.7	331.5	9.7	Downgradient
299-E17-19	1988	321.3	7/7/2014	304	326.6	5.3	Upgradient

Table B-21. 216-A-36B Crib Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.31 – 8.44	7.58 – 8.01	No	None[a]
Specific conductance (µS/cm)	853	553 – 719	No	None
Total organic carbon (µg/L)	719	246 – 794	Yes	299-E17-16[b] 299-E17-18[b]
Total organic halides (µg/L)	31.5	2.2 – 24.6	No	None

a. Verification sample results for pH were within the 2013 or 2014 ranges.

b. Verification sampling results for TOC were less than the 2013 and 2014 critical mean values for TOC.

Table B-22. 216-A-36B Groundwater Quality Parameter Summary

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Alkalinity (µg/L)	110,000 – 130,000	None	NA	—	None
Calcium (µg/L)	61,600 – 72,800	None	NA	—	None
Chloride (mg/L)	13.0 – 17.6	250	Secondary MCL	No	None
Iron (µg/L)	<40 – 46.4	300	Secondary MCL	No	None
Magnesium (µg/L)	19,100 – 23,100	None	NA	—	None
Manganese (µg/L)	0.76 – <4	50	Secondary MCL	No	None
Nitrate (mg/L)*	51.8 – 156	45	MCL	Yes	299-E17-14 299-E17-16 299-E17-18 299-E17-19
Phenol (µg/L)	<0.9	2,400	MTCA Method B	No	None
Potassium (µg/L)	8,120 – 8,840	None	NA	—	None
Sodium (mg/L)	25.0 – 29.1	None	NA	NA	NA
Sulfate (mg/L)	78.4 – 93.2	250	Secondary MCL	No	None

Table B-23. Monitoring Wells and Constituents for 216-A-37-1 Crib

Well Name[a]	WAC Compliant	Contamination Indicator Parameters[b]				Supporting Constituents				Sampled as Scheduled in 2014?
		pH (field)	Specific Conductance (field)	TOC	TOX	Anions[c]	Metals[c]	Alkalinity	Phenols	
299-E25-17	P	S	S	S	S	A	A	A	A	No[d]
299-E25-19	P	S	S	S	S	A	A	A	A	Yes
299-E25-20	P	S	S	S	S	A	A	A	A	Yes
299-E25-47	C	S	S	S	S	A	A	A	A	No[e]

Notes: Requirements for 216-A-37-1 Crib are from *Interim Status Groundwater Monitoring Plan for the 216-A-37-1 PUREX Plant Crib* (DOE/RL-2010-92 Rev. 1).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italic*** indicates upgradient well.

b. Quadruplicate samples were collected during each sampling event for contamination indicator parameters.

c. Anions analysis includes, at a minimum, the groundwater quality parameters chloride and sulfate. Metals analysis includes, at a minimum, calcium, magnesium, potassium, and sodium, as well as the groundwater quality parameters iron and manganese.

d. July sampling event delayed until August due to an electrical issue with the well pump.

e. January sampling event missed because well was not accessible to sampling van.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-24. 216-A-37-1 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E25-17*	1976	278.5	12/12/2014	273	295	16.5	Downgradient
299-E25-19*	1976	279.6	12/22/2014	270	295	15.4	Downgradient
299-E25-20*	1976	279.0	7/11/2014	269	294	14.96	Downgradient
299-E25-47	1992	274.3	7/7/2014	263	283.2	8.9	Upgradient

* Perforated well.

Table B-25. 216-A-37-1 Crib Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.53 – 8.43	7.65 – 8.37	No	None
Specific conductance (µS/cm)	937	362 – 531	No	None
Total organic carbon (µg/L)	1,267	<270 – 3,080	Yes	299-E25-17*
Total organic halides (µg/L)	14.93	<3.33 – 15.0	No	None

* Verification sampling results were less than the 2014 critical mean.

Table B-26. 216-A-37-1 Crib Groundwater Quality Parameter Summar

Constituent (units)	2013 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Alkalinity (µg/L)	83,000 – 87,000	NA	None	—	None
Calcium (µg/L)	34,200 – 47,600	NA	None	—	None
Chloride (mg/L)	5.2 – 12.8	250	Secondary MCL	No	none
Iron (µg/L)	221 – 1,330	300	Secondary MCL	Yes	299-E25-17 299-E25-19 299-E25-47
Magnesium (µg/L)	11,000 – 14,500	NA	None	—	None
Manganese (µg/L)	8.1 – 139	50	Secondary MCL	Yes	299-E25-19 299-E25-20
Nitrate (mg/L)	24.3 – 64.2	45	MCL	Yes	299-E25-20
Phenol (µg/L)	<0.9	2,400	MTCA Method B	No	None
Potassium (µg/L)	6,470 – 8,420	NA	None	—	None
Sodium (mg/L)	18.3 – 24.2	None	NA	NA	NA
Sulfate (mg/L)	40.7 – 105	250	Secondary MCL	No	None

Table B-27. Monitoring Wells and Constituents for 216-B-3 Pond

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Parameters						Sampled as Scheduled in 2014?
			Specific Conductance	pH (Field)	TOC	TOX	Alkalinity	Arsenic	Anions	Cadmium	Metals	Phenols	
699-42-42B	Bottom of aquifer	C	S	S	S	S	A	A	A	A	A	A	Yes
699-43-44	—	C	S	S	S	S	A	A	A	A	A	A	Yes
699-43-45	—	C	S	S	S	S	A	A	A	A	A	A	Yes
699-44-39B	—	C	S	S	S	S	A	A	A	A	A	A	No[c]

Notes: Requirements are from *Interim Status Groundwater Monitoring Plan for the 216-B-3 Pond* (DOE/RL-2008-59).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. Upgradient well is noted by ***bold italic***.

b. Quadruplicate samples were collected during each sampling event for contamination indicator parameters.

c. January sampling delayed until February because of equipment malfunction.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-28. 216-B-3 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
699-42-42B	1988	182.1	7/7/2014	183.5	203.5	21.4	Downgradient
699-43-44	1999	179.9	7/7/2014	171	191	11.7	Downgradient
699-43-45	1989	198.3	10/23/2014	183	203.3	5	Downgradient
699-44-39B	1992	107.7	7/7/2014	98.9	118.9	11.2	Upgradient

Table B-29. 216-B-3 Pond Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.50 – 8.61	7.90 – 8.55	No	None
Specific conductance (µS/cm)	356	254 – 309	No	None
Total organic carbon (µg/L)	499	143 – 326	No	None
Total organic halides (µg/L)	1st quarter: WSCF (LOQ = 18.3) 2nd quarter: TASL (insufficient data) GEL (insufficient data) 3rd quarter: TASL (LOQ = 17.5) GEL (insufficient data) 4th quarter: TASL (LOQ = 14.7) GEL (LOQ = 5.6)	2.3 – 5.93	No	None

GEL = Geotechnical Engineering Laboratory
LOQ = limit of quanitation
NC = not calculated because proportion non-detects is greater than 50 percent
TASL = Test America St. Louis
WSCF = Waste Sampling and Characterization Facility

Table B-30. 216-B-3 Groundwater Quality Parameter Results

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Arsenic (filtered) (µg/L)	4.2 – 9.5*	10	MCL	No	None
Arsenic (unfiltered) (µg/L)	4.1 – 8.8*	10	MCL	No	None
Cadmium (filtered) (µg/L)	<4	5	MCL	No	None
Cadmium (unfiltered) (µg/L)	<0.3 – <4	5	MCL	No	None
Chloride (mg/L)	3.0 – 5.2	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<40	300	Secondary MCL	No	None
Iron (unfiltered)	<40 – 48.4	300	Secondary MCL	No	None
Manganese (filtered) (µg/L)	<4	50	Secondary MCL	No	None
Manganese (unfiltered)	<1 – <4	50	Secondary MCL	No	None
Nitrate (mg/L)	3.4 – 9.9	45	MCL	No	None
Phenol (µg/L)	<0.9	2,400	MTCA Method B	No	None
Sodium (filtered) (mg/L)	9.8 – 20.1	None	NA	—	None
Sodium (unfiltered)	10.4 – 20.2	None	NA	—	None
Sulfate (mg/L)	15.9 – 27.9	250	Secondary MCL	No	None

* Samples analyzed per EPA Method6010 had a detection limit of 25 µg/L.

Table B-31. Monitoring Wells and Constituents for 216-B-63 Trench

Well Name[a]	WAC Compliant	Contamination Indicator Parameters[b]				Other Parameters				Sampled as Scheduled in 2014?
		Specific Conductance (Field)	pH (Field)	TOC	TOX	Alkalinity	Anions	Metals	Phenols	
299-E27-16	C	S4	S4	S4	S4	A	S	S	S	Yes
299-E27-18	C	S4	S4	S4	S4	A	S	S	S	Yes
299-E27-19	C	S4	S4	S4	S4	A	S	S	S	Yes
299-E33-33	C	S4	S4	S4	S4	A	S	S	S	Yes
299-E34-8	C	S4	S4	S4	S4	A	S	S	S	Yes
299-E34-12	C	S4	S4	S4	S4	A	S	S	S	Yes

Source: *Interim Status Groundwater Monitoring Plan for the 216-B-63 Trench* (DOE/RL-2008-60, Rev. 1).

Note: All wells screened from the water table to t the top of the unconfined aquifer.

a. ***Bold italics*** well names are upgradient wells.

b. Quadruplicate samples were collected during each sampling event (e.g., S4).

c. For anions, analytes include, but not limited to, chloride, nitrate, nitrite, and sulfate. For metals, analytes include, but are not limited to, calcium, magnesium, potassium, and sodium.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-32. 216-B-63 Trench Indicator Parameter Results

Constituent (units)	2014 Critical Mean Comparison Value[a]	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.62 – 8.66	7.86 – 8.29	No	None
Specific conductance (µS/cm)	703	528 – 668	No	None
Total organic carbon (µg/L)	547	230 – 452	No	None
Total organic halides (µg/L)	April – 28.5[b] October – NA[c]	9.15 – 15.2 <3.33 – 3.7	No	None

a. *Environmental Calculation File: Calculation of Critical Means for Calendar Year 2013 RCRA Groundwater Monitoring*, Table 9 (ECF-Hanford-13-0013).

b. LOQ value derived for comparison value based on WSCF blank sample results from 1/1/2013 through 12/31/2013.

c. LOQ value not able to be derived, as the laboratories providing analyses were recently contracted and there was insufficient data to statistically derive comparison value.

LOQ = limit of quantitation (used because insufficient results to derive critical mean comparison value from upgradient 216-B-63 Trench wells)

WSCF = Waste Sampling and Characterization Facility

Table B-33. 216-B-63 Water-Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)*	Remaining Water Column (ft)	Location
299-E27-16	1989	253.4	10/3/2014	238.7	259.7	6.3	Downgradient
299-E27-18	1992	251.0	11/25/2014	241.4	261.5	10.5	Downgradient
299-E27-19	1992	251.9	10/3/2014	242	262.1	10.2	Downgradient
299-E33-33	1990	241.3	10/3/2014	227.3	248.3	7.0	Upgradient
299-E34-8	1991	242.1	10/3/2014	227.9	247.9	5.8	Upgradient
299-E34-12	1991	239.9	10/22/2014	223.9	244.5	4.6	Upgradient

Source: *Interim Status Groundwater Monitoring Plan for the 216-B-63 Trench* (DOE/RL-2008-60, Rev. 1).

