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Revision 0

Annual Performance Report for the 200-DV-1 Operable Unit Perched Water Extraction, Fiscal Year 2014

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

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

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Plateau Remediation Company
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Richland, Washington 99352

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Terms

bgs	below ground surface
CCU	Cold Creek unit
CCU_g	Cold Creek unit gravel
CCU_z	Cold Creek unit silt
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CMS	corrective measures study
CSM	conceptual site model
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
ERT	electrical resistivity tomography
ETF	Effluent Treatment Facility
FS	feasibility study
FY	fiscal year
H2 unit	Hanford formation—sand-dominated unit
HEIS	Hanford Environmental Information System
OU	operable unit
P&T	pump and treat
PNNL	Pacific Northwest National Laboratory
RCRA	*Resource Conservation and Recovery Act of 1976*
RFI	RCRA Facility Investigation
RI	remedial investigation
SST	single-shell tank
TPA	Tri-Party Agreement
UPR	unplanned release

1 Summary of Fiscal Year 2014 Activities

Contaminated perched water is present in the deep vadose zone at the B Complex Area located in the 200 East Area of the Hanford Site (Figure 1-1). The B Complex Area includes waste sites in the 200-DV-1 Operable Unit (OU) and the B, BX, and BY single-shell tank (SST) farms in Waste Management Area B-BX-BY (Figure 1-2). The perched water contains uranium, technetium-99, and nitrate at concentrations that have exceeded 100,000 µg/L; 50,000 pCi/L; and 800,000 µg/L, respectively. This perched water is a continuing source of contamination to groundwater in the underlying unconfined aquifer. Characterization and remediation of the contaminated perched water is being conducted as part of the 200-DV-1 OU, which was created in 2010 to support remedy selection for waste sites with deep vadose zone contamination.

The perched water zone is estimated to extend from the east-central portion of the BX Tank Farm northeast to the 216-B-8 Crib and to include the northwest portion of the B Tank Farm (Figure 1-2). Perched water has been detected in this area since 1991 during drilling of *Resource Conservation and Recovery Act of 1976* (RCRA) wells to characterize groundwater contamination in the underlying unconfined aquifer. Significant perched water was encountered during drilling of Well 299-E33-344 in January 2008 (Figure 1-2). This well was planned to be drilled into the unconfined aquifer as part of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedial investigation (RI) for the 200-BP-5 Groundwater OU, but the drilling was terminated in the deep vadose zone because high levels of radiological contamination were detected in the perched water. The well was completed as a monitoring well in the perched zone (SGW-39626, *Borehole Summary Report for the Installation of Seven Groundwater Monitoring Wells at the 200-BP-5 Operable Unit, CY 2008*).

Extraction of the contaminated perched water began in August 2011 to collect information on the perched zone and to reduce migration of contamination to the unconfined aquifer. The U.S. Department of Energy (DOE) initiated the action through a change notice (TPA-CN-428, *Tri-Party Agreement Change Notice Form: DOE/RL-2007-18, Rev. 1, Remedial Investigation/Feasibility Study Work Plan for the 200-BP-5 Groundwater Operable Unit*) to the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989), also known as the Tri-Party Agreement (TPA). Well 299-E33-344 was configured for use as the extraction well.

Perched water pumping from Well 299-E33-344 has continued in accordance with DOE/RL-2011-40, *Field Test Plan for the Perched Water Pumping/Pore Water Extraction Treatability Test*, which was prepared in response to TPA (Ecology et al., 1989) Milestone M-015-50. As of September 30, 2014, approximately 882,000 L (233,000 gal) of perched water containing approximately 49 kg (108 lb) of uranium, 1.7 g (0.004 lb) of technetium-99, and 471 kg (1,037 lb) of nitrate have been removed from the perched zone.

Removal of the contaminated perched water is slow due to the relatively low permeability sand that contains the contaminated water. The perched water must be pumped at a low flow rate. After the extraction well (299-E33-344) is pumped dry, the pump in the well is cycled off to allow the perched water to refill the area drained around the well and then the pump is cycled on again. This first phase of the perched water extraction is referred to as "gravity drain" because recharge of the well occurs naturally.

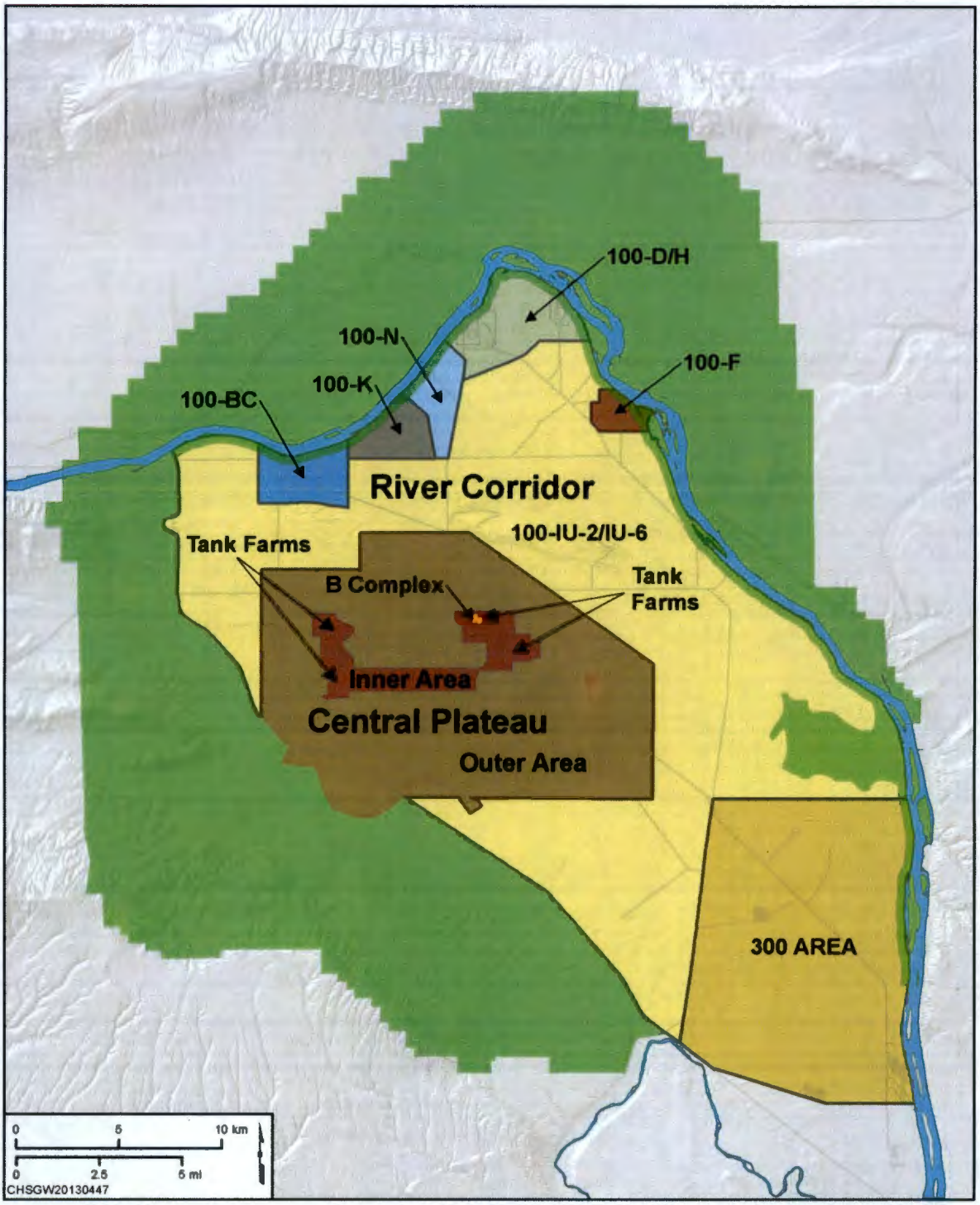
Two additional phases of perched water extraction are described in the treatability test plan (DOE/RL-2011-40). The second phase of perched water pumping would add a vacuum system to accelerate recharge into the well. Based on the results of the enhanced perched water pumping using the vacuum system, a third phase could be implemented to extract the pore water in the perched zone. As of September 30, 2014, the vacuum enhanced pumping phase of the treatability test plan has not been implemented because the natural recharge rate has been sufficient to maintain pumping from the extraction well.

Two new 200-DV-1 OU perched water extraction wells were drilled, sampled, and constructed in March 2014. Well 299-E33-350 is north of Well 299-E33-344, between the B Tank Farm and the 216-B-8 Crib and Tile Field; and Well 299-E33-351 is northwest of Well 299-E33-344, between the B and BX Tank Farms (Figure 1-2). Highly contaminated perched water was encountered in both of these new wells. Extraction of perched water using these two additional wells is anticipated to begin in fiscal year (FY) 2015.

A new 200-BP-5 OU groundwater monitoring well was drilled and sampled in the perched water area in September 2014. Well 299-E33-360 is approximately 11 m (36 ft) west of perched water extraction Well 299-E33-344 (Figure 1-2). Samples of the perched water were collected during drilling and were found to be highly contaminated. The new well will be used to monitor the unconfined aquifer beneath the perched water interval near the decommissioned Well 299-E33-18 (Figure 1-2).

In January 2014, an engineering evaluation/cost analysis (EE/CA) was prepared to evaluate alternatives for continued extraction of perched water as a non-time-critical removal action under CERCLA (DOE/RL-2013-37, *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction*). A 30-day public and Tribal Nations review of the EE/CA was held from February 3 through March 3, 2014. Draft A of the Action Memorandum that documents selection of the alternative for extraction and treatment of the perched water as a non-time-critical removal action was provided to the Washington State Department of Ecology (Ecology) for review in June 2014 (DOE/RL-2014-34, *Action Memorandum for 200-DV-1 Operable Unit Perched Water Pumping/Pore Water Extraction*). The non-time-critical removal action is anticipated to begin in FY 2015.

The purpose of this report is to summarize the results of the perched water extraction, summarize the results of the drilling and sampling at the two new extraction wells, summarize the results of perched water sampling at the new groundwater monitoring well, present the updated perched water conceptual site model (CSM) for the perched water zone, provide the status and path forward for the remediation, and provide the status of previous recommendations for additional characterization and remediation of the perched water zone. The previous CSM and recommendations for the perched water zone were included in SGW-53604, *Path Forward Recommendations Report for the Uranium Contamination in the B Area*, issued in December 2013.



Source: Modified from DOE/RL-2011-118, *Hanford Site Groundwater Monitoring for 2011*.

Figure 1-1. Location of the B Complex Area on the Hanford Site

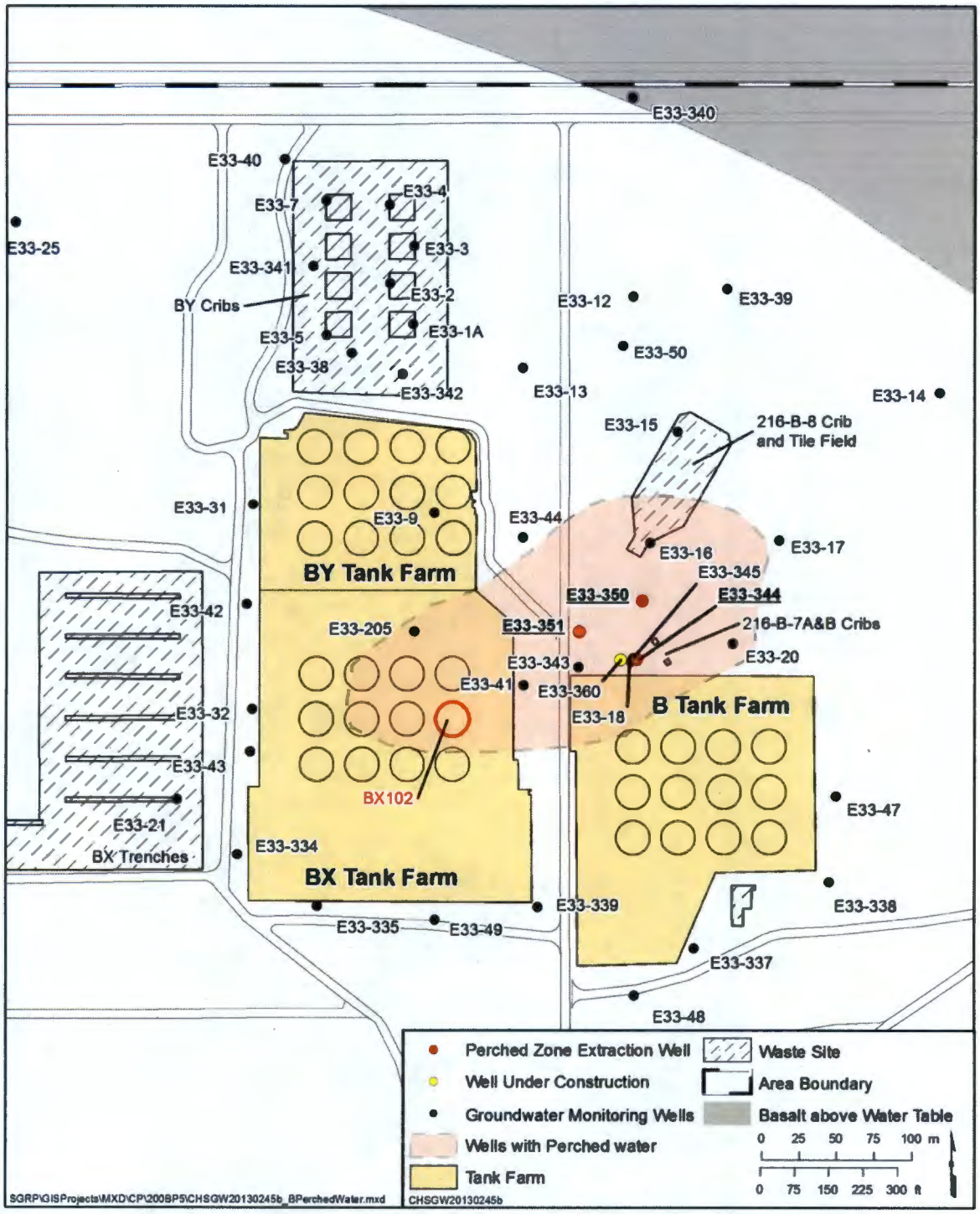


Figure 1-2. Location of Waste Sites, Tank Farms, and Wells in the B Complex Area

2 200-DV-1 Operable Unit Perched Water Extraction

Extraction of the contaminated perched water from Well 299-E33-344 was initiated on August 30, 2011. A dedicated submersible pump was installed in Well 299-E33-344 with automatic on-off pump control provided by a water-level sensor (transducer) (Figure 2-1). When the perched water level in Well 299-E33-344 reaches the high-level set point, the pump turns on and the water is pumped into an aboveground water collection system (approximately 23 to 27 L [6 to 7 gal] per cycle). The extracted water accumulates in an aboveground, 11,355 L (3,000 gal) high-density polyethylene collection tank located near the wellhead (Figure 2-2). Once pumping lowers the water level to the low-level set point, the pump shuts off to allow the well to recover. This on-off cycle, with durations typically 25 to 35 minutes, has continued since extraction began, with the exceptions of the temporary shutdowns described in this chapter. The accumulated perched water in the aboveground tank near the well is periodically transferred to the Effluent Treatment Facility (ETF) for treatment. Figure 2-2 shows the configuration of the perched water extraction site.

In September 2011, the pump was programmed to begin operations when the water level in the well reached 2.4 m (8 ft) above the pump (i.e., the high set point) and to cease operations when the water level in the well fell to 0.15 m (0.5 ft) above the pump (i.e., the low set point). On September 13, 2012, the high set point was lowered to 2.1 m (7 ft) above the pump to reduce the length of time that the pump was not operating.

Prior to initiation of perched water extraction, between July 2008 and August 2011, nine water quality samples were collected from Well 299-E33-344. The uranium concentrations ranged from 788 to 5,300 μg/L; the technetium-99 concentrations ranged from 4,130 to 6,200 pCi/L; and the nitrate concentrations ranged from 417,000 to 580,000 μg/L (Table 2-1). On October 4, 2011, the first perched water sample was collected after the initiation of pumping. The concentrations of all three of these contaminants were higher in the October 4, 2011 sample. The increases in uranium and technetium-99 were dramatic (Figure 2-3). Concentrations also increased in nearby groundwater Wells 299-E33-345 (Figure 2-4) and 299-E33-18 (Figure 2-5). Concentrations have varied in samples collected during extraction operations, but the uranium and technetium-99 concentrations in the perched water well are still significantly elevated compared to the pre-pumping concentrations (Table 2-1 and Figure 2-3).

On December 7, 2011, upon receipt of the October 4, 2011 sample results, the pumping system was temporarily shut down to evaluate the process and the treatment options for extracted water with the increased contaminant concentrations. After confirming that the water could continue to be transferred to ETF for treatment, it was determined that the submersible pump had failed, resulting in an extended shutdown until it was replaced. The system was restarted on April 11, 2012.

Pumping continued until April 26, 2012, when it was observed that algae were present in the collected water at concentrations that prevented its treatment at ETF. Residual water in the collection tank since the December shutdown had been subjected to increasing ambient temperature that facilitated the algae growth. On May 17, 2012, a copper sulfate ($CuSO_4$) solution was added to the collection tank, using a newly installed metering system, to control algae growth, and perched water pumping resumed. Despite failure of the $CuSO_4$ solution metering pump on June 6, 2012, collected water has remained acceptable for treatment at ETF. During this time, a diaphragm pump was installed to replace the metering pump, and 0.5 L (0.1 gal) of the $CuSO_4$ solution was added weekly to the process to control algae formation. Pumping of the perched water continued until September 26, 2012 when the pumping system was turned off.

During FY 2013, pumping resumed on October 18, 2012. Pumping continued throughout the remainder of the FY with only minimal downtime. On September 24, 2013, upon receipt of the August 13, 2013, sample results, the pumping system was temporarily shut down to evaluate the process and the treatment options for extracted perched water with the increased uranium concentration. Following re-analysis of the sample for uranium, it was determined that the initial reported result was incorrect and that the uranium concentration was consistent with previous results (Figure 2-3). The system was restarted on October 7, 2013. Pumping continued throughout FY 2014 with only minimal downtime.

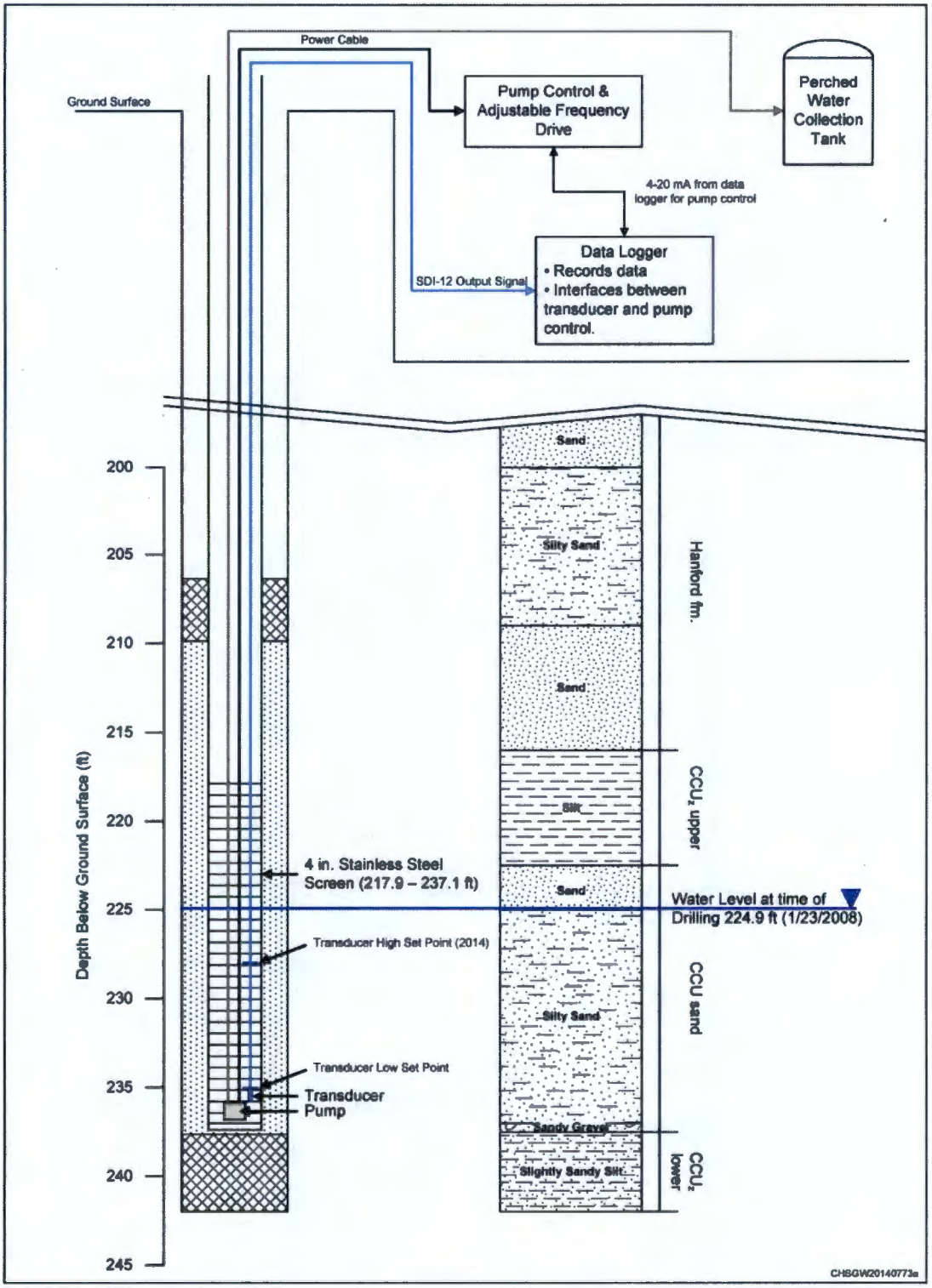


Figure 2-1. Configuration of Perched Water Extraction Well 299-E33-344

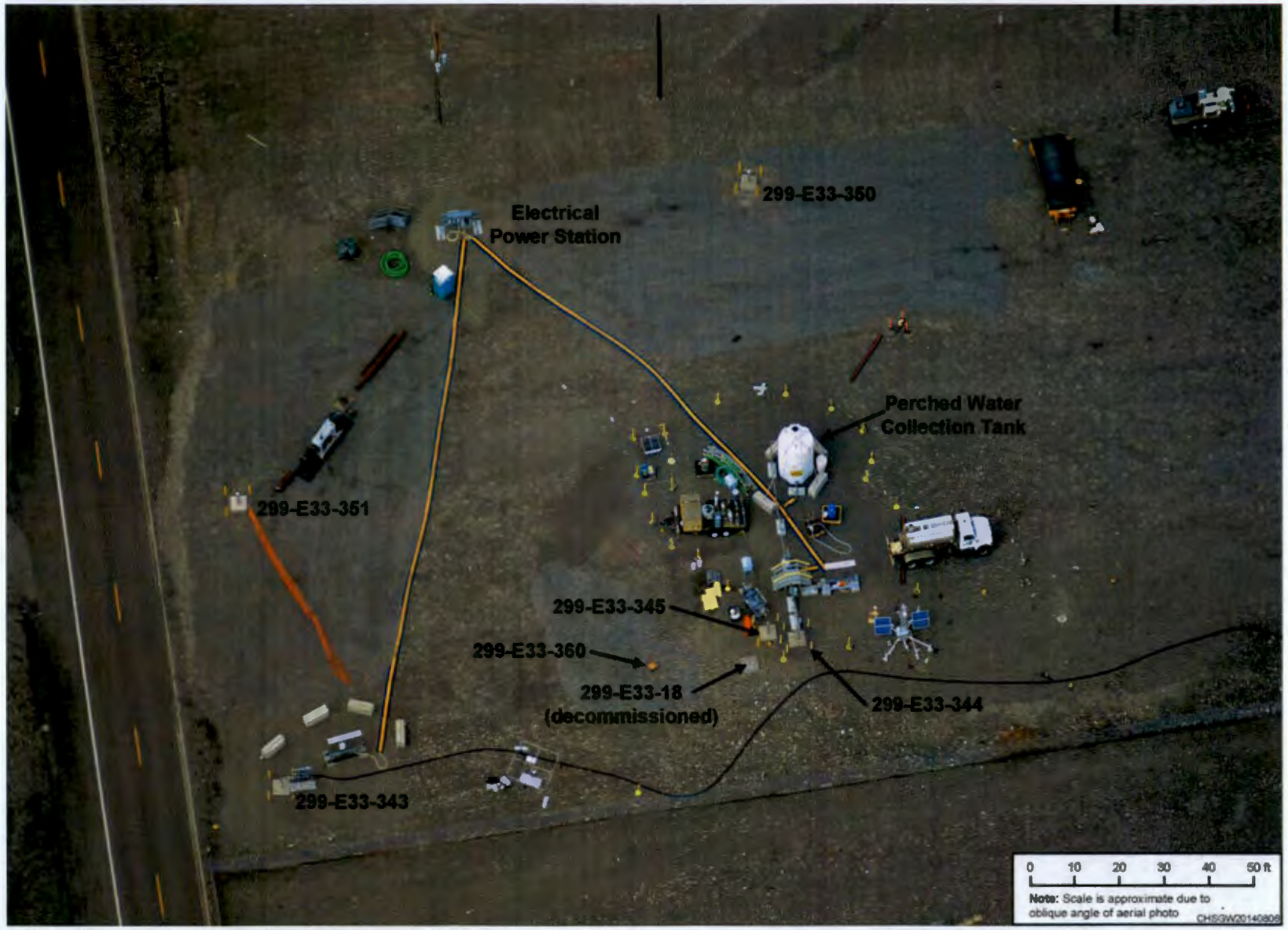


Figure 2-2. Configuration of the Perched Water Extraction Site (Photographed August 2014)

Figure 2-6 shows the volume of extracted perched water transferred from the collection tank to ETF each week, through September 30, 2014. The overall trend is a decline in the weekly volume collected. A relatively low weekly volume removed typically was a result of the system being down for maintenance.

The time for Well 299-E33-344 to recharge following pumping generally increases with continued extraction following an extended period of no pumping or after the high-level set point is lowered (Figure 2-7). The increase in the recharge time indicates that it is taking progressively longer for additional perched water to refill the well after it has been pumped. The time increase for recharge results in an increased duration of the pump cycle. One pump cycle is defined as the time when the pump is off (to allow the water in the well to recover) followed by the time when the pump is on (to remove the water).

Since pumping began, approximately 882,000 L (233,000 gal) of perched water have been extracted. Based on sampling data, approximately 49 kg (108 lb) of uranium, 1.7 g (0.004 lb) of technetium-99, and 471 kg (1,037 lb) of nitrate have been removed from the perched zone (Table 2-2).

Table 2-1. Well 299-E33-344 Perched Water Sample Data

Sampling Date	Nitrate (µg/L)	Technetium-99 (pCi/L)	Uranium (µg/L)
07/15/08	436,000	4,400	897
09/19/08	522,000	4,130	788
11/18/08	483,000	4,800	1,820
05/22/09	—	5,400	1,460
06/26/09	474,000	—	—
08/04/09	478,000	5,900	5,300
08/04/09	483,000	5,800	4,940
11/12/09	417,000	6,200	2,980
11/12/09	433,000	6,000	2,910
05/24/10	469,000	5,900	1,660
12/19/10	580,000	4,320	409
12/19/10	—	5,400	—
09/07/11	401,000	5,640	4,500
10/04/11	604,000	37,800	63,600
12/05/11	810,000	45,100	71,500
04/23/12	456,000	22,100	51,500
08/02/12	522,000	12,200	26,600
02/05/13	637,000	51,000	37,300
08/13/13	474,000	33,000	60,800
10/22/13	—	—	102,000
10/22/13	—	—	106,000
04/22/14	435,000	51,000	76,100

Table 2-1. Well 299-E33-344 Perched Water Sample Data

Sampling Date	Nitrate (µg/L)	Technetium-99 (pCi/L)	Uranium (µg/L)
04/22/14	549,000	39,000	38,800
06/24/14	316,000	15,700	28,800
07/30/14	360,000	17,200	29,700
08/20/14	580,000	42,500	77,500
09/25/14	611,000	53,300	99,300

— = no value measured

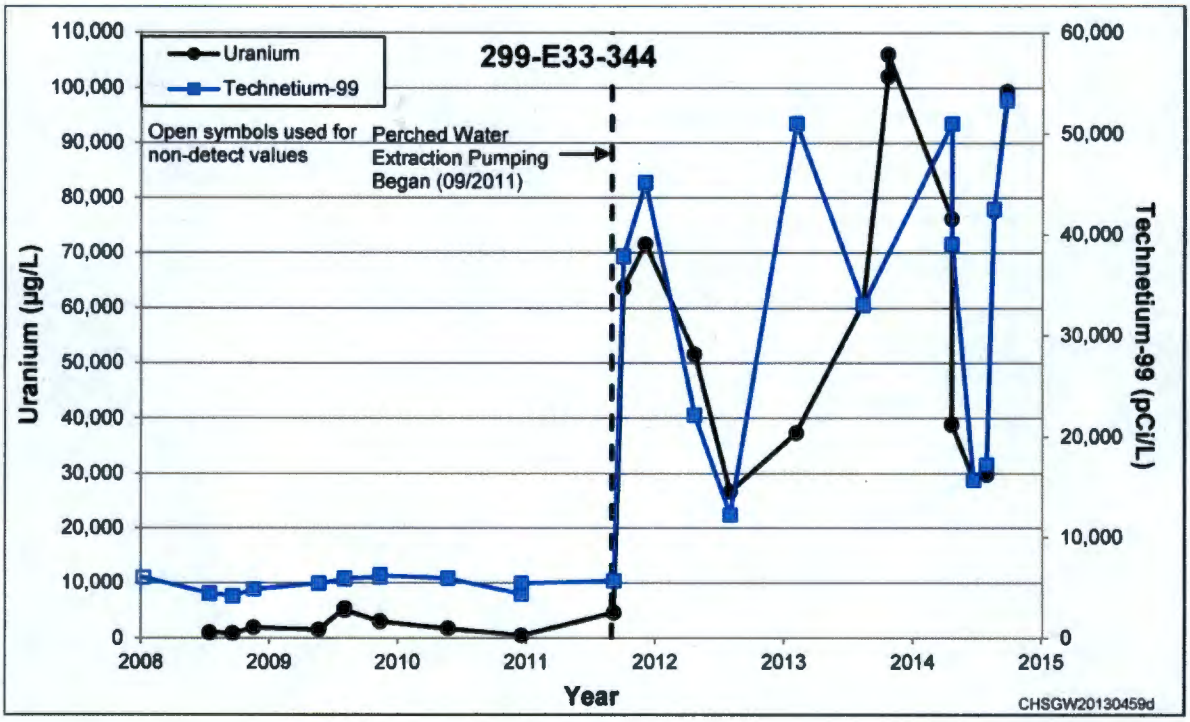


Figure 2-3. Increase in Uranium and Technetium-99 Concentrations in Perched Water Extraction Well 299-E33-344 after Pumping Began