* None of the wells are screened to basalt, but 4 of the 6 well screens are within 10 feet of basalt. Well 299-E34-8 was drilled 12.1 ft beyond the bottom of the screen, but did not encounter basalt. Well 299-E27-19 was drilled to 4.7 ft below the well screen, but did not encounter basalt.

bgs = below ground surface

Table B-34. 216-B-63 Groundwater Quality Parameter Results

Constituent (units)	2014 Range (µg/L)	DWS (µg/L)	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride	18,900 – 28,200	250,000	Secondary MCL	No	None
Iron (unfiltered)	34.4 – 72.9	300	Secondary MCL	No	None
Manganese (unfiltered)	<1 – <4	50	Secondary MCL	No	None
Nitrate	51,800 – 118,000	45,000	Primary MCL	Yes	All
Phenol	<0.9 – <3.0	2,400	MTCA Method B	No	None
Sodium (unfiltered)	21,800 – 28,400	None	NA	NA	NA
Sulfate	78,600 – 103,000	250,000	Secondary MCL	No	None

DWS = drinking water standard
MCL = maximum contaminant level
MTCA = Model Toxic Control Act
NA = not applicable

Table B-35. Monitoring Wells and Constituents for 216-S-10 Pond and Ditch

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Parameters								Sampled as Scheduled During 2014?
			Specific Conductance (Field)	pH (Field)	TOC	TOX	Alkalinity	Anions	Metals	Hexavalent Chromium	Mercury	VOAs	PCBs	Phenols	
299-W26-13	—	C	S	S	S	S	S	S	S	S	S	A	A	A	Yes
299-W26-14	—	C	A	A	A	A	A	A	A	A	A	A	A	A	Yes
299-W27-2	Bottom of aquifer; no statistics	C	A	A	A	A	A	A	A	A	A	A	A	A	Yes
699-32-76	—	C	S	S	S	S	S	S	S	S	S	A	A	A	Yes
699-33-75	—	C	S	S	S	S	S	S	S	S	S	A	A	A	Yes
699-33-76	—	C	S	S	S	S	S	S	S	S	S	A	A	A	Yes

Notes: Requirements are from *Interim Status Groundwater Monitoring Plan for the 216-S-10 Pond and Ditch* (DOE/RL-2008-61).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. Upgradient well is noted by ***bold italic***.

b. Quadruplicate samples were collected during each sampling event.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-36. 216-S-10 Pond and Ditch Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	4.19 – 11.30	7.79 – 7.99	No	None
Specific conductance (µS/cm)	363	272 – 333	No	None
Total organic carbon (µg/L)	852	273 – 439	No	None
Total organic halides (µg/L)	49.82	3.0 – 8.2	No	None

Table B-37. 216-S-10 Pond and Ditch Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-W26-13	1999	213.0	11/4/2014	202.2	237.3	24.3	Downgradient
299-W26-14	2003	233.1	5/20/2014	223.4	258.4	25.3	Downgradient
299-W27-2	1992	240.2	5/20/2014	406.1	416.6	176.4	Downgradient
699-32-76	2008	232.4	11/3/2014	227.0	262.0	29.6	Downgradient
699-33-75	2008	241.3	11/3/2014	235.0	270.0	28.7	Downgradient
699-33-76	2008	228.4	11/3/2014	222.0	257.0	28.6	Upgradient

Table B-38. 216-S-10 Pond and Ditch Water Quality and Other Monitored Parameters

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride (mg/L)	6.4 – 19.7	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<12.8 – <30	300	Secondary MCL	No	None
Iron (unfiltered) (µg/L)	<30 – 544*	300	Secondary MCL	No	299-W27-2*
Manganese (filtered) (µg/L)	<1 – <2	50	Secondary MCL	No	None
Manganese (unfiltered) (µg/L)	<1 – 11.2[a]	50	Secondary MCL	No	None
Phenol (µg/L)	<1.9 – <9.6	2,400	MTCA Method B	No	None
Sodium (filtered) (µg/L)	13,300 – 22,700	None	NA	—	None
Sodium (unfiltered) (µg/L)	12,400 – 22,700	None	NA	—	None
Sulfate (mg/L)	16.3 – 23.6	250	Secondary MCL	No	None
Chromium (total, filtered) (µg/L)	<1 – 122	48	MTCA Method B	Yes	299-W26-13
Chromium (total, unfiltered) (µg/L)	<1 – 127	48	MTCA Method B	Yes	299-W26-13 299-W27-2*
Hexavalent chromium (filtered) (µg/L)	<1.5 – 121	48	MTCA Method B	Yes	299-W26-13
Hexavalent chromium (unfiltered) (µg/L)	1.6 – 122	48	MTCA Method B	Yes	299-W26-13
Copper (filtered) (µg/L)	<2.1 – 3.6	1,000	Secondary MCL	No	None
Copper (unfiltered) (µg/L)	<2.1 – <3	1,000	Secondary MCL	No	None
Mercury (filtered) (µg/L)	<0.06 – 0.08	2	Primary MCL	No	None
Mercury (unfiltered) (µg/L)	<0.06 – 0.11	2	Primary MCL	No	None
Zinc (filtered) (µg/L)	<3.3 – 13.7	5,000	Secondary MCL	No	None
Zinc (unfiltered) (µg/L)	<3.3 – 18	5,000	Secondary MCL	No	None
Aroclor-1254 (µg/L)	<0.09 – <0.16	0.5	Primary MCL for PCBs	No	None

Table B-38. 216-S-10 Pond and Ditch Water Quality and Other Monitored Parameters

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Benzo(a)pyrene (µg/L)	All results <0.1	0.2	Primary MCL	No	None

* Results from well 299-W27-2 are affected by corrosion of the stainless-steel screen.

DWS = drinking water standard

MCL = maximum contaminant level

MTCA = Model Toxic Control Act

Table B-39. Monitoring Wells and Constituents for 316-5 Process Trenches

Well Name	Aquifer	WAC Compliant	cis-1,2-Dichloroethene	Trichloroethene	Uranium*	Sampled as Planned in 2014?
399-1-10A	Top unconfined	C	S	S	S	Yes
399-1-10B	Lower unconfined	C	S	S	S	Yes
399-1-16A	Top unconfined	C	S	S	S	Yes
399-1-16B	Lower unconfined	C	S	S	S	Yes
399-1-17A	Top unconfined	C	S	S	S	Yes
399-1-17B	Lower unconfined	C	S	S	S	Yes
399-1-18A	Top unconfined	C	S	S	S	Yes
399-1-18B	Lower unconfined	C	S	S	S	Yes

Notes: Requirements are from *Groundwater Monitoring Plan for the 300 Area Process Trenches* (WHC-SD-EN-AP-185) and the Hanford Facility RCRA Permit modification (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*).

* Radionuclides are not typically subject to RCRA monitoring but are included in the current Hanford Facility RCRA Permit (WA7890008967) for the 316-5 Process Trenches.

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled four times semiannually (8 months)

WAC = *Washington Administrative Code*

Table B-40. 316-5 Process Trenches Water Level Summary

Well Name	Year Installed	Water Depth (m bgs)	Water Depth (ft bgs)	Water Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
399-1-10A	1986	8.92	29.27	12/30/2014	24.5	39.5	10.23	Downgradient
399-1-10B	1991	9.44	30.98	12/03/2014	104.5	114.5	83.52	Downgradient
399-1-16A	1986	11.74	38.50	12/16/2014	32.5	47.5	9.00	Downgradient
399-1-16B	1987	11.64	38.18	12/16/2014	105.0	115.0	76.82	Downgradient
399-1-17A	1986	10.12	33.19	12/16/2014	25.0	40.0	6.81	Downgradient
399-1-17B	1986	10.20	33.47	12/16/2014	100.0	110.0	76.53	Downgradient
399-1-18A	1986	13.66	44.82	12/16/2014	39.0	54.0	9.18	Upgradient
399-1-18B	1987	13.45	44.12	12/16/2014	108.5	118.5	74.38	Upgradient

bgs = below ground surface

Table B-41. 316-5 Process Trenches Post-Closure Corrective Action Monitoring Constituent Summary

COC	Range Low (µg/L)	Range High (µg/L)	RCRA Concentration Limit* (µg/L)	Exceedance in 2014?
Trichloroethene	0.25 U	1.99 J	5	No
cis-1,2-Dichloroethene	0.09 U	207 D	70	Yes
Other Waste Constituent	**Range Low (µg/L)**	**Range High (µg/L)**	**Concentration Limit (µg/L)**	**Exceedance in 2014?**
Uranium (total; chemical analysis)	0.144 U	79.9 D	30	Yes

* Concentration limits are from *Groundwater Monitoring Plan for the 300 Area Process Trenches* (WHC-SD-EN-AP-185) and the Hanford Facility RCRA Permit modification (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*).

D = analyte reported at a secondary dilution factor

COC = contaminant of concern

J = estimated value

U = undetected above the practical quantitative limit

Table B-42. Monitoring Wells and Constituents for the Integrated Disposal Facility

Well Name[a]	WAC Compliant	Indicator Parameters					Other Parameters								Sampled as Planned in 2014?
		Chromium (Filtered)	Specific Conductance (Field)	pH (Field)	TOC	TOX	Alkalinity	Turbidity (Field)	Anions	Metals	Alpha[b]	Beta[b]	Iodine-129[b]	Technetium-99[b]	
299-E17-22	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes
299-E17-23	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes
299-E17-25	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes
299-E17-26	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes
299-E18-1	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes
299-E24-21	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes
299-E24-24	C	A	A	A	A	A	A	A	A	A	S	S	S	S	Yes

Notes: Requirements are from *Hanford Facility Dangerous Waste Permit Application Integrated Disposal Facility* (WA890008967) and *Integrated Disposal Facility Operational Monitoring Plan to Meet DOE Order 435.1* (RPP-PLAN-26534). Per June 30, 2010 Class 1 Modification of RCRA Permit WA7890008967, *Part III Operating Units 11, Integrated Disposal Facility*, groundwater sampling under the permit will continue annually during the pre-active life of the facility.

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italics*** indicate upgradient well.

b. Operational parameters are monitored for DOE O 435.1, *Radioactive Waste Management*, and not for RCRA purposes.

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

TOC = total organic carbon

TOX = total organic halides

WAC = *Washington Administrative Code*

Table B-43. Integrated Disposal Facility Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E18-1	1988	320.7	7/11/2014	308.5	331.5	10.8	Upgradient
299-E24-21	2001	315.3	12/21/2014	312.2	332.2	16.9	Upgradient
299-E24-24	2005	323.9	12/21/2014	321.4	356.4	32.5	Upgradient
299-E17-22	2002	324.2	12/21/2014	321.6	356.7	32.5	Downgradient
299-E17-23	2002	334.9	12/21/2014	333	367.1	32.1	Downgradient
299-E17-25	2002	339.8	12/21/2014	336.6	371.6	31.8	Downgradient
299-E17-26	2005	340.6	7/11/2014	338.1	373.1	32.5	Downgradient

bgs = below ground surface

Table B-44. Integrated Disposal Facility RCRA Indicator Parameter Results

Constituent (units)	Historical Range	2014 Range	Standard	Standard Type	2014 Exceedance?
Chromium – filtered (µg/L)	<1.9 – 32.1	<5 – 7.2	48*	MTCA Method B	No
pH	6.90 – 8.80	7.46 – 8.74	—	—	—
Specific conductance (µS/cm)	316 – 812	379 – 612	—	—	—
Total organic carbon (µg/L)	<100 – 16,100	139 – 692	—	—	—
Total organic halides (mg/L)	<1 – 61.9	12.5 – 16.1	—	—	—

* Groundwater cleanup level is for hexavalent chromium. Filtered chromium was included in the permit list of constituents since hexavalent chromium is a mobile regulated metal expected to be disposed of at the Integrated Disposal Facility. Comparison to MTCA Method B value provided for informational purposes only.

MTCA = "Model Toxics Control Act—Cleanup" (WAC 173-340)

Table B-45. Monitoring Wells and Constituents for Liquid Effluent Retention Facility

Well Name[a]	WAC Compliant	Geochemical Parameters			Indicator Parameters[b]						Sampled as Scheduled in 2014?[c]
		Alkalinity	Anions	Metals	Hexavalent Chromium[c]	Carbon Tetrachloride	pH	Specific Conductance	Total Organic Caron	Organic Total Halides	
299-E26-14	C	S	S	S	S	S	S	S	S	S	Yes
299-E26-77	C	S	S	S	S	S	S	S	S	S	Yes
299-E26-79	C	S	S	S	S	S	S	S	S	S	Yes

Notes:

Requirements for the July 2014 sampling event were based on *Groundwater Monitoring Plan for the Liquid Effluent Retention Facility*, DOE/RL-2013-46 which was approved and implemented in April 2014. Prior to the July sampling event, samples were collected in accordance with the *Liquid Effluent Retention Facility Final-Status Groundwater Monitoring Plan* (PNNL-11620).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italic*** indicates upgradient well.

b. Quadruplicate samples were collected during the July sampling event.

c. At least four sampling events must be completed prior to deriving a critical mean. Until that time the results are collected to derive a local background concentration.

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-46. Liquid Effluent Retention Facility Indicator Constituent Results

Constituent (units)	2014 Critical Mean Comparison Value*	2014 Concentration at Upgradient Well 299-E26-14	2014 Concentration at Downgradient Well 299-E26-79	2014 Exceedance?
pH measurement	7.42 – 8.15	7.88	7.96	No
Specific conductance (µS/cm)	1,005	771	699	No
Total organic carbon (µg/L)	3,376	3,280	741	No
Total organic halides (µg/L)	11.07	4.17	3.38	No
Carbon tetrachloride (µg/L)	> detection	<0.3	<0.3	No

* *Environmental Calculation File: Calculation of Critical Means for Calendar Year 2014 RCRA Groundwater Monitoring*, Table 7-10 (ECF-HANFORD-14-0043, Rev. 0).

Table B-47. Liquid Effluent Retention Facility Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Water Table Elevation (ft)	Screen Top (ft bgs)	Screen Bottom (ft bgs)*	Remaining Water Column (ft)	Location
299-E26-10	1990	202.51	4/24/2014	399.56	190.5	206.1	3.59	Crossgradient
299-E26-14	2011	198.93	4/24/2014	399.81	195.9	215.9	16.97	Upgradient
299-E26-77	2008	203.76	4/24/2014	399.61	200.85	225.6	21.84	Crossgradient
299-E26-79	2008	198.70	4/24/2014	399.58	195.2	220.2	21.50	Downgradient

Source: *Groundwater Monitoring Plan for the Liquid Effluent Retention Facility* (DOE/RL-2013-46, Rev. 0).

* Three of the wells are screened to basalt or beyond the top of basalt. Well 299-E26-14 was screened approximately 3 ft above the basalt surface.

bgs = below ground surface

Table B-48. Semiannual Monitoring Wells and Constituents for Low-Level Waste Management Area 1

Well Name[a]	WAC Compliant	RCRA Required Constituents										Supporting Constituents				Sampled as Scheduled in 2014?
		Contaminant Indicator Parameters[b]				Groundwater Quality Parameters										
						Anions[c]			Metals, Unfiltered, Filtered[c]							
		pH	Specific Conductance	Total Organic Carbon	Total Organic Halides	Chloride	Sulfate	Phenols	Iron	Manganese	Sodium	Alkalinity	Dissolved Oxygen	Temperature	Turbidity	
299-E28-26	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	No[d]
299-E28-27	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	No[d]
299-E28-28	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-2	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	No[d]
299-E32-3	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-4[e]	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-5	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-6	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-7	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-8	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-9	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E32-10	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E33-28	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E33-29	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes

Table B-48. Semiannual Monitoring Wells and Constituents for Low-Level Waste Management Area 1

Well Name[a]	WAC Compliant	RCRA Required Constituents										Supporting Constituents				Sampled as Scheduled in 2014?
		Contaminant Indicator Parameters[b]				Groundwater Quality Parameters										
						Anions[c]			Metals, Unfiltered, Filtered[c]							
		pH	Specific Conductance	Total Organic Carbon	Total Organic Halides	Chloride	Sulfate	Phenols	Iron	Manganese	Sodium	Alkalinity	Dissolved Oxygen	Temperature	Turbidity	
299-E33-34[e]	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E33-35[e]	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E33-265	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E33-266	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes

Note: Requirements are from *Interim Status Groundwater Monitoring Plan for the LLBG WMA-1* (DOE/RL-2009-75).

a. ***Bold italics*** indicates upgradient well. The upgradient wells identified reflects the flow direction change. The monitoring plan is being updated in 2015 to reflect the apparent permanent change.

b. Quadruplicate samples were collected during each sampling event.

c. For anions, analytes include chloride, fluoride, nitrate, nitrite, and sulfate. For metals, analytes include (but are not limited to) calcium, chromium, iron, manganese, potassium, and sodium.

d. January sampling delayed until first week of February, because of increased sampling requirements for 100-BC in November and December 2013 and lack of time for schedule recovery.

e. **Bold** indicates crossgradient well. The crossgradient wells identified reflects the flow direction change. The monitoring plan is being updated in 2015 to reflect the apparent permanent change.

A = to be sampled annually

C = well is constructed in accordance with WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

RCRA = *Resource Conservation and Recovery Act of 1976*

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-49. Low-Level Waste Management Area 1 Indicator Parameter Results

Constituent (units)	2014 Critical Mean Comparison Value[a]	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.54 – 8.36	7.75 – 8.22	No	None
Specific conductance (µS/cm)	2,510	407 – 827	No	None
Total organic carbon (µg/L)	899	108 – 1,270	Yes[b]	299-E33-265
Total organic halides (µg/L)	11.4	<1.8 – 24.5	Yes[c]	All, except 299-E28-26, 299-E28-27, and 299-E32-2

a. *Environmental Calculation File: Calculation of Critical Means for Calendar Year 2013 RCRA Groundwater Monitoring*, Table 9 (ECF-Hanford-13-0013).

b. Previously assessed and concluded to most likely be associated with natural organic material.

c. Total organic halide critical mean was exceeded in January 2014 for 15 of 18 wells. However, all the results were less than the Limit of Quantitation (LOQ) for WSCF data for the periods 10/1/2012 through 9/30/2013 (LOQ = 29.1 µg/L) and 1/1/2013 through 12/31/2013 (LOQ = 28.5 µg/L). Total organic halide results from the July sampling event returned results all below the critical mean value.

LOQ = limit of quantitation

WSCF = Waste Sampling and Characterization Facility

Table B-50. Low-Level Waste Management Area 1 Water Level Summary

Well Name[a]	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E28-26	1987	289	7/22/2014	278.8	298.8	9.88	Downgradient
299-E28-27	1987	282.1	12/21/2014	269.8	289.8	7.7	Downgradient
299-E28-28	1990	287.9	7/21/2014	275	295	7.1	Downgradient
299-E32-10	1991	238.8	7/22/2014	225	245.3	6.5	Upgradient
299-E32-2	1987	272.1	7/8/2014	257.8	289.2	17.1	Upgradient
299-E32-3	1987	279.4	7/8/2014	266.2	286.2	6.8	Upgradient
299-E32-4	1987	289	7/22/2014	278.1	298.1	9.1	Crossgradient
299-E32-5	1989	283	12/21/2014	270.8	291.8	8.8	Upgradient
299-E32-6	1991	267.6	12/21/2014	254.5	275.5	7.9	Upgradient
299-E32-7	1991	258.7	7/14/2014	245.6	266.6	7.9	Upgradient
299-E32-8	1991	245.8	12/21/2014	234.7	255	9.2	Upgradient
299-E32-9	1991	243.8	7/22/2014	230.7	251.3	7.5	Upgradient
299-E33-28	1987	266.5	12/21/2014	255.7	275.7	9.2	Downgradient
299-E33-29	1987	275.7	7/9/2014	279.5	289.5	13.8	Downgradient
299-E33-34	1990	234.4	12/21/2014	219	239.3	4.9	Cross gradient
299-E33-35	1990	244.3	7/22/2014	228.3	249.3	5	Cross gradient
299-E33-265	2010	267.5	7/30/2014	260.9	281	13.5	Upgradient
299-E33-266	2010	268.8	7/30/2014	263.1	283.1	14.3	Upgradient

a. ***Bold italics*** indicates upgradient well. The upgradient wells identified reflects the flow direction change. The monitoring plan is being updated in 2015 to reflect the apparent permanent change.

b. **Bold** indicates crossgradient well. The crossgradient wells identified reflects the flow direction change. The monitoring plan is being updated in 2015 to reflect the apparent permanent change.

bgs = gelow ground surface

Table B-51. Low-Level Waste Management Area 1 Groundwater Quality Parameter Results

Constituent (units)	2014 Range (µg/L)	DWS (µg/L)	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride	10,800 – 20,900	250,000	Secondary MCL	No	None
Iron (unfiltered)	<12.8 – 220	300	Secondary MCL	No	None
Manganese (unfiltered)	<1 – 4.79	50	Secondary MCL	No	None
Nitrate	40,700 – 194,000	45,000	Primary MCL	Yes	All, except 299-E32-2 and 299-E32-3
Phenol	<0.9 – <3.0	2,400	MTCA Method B	No	None
Sodium (unfiltered)	20,900 – 60,300	None	NA	NA	NA
Sulfate	36,900 – 110,000	250,000	Secondary MCL	No	None

DWS = drinking water standard
MCL = maximum contaminant level
MTCA = Model Toxic Control Act
NA = not applicable

Table B-52. Monitoring Wells and Constituents for Low-Level Waste Management Area 2

Well Name[a]	WAC Compliant	RCRA Required Constituents										Supporting Constituents				Sampled as Scheduled in 2013?
		Contaminant Indicator Parameters[b]				Groundwater Quality Parameters										
						Anions[c]			Metals, Unfiltered, Filtered[c]							
		pH	Specific Conductance	TOC	TOX	Chloride	Sulfate	Phenols	Iron	Manganese	Sodium	Alkalinity	Dissolved Oxygen	Temperature	Turbidity	
299-E27-8	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E27-9	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E27-10[a]	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	No[d]
299-E27-11	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E27-17	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E34-2	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E34-9	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E34-10	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes
299-E34-12	C	S	S	S	S	S	S	A	S	S	S	S	S	S	S	Yes

Note: Requirements are from *Interim Status Groundwater Monitoring Plan for the LLBG WMA-2* (DOE/RL-2009-76).

a. According to DOE/RL-2009-76, well 299-E27-10 is used as the upgradient well; however, based on the flow direction change a revised monitoring plan will be implemented in 2015 establishing a new upgradient well and network.

b. Quadruplicate samples were collected during each sampling event.

c. For anions, analytes include chloride, fluoride, nitrate, nitrite, and sulfate. For metals, analytes include, but are not limited to, calcium, chromium, iron, manganese, potassium, and sodium.

d. October 2014 sampling event was delayed until December for coordination with TOC characterization of groundwater at this well.

A = to be sampled annually

C = well is constructed in accordance with requirements of WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

RCRA = *Resource Conservation and Recovery Act of 1976*

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

Table B-53. Low-Level Waste Management Area 2 Indicator Parameter Results

Constituent (units)	2014 Critical Mean Comparison Value[a]	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	6.84 – 8.78	7.74 – 8.24	No	None
Specific conductance (µS/cm)	1,400	444 – 1,490	Yes	299-E34-9[b]
Total organic carbon (µg/L)	1,750	222 – 862	No	None
Total organic halides (µg/L)	16	<3.3 – 15.1	No	None

a. *Environmental Calculation File: Calculation of Critical Means for Calendar Year 2013 RCRA Groundwater Monitoring*, Table 9 (ECF-Hanford-13-0013).

b. Previously assessed and concluded the elevated specific conductance in this well is mainly associated with a migrating nitrate plume from the BY Cribs as explained in Letter 13-AMRP-0192.