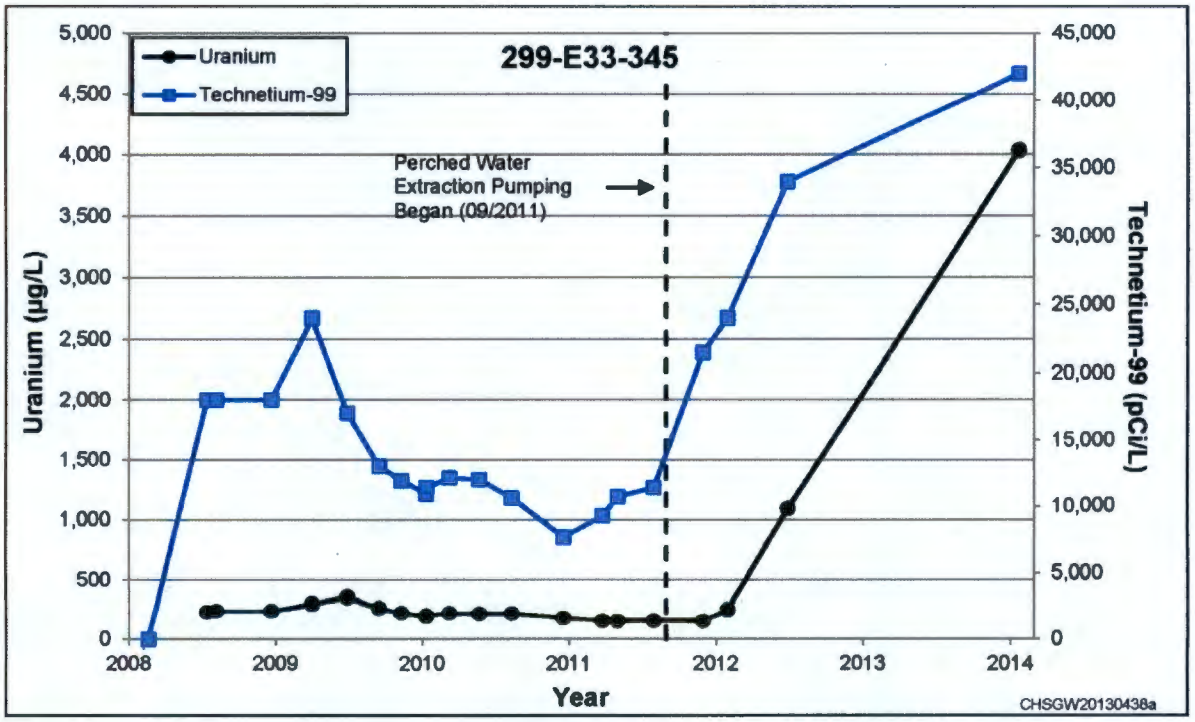


Figure 2-4. Increase in Uranium and Technetium-99 Concentrations in Groundwater Monitoring Well 299-E33-345 after Pumping Began from Well 299-E33-344

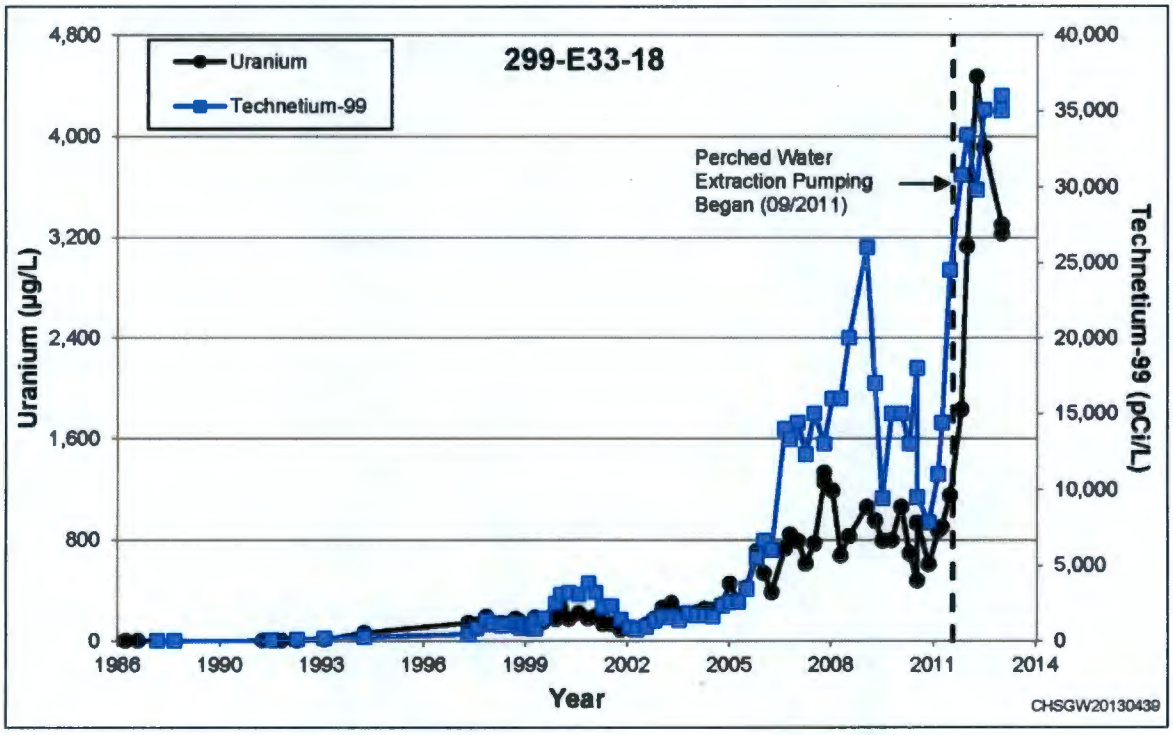


Figure 2-5. Increase in Uranium and Technetium-99 Concentrations in Groundwater Monitoring Well 299-E33-18 after Pumping Began from Well 299-E33-344

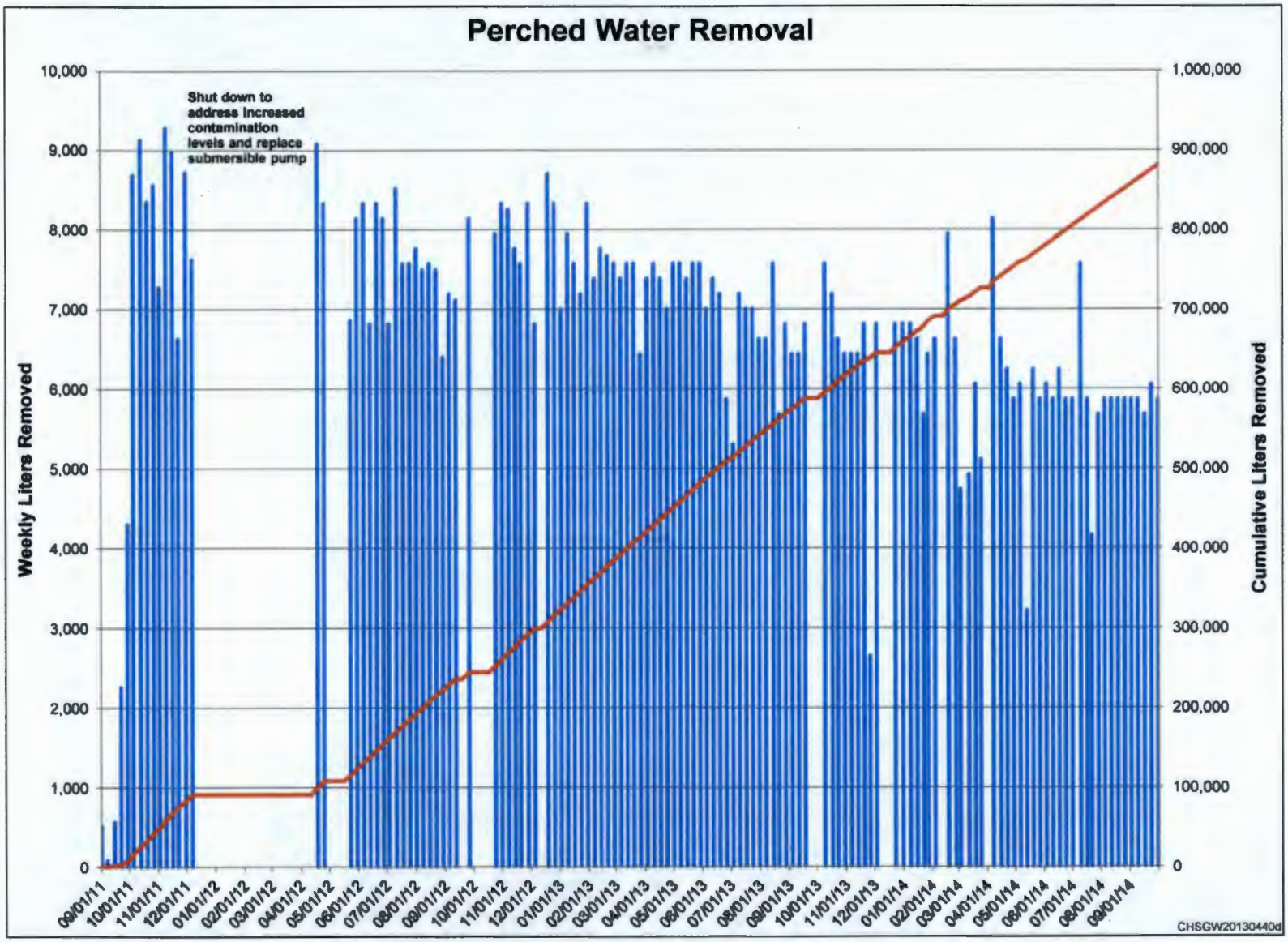


Figure 2-6. Well 299-E33-344 Perched Extraction History

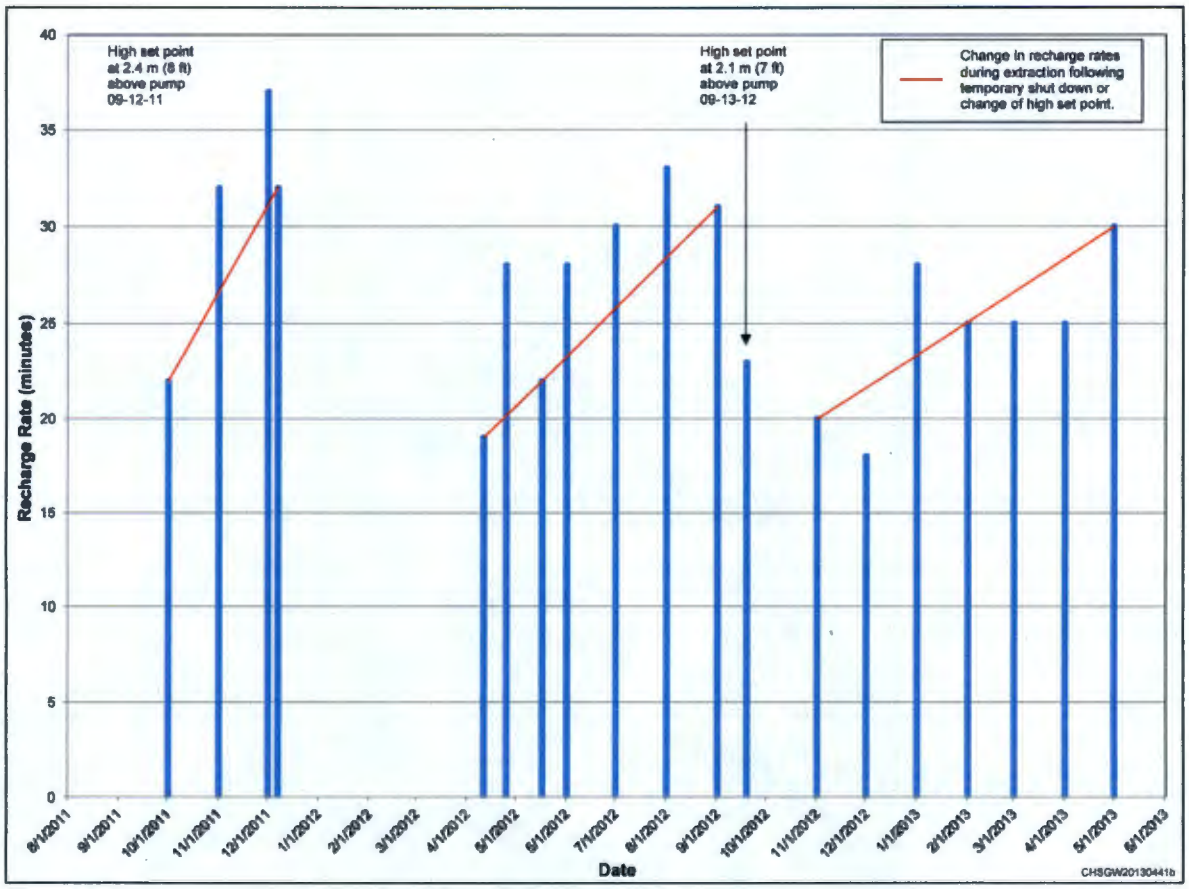


Figure 2-7. Average Daily Recharge Rates with Continued Extraction October 2011 to May 2013

Table 2-2. Perched Water Extracted and Contaminants Removed from Well 299-E33-344

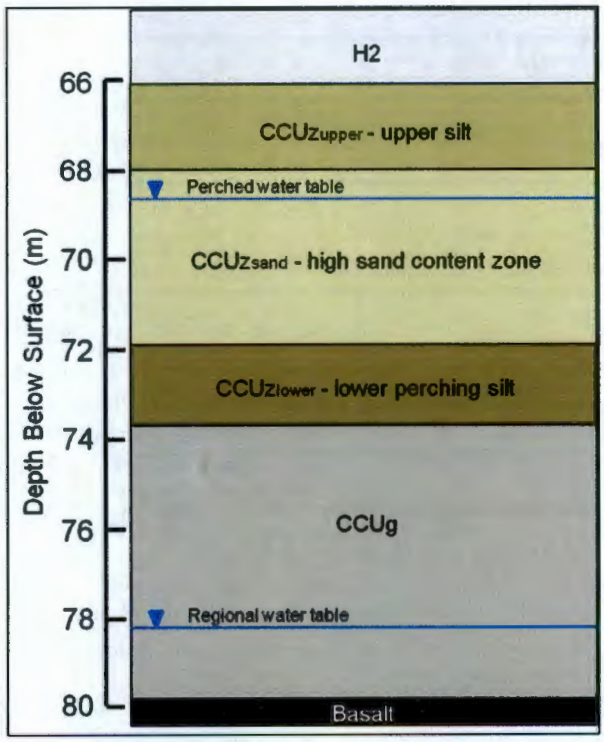
Year	Duration	Perched Water Extracted	Uranium Removed	Technetium-99 Removed	Nitrate Removed
		L	kg	g	kg
2012	08/2011 to 09/2012	246,657	12.0	0.37	131.0
2013	10/2012 to 09/2013	349,367	13.1	0.74	202.6
2014	10/2013 to 09/2014	286,222	24.1	0.59	137.2
Total	08/2011 to 09/2014	882,246	49.2	1.70	470.9

3 Characterization of the Perched Water Zone

Two new perched water wells, 299-E33-350 (C8914) and 299-E33-351 (C8915), were installed within the perched water zone in March 2014. The sampling and analysis plan (DOE/RL-2013-52, *Sampling and Analysis Plan for Perched Water Wells C8914 and C8915 in the 200-DV-1 Operable Unit*) outlined the characterization requirements, which included detailed sediment and perched water sampling above and within the perching interval. Intact sediment core samples, depth-discrete perched water samples, geophysical borehole logs, and perched zone aquifer testing was performed during the drilling and installation of these two wells (SGW-57488, *Borehole Summary Report for the Installation of Two Perched Groundwater Wells in the 200-DV-1 Operable Unit, FY 2014*).