Table B-54. Low Level Waste Mangement Area 2 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E27-10	1987	226.4	12/19/2014	212.1	232.4	6.0	Downgradient
299-E27-11	1993	244.5	10/20/2014	230.4	251.4	6.9	Cross gradient
299-E27-17	1991	235.5	12/22/2014	223.2	244.2	8.7	Cross gradient
299-E27-8	1987	238.6	12/22/2014	225.5	245.5	6.9	Downgradient
299-E27-9	1987	231.3	12/22/2014	219.8	239.1	7.8	Downgradient
299-E34-10	1991	240.7	12/22/2014	225.3	246.3	5.6	Cross gradient
299-E34-12	1991	239.9	10/22/2014	223.9	244.5	4.6	Cross gradient
299-E34-2	1987	233.0	10/22/2014	219.9	239.9	6.9	Upgradient
299-E34-9	1991	229.7	4/24/2014	212.6	233.4	3.7	Cross gradient

a. ***Bold italics*** indicates upgradient well. The upgradient wells identified reflects the flow direction change. The monitoring plan is being updated in 2015 to reflect the apparent permanent change.

bgs = below ground surface

Table B-55. Low-Level Waste Management Area 2 Groundwater Quality Parameter Results

Constituent (units)	2014 Range (µg/L)	DWS (µg/L)	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride	17,900 – 79,100	250,000	Secondary MCL	No	None
Iron (unfiltered)	38.5 – 357	300	Secondary MCL	Yes	299-E27-10[a]
Manganese (unfiltered)	<2 – 13.5	50	Secondary MCL	No	None
Nitrate	12,400 – 379,000	45,000	Primary MCL	Yes	299-E27-9[b], 299-E27-10[b], 299-E34-9[c], 299-E34-10[c], 299-E34-12[c]
Phenol	<0.94 – <4.72	2,400	MTCA Method B	No	None
Sodium (unfiltered)	16,000 – 50,200	None	NA	NA	NA
Sulfate	81,700 – 350,000	250,000	Secondary MCL	Yes	299-E27-10[b], 299-E34-9[c]

a. Appears to be associated with casing corrosion as this well has been video surveyed and shown corrosion on the screen.

b. Elevated nitrate and sulfate appears to be associated with past release at the 216-B-2 Ditches.

c. Elevated nitrate and sulfate are associated with southeast migration of nitrate plume from the BY Cribs.

DWS = drinking water standard

MCL = maximum contaminant level

MTCA = Model Toxic Control Act

NA = not applicable

Table B-56. Monitoring Wells and Constituents for Low-Level Waste Management Area 3

Well Name[a]	WAC Compliant	Contamination Indicator Parameters[b]				Other Chemical Parameters				Sampled as Scheduled in 2014?
		pH (Field)	Specific Conductance (Field)	TOC	TOX	Alkalinity	Anions[c]	Metals[c]	Phenols	
299-W9-2	C	S	S	S	S	A	A	A	A	Yes
299-W10-29	C	S	S	S	S	A	A	A	A	Yes
299-W10-30	C	S	S	S	S	A	A	A	A	Yes
299-W10-31	C	S	S	S	S	A	A	A	A	Yes

Notes: Requirements are from *Interim Status Groundwater Monitoring Plan for the LLBG WMA-3* (DOE/RL-2009-68, Rev. 2).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. Upgradient well is noted in ***bold italic***.

b. Quadruplicate samples were collected during each sampling event.

c. For anions, analytes include chloride, fluoride, nitrate, nitrite, and sulfate. For metals, analytes include, but are not limited to, calcium, chromium, iron, manganese, potassium, and sodium.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

Table B-57. Low-Level Waste Management Area 3 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-W9-2	2011	284	11/18/2014	285	320	36	Upgradient
299-W10-29	2006	245	9/5/2014	245	280	35	Downgradient
299-W10-30	2006	242	9/5/2014	242	277	35	Downgradient
299-W10-31	2006	240	9/5/2014	240	275	35	Downgradient

bgs = below ground surface

Table B-58. Low-Level Waste Management Area 3 Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.52 – 8.48	7.52 – 8.02	No	None
Specific conductance (µS/cm)	448	379 – 503	Yes	299-W10-31
Total organic halides (µg/L)	11.36	3.33 – 21.3	Yes	299-W10-29 299-W10-30 299-W10-31

* Average of quadruplicate measurements below critical mean.

LOQ = limit of quantitation

Table B-59. Low-Level Waste Management Area 3 Intrawell Total Organic Carbon Indicator Parameter Results

Well Name	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?
299-W10-29	5,447	176 – 429	No
299-W10-30	10,339	350 – 830	No
299-W10-31	7,709	271 – 439	No

Table B-60. Average Concentration for Indicator Parameters in Low-Level Waste Management Area 3 Wells in 2014

Well Name	pH Measurement Critical Mean (7.52 – 8.48)	Specific Conductance Critical Mean (448)	TOX Critical Mean (11.4)	TOC Critical Mean (5447 – 10339)
299-W10-29	7.88	396	7.2	284
299-W10-30	7.75	407	11.9	525
299-W10-31	7.85	488	15.8	352
299-W9-2	7.94	392	6.2	304

TOC = total organic carbon

TOX = total organic halides

Table B-61. Low-Level Waste Management Area 3 Water Quality and Supporting Constituent Parameter Summary

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Alkalinity (mg/L)	110	NA	NA	No	None
Calcium (µg/L)	46,500 – 59,500	NA	NA	No	None
Chloride (mg/L)	15.4 – 29.4	250	Secondary MCL	No	None
Chromium (µg/L)	<5	100	Federal MCL	No	None
Dissolved oxygen (mg/L)	5.3 – 10.5	NA	NA	No	None
Fluoride (µg/L)	187 – 222	2,000	Secondary MCL	No	None
Hexavalent chromium (µg/L)	<2 – 3.1	48	Federal MCL	No	None
Iron – unfiltered (µg/L)	<20 – 69.5	300	Secondary MCL	No	None
Magnesium – unfiltered (µg/L)	14,300 – 18,800	NA	NA	No	None
Manganese – unfiltered (µg/L)	<4 – 7.5	50	Secondary MCL	No	None
Nitrate (as N mg/L)	6.0 – 11.0	10	Federal MCL	Yes	299-W10-31
Oxidation reduction (mV)	226 – 408	NA	NA	No	None
pH (unitless)	7.52 – 8.02	6.5 – 8.5	Secondary MCL	No	None
Phenol (µg/L)	<0.9	2,400	MTCA Method B	No	None
Potassium (µg/L)	4,050 – 4,370	NA	NA	No	None
Sodium (mg/L)	11.5 – 12.9	NA	NA	No	None
Specific conductance (µS/cm)	379 – 503	448	Critical mean	Yes	299-W10-31
Sulfate (mg/L)	37.4 – 64.6	250	Secondary MCL	No	None
Temperature	13.6 – 21.8	NA	NA	No	None
Turbidity (NTU)	0.62 – 4.58	NA	NA	No	None

DWS = drinking water standard
MCL = maximum contaminant level
MTCA = Model Toxic Control Act
NA = not applicable

Table B-62. Monitoring Wells and Constituents for Low-Level Waste Management Area 4

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Chemical Parameters				Sampled as Scheduled in 2014?
			pH (Field)	Specific Conductance (Field)	TOC	TOX	Alkalinity	Anions[c]	Metals[c]	Phenols	
299-W15-17	Deep unconfined; no statistics	C	S	S	S	S	S	A	A	A	Yes
299-W15-30	—	C	S	S	S	S	S	A	A	A	Yes
299-W15-83	—	C	S	S	S	S	S	A	A	A	Yes
299-W15-94	—	C	S	S	S	S	S	A	A	A	Yes
299-W15-152	—	C	S	S	S	S	S	A	A	A	Yes
299-W15-224	—	C	S	S	S	S	S	A	A	A	Yes
299-W18-21	—	C	A	A	A	A	A	A	A	A	Yes
299-W18-22	Deep unconfined; no statistics	C	S	S	S	S	S	A	A	A	Yes

Notes: Requirements are from *Interim Status Groundwater Monitoring Plan for the LLBG WMA-4* (DOE/RL-2009-69, Rev. 2).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. Upgradient well is noted in ***bold italic***.

b. Quadruplicate samples were collected during each sampling event.

c. For anions, analytes include chloride, fluoride, nitrate, nitrite, and sulfate. For metals, analytes include (but are not limited to) calcium, chromium, iron, manganese, potassium, and sodium.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

Table B-63. Low-Level Waste Management Area 4 Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	7.18 – 8.37	7.77 – 8.22	No	None
Specific conductance (µS/cm)	671	365 – 575	No	None
Total organic carbon (µg/L)	1,585	<270 – 830	No	None
Total organic halides (µg/L)	48.89	<3.3 – 58.4	Yes	299-W15-224

Table B-64. Low-Level Waste Management Area 4 Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-W15-17	1987	243	11/14/2014	422	432	189	Downgradient
299-W15-30	1995	244	11/14/2014	218	258	14	Downgradient
299-W15-83	2005	241	7/9/2014	235	270	29	Downgradient
299-W15-94	2005	243	7/9/2014	236	271	28	Downgradient
299-W15-152	2005	250	7/22/2015	236	271	21	Downgradient
299-W15-224	2006	239	7/9/2014	236	271	32	Downgradient
299-W18-22	1987	227	11/18/2014	416	447	220	Upgradient

bgs = below ground surface

Table B-65. Low-Level Waste Management Area 4 Groundwater Quality Parameter and Supporting Constituent Summary

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Alkalinity (mg/L)	100 – 130	—	NA	—	None
Aluminum (µg/L)	<20	200	Secondary MCL	No	None
Calcium (mg/L)	39.2 – 62.2	—	NA	—	None
Chloride (mg/L)	10.7 – 35.7	250	Secondary MCL	No	None
Chromium (µg/L)	5.6 – 19.7	100	Federal MCL	No	None
Dissolved oxygen (mg/L)	6.8 – 9.4	—	NA	No	None
Fluoride (µg/L)	223 – 528	2,000	Secondary MCL	No	None
Hexavalent chromium (µg/L)	2 – 9.3	48	Federal MCL	—	—
Iron – unfiltered (µg/L)	<40 – 84.3	300	Secondary MCL	No	None
Magnesium – unfiltered (mg/L)	13.7 – 19.5	—	NA	—	None
Manganese – unfiltered (µg/L)	<4	50	Secondary MCL	No	None
Nitrate (as N mg/L)	4.7 – 25.9	10	Federal MCL	Yes	299-W15-30 299-W15-83 299-W15-94 299-W15-152 299-W15-224
Oxidation reduction (mV)	177 – 369	—	NA	No	None
pH (unitless)	7.77 – 8.22	6.5 – 8.5	Secondary MCL	No	None
Phenol (µg/L)	<1	2,400	MTCA Method B	No	None
Potassium (µg/L)	4,690 – 5,580	—	NA	—	None
Sodium (mg/L)	14.4 – 31.2	—	NA	—	None
Specific conductance (µS/cm)	365 – 575	671	Critical mean	No	None
Sulfate (mg/L)	23.7 – 68.7	250	Secondary MCL	No	None
Temperature	16.9 – 23.3	—	NA	—	None
Turbidity (NTU)	0.39 – 4.20	—	NA	—	None

DWS = drinking water standard
MCL = maximum contaminant level
MTCA = Model Toxic Control Act
NA = not applicable

Table B-66. Monitoring Wells and Constituents for the Nonradioactive Dangerous Waste Landfill

Well Name[a]	Comment	WAC Compliant	Contamination Indicator Parameters[b]				Other Chemical Parameters				Sampled as Scheduled in 2014?
			pH (Field)	Specific Conductance (Field)	TOC	TOX	Anions	Metals	Phenols	VOA	
699-25-33A	Top of LPU; no statistical evaluation	C	S	S	S	S	S	A	A	S	Yes
699-25-34A	—	C	S	S	S	S	S	A	A	S	No[c]
699-25-34B	—	C	S	S	S	S	S	A	A	S	Yes
699-25-34D	—	C	S	S	S	S	S	A	A	S	No[d]
699-26-33	—	C	S	S	S	S	S	A	A	S	No[c]
699-26-34A	—	C	S	S	S	S	S	A	A	S	Yes
699-26-34B	—	C	S	S	S	S	S	A	A	S	Yes
699-26-35A	—	C	S	S	S	S	S	A	A	S	Yes
699-26-35C	Top of LPU; no statistical evaluation	C	S	S	S	S	S	A	A	S	Yes

Notes: Requirements are from *Groundwater Monitoring Plan for the Nonradioactive Dangerous Waste Landfill* (PNNL-12227) and corresponding Interim Change Notice 1 (PNNL-12227-ICN-1).

Wells completed at the top of the unconfined aquifer unless otherwise specified.

a. ***Bold italics*** indicate upgradient wells.

b. Quadruplicate samples were collected during each sampling event for contamination indicator parameters except in LPU wells.

c. Well not sampled in January due to pump issues.

d. January sampling event delayed to March due to pump issues.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

LPU = low-permeability units (in upper portion of Ringold Formation within member of Taylor Flat)

S = to be sampled semiannually

TOC = total organic carbon

TOX = total organic halides

VOA = volatile organic analyte

Table B-67. Nonradioactive Dangerous Waste Landfill Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
699-25-33A	1987	130.9	10/28/2014	191.0	201.0	10.0	Downgradient
699-25-34A	1986	132.37	11/13/2014	117.9	137.9	5.5	Downgradient
699-25-34B	1986	131.2	10/14/2014	118.2	138.2	6.8	Downgradient
699-25-34D	1992	138.6	11/13/2014	126.8	161.3	22.8	Downgradient
699-26-33	1986	137.8	10/28/2014	123.5	143.5	5.7	Downgradient
699-26-34A	1986	130.5	10/28/2014	117.2	137.2	6.7	Upgradient
699-26-34B	1992	130.6	11/13/2014	118.4	153.3	22.7	Downgradient
699-26-35C	1987	134.7	10/28/2014	193.0	203.0	10.0	Downgradient
699-26-35A[d]	1986	134.5	10/28/2014	120.4	140.4	6	Upgradient

bgs = below ground surface

Table B-68. Nonradioactive Dangerous Waste Landfill Indicator Parameter Results

Constituent (units)	2014 Critical Mean	2014 Concentration Range	2014 Exceedance?	Wells Exceeded
pH	6.74 – 7.96	7.11 – 8.26	Yes (high)	699-25-33A*
Specific conductance (µS/cm)	583	317 – 615	Yes	699-25-34A 699-25-34B 699-25-34D
Total organic carbon (µg/L)	725	170 – 1,200	Yes (high)	699-26-35C*
Total organic halides (µg/L)	1st quarter: WSCF (LOQ = 18.3) 2nd quarter: TASL (insufficient data) GEL (insufficient data) 3rd quarter: TASL (LOQ = 17.5) GEL (insufficient data) 4th quarter: TASL (LOQ = 14.7) GEL (5.6)	<1.8 – 10.5	No	None

* Deep well not used in statistical evaluation.

GEL = Geotechnical Engineering Laboratory

LOQ = limit of quantitation

NC = not calculated because proportion non-detects is greater than 50 percent.

TASL = Test America St. Loius

Table B-69. Nonradioactive Dangerous Waste Landfill Water Quality and Site-Specific Parameter Results

Constituent (units)	2014 Range	DWS	Standard Type	2014 Exceedance?	Wells Exceeded
Chloride (mg/L)	6.07 – 8.50	250	Secondary MCL	No	None
Iron (filtered) (µg/L)	<12.8 – <40	300	Secondary MCL	No	None
Iron (unfiltered) (µg/L)	<12.8 – 922	300	Secondary MCL	Yes	699-25-34A
Manganese (filtered) (µg/L)	0.53 – <4	50	Secondary MCL	No	None
Manganese (unfiltered) (µg/L)	<1 – 10.8	50	Secondary MCL	No	None
Nitrate (mg/L)	5.8 – 23.5	45	MCL	No	None
Phenol (µg/L)	<0.9 – <2.9	2,400	MTCA Method B	No	None
Sodium (filtered) (mg/L)	19.8 – 25.2	None	NA	—	None
Sodium (unfiltered)	17.3 – 27.6	None	NA	—	None
Sulfate (mg/L)	26.0 – 50.1	250	Secondary MCL	No	None

DWS = drinking water standard
MCL = maximum contaminant level
MTCA = "Model Toxics Control Act—Cleanup" (WAC 173-340)
NA = not applicable

Table B-70. Monitoring Wells and Constituents for Waste Management Area A-AX

Well Name[a]	WAC Compliant	Site-Specific Constituents						Supporting Constituents					Sampled as Scheduled in 2013?
		Nitrate	Sodium	Sulfate	TOC	Chromium	Lead	Alkalinity	Anions[b]	Metals[b]	Technetium-99[c]	Field Parameters	
299-E24-20	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E24-22	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E24-33	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E25-2	P	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E25-40	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E25-41	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E25-93	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E25-94	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E25-236	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	No[d]

Notes: Requirements are from *RCRA Assessment Plan for Single-Shell Tank Waste Management Area A-AX at the Hanford Site* (PNNL-15315).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italics*** indicate upgradient wells.

b. For anions, analytes include, but are not limited to, nitrate and sulfate. For metals, analytes include, but are not limited to, chromium and sodium.

c. *Atomic Energy Act of 1954* parameter.

d. Well decommissioned in June 2013.

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

TOC = total organic carbon

Table B-71. Waste Management Area A-AX Water Levels

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E24-20	1991	289.7	12/2/2014	279.2	299.4	9.7	Upgradient
299-E24-22	2003	288.3	12/22/2014	286.2	321.3	33	Upgradient
299-E24-33	2004	276.5	12/22/2014	278.1	310.1	33.6	Upgradient
299-E25-2*	1955	277.0	12/2/2014	276.0	316.0	39	Downgradient
299-E25-40	1989	266.9	12/2/2014	252.0	273.0	6.1	Downgradient
299-E25-41	1989	272.1	12/2/2014	255.3	276.3	4.2	Downgradient
299-E25-93	2003	280.5	12/22/2014	278.2	313.3	32.8	Downgradient
299-E25-94	2004	294.6	12/3/2014	295.1	330.1	35.5	Downgradient
299-E25-236	Decommissioned		—	—	—	—	Downgradient

* Perforated well.

bgs = below ground surface

Table B-72. Waste Management Area A-AX 2014 Assessment Parameter Summary

Parameter	Range
Alkalinity	75,400 – 136,000 µg/L
Chromium (filtered)	<1 – 10.6 µg/L
Lead (filtered)	<0.05 – <0.5 µg/L
Nitrate	12,300 – 60,200 µg/L
pH Measurement	7.23 – 8.34
Sodium (filtered)	11,200 – 28,800 µg/L
Specific conductance	445 – 725 µS/cm
Sulfate	92,300 – 210,000 µg/L
Technetium-99	<11.8 – 1,840 pCi/L
Temperature	16.0 – 20.8°C
Total organic carbon	230 – 850 µg/L
Turbidity	0.14 – 53.3 NTU

Table B-73. Monitoring Wells and Constituents for Waste Management Area B-BX-BY

Well Name[a]	WAC Compliant	pH	Specific Conductance	TOC	Alkalinity	Anions[b]	Cyanide	Metals[c]	Water Level	Sampled as Scheduled in 2014?
299-E33-18	P	Q	Q	Q	Q	Q	Q	Q	Q	No[d]
299-E33-20	P	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-31	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-32	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-38	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-41	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-42	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-44	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-47	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-48	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-49	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-334	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-335	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-337	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-338	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes
299-E33-339	C	Q	Q	Q	Q	Q	Q	Q	Q	Yes

Source: *Groundwater Quality Assessment Plan for Single-Shell Tank Waste Management Area B-BX-BY* (DOE/RL-2012-53).

Note: Wells generally screened acrossed entire unconfined aquifer. Aquifer thickness ranges from approximately 1 to 6 m.

a. ***Bold italic*** well names are upgradient wells due to flow direction change to southeast.

b. Anions include, but are not limited to, chloride, nitrate, and sulfate.

c. Metals (filtered and unfiltered) include, but are not limited to, iron, manganese, and sodium .

d. Well decommissioned in June 2013.

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

WAC = *Washington Administrative Code*

Table B-74. Waste Management Area B-BX-BY Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E33-20[a]	1956	250.8	11/4/2014	239.0	254.0	3.2	Upgradient
299-E33-31	1989	248.1	11/4/2014	234.9	255.9	7.8	Upgradient
299-E33-32	1989	260.8	11/4/2014	246.4	267.4	6.6	Upgradient
299-E33-334[b]	2000	267.3	11/5/2014	257.7	282.7	15.4	Upgradient
299-E33-335	2000	267.8	11/5/2014	260.0	280.0	12.2	Downgradient
299-E33-337	2001	263.1	11/5/2014	255.4	280.4	17.3	Downgradient
299-E33-338	2001	257.4	11.5/2014	250.9	270.9	13.5	Downgradient
299-E33-339[b]	2001	264.1	12/21//2014	259.4	279.3	15.2	Downgradient
299-E33-38	1991	233.6	12/21/2014	218.6	239.6	6.0	Upgradient
299-E33-41	1991	255.3	11/4/2014	244.9	261.0	5.7	Downgradient
299-E33-42[b]	1991	254.6	11/4/2014	238.5	259.8	5.2	Upgradient
299-E33-44	1998	243.3	11/4/2014	238.0	253.0	9.7	Downgradient
299-E33-47	2004	242.8	11/4/2014	244.1	264.1	21.3	Downgradient
299-E33-48	2004	265.0	11/4/2014	260.2	285.2	20.2	Downgradient
299-E33-49	2004	266.9	11/4/2014	263.5	283.5	16.6	Downgradient

a. Well not constructed as a WAC 173-350 resource protection well.

b. Well not drilled to basalt.

bgs = below ground surface

Table B-75. Monitoring Wells and Constituents for Waste Management Area C

Well Name[a]	Well Construction Standard	pH	Specific Conductance	Alkalinity	Anion[b]	Cyanide	Metals[c], Unfiltered, Filtered	Sampled as Scheduled in 2014?
299-E27-4	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-7	P	Q	Q	Q	Q	Q	Q	Yes
299-E27-12	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-13	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-14	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-15	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-21	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-22	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-23	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-24	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-25	C	Q	Q	Q	Q	Q	Q	Yes
299-E27-155	C	Q	Q	Q	Q	Q	Q	Yes

Source: *Groundwater Quality Assessment Plan for the Single-Shell Waste Management Area C* (DOE/RL-2009-77).