One new groundwater monitoring well, 299-E33-360 (C8923), was drilled through the perched water zone in August 2014. The sampling instruction (SGW-57810, *Sampling Instruction for Conceptual Model Refinement during the Drilling of Wells 299-E25-237, 299-E33-360, and 299-E33-361 in 200 East*) included collection of two sediment samples for pore water analysis, one depth-discrete perched water sample, and geophysical borehole logs. The purpose of data collection in the perched zone of Well 299-E33-360 was for comparison to the nature of contamination in the perched zone in perched water extraction Well 299-E33-344.

Figure 3-1 illustrates the generalized conceptual stratigraphic model of the perched-water zone. The full thickness of the Hanford formation H2 sand dominated unit is not depicted. The Cold Creek Unit silt (CCU_z) in the area with perched water is composed of a lower perching silt ($CCU_{z\,lower}$), a high sand content zone ($CCU_{z\,sand}$), and upper silt zone ($CCU_{z\,upper}$). The underlying Cold Creek Unit gravel (CCU_g) contains the regional groundwater aquifer and is underlain by basalt.



Source: PNNL-22449, *Perched-Water Evaluation for the Deep Vadose Zone Beneath the B, BX, and BY Tank Farms Area of the Hanford Site*.

Figure 3-1. Generalized Conceptual Stratigraphic Model of the Perched Water Zone near Wells 299-E33-350, 299-E33-351, and 299-E33-360

At the two new 200-DV-1 OU perched water wells, 299-E33-350 and 299-E33-351 (Figure 3-2), the Cold Creek upper silt zone was encountered at approximately the same depth (approximately 65.5 m [215 ft] below ground surface [bgs]) as in the existing perched water extraction Well 299-E33-344 (Figure 2-1) and nearby groundwater Well 299-E33-345. The Cold Creek upper silt zone is approximately 1.5 m (5 ft) thick at the location of the two new wells. A highly contaminated perched water (saturated) interval was detected in new Well 299-E33-350 at approximately 68.4 m (224.3 ft) bgs and in new Well 299-E33-351 at approximately 68.2 m (223.8 ft) bgs. The perched water interval thickness (saturated zone) in each new well extends to the top of the lower CCU_z interval, which is approximately 71.3 m (234 ft) bgs in Well 299-E33-350 and 71.0 m (233 ft) bgs in Well 299-E33-351. The perched water interval is approximately 2.95 m (9.7 ft) thick in Well 299-E33-350 and 2.8 m (9.2 ft) thick in Well 299-E33-351. Borehole geophysical log results (SGW-57488) indicate the presence of manmade uranium contamination within the saturated perched water interval in each well. Figure 3-2 illustrates the details of the perched water interval in each new well from approximately 61.0 to 71.6 m (200 to 235 ft) bgs, showing the configuration of the perching Cold Creek unit lower silt, the perched water table, and the uranium contaminated interval. Figure 3-2 also shows the locations of the depth-discrete sediment and perched water samples collected during drilling, and the locations of the pressure ports and well screens installed during well construction. Two pressure ports were installed in each well, one above and one within the perched water interval, to support the phase 2 enhanced vacuum extraction and phase 3 pore water extraction, if implemented.

Complete well construction details, including the borehole geologic logs, as-built diagrams (well summary sheets), and borehole geophysical log reports for the two new perched water wells (299-E33-350 and 299-E33-351), are provided in the borehole summary report (SGW-57488).

At the new 200-BP-5 OU groundwater well (299-E33-360), the Cold Creek upper silt zone was encountered at approximately the same depth (approximately 65.5 m [215 ft] bgs) as in the existing perched water extraction Well 299-E33-344 (Figure 2-1) and nearby groundwater Well 299-E33-345. Figure 3-3 shows the configuration of the perching CCU_z, perched water table, and uranium contaminated interval. Figure 3-3 also shows the locations of two depth-discrete sediment samples and one perched water sample collected in the perched water zone during drilling. Figure 3-3 illustrates the details of the underlying unconfined aquifer in Well 299-E33-360 from approximately 64.0 m (210 ft) bgs to total borehole depth (83.8 m [275 ft]) bgs. The Cold Creek upper silt zone is approximately 1.8 m (6 ft) thick. A highly contaminated perched water (saturated) interval was detected in Well 299-E33-360 at approximately 68.6 m (225 ft) bgs. The perched water interval thickness (saturated zone) extends to the top of the lower CCU_z interval, which is approximately 72.5 m (238 ft) bgs in Well 299-E33-360. The perched water interval is approximately 3.96 m (13 ft) thick. Borehole geophysical logging results (HGLP-LDR-790, *299-E33-360 (C8923) Log Data Report*) indicate the presence of manmade uranium contamination within the saturated perched water interval. The underlying water table (unconfined aquifer) was encountered approximately 77.1 m (253 ft) bgs and is approximately 4.6 m (15 ft) thick at this location. The bottom of the unconfined aquifer is defined as the top of the basalt surface, which is located in this well at approximately 79.2 m (260 ft) bgs.

Aquifer testing was performed in the two new 200-DV-1 OU wells (299-E33-350 and 299-E33-351) to determine the perched zone hydraulic properties (PNNL-23380, *Field-Derived Hydraulic Properties for Perched-Water Aquifer Wells 299-E33-350 and 299-E33-351, Hanford Site B-Complex Area*). These tests represent the first known in situ field-scale, hydraulic property estimates for the Cold Creek fine-grained unit at the Hanford Site. The aquifer testing results represent horizontal hydraulic properties indicating low to moderate permeability conditions within the high sand content zone ($CCU_{z\ sand}$).

Figures 3-4 and 3-5 present the depth profiles summarizing the horizontal (based on aquifer testing) and vertical (based on core analysis) hydraulic conductivity variations measured within Wells 299-E33-350 and 299-E33-351, respectively (PNNL-23380).

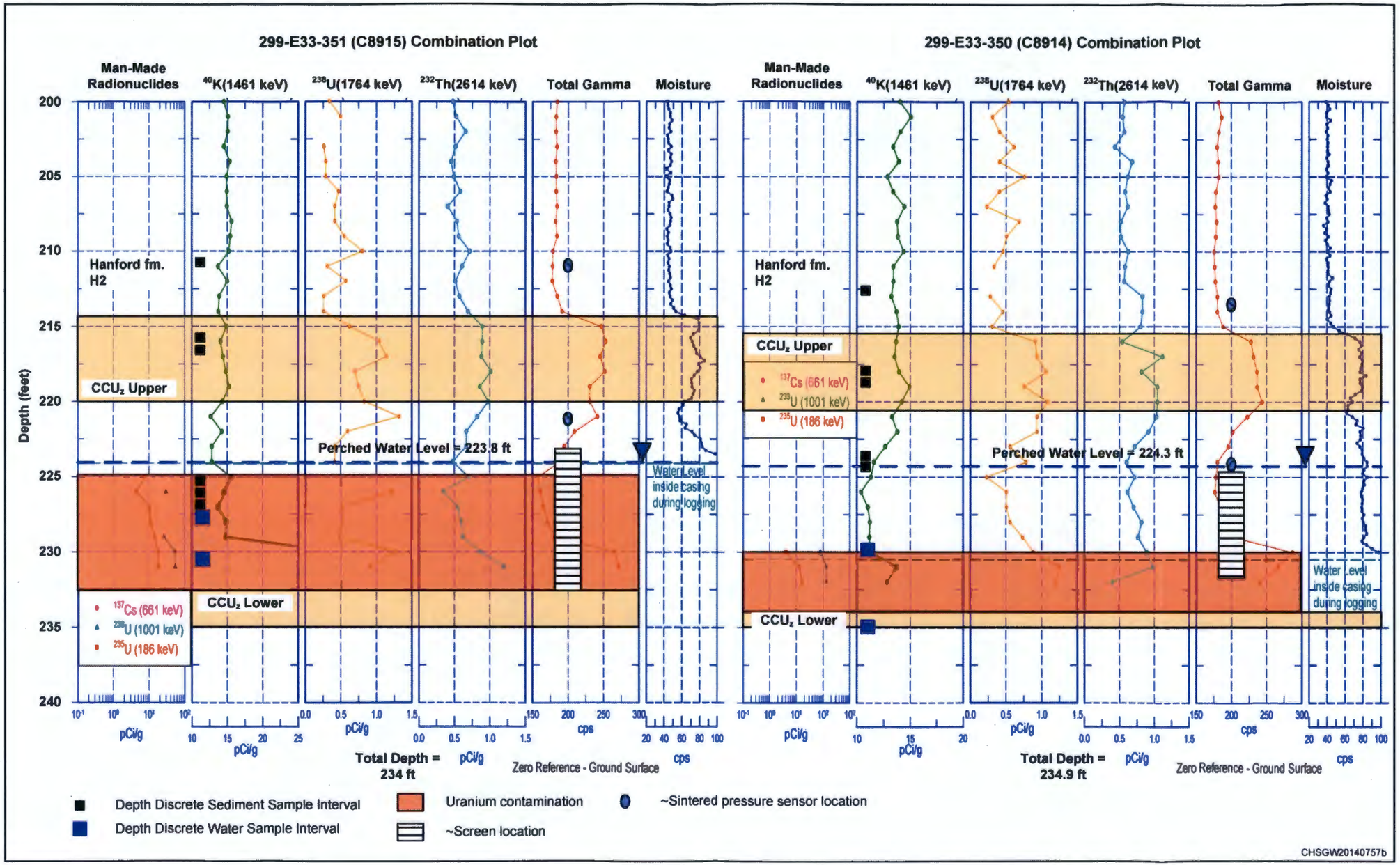


Figure 3-2. Borehole Composite Logs Showing the Perched Zone Detail in New Wells 299-E33-350 and 299-E33-351

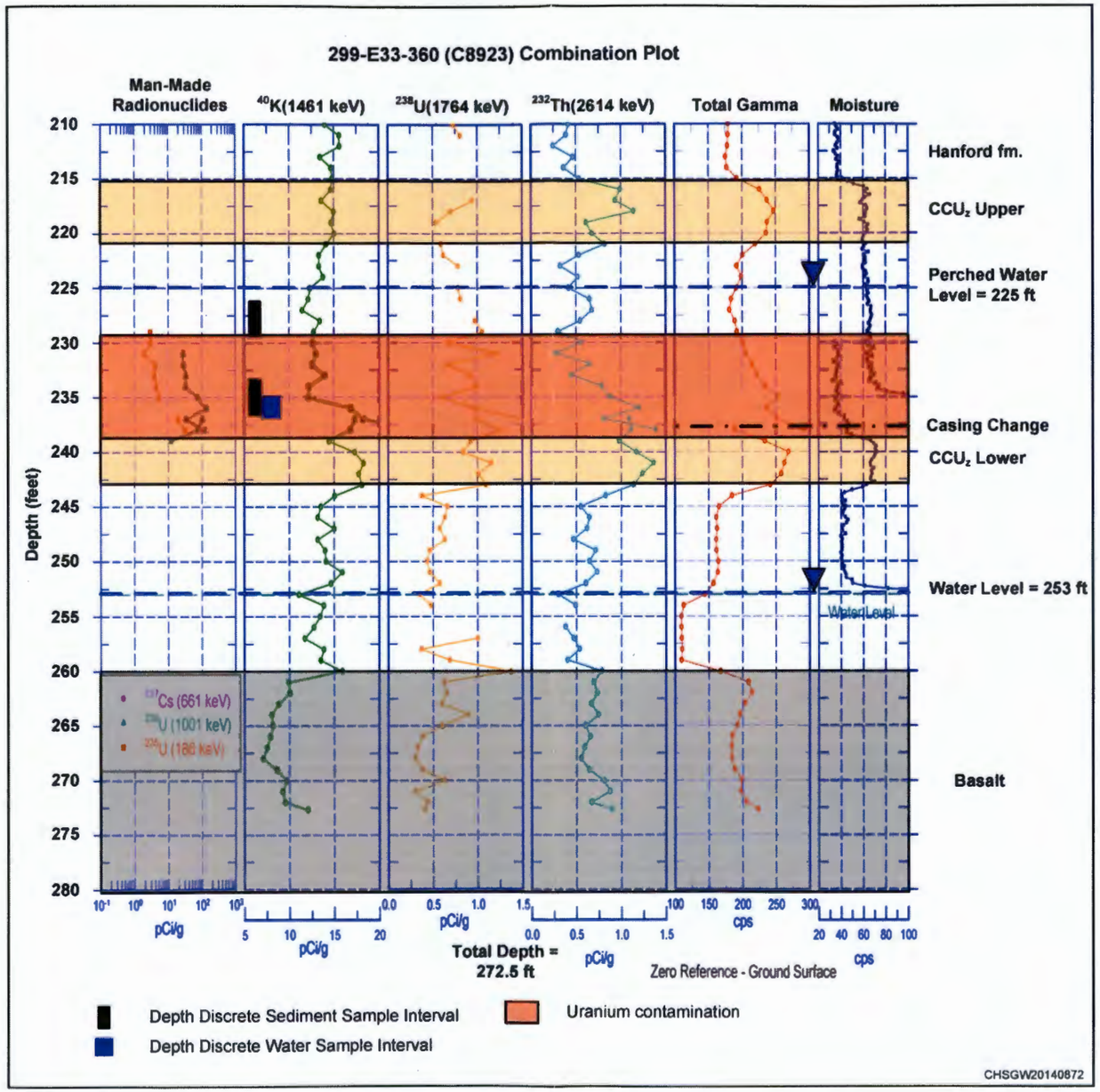
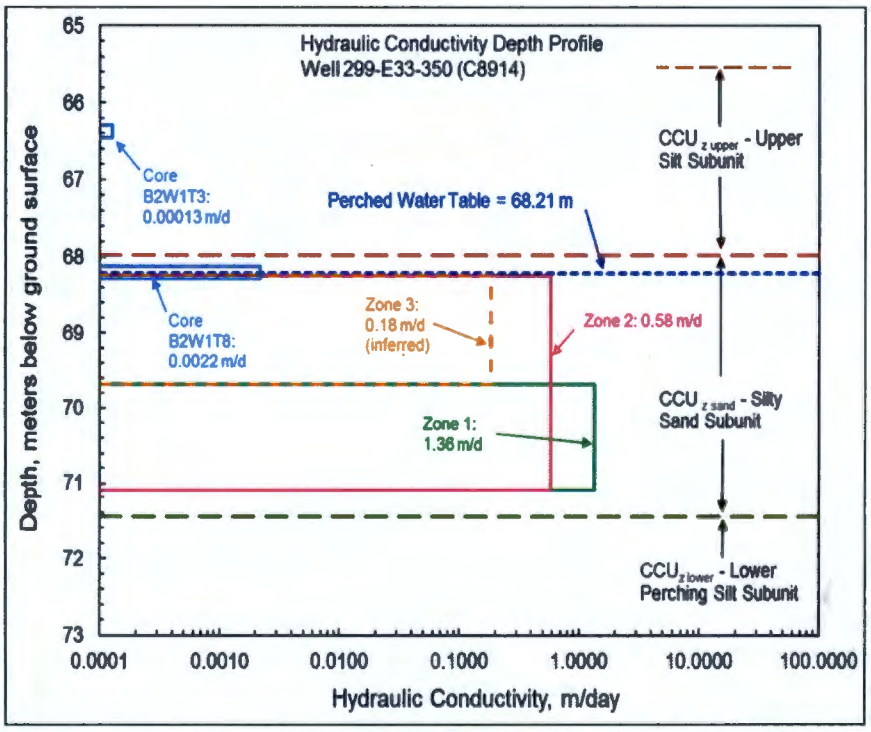
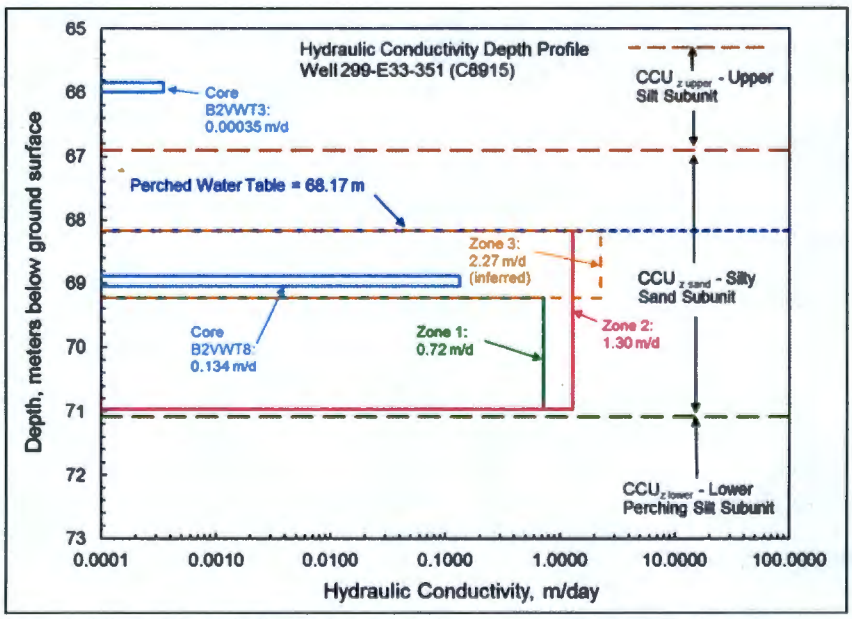