Note: Ten wells screened from the water table to 1.5 to 12.2 m below the water table. Two wells, 299-E27-24 and 299-E27-155 , screened across the bottom 6.1 and 10.6 m of the aquifer, respectively.

a. ***Bold italics*** well names are upgradient wells.

b. Anions include, but are not limited to, chloride, nitrate, and sulfate.

c. Metals (filtered and unfiltered) include, but are not limited to, iron, manganese, and sodium.

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P constructed before WAC requirements were applicable at the Hanford Site

Q = to be sampled quarterly

WAC = *Washington Administrative Code*

Table B-76. Waste Management Area C Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-E27-12	1989	261.5	11/25/2014	246.5	267.6	6.1	Upgradient
299-E27-13	1989	270.0	12/5/2014	253.6	274.7	4.7	Upgradient
299-E27-14	1989	259.2	12/4/2014	245.8	266.8	7.6	Downgradient
299-E27-15	1989	253.7	12/5/2014	238.0	259.0	5.3	Upgradient
299-E27-155	2007	282.0	12/4/2014	300.5	335.5	35	Cross gradient
299-E27-21	2003	272.9	3/25/2014	271.4	306.4	33.5	Downgradient
299-E27-22	2003	232.1	12/3/2014	228.1	268.0	35.9	Upgradient
299-E27-23	2003	275.0	12/4/2014	273.5	308.5	33.5	Downgradient
299-E27-24	2010	266.0	12/16/2014	294.6	314.6	20.0	Downgradient
299-E27-25	2010	214.4	12/3/2014	209.1	229.2	14.8	Cross gradient
299-E27-4	2003	271.8	12/16/2014	270.3	305.3	33.5	Upgradient
299-E27-7	1982	237.6	12/16/2014	241.0	281.0	40.0	Downgradient

bgs = below ground surface

Table B-77. Monitoring Wells and Constituents for Waste Management Area S-SX

Well Name[a]	WAC Compliant	RCRA		Supporting Constituents				Sampled as Scheduled in 2014?
		Chromium	Nitrate	Alkalinity	Anions[b]	Metals[b]	Field Parameters	
299-W22-44	C	Q	Q	Q	Q	Q	Q	No[c]
299-W22-45	C	S	S	S	S	S	S	No[d]
299-W22-47	C	Q	Q	Q	Q	Q	Q	Yes
299-W22-49	C	S	S	S	S	S	S	No[e]
299-W22-50	C	Q	Q	Q	Q	Q	Q	No[f]
299-W22-69	C	A	A	A	A	A	A	Yes
299-W22-72	C	A	A	A	A	A	A	Yes
299-W22-80	C	A	A	A	A	A	A	Yes
299-W22-81	C	A	A	A	A	A	A	Yes
299-W22-82	C	A	A	A	A	A	A	Yes
299-W22-83	C	A	A	A	A	A	A	Yes
299-W22-84	C	A	A	A	A	A	A	Yes
299-W22-85	C	S	S	S	S	S	S	Yes
299-W22-86	C	A	A	A	A	A	A	Yes
299-W22-89	C	A	A	A	A	A	A	Yes
299-W22-94	C	S	S	S	S	S	S	Yes
299-W22-95	C	S	S	S	S	S	S	No[g]
299-W22-113	C	S	S	S	S	S	S	No[h]
299-W23-15	C	A	A	A	A	A	A	No[i]
299-W23-19	C	Q	Q	Q	Q	Q	Q	No[j]
299-W23-20	C	A	A	A	A	A	A	Yes
299-W23-21	C	A	A	A	A	A	A	Yes

Table B-77. Monitoring Wells and Constituents for Waste Management Area S-SX

Well Name[a]	WAC Compliant	RCRA	Nitrate	Supporting Constituents				Sampled as Scheduled in 2014?
		Chromium		Alkalinity	Anions[b]	Metals[b]	Field Parameters	

Notes: Requirements are from *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area S-SX* (DOE/RL-2009-73).

Wells completed at the top of the unconfined aquifer.

a. ***Bold italics*** indicate upgradient wells.

b. Anions include, but are not limited to, chloride, nitrate, and sulfate. Metals (filtered and unfiltered) include, but are not limited to, calcium, magnesium, potassium, and sodium.

c. Well sample dry as of September 2013; replacement well scheduled for drilling.

d. June sampling event delayed until July; access restricted due to vapors from nearby waste tanks.

e. Well replaced by 299-W22-113; scheduled for December but sampled in January 2015 after pump was installed.

f. Well sample dry in June; replacement well scheduled for drilling.

g. December sampling event delayed until January 2015 due to well cap issue.

h. Well replaced 299-W22-49. December sampling event delayed until January for installation of a sample pump.

i. June sampling event delayed until August due to pump issue.

j. March sampling event delayed until April due to well access issues.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

RCRA = *Resource Conservation and Recovery Act of 1976*

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-78. Waste Management Area S-SX Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Water Remaining (ft)	Location
299-W22-44	1991	Dry	—	205.1	242	Dry	Downgradient
299-W22-45	1992	230.7	12/31/2014	198.1	233.6	2.9	Downgradient
299-W22-47	2005	238.5	12/10/2014	228.7	263.7	25.2	Downgradient
299-W22-49	1999	Dry	—	217.9	232.9	Dry	Downgradient
299-W22-50	2000	Dry	—	218.0	233.0	Dry	Downgradient
299-W22-69	2006	245.1	12/19/2014	238.0	273.1	28.0	Downgradient
299-W22-72	2006	246.0	12/19/2014	237.0	272.0	26.0	Downgradient
299-W22-80	2000	219.1	12/10/2014	205.0	240.1	21.0	Downgradient
299-W22-81	2001	240.1	12/19/2014	226.8	261.7	21.6	Downgradient
299-W22-82	2001	240.4	9/26/2014	226.1	261.2	20.8	Downgradient
299-W22-83	2001	241.9	12/17/2014	226.3	261.3	19.4	Downgradient
299-W22-84	2001	246.6	12/31/2014	232.0	267.0	20.4	Downgradient
299-W22-85	2001	232.2	12/31/2014	217.1	252.0	19.8	Downgradient
299-W22-86	2006	241.1	12/19/2014	231.4	266.5	25.4	Downgradient
299-W22-89	2010	237.9	9/26/2014	230.8	265.9	28.0	Downgradient
299-W22-94[a]	2013	245.2	12/19/2014	243.2	278.2	33.0	Downgradient
299-W22-95[b]	2013	248.0	12/19/2014	250.0	290.0	42.0	Downgradient
299-W22-113[c]	2014	232.7	10/2/2014	233.9	264.0	31.3	Downgradient
299-W23-15	1991	217.4	12/10/2014	185.7	222.4	5.0	Downgradient
299-W23-19	1999	226.6[d]	9/26/2014	210.7	241.3	14.7	Downgradient
299-W23-20	2000	228.2	9/26/2014	215.5	250.5	22.3	Upgradient
299-W23-21	2000	226.9	12/10/2014	212.6	249.7	22.8	Upgradient

a. 299-W22-94 is a replacement well for 299-W22-48 (sample dry).

b. 299-W22-95 is a replacement well for 299-W22-26 (sample dry).

c. 299-W22-113 is a replacement well for 299-W22-49 (sample dry).

d. Water-level measurements are not possible from 299-W23-19 because it is located within the tank farm fence line and sampled remotely from outside the fence. The water level was estimated by trend surface analysis of the 9/26/2014 measurements from nearby wells.

bgs = below ground surface

Table B-79. Waste Management Area S-SX Assessment Parameter Summary

Parameter	Range
Alkalinity	80,000 – 112,000 µg/L
Chromium (filtered)	1.0 – 460 µg/L
Chromium (unfiltered)	<1 – 497 µg/L
Nitrate	7.53 – 199 mg/L
pH Measurement	7.43 – 8.20
Specific conductance	227 – 561 µS/cm
Temperature	16.8 – 21.4°C
Turbidity	0.42 – 819 NTU

Table B-80. Monitoring Wells and Constituents for Waste Management Area T

Well Name[a]	WAC Compliant	RCRA Dangerous Constituent	Supporting Parameters			Field-Measured Parameters					Sampled as Scheduled in 2014?
		Hexavalent Chromium	Nitrate and Other Anions	Alkalinity	Metals, Unfiltered	pH	Specific Conductance	Turbidity	Temperature	Dissolved Oxygen	
299-W10-1	P	A	A	A	A	A	A	A	A	A	Yes
299-W10-4	P	A	A	A	A	A	A	A	A	A	No, well sample dry in 2013
299-W10-8	P	A	A	A	A	A	A	A	A	A	No, well sample dry in 2013
299-W10-23	C	B	B	B	B	B	B	B	B	B	Not scheduled for 2014
299-W10-24	C	A	A	A	A	A	A	A	A	A	Yes
299-W10-28	C	A	A	A	A	A	A	A	A	A	Yes
299-W11-39	C	A	A	A	A	A	A	A	A	A	Yes
299-W11-40	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W11-41	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W11-42	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W11-45[b]	C	Q	S	A	S	S	S	S	S	S	No
299-W11-47[c]	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes

Notes: Requirements are from *Interim Status Groundwater Quality Assessment Plan for Single-Shell Tank Waste Management Area T* (DOE/RL-2009-66).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italics*** indicate upgradient wells.

b. Offline extraction well was converted to monitoring well in October 2014 and sampled once in December 2014.

c. Screened 9 to 18 m below water table.

A = to be sampled annually

B = to be sampled biennially

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed prior to WAC requirements

Q = to be sampled quarterly

RCRA = *Resource Conservation and Recovery Act of 1976*

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-81. Waste Management Area T Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-W10-1	1947	239	11/12/14	190	270	31	Upgradient
299-W10-4	1952	237	11/15/13	190	234	0	Assessment
299-W10-8	1973	248	3/8/13	211	251	3	Downgradient
299-W10-23	1998	243	3/17/14	226	261	18	Assessment
299-W10-24	1998	252	11/5/14	233	268	16	Downgradient
299-W10-28	2001	241	11/5/14	225	260	19	Upgradient
299-W11-39	2000	257	11/7/14	239	274	17	Downgradient
299-W11-40	2000	257	11/11/14	238	273	16	Downgradient
299-W11-41	2000	257	11/11/14	237	272	15	Downgradient
299-W11-42	2000	258	11/7/14	237	272	14	Downgradient
299-W11-45	2006	271	12/12/14	281	296	25	Far-field
299-W11-47	2006	257	11/7/14	274	305	48	Downgradient

bgs = below ground surface

Table B-82. Waste Management Area T Assessment Parameter Summary

Parameter	Range
Alkalinity (µg/L)	100,000 – 143,000
Calcium – unfiltered (µg/L)	6,500 – 58,300
Chloride (mg/L)	13.5 – 20.8
Chromium – unfiltered (µg/L)	19 – 109
Dissolved oxygen (mg/L)	7.28 – 10.26
Fluoride (µg/L)	190 – 4,570
Hexavalent chromium (µg/L)	6.8 – 67.4
Magnesium – unfiltered (µg/L)	2,010 – 19,900
Nitrate (as NO_3 mg/L)	77 – 456
pH (unitless)	7.54 – 8.56
Potassium – unfiltered (µg/L)	2,290 – 4,750
Sodium – unfiltered (mg/L)	12.7 – 172
Specific conductance (µS/cm)	470 – 1,115
Sulfate (mg/L)	34.5 – 57.3
Temperature	15.1 – 22.2
Turbidity (NTU)	0.95 – 31.3

Table B-83. Monitoring Wells and Constituents for Waste Management Area TX-TY

Well Name[a]	WAC Compliant	RCRA Dangerous Parameter	Supporting Parameters			Field-Measured Parameters					Sampled as Scheduled in 2014?
		Hexavalent Chromium	Nitrate and Other Anions	Alkalinity	Metals, Unfiltered	pH	Specific Conductance	Turbidity	Temperature	Dissolved Oxygen	
299-W10-26	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W10-27	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W14-11[b]	C	S	S	A	S	S	S	S	S	S	Yes
299-W14-13	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W14-14	C	S	S	A	S	S	S	S	S	S	Yes
299-W14-15	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W14-16	C	A	A	A	A	A	A	A	A	A	Yes
299-W14-17	C	A	A	A	A	A	A	A	A	A	Yes
299-W14-18	C	Q	S	A	S	Q	Q	Q	Q	Q	Yes
299-W14-19	C	S	S	A	S	S	S	S	S	S	Yes
299-W15-44	C	S	S	A	S	S	S	S	S	S	Yes
299-W15-763	C	S	S	A	S	S	S	S	S	S	Yes
299-W15-765[c]	C	S	S	A	S	S	S	S	S	S	Yes

Notes: Requirements are from *Interim Status Groundwater Quality Assessment Plan for Single-Shell Tank Waste Management Area TX-TY* (DOE/RL-2009-67).