Figure 3-3. Borehole Composite Log Showing the Perched Zone and Unconfined Aquifer Detail in New Well 299-E33-360



Source: PNNL-23380, *Field-Derived Hydraulic Properties for Perched-Water Aquifer Wells 299-E33-350 and 299-E33-351, Hanford Site B-Complex Area.*

Figure 3-4. Hydraulic-Conductivity Depth Profile for Well 299-E33-350 (C8914)



From: PNNL-23380, *Field-Derived Hydraulic Properties for Perched-Water Aquifer Wells 299-E33-350 and 299-E33-351, Hanford Site B-Complex Area.*

Figure 3-5. Hydraulic-Conductivity Depth Profile for Well 299-E33-351 (C8915)

Table 3-1 summarizes the transmissivity and horizontal hydraulic conductivity values for both wells, based on the aquifer testing results. These estimates, which assume uniform hydraulic conductivity across each individual test interval, are representative of the silty-sand subunit, $CCU_{z\ sand}$ (PNNL-23380).

The saturated perched water zone testing confirmed that the composite transmissivity of the perched water aquifer at Well 299-E33-351 (3.64 m^2/day) is more than two times the composite transmissivity at Well 299-E33-350 (1.65 m^2/day). This difference in transmissivity at these two perched-water aquifer well locations is consistent with the uranium plume distribution in the underlying unconfined aquifer (Figure 3-6); that is, higher unconfined aquifer uranium concentrations underlie the location with higher perched-water aquifer transmissivity. Figure 3-6 indicates that Well 299-E33-351 is located within the plume area where the uranium concentrations are greater than 300 µg/L, while Well 299-E33-350 is located within the plume area where the uranium concentrations are between 30 µg/L and 300 µg/L (PNNL-23380).

Vertical hydraulic conductivity was determined from laboratory tests on intact core samples collected from 0.15 m (0.49 ft) thick intervals within the upper part of the $CCU_{z\ sand}$ (Figures 3-4 and 3-5). The geometric mean vertical hydraulic conductivity in core samples within the upper part of the $CCU_{z\ sand}$ was 0.017 m/day (Table 3-2). Comparison of this mean value with the geometric mean of 0.64 m/day for the inferred horizontal hydraulic conductivities within the upper part of the $CCU_{z\ sand}$ (Table 3-1) indicates a vertical to horizontal anisotropy ratio of approximately 0.026 for the upper half of the perched $CCU_{z\ sand}$. This vertical to horizontal anisotropy ratio for the $CCU_{z\ sand}$ is within the range expected for silty-sand materials (PNNL-23380).

Eight depth-discrete sediment core samples and two depth-discrete perched water samples were collected during drilling of Well 299-E33-350; three depth-discrete sediment core samples and two depth-discrete perched water samples were collected during drilling of Well 299-E33-351. The core and perched water sample depths are summarized in Table 3-3 (details are provided in SGW-57488). Fewer core samples were collected from Well 299-E33-351 because it is close to Well 299-E33-343, which was sampled through the vadose zone when it was drilled in 2008 (Figure 1-2).

The locations of samples collected within the perched water zone at Wells 299-E33-350 and 299-E33-351 are shown on Figure 3-2. The core samples were analyzed for alkalinity, specific conductivity, pH, moisture content, anions, metals, select site-specific radiological contaminants, and physical properties (bulk density, particle density, and particle size distribution); the results are provided in Appendix A. The perched water samples were analyzed for alkalinity, specific conductivity, pH, dissolved oxygen, oxidation-reduction potential, anions, metals, and select site-specific radiological contaminants; the results are provided in Appendix B.

Vertical concentration profiles for nitrate, technetium-99, and uranium-238 based on sediment and perched water samples collected from the perched water zone during drilling of new Well 299-E33-350 (borehole C8914) are provided in Figure 3-7 through Figure 3-9. The vertical profiles show that detectable levels of nitrate, technetium-99, and uranium-238 occur within the perching zone. The distribution of nitrate, technetium-99, uranium-235, and uranium-238 for all perched water samples from Well 299-E33-350 is shown in Figure 3-10.

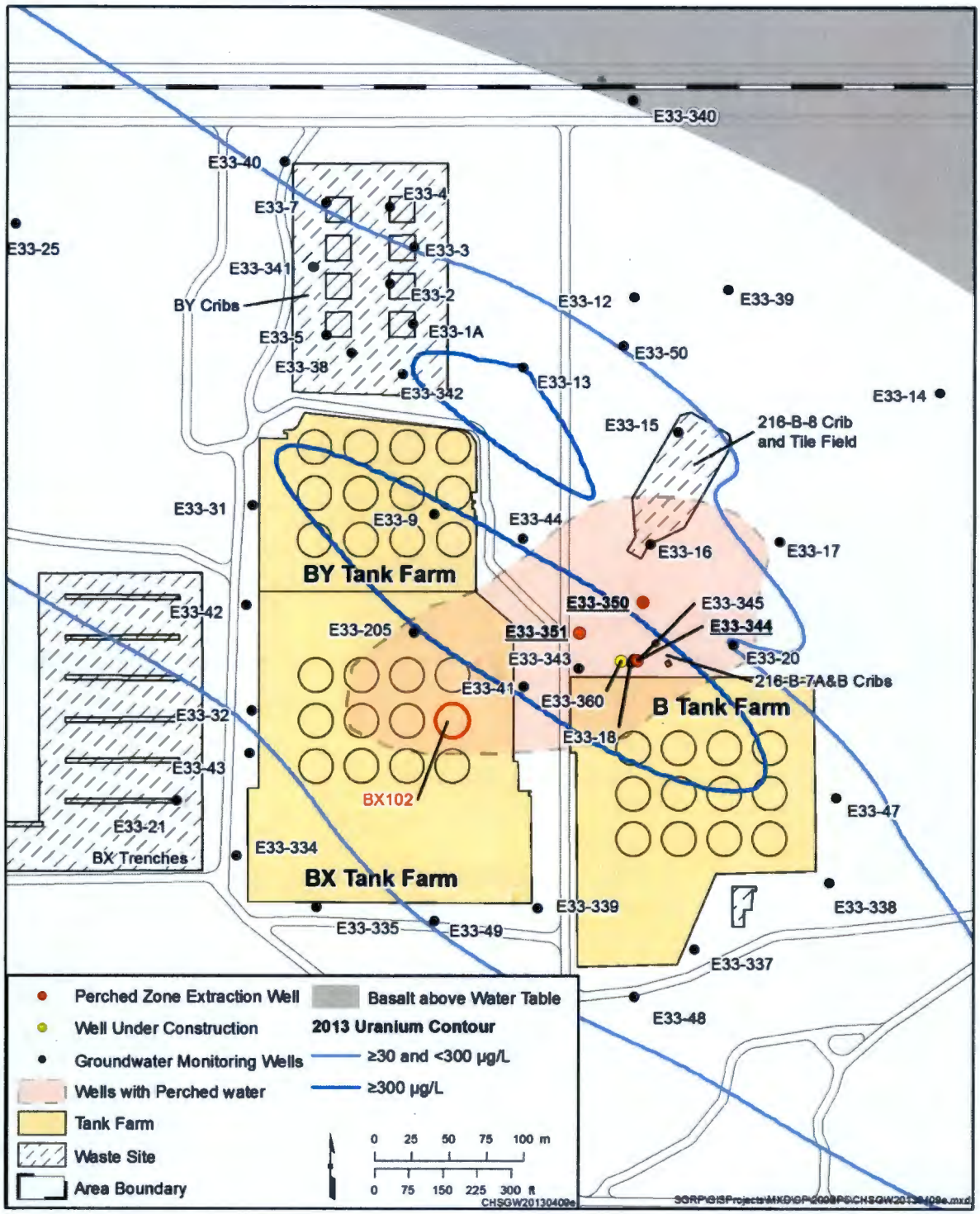


Figure 3-6. Uranium Plume in Unconfined Aquifer Underlying the B Complex Area

Table 3-1. Estimates of Transmissivity and Horizontal Hydraulic Conductivity based on Average Type-Curve Slug-Test Analysis Results for the Silty-Sand Subunit of the Cold Creek Fine-Grained Unit

Test Well Number (Borehole Identification)	Test Zone	Transmissivity, T[a] (m^2/day)	Test/Depth Interval, L (m bgs)	Test/Depth Interval Thickness (m)	Horizontal Hydraulic Conductivity, K_h[a] (m/day)
299-E33-350 (C8914)	Zone 1 (lower half)	1.92	69.68 – 71.09	1.41	1.36
	Zone 2 (nearly full thickness)	1.65	68.24 – 71.09	2.85	0.58
	Zone 3 (upper half)	0.27 (inferred)	68.24 – 69.68	1.44	0.18 (inferred)[b]
299-E33-351 (C8915)	Zone 1 (lower half)	1.26	69.22 – 70.97	1.75	0.72
	Zone 2 (nearly full thickness)	3.64	68.17 – 70.97	2.80	1.30
	Zone 3 (upper half)	2.38 (inferred)	68.17 – 69.22	1.05	2.27 (inferred)[b]

Source: Modified from PNNL-23380, *Field-Derived Hydraulic Properties for Perched-Water Aquifer Wells 299-E33-350 and 299-E33-351, Hanford Site B-Complex Area* (Table 5.1).

bgs = below ground surface

a. Assumed to be uniform within the zone section.

b. The geometric mean value of 0.64 m/day is calculated as the square root of (0.18 × 2.27).

Table 3-2. Estimates of Vertical Hydraulic Conductivity Based on Laboratory Testing of Intact Core Samples from the Silty-Sand Subunit of the Cold Creek Fine-Grained Unit

Test Well Number (Borehole Identification)	Core Sample	Core Sample Depth Tested (m bgs)	Core Sample Thickness Tested (m)	Vertical Hydraulic Conductivity, K_v[a] (m/day)	Geometric Average Vertical Hydraulic Conductivity[b] (m/day)
299-E33-350 (C8914)	B2W1T8	68.28 – 68.43	0.15	0.0022	0.017
299-E33-351 (C8915)	B2VWT8	69.07 – 69.22	0.15	0.134	

bgs = below ground surface

a. Assumed to be uniform within the zone section.

b. The geometric mean value of 0.017 m/day is calculated as the square root of (0.0022×0.134).