Wells completed at the top of the unconfined aquifer, unless specified otherwise.

a. ***Bold italic*** indicates upgradient well.

b. Screened 11 to 14.6 m below water table.

c. Well taken out of service as an extraction well and converted to a monitoring well in fourth quarter of calendar year 2012.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

RCRA = *Resource Conservation and Recovery Act of 1976*

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-84. Waste Management Area TX-TY Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Remaining Water Column (ft)	Location
299-W10-26	1998	242	11/18/2014	217	252	10	Downgradient
299-W10-27	2001	242	11/5/2014	221	256	14	Downgradient
299-W14-11	2005	241	11/11/2014	262	272	31	Downgradient
299-W14-13	1998	246	11/11/2014	217	252	6	Downgradient
299-W14-14	1998	243	11/18/2014	217	252	9	Downgradient
299-W14-15	2000	243	8/4/2014	220	255	12	Downgradient
299-W14-16	2000	246	11/4/2014	223	258	12	Far-field
299-W14-17	2000	245	11/4/2014	222	257	12	Far-field
299-W14-18	2000	243	11/11/2014	218	253	10	Downgradient
299-W14-19	2002	244	11/11/2014	224	259	15	Downgradient
299-W15-44	2002	235	5/27/2014	216	251	16	Downgradient
299-W15-763	2001	230	5/20/2014	212	247	17	Downgradient
299-W15-765	2001	241	11/7/2014	220	255	14	Upgradient

Table B-85. Waste Management Area TX-TY Assessment Parameter Summmary

Parameter	Range
Alkalinity (µg/L)	108,000 – 135,000
Aluminum – unfiltered (µg/L)	<12.9 – 106
Calcium – unfiltered (µg/L)	41,000 – 119,000
Chloride (mg/L)	14.3 – 43.4
Chromium – unfiltered (µg/L)	12.3 – 108
Dissolved oxygen (mg/L)	7.86 – 12.16
Fluoride (µg/L)	221 – 1,200
Hexavalent chromium (µg/L)	<8 – 144
Magnesium – unfiltered (µg/L)	14,000 – 35,200
Nitrate (as NO_3 mg/L)	49.1 – 536
pH (unitless)	6.78 – 8.08
Potassium – unfiltered (µg/L)	4,340 – 7,260
Sodium – unfiltered (mg/L)	17 – 136
Specific conductance (µS/cm)	447 – 1,505
Sulfate (mg/L)	31.6 – 81.6
Temperature	13.5 – 26.3
Turbidity (NTU)	0.47 – 367

Table B-86. Monitoring Wells and Constituents for Waste Management Area U

Well Name[a]	WAC Compliant	RCRA	Supporting Parameters					Sampled as Scheduled in 2014?
		Chromium	Nitrate	Alkalinity	Anions[b]	Metals[b]	Field Parameters	
299-W18-30	C	S	S	S	S	S	S	No[c]
299-W18-40	C	A	A	A	A	A	A	Yes
299-W19-12	N	S	S	S	S	S	S	Yes
299-W19-41	C	S	S	S	S	S	S	Yes
299-W19-42	C	S	S	S	S	S	S	Yes
299-W19-44	C	S	S	S	S	S	S	Yes
299-W19-45	C	S	S	S	S	S	S	Yes
299-W19-47	C	S	S	S	S	S	S	Yes

Notes: Requirement is from *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area U* (DOE/RL-2009-74).

Wells completed at the top of the unconfined aquifer.

a. ***Bold italic*** indicates upgradient well.

b. Anions include, but are not limited to, chloride, nitrate, and sulfate. Metals (filtered and unfiltered) include, but are not limited to, calcium, magnesium, potassium, and sodium.

c. Well is dry; replacement well 299-W18-260 drilled at end of year; first sampling scheduled for April 2015.

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

N = well constructed prior to WAC requirements

S = to be sampled semiannually

Q = to be sampled quarterly

RCRA = *Resource Conservation and Recovery Act of 1976*

WAC = *Washington Administrative Code*

Table B-87. Waste Management Area U Water Level Summary

Well Name	Year Installed	Water Depth (ft bgs)	Water-Level Date	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Water Remaining (ft)	Location
299-W18-30	1991	Dry	—	197.5	233.7	Dry	Downgradient
299-W18-40	2001	225.8	12/10/2014	218.3	253.3	24.5	Upgradient
299-W19-12	1983	239.2	12/10/2014	210.0	247.0	7.8	Downgradient
299-W19-41	1998	239.2	12/10/2014	220.1	255.1	15.9	Downgradient
299-W19-42	1998	238.0	12/10/2014	220.3	255.4	17.4	Downgradient
299-W19-44	2001	241.9	12/10/2014	229.9	264.9	23.0	Downgradient
299-W19-45	2001	240.0	12/31/2014	224.1	259.0	19.0	Downgradient
299-W19-47	2004	238.2	7/11/2014	227.1	262.0	23.8	Downgradient

bgs = below ground surface

Table B-88. Waste Management Area U Assessment Parameter Summary

Parameter	Range
Alkalinity	68,000 – 110,000 µg/L
Chromium (filtered)	<5 – 13.9 µg/L
Chromium (unfiltered)	<5 – 21.1 µg/L
Nitrate	33.5 – 102 mg/L
pH Measurement	7.74 – 8.41
Specific conductance	343 – 556 µS/cm
Temperature	17.4 – 21.1°C
Turbidity	0.59 – 14 NTU

Table B-89. Monitoring Wells and Constituents for Environmental Restoration Disposal Facility

Well Name[a]	WAC Compliant	Alkalinity	Alpha	Anions	Beta	Carbon-14	Iodine-129	Metals	Radium[b]	Total Dissolved Solids	Technetium-99	TOX	Uranium	VOA	Sampled as Scheduled in 2014?
699-35-66A	P	S	S	S	S	S	S	S	S	S	S	S	S	S	Yes
699-36-66B	C	S	S	S	S	S	S	S	S	S	S	S	S	S	Yes
699-36-70A	C	S	S	S	S	S	S	S	S	S	S	S	S	S	Yes
699-37-66	C	S	S	S	S	S	S	S	S	S	S	S	S	S	Yes

Notes: Requirements are from *Groundwater Protection Plan for the Environmental Restoration Disposal Facility* (WCH-198).

Wells completed at the top of the unconfined aquifer.

a. ***Bold italic*** indicates upgradient well.

b. Total alpha energy emitted from radium.

C = well is constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

S = to be sampled semiannually

TOX = total organic halides

VOA = volatile organic analyte

WAC = *Washington Administrative Code*

Table B-90. Monitoring Wells and Constituents for the KE and KW Basins

Well Name	WAC Compliant	Gross Alpha	Anions	Gross Beta	Carbon-14	Metals	Strontium-90	Technetium-99	Tritium	Sampled as Scheduled in 2014?
KE Basins										
199-K-11	P	A	A	A	A	—	—	A	A	Yes
199-K-13	P	A	A	A	A	A	A	A	A	Yes
199-K-23	P	A	A	A	A	A	A	A	A	Yes
199-K-32A	C	Q	Q	Q	S	—	—	S	Q	Yes
199-K-110A	C	S	S	S	—	S	—	—	S	Yes
199-K-111A	C	Q	Q	Q	A	A	—	A	Q	Yes
199-K-141	C	Q	Q	Q	Q	S	Q	Q	Q	Yes
199-K-142	C	S	S	S	S	S	S	S	S	Yes
KW Basins										
199-K-31	P	S	S	S	A	S	A	A	S	Yes
199-K-34	C	Q	Q	Q	A	S	A	A	Q	Yes
199-K-106A	C	Q	Q	Q	A	S	—	—	Q	Yes
199-K-107A	C	Q	Q	Q	A	S	A	A	Q	No (August sample delayed until September)
199-K-108A	C	S	S	S	—	S	—	—	S	Yes
199-K-132	C	S	S	S	S	S	—	S	S	No (this well was analyzed only in June 2014)

Note: Requirements are modified from *Groundwater Monitoring and Assessment Plan for the 100-K Area Fuel Storage Basins* (PNNL-14033). The following wells were listed in PNNL-14033 but were decommissioned before 2011: 199-K-27, 199-K-29, 199-K-30, and 199-K-109A (KE Basins) and 199-K-33 (KW Basins). Wells 199-K-11, 199-K-13, 199-K-23, 199-K-31, 199-K-132, 199-K-141, and 199-K-142 were added to the networks. Newly constructed wells 199-K-202 and 199-K-203 are being considered for addition to the AEA monitoring network for KE Basin vicinity. Newly constructed well 199-K-204 is being considered for addition to the AEA monitoring network for KW Basin vicinity.

Table B-90. Monitoring Wells and Constituents for the KE and KW Basins

Well Name	WAC Compliant	Gross Alpha	Anions	Gross Beta	Carbon-14	Metals	Strontium-90	Technetium-99	Tritium	Sampled as Scheduled in 2014?

A = to be sampled annually

C = constructed as a resource protection well under WAC 173-160, "Minimum Standard for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-91. Monitoring Wells, Constituents, and Enforcement Limits for State-Approved Land Disposal Site

Well Name	Comment	WAC Compliant	Constituents with Enforcement Limits											Other Constituents					Sampled as Scheduled in 2014?
			pH	Acetone	Benzene	Cadmium[a]	Chloroform	Copper[a]	Lead[a]	Mercury[a]	Sulfate	Tetrahydrofuran	Total Dissolved Solids	Specific Conductance	Alpha	Beta	Strontium-90	Tritium	
299-W6-6	Bottom of unconfined	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	Yes
299-W6-11	—	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	Yes
299-W6-12	—	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	Yes
299-W7-3	Bottom of unconfined	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	S	Yes
299-W8-1	—	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	Yes
699-48-71	Unconfined	P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	No[b]
699-48-77C	Ringold Formation unit E, middle to lower	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-48-77D	Ringold Formation unit E, upper	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-49-79	—	P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	No[b]
699-51-75	—	P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	S	No[c]
699-51-75P	Lower unconfined	P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	Yes

Notes: Requirements are from *Groundwater Monitoring and Tritium-Tracking Plan for the 200 Area State-Approved Land Disposal Site* (PNNL-13121). The following wells have gone dry: 299-W6-7, 299-W6-8, 299-W7-1, 299-W7-11, 299-W7-12, 299-W7-5, 299-W7-6, 299-W7-7, 299-W7-8, 299-W7-9, 299-W8-1, and 699-48-77A.

Wells are completed at the top of the aquifer, unless specified otherwise.

Table B-91. Monitoring Wells, Constituents, and Enforcement Limits for State-Approved Land Disposal Site

Well Name	Comment	WAC Compliant	Constituents with Enforcement Limits											Other Constituents					Sampled as Scheduled in 2014?
			pH	Acetone	Benzene	Cadmium[a]	Chloroform	Copper[a]	Lead[a]	Mercury[a]	Sulfate	Tetrahydrofuran	Total Dissolved Solids	Specific Conductance	Alpha	Beta	Strontium-90	Tritium	

a. Filtered and unfiltered samples.

b. January sampling event delayed until August; road work needed to access well.

c. May sampling event delayed until June; pump problem.

A = to be sampled annually

C = constructed as a resource protection well under WAC-173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

S = to be sampled semiannually

WAC = *Washington Administrative Code*

Table B-92. Monitoring Wells and Constituents for Solid Waste Landfill

Well Name[b]	Comment	WAC Compliant	Contamination Indicator Parameters														Other Parameters				Sampled as Scheduled in 2014?
			Ammonia/Ammonium Ion	Chemical Oxygen Demand	Chloride	Iron (Filtered)	Manganese (Filtered)	Zinc (Filtered)	Nitrate	Nitrite	pH	Specific Conductance	Sulfate	Temperature (Field)	Coliform Bacteria	TOC	Anions	Metals (Filtered)	Arsenic (Filtered)	VOA	
699-22-35	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-23-34A	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	No; well sample dry as of 4th quarter 2013
699-23-34B	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-24-33	Information only; no statistical evaluation	P	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-24-34A	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-24-34B	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-24-34C	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	No; well is sample dry
699-24-35	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes
699-25-34C	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	No; well is sample dry

Table B-92. Monitoring Wells and Constituents for Solid Waste Landfill

Well Name[b]	Comment	WAC Compliant	Contamination Indicator Parameters														Other Parameters				Sampled as Scheduled in 2014?
			Ammonia/Ammonium Ion	Chemical Oxygen Demand	Chloride	Iron (Filtered)	Manganese (Filtered)	Zinc (Filtered)	Nitrate	Nitrite	pH	Specific Conductance	Sulfate	Temperature (Field)	Coliform Bacteria	TOC	Anions	Metals (Filtered)	Arsenic (Filtered)	VOA	
699-25-34E	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes[b]
699-26-35A	—	C	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Yes

Notes:

Requirements are from *Groundwater Monitoring Plan for the Solid Waste Landfill* (PNNL-13014). Wells 699-24-34C and 699-25-34C are sample dry.

Wells completed at the top of the unconfined aquifer.

a. ***Bold italics*** indicates upgradient well.

b. Well installed as a replacement for wells 699-24-34C and 699-25-34C. First sample collected in October.

C = well is constructed as a resource protection well under WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

P = constructed before WAC requirements

Q = to be sampled quarterly

TOC = total organic carbon

VOA = volatile organic analyte

WAC = *Washington Administrative Code*

Table B-93. Analytical Results for Required Constituents at the Solid Waste Landfill, 2014

Constituent[a]	Date	699-22-35[c]	699-23-34A	699-23-34B	699-24-33	699-24-34A	699-24-34B	699-25-34E	699-24-35	699-26-35A
Ammonium ion (µg/L) BTV = 90 µg/L[b]	January	<6.44	—	<6.44	<6.44	<6.44	<6.44	NS	22.9	<6.44
	April	<6.44	—	<6.44	9.92	<6.44	<6.44	NS	<6.44	<6.44
	July	<17	—	<17	<17	27.7	<17	NS	<17	<17
	October	64.9	—	<10.1	42.9	<10.1	<17	<10.1	<10.1	No result
Chemical oxygen demand (mg/L) BTV = 10 mg/L	January	<10	—	<10	<10	<10	<10	NS	<10	<10
	April	**11**	—	**13**	<10	**27**	**19**	NS	<10	<10
	July	<6.5	—	<6.7	<6.5	**15.9**	<6.5	NS	**15**	<6.5
	October	<6.7	—	<1.1	<6.7	**11**	**17.4**	<1.1	<1.1	No result
Chloride (mg/L) BTV = 7.82 mg/L	January	6.06	—	5.41	5.92	6.55	7.40	NS	5.70	6.91
	April	6.34	—	5.65	6.24	6.44	6.27	NS	5.57	6.93
	July	6.60	—	6.21	6.70	6.72	6.26	NS	5.95	7.2
	October	6.18	—	7.00	6.21	7.20	6.70	**8.30**	6.30	7.09
Coliform bacteria (colonies/100mL) BTV = 1 col./ 100 mL	January	<1	—	<1	<1	<1	<1	NS	**6.3**	<1
	April	<1	—	<1	<1	<1	<1	NS	<1	<1
	July	<1	—	<1	<1	**9.6**	<1	NS	<1	<1
	October	<1	—	<1	<1	<1	**12**	**2**	<1	No result
Iron (filtered) (µg/L) BTV = 160 µg/L	January	<40	—	<40	<40	<40	50.5	NS	<40	<40
	April	<40	—	47.7	<40	85.4	41	NS	<40	<40
	July	16.1	—	<30	71.3	<30	56.9	NS	<30	<12.8
	October	<30	—	14.9	<30	23.8	43.2	<12.8	15.1	<30

Table B-93. Analytical Results for Required Constituents at the Solid Waste Landfill, 2014

Constituent[a]	Date	699-22-35[c]	699-23-34A	699-23-34B	699-24-33	699-24-34A	699-24-34B	699-25-34E	699-24-35	699-26-35A
Manganese (filtered) (µg/L) BTV = 18 µg/L	January	<4	—	<4	<4	<4	<4	NS	<4	<4
	April	<4	—	<4	<4	<4	<4	NS	<4	<4
	July	2.7	—	2.52	<1	<2	<1	NS	<2	2
	October	<2	—	<1	<2	<1	<2	2.4	<1	<2
Nitrate (mg/L) BTV = 29 mg/L	January	17.5	—	16.6	14.2	13.5	15.0	NS	12.4	18
	April	17.8	—	16.6	14.6	13.4	15.6	NS	11.8	18
	July	17.3	—	18.0	14.6	13.7	15.1	NS	12.4	18.6
	October	16.5	—	15.9	14.1	14.2	15.0	16.8	11.1	17.9
Nitrite (µg/L) BTV = 266 µg/L	January	<131	—	<131	<131	<131	<131	NS	<131	<131
	April	<131	—	<131	<131	<131	<131	NS	<131	<131
	July	<9.85	—	<125	<9.85	<125	<9.85	NS	<125	<9.85
	October	<125	—	<19.7	<125	<19.7	<125	<19.7	<19.7	<125

Table B-93. Analytical Results for Required Constituents at the Solid Waste Landfill, 2014

Constituent[a]	Date	699-22-35[c]	699-23-34A	699-23-34B	699-24-33	699-24-34A	699-24-34B	699-25-34E	699-24-35	699-26-35A
pH measurement BTV = 6.68-7.84	January	7.02	—	6.74	6.98	**6.55**	**6.55**	NS	**6.58**	7.11
	April	6.95	—	6.68	6.96	6.74	6.80	NS	7	7.36
	July	6.95	—	**6.67**	7.04	6.94	6.86	NS	6.95	7.47
	October	7.01	—	6.73	6.92	6.76	6.74	6.9	6.68	7.32
Specific conductance (µS/cm) BTV = 583 µS/cm	January	**808**	—	**728**	**738**	**628**	**648**	NS	542	522
	April	**765**	—	**690**	**725**	**607**	**662**	NS	543	529
	July	**793**	—	**714**	**749**	**661**	**670**	NS	559	548
	October	**796**	—	**720**	**713**	**632**	**665**	**627**	536	528
Sulfate (mg/L) BTV = 47.2 mg/L	January	42.0	—	43.5	43.7	45.0	45.4	NS	45	40.5
	April	41.5	—	42.9	43.5	43.8	45.0	NS	42.5	39.4
	July	38.8	—	**47.8**	43.1	45.1	43.5	NS	40	38.8
	October	41.1	—	40.4	41.9	41.5	43.8	39	39.8	38.9
Temperature (°C) BTV = 20.7°C	January	17.8	—	18.0	19.2	18.1	18.5	NS	17.7	19.2
	April	18.0	—	18.6	19.4	18.3	18.6	NS	17.7	19.3
	July	19.5	—	20.3	19.6	**27.8**	19.3	NS	18.9	19.8
	October	18.3	—	18.7	19.2	18.7	18.8	19.9	18.1	19.2
TOC (µg/L) BTV = 1,200 µg/L	January	611	—	638	767	458	448	NS	381	391
	April	652	—	645	**1,630**	573	684	NS	426	480
	July	<270	—	813	1,000	<330	<270	NS	478	<270
	October	839	—	<350	**1,510**	<350	812	<350	<350	584

Table B-93. Analytical Results for Required Constituents at the Solid Waste Landfill, 2014

Constituent[a]	Date	699-22-35[c]	699-23-34A	699-23-34B	699-24-33	699-24-34A	699-24-34B	699-25-34E	699-24-35	699-26-35A
Zinc (filtered) (µg/L) BTV = 42.3 µg/L	January	<5	—	<5	<5	<5	<5	NS	33.6	<5
	April	<5	—	<5	<5	<5	<5	NS	23.6	8.94
	July	10.3	—	<3.3	<8.3	<3.3	<8.3	NS	33.6	10.3
	October	<3.3	—	<8.3	<3.3	<8.5	<3.3	12.3	31.1	9.34

Note: Wells in **bold** are part of the upgradient network. Results in **bold** exceed background threshold values (BTV). Wells 699-24-34C and 699-25-34C are not included in table because wells sample dry, and no samples were collected in 2014.

a. WAC 173-304, "Minimum Functional Standards for Solid Waste Handling."

b. 2010 Background threshold values were obtained from Table C-41 of *Hanford Site Groundwater Monitoring and Performance Report for 2009: Volumes 1 & 2* (DOE/RL-2010-11).

c. Sample collected and delivered to laboratory. Result not returned from laboratory due to quality control issues with sample batch.

— = no sample collected; well sample dry

BTV = background threshold value

NS = not sampled

TOC = total organic carbon

Table B-94. Solid Waste Landfill Groundwater Monitoring Results

Constituent (units)	Background Threshold Value	2014 Range	2014 Exceedance?	Wells Exceeded
Ammonium (µg/L)	90	<6.44 – 22.9	No	—
Chemical oxygen demand (µg/L)	10,000	<1,100 – 27,000	Yes	699-22-35 699-22-34B 699-24-34A 699-24-34B 699-24-35 (upgradient)
Chloride (µg/L)	7,820	5,410 – 8,300	Yes	699-25-34E
Coliform bacteria (colonies/100 mL)	1	<1 – 12	Yes	699-24-34A 699-24-34B 699-25-34E
pH	6.68 – 7.84	6.55 – 7.48	Yes	699-23-34B (low) 699-24-34A (low) 699-24-34B (low) 699-24-35 (low) (upgradient)
Iron – dissolved (µg/L)	174	<12.8 – 85.4	No	—
Manganese (µg/L)	27.5	<1 to <4 (2.7 highest detect)	No	—
Nitrate (µg/L)	29,000	12,400 – 18,600	No	—
Nitrite (µg/L)	165	<9.85 – <131	No	—
Specific conductance (µS/cm)	583	522 – 808	Yes	699-22-35 699-24-33 699-23-34B 699-24-34A 699-24-34B
Sulfate (µg/L)	47,200	38,800 – 47,800	Yes	699-23-34B
Temperature (degrees C)	20.7	17.7 – 27.8	Yes	699-24-34A
Total organic carbon (µg/L)	842	170 – 1,630	Yes	699-24-33
Zinc – dissolved (µg/L)	42.3	<3.3 – 33.6	No	—