Table 3-3. Sample Collection Summary

Borehole ID Number	Sample Type	Sample Depth m (ft) bgs	Sample Date	Sample HEIS Numbers
C8914	Sediment Core	11.1 to 11.7 (36.5 to 38.5)	02/04/2014	B2W1N0, B2W1N1, B2W1N2, B2W1N3, B2W1N4
C8914	Sediment Core	23.4 to 24.0 (76.7 to 78.7)	02/04/2014	B2W1N5, B2W1N6, B2W1N7, B2W1N8, B2W1N9
C8914	Sediment Core	35.4 to 36.1 (116.3 to 118.3)	02/05/2014	B2W1P0, B2W1P1, B2W1P2, B2W1P3, B2W1P4
C8914	Sediment Core	47.6 to 48.2 (156.3 to 158.3)	02/11/2014	B2W1P5, B2W1P6, B2W1P7, B2W1P8, B2W1P9
C8914	Sediment Core	59.6 to 60.2 (195.5 to 197.5)	02/18/2014	B2W1R0, B2W1R1, B2W1R2, B2W1R3, B2W1R4
C8914	Sediment Core	64.3 to 64.9 (210.9 to 212.9)	02/18/2014	B2W1R5, B2W1R6, B2W1R7, B2W1R8, B2W1R9
C8914	Sediment Core	66.0 to 66.6 (216.5 to 218.5)	02/19/2014	B2W1T0, B2W1T1, B2W1T2, B2W1T3, B2W1T4
C8914	Sediment Core	67.8 to 68.4 (222.5 to 224.5)	02/19/2014	B2W1T5, B2W1T6, B2W1T7, B2W1T8, B2W1T9
C8914	Perched Water	69.9 (229.3)	02/20/2014	B2W1V5, B2W1V6, B2W1V7, B2W1W7, B2W1W9
C8914	Perched Water	71.6 (235)	02/24/2014	B2W1W1, B2W1W2, B2W1W3, B2W1W4, B2W1W5, B2W1W6, B2W1W8, B2W499, B2W4B0
C8915	Sediment Core	63.9 to 64.5 (209.6 to 211.6)	01/27/2014	B2VWR5, B2VWR7, B2VWR8, B2VWR9
C8915	Sediment Core	65.4 to 66.0 (214.5 to 216.5)	01/27/2014	B2VWT0, B2VWT2, B2VWT3, B2VWT4
C8915	Sediment Core	68.6 to 69.2 (225.1 to 227.1)	01/28/2014	B2VWT5, B2VWT7, B2VWT8, B2VWT9
C8915	Perched Water	69.4 (227.7)	01/29/2014	B2VWV6, B2VWV7, B2VWV8, B2VWV9, B2VWW0, B2VWW1, B2VWW3
C8915	Perched Water	70.4 (231.0)	01/30/2014	B2VWV0, B2VWV1, B2VWV2, B2VWW2

Note: Table is based on Table A-1 and Table B-1 in SGW-57488, *Borehole Summary Report for the Installation of Two Perched Groundwater Wells in the 200-DV-1 Operable Unit, FY 2014.*

bgs = below ground surface

HEIS = Hanford Environmental Information System

Vertical concentration profiles for nitrate and uranium-238, based on all sediment and perched water samples collected during drilling of new Well 299-E33-350 (borehole C8914), are provided in Figure 3-11 and Figure 3-12. Technetium-99 was not detected in any sediment samples from this well. Samples collected immediately above the $CCU_{z\ upper}$ silt, within the overlying lower Hanford H2 unit,

show that nitrate contamination is detected at relatively low concentrations above the perched water zone (Figure 3-11). However, uranium-238 concentrations detected above the perched water zone were consistent with background levels (Figure 3-12) (PNNL-19277, *Conceptual Models for Migration of Key Groundwater Risk Contaminants Through the Vadose Zone and Into the Unconfined Aquifer Below the B-Complex*).

Vertical concentration profiles for nitrate, technetium-99, and uranium-238 based on sediment and perched water samples collected from the perched water zone during drilling of new Well 299-E33-351 (borehole C8915) are provided in Figure 3-13 through Figure 3-15. The vertical profiles show that detectable levels of nitrate, technetium-99, and uranium-238 occur within the perching zone. The distribution of nitrate, technetium-99, uranium-235, and uranium-238 for all perched water samples from Well 299-E33-351 is shown in Figure 3-16.

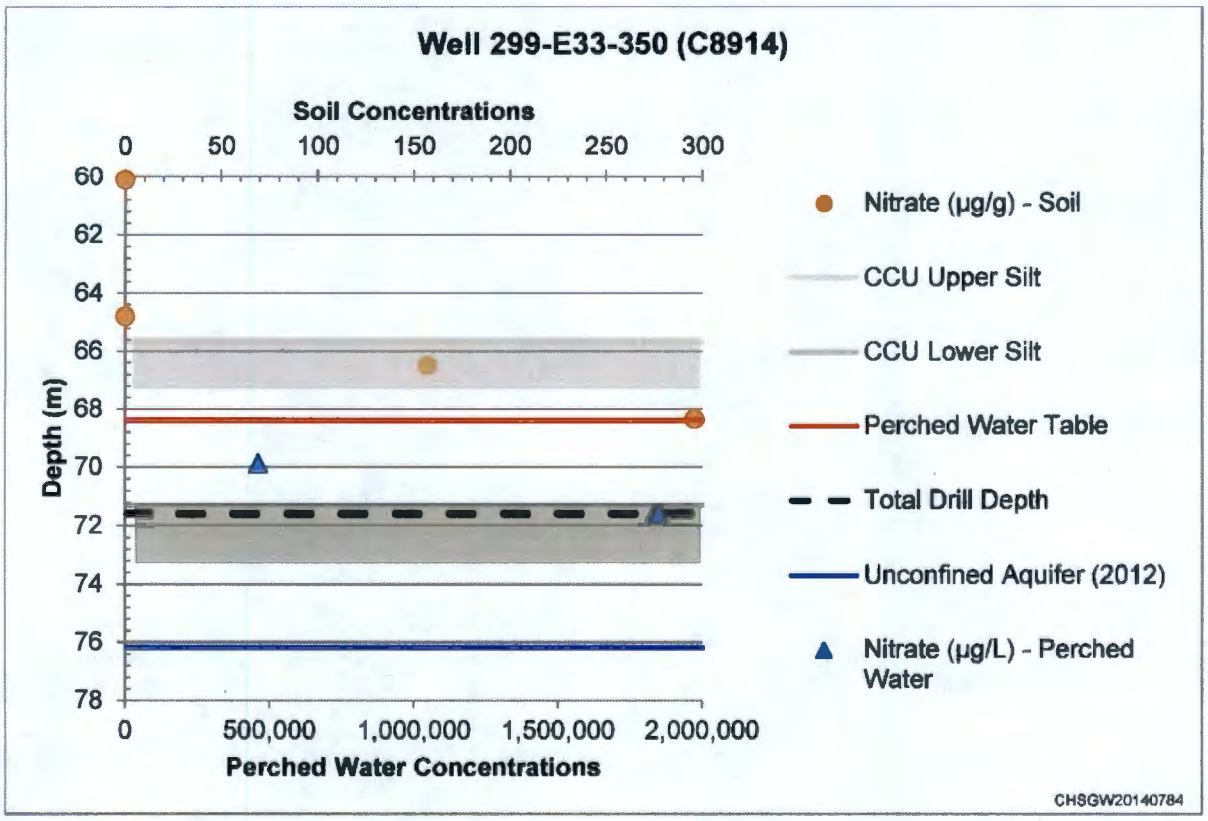
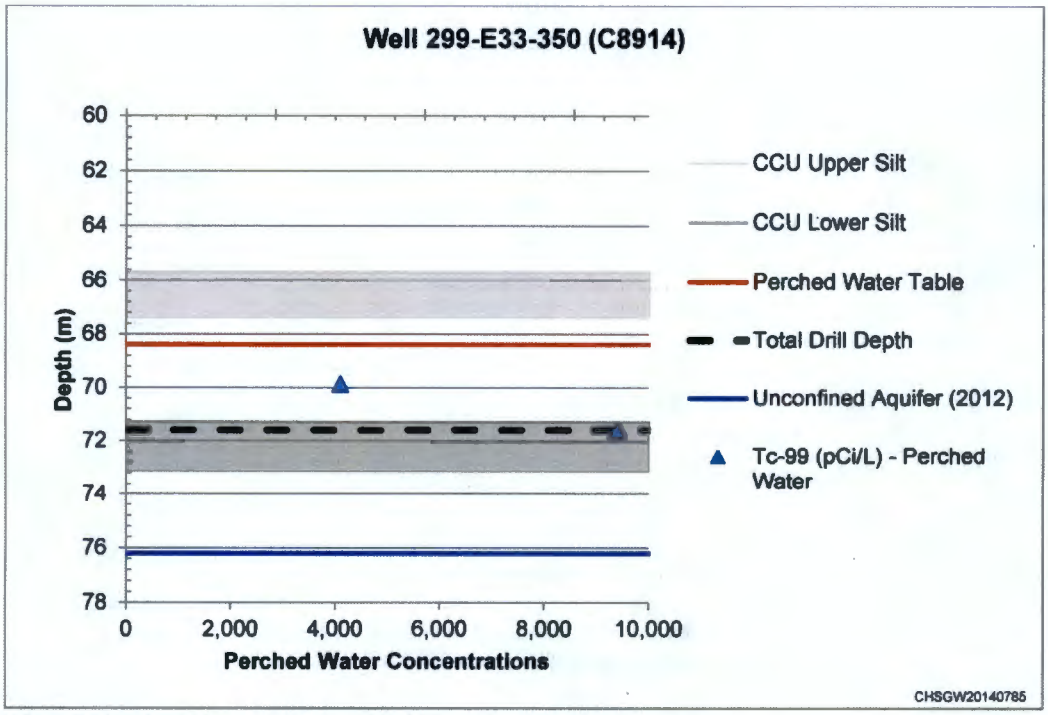


Figure 3-7. Nitrate Distribution within the Perched Zone in Well 299-E33-350 (C8914)



Note: Technetium-99 was not detected in depth-discrete sediment samples.

Figure 3-8. Technetium-99 Distribution within the Perched Zone in Well 299-E33-350 (C8914)

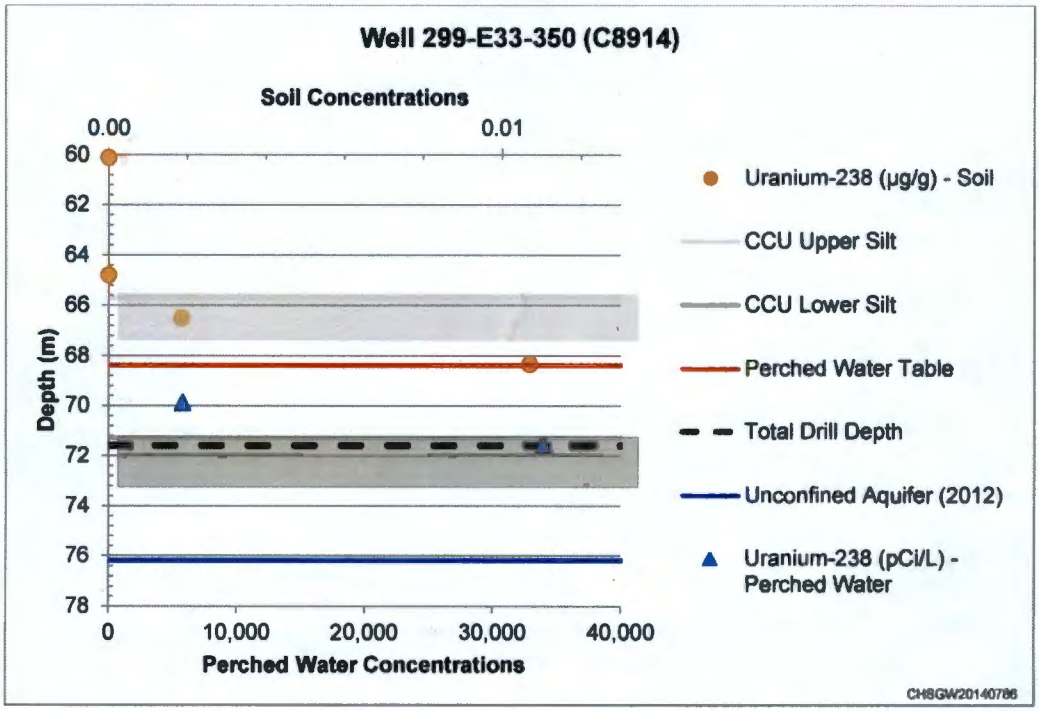


Figure 3-9. Uranium-238 Distribution within the Perched Zone in Well 299-E33-350 (C8914)

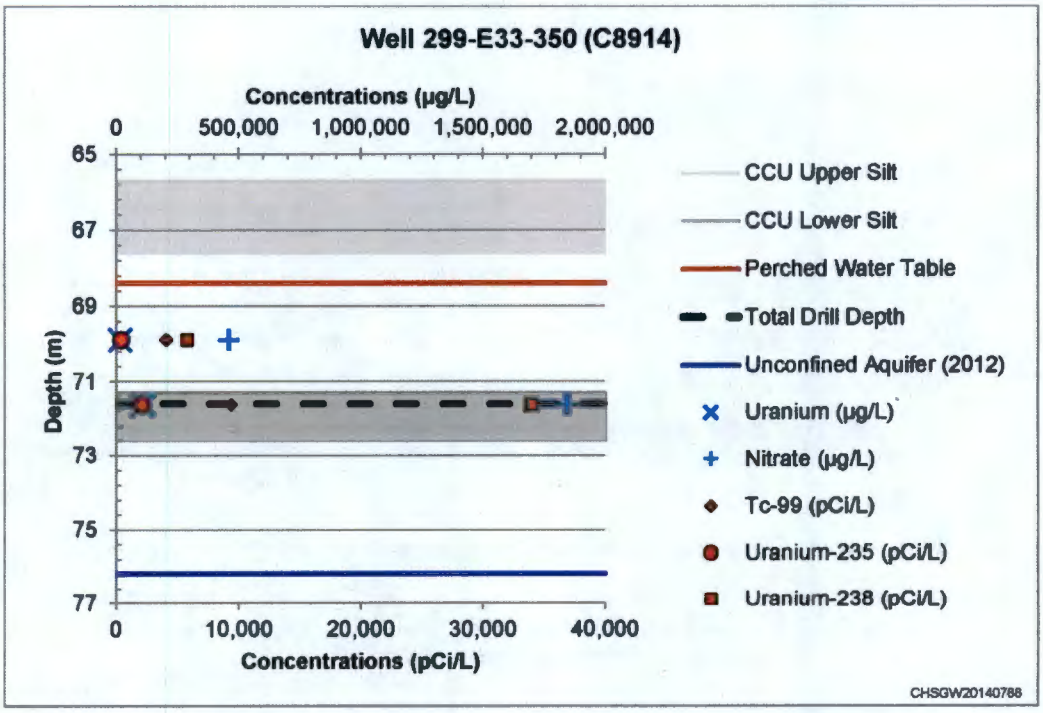


Figure 3-10. Perched Water Depth-Discrete Contaminant Plot Showing Total Uranium, Nitrate, Technetium-99, Uranium 235, and Uranium-238 in Perched Water Samples from Well 299-E33-350 (C8914)

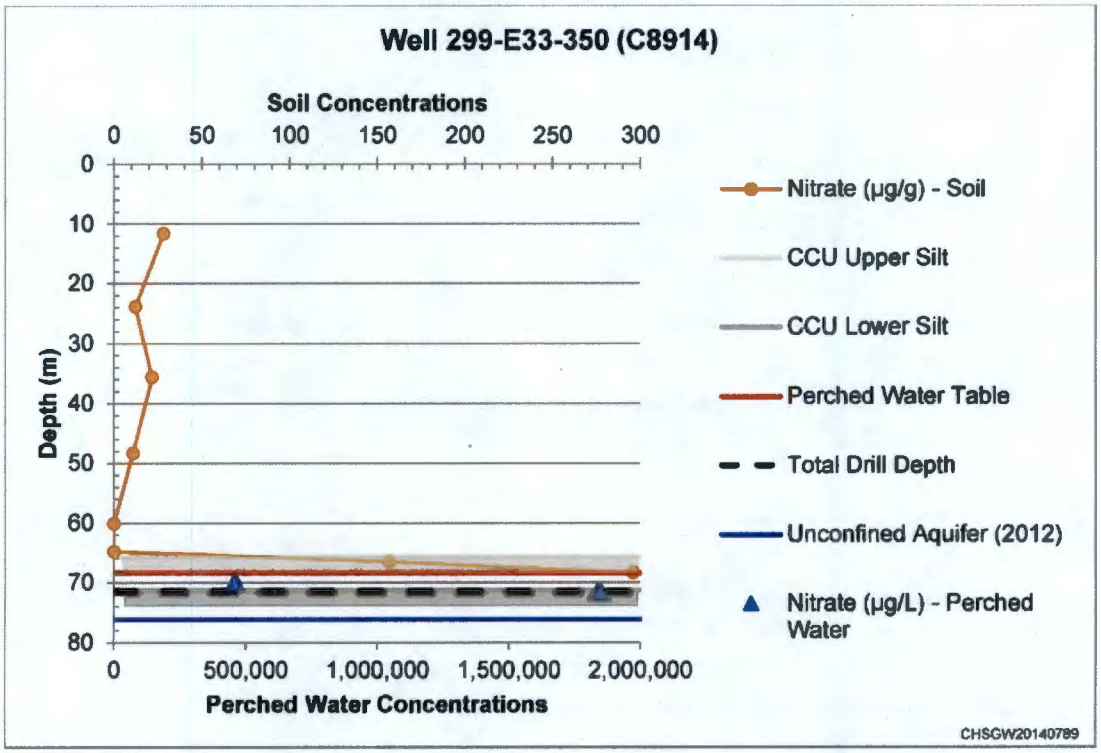


Figure 3-11. Depth-Discrete Nitrate Distribution in Well 299-E33-350 (C8914)

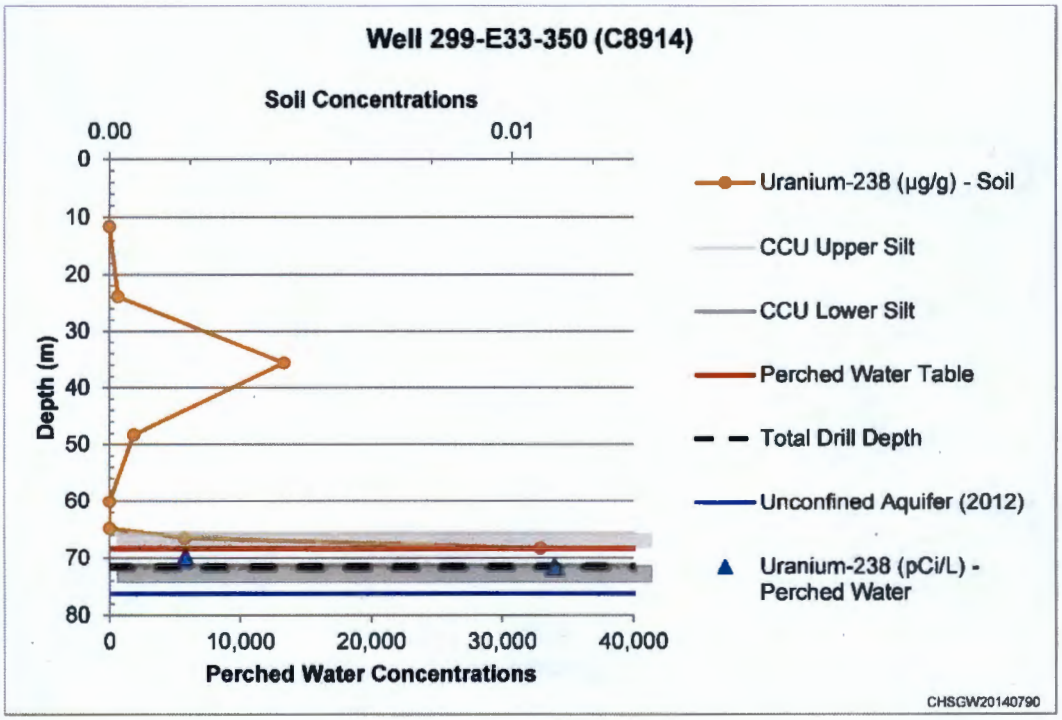


Figure 3-12. Uranium-238 Distribution in Well 299-E33-350 (C8914)

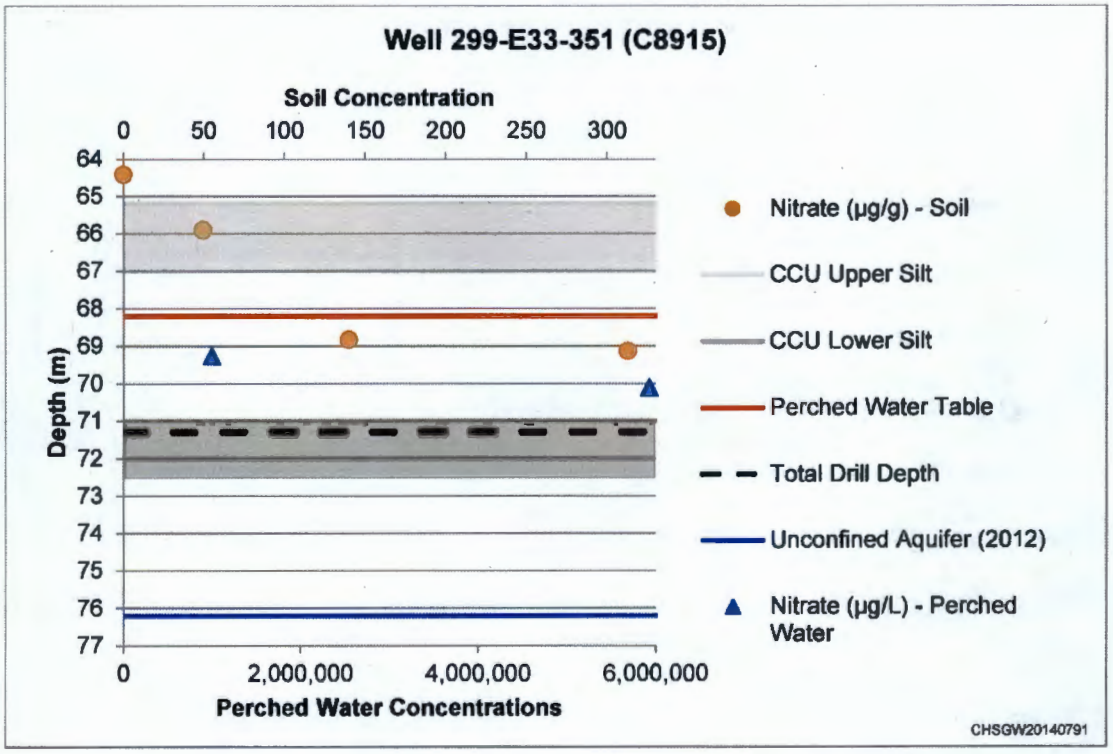


Figure 3-13. Nitrate Distribution within the Perched Zone in Well 299-E33-351 (C8915)

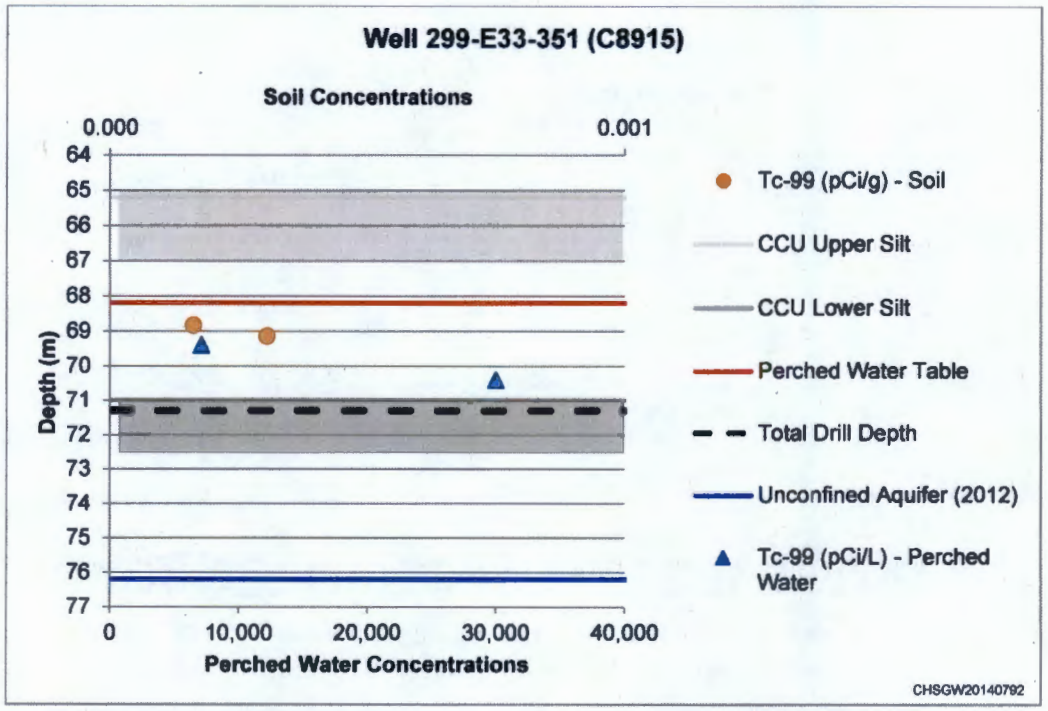


Figure 3-14. Technetium-99 Distribution within the Perched Zone in Well 299-E33-351 (C8915)

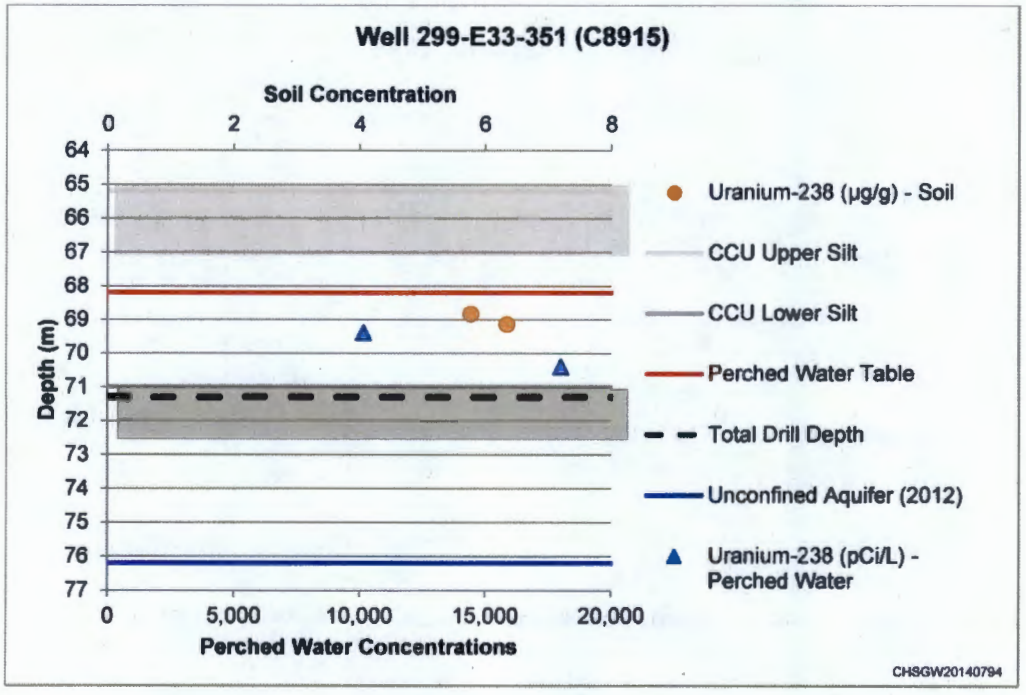


Figure 3-15. Uranium-238 Distribution within the Perched Zone in Well 299-E33-351 (C8915)

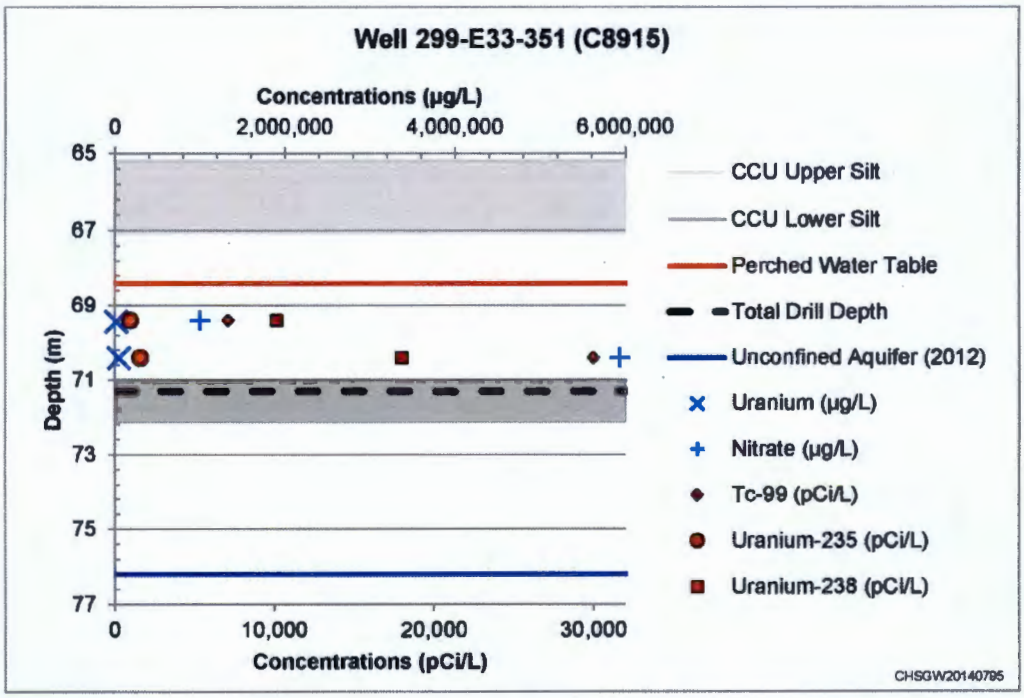


Figure 3-16. Perched Water Depth-Discrete Contaminant Plot Showing Total Uranium, Nitrate, Technetium-99, Uranium-235, and Uranium-238 in Perched Water Samples from Well 299-E33-351 (C8915)

Figures 3-17 through Figure 3-19 show the vertical concentration profiles for nitrate, technetium-99, and uranium in sediment samples from existing Well 299-E33-343 and nearby new Well 299-E33-351 (Figure 1-2). These plots show that the contaminant profiles at these two wells, approximately 24 m(77 ft) apart, are not inconsistent with each other, confirming the decision to use previous sample results from Well 299-E33-343 to represent the Hanford formation at the location of new Well 299-E33-351. Figures 3-17 through Figure 3-19 show similar contaminant trends within the sampled interval of the perched zone as shown on Figures 3-13 through 3-15.

A depth-discrete sample of perched water was collected from new 200-BP-5 OU Well 299-E33-360. The uranium concentration in the perched water from Well 299-E33-360 is compared to the uranium concentrations in perched water from nearby wells in Figure 3-20. The high uranium concentrations in perched water in Wells 299-E33-343 and 299-E33-360 are consistent with the locations of these wells closer to the location of the 241-BX-102 unplanned release (UPR) (Figure 1-2). Two depth-discrete split-spoon sediment samples were collected within the saturated perched water CCU sand interval (Figure 3-3) and have been submitted for analysis of the pore water. Results from this analysis will be reported in another report at a later date.

The depth-discrete sediment and perched water analytical results indicate that there is highly contaminated perched water in all three of the new wells (299-E33-350, 299-E33-351, and 299-E33-360). Uranium concentrations are highest in perched water sampled during drilling of new Well 299-E33-360 (Table 3-4). The perched water sampled during drilling of new Well 299-E33-350 has approximately the same uranium concentration as the maximum concentration detected in Well 299-E33-344 during perched water extraction. Technetium-99 concentrations in perched water sampled during drilling of all three new wells are lower than the maximum concentration detected in Well 299-E33-344 during perched water extraction. The perched water sampled during drilling of all three new wells has higher nitrate

concentrations than the maximum concentration detected in Well 299-E33-344 during perched water extraction. The contaminant variability suggests multiple sources, which is consistent with the derived inventory of waste releases in this area (i.e., 241-BX-102 UPR, 216-B-8 Crib, and 216-B-7A&B Cribs).

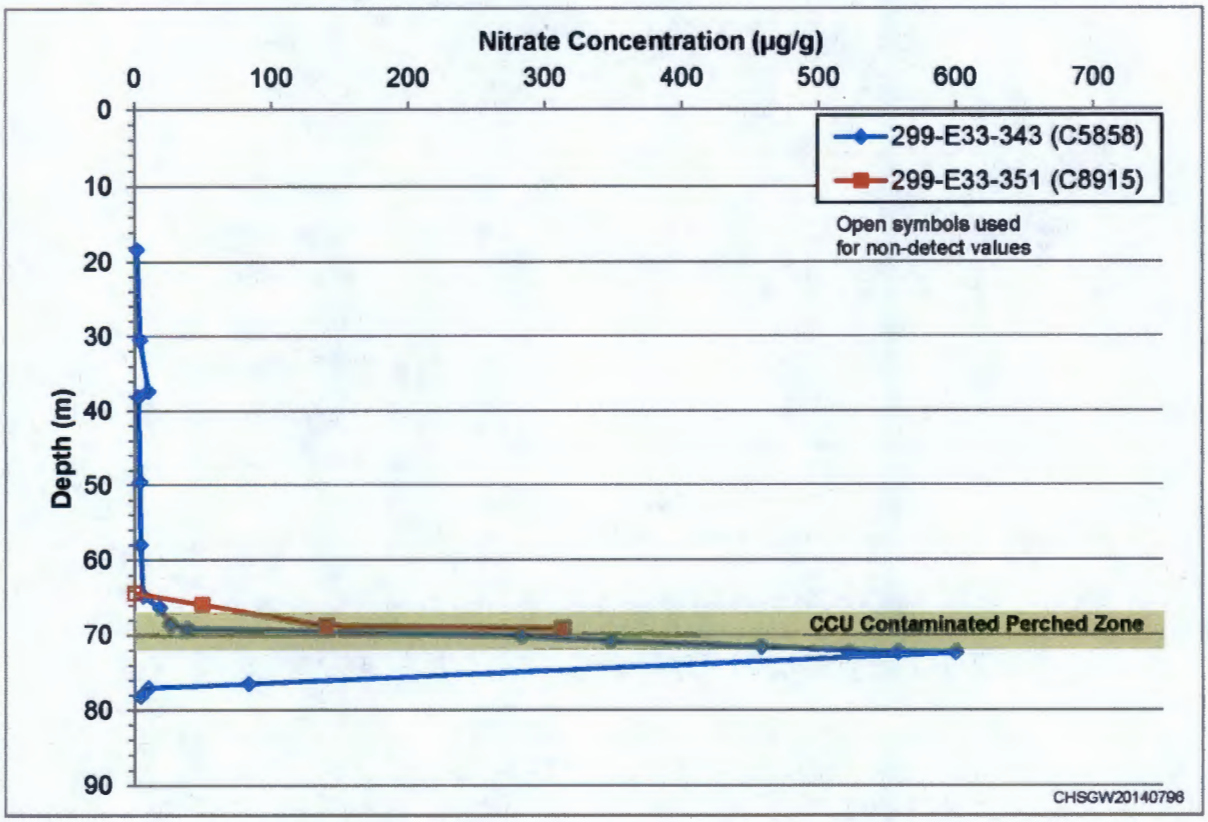


Figure 3-17. Comparison of Depth-Discrete Nitrate Distributions in Existing Well 299-E33-343 and New Well 299-E33-351 (C8915)

The characterization data reveal that the perched water encountered in the three new wells occurs in the same stratigraphic interval as it does in all of the surrounding wells (i.e., 299-E33-343, 299-E33-344, and 299-E33-345) (Figure 3-1). As a result, it appears that the perched water is continuous throughout the center of the perched water area depicted in Figure 1-2.

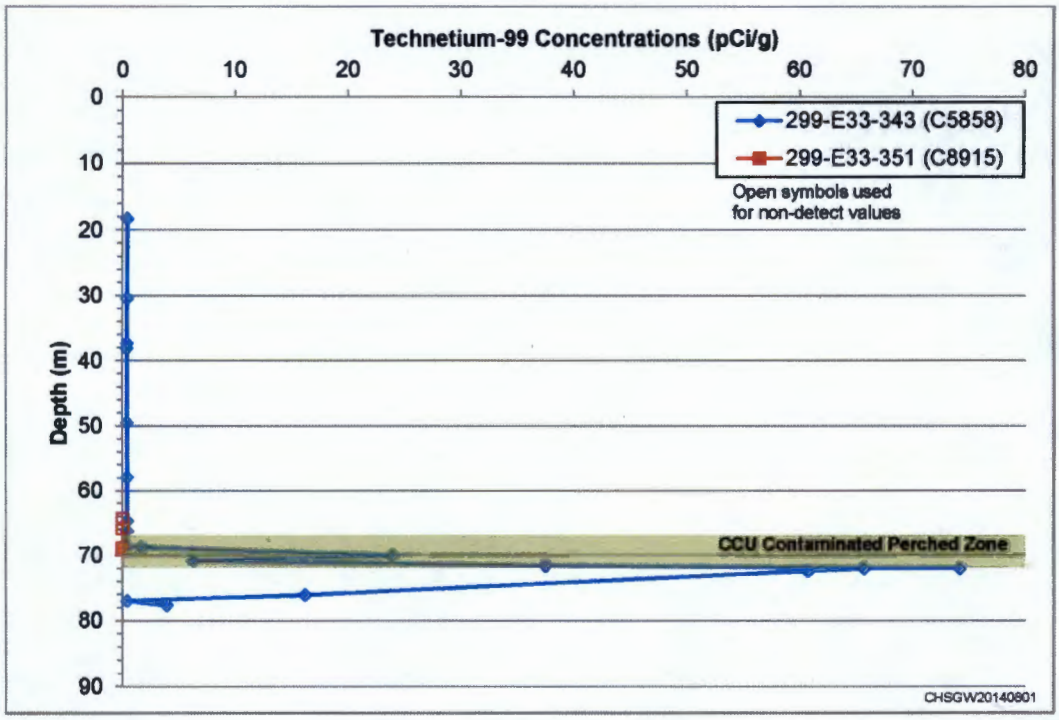


Figure 3-18. Comparison of Depth-Discrete Technetium-99 Distributions in Existing Well 299-E33-343 and New Well 299-E33-351 (C8915)

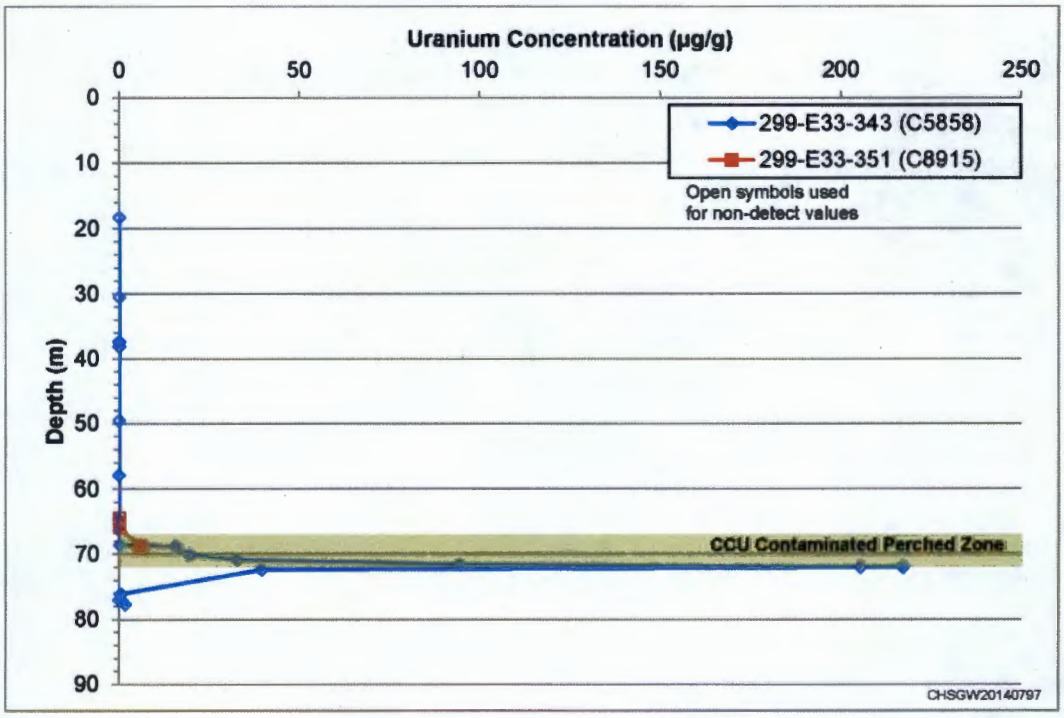


Figure 3-19. Comparison of Depth-Discrete Uranium Distributions in Existing Well 299-E33-343 and New Well 299-E33-351 (C8915)

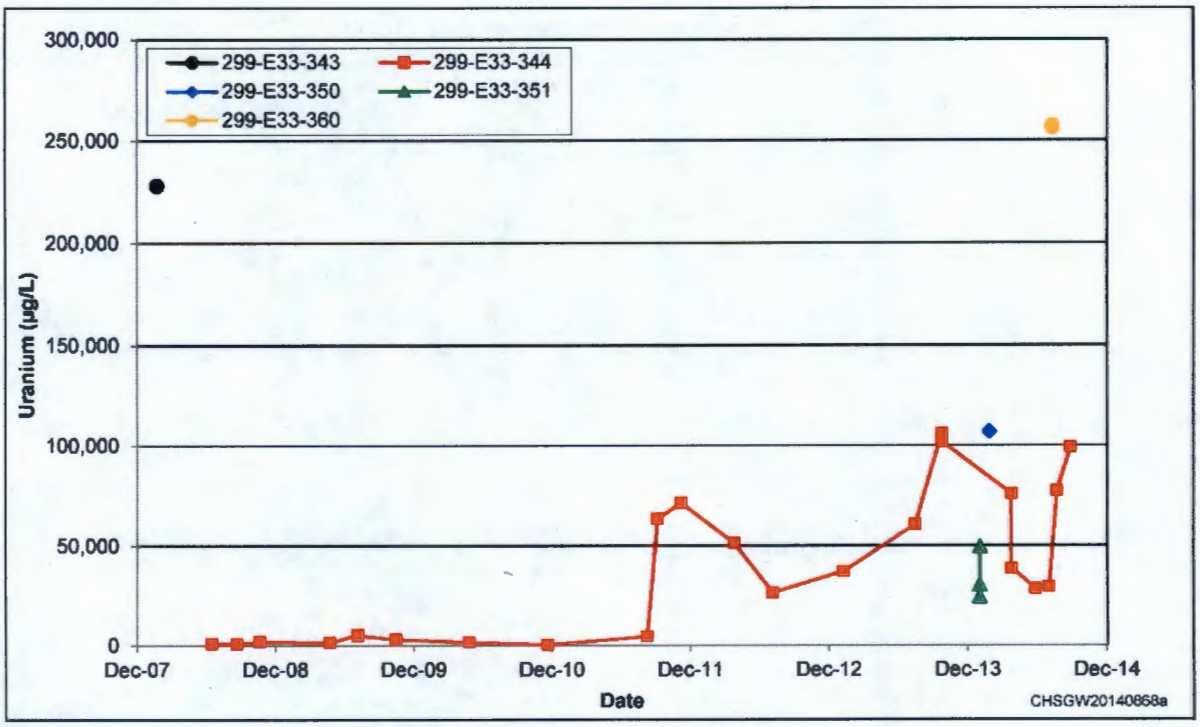


Figure 3-20. Comparison of Uranium Concentrations in Perched Water Samples from Wells 299-E33-343, 299-E33-344, 299-E33-350, 299-E33-351, and 299-E33-360

Table 3-4. Maximum Uranium, Technetium-99, and Nitrate Concentrations in Perched Water Samples from Wells 299-E33-344, 299-E33-350, 299-E33-351, and 299-E33-360

Well	Maximum Uranium (µg/L)	Maximum Technetium-99 (pCi/L)	Maximum Nitrate (µg/L)
299-E33-344	106,000	53,300	810,000
299-E33-350	107,000	9,900	1,850,000
299-E33-351	49,800	30,000	5,930,000
299-E33-360	257,000	20,000	1,780,000

4 Conceptual Site Model

The integration and interpretation of borehole hydrogeologic, geochemical, and geophysical data sets were used to resolve the nature of the perching horizon and the location and extent of the contaminated perched water within the perching zone (Section A7 of SGW-53604). The resulting CSM indicates that the contaminated perched water is contained within a localized silty sand lens deposited in a structural low on top of a low permeability paleosol (silt) layer (lower CCU_z silt) in the CCU (Figure 4-1). The top of the contaminated sand lens is defined between approximately 67 and 68.6 m (220 and 225 ft) bgs based on geophysical logs. The maximum thickness of the sand lens is approximately 4.6 m (15 ft). The lateral and vertical extent of the perched water is limited to the region containing the sand lens and underlying lower perching silt zone ($CCU_{z\ lower}$). The bottom of the perched sand lens is approximately 4.6 m (15 ft) above the unconfined aquifer at its lowest point. The underlying perching silt layer ($CCU_{z\ lower}$) forms a natural barrier that slows contaminant migration from the saturated sand layer to the aquifer.

Liquid wastes containing uranium, technetium-99, and nitrate migrated vertically and laterally in the subsurface and accumulated within the CCU sand lens. The major sources of the contaminated water are considered the nearby 200-DV-1 OU waste sites (216-B-7A&B and 216-B-8 Cribs), which were used for subsurface infiltration of liquid wastes, and the SST (241-BX-102), which released liquid waste to the subsurface when it was inadvertently overfilled. UPRs near the SSTs (241-B-105 and 241-B-106) also may have contaminated groundwater (DOE/RL-2012-53, *Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area B-BX-BY*); however, the signature contaminant (cyanide) has not been detected at Well 299-E33-344.

Dramatic changes in perched water chemistry and increases in contaminant concentrations occurred after the initiation of perched water extraction at Well 299-E33-344 (Figure 2-3). The initial extraction of perched water from this well is thought to have removed the lower concentration residual water that had accumulated from disposal operations that occurred several decades ago at the 216-B-7A&B and 216-B-8 Cribs; these cribs are located on the eastern margin of the perching silt layer (Figure 1-2). The large volumes of wastewater disposed to these cribs most likely saturated the perched water zone. Continued perched water pumping expanded the perched water capture area and pulled higher concentrations of uranium, technetium-99, and nitrate from the west side of the perched zone, nearer the 241-BX-102 tank release, to the extraction well (Figures A-15 and A-16 in SGW-53604).

In addition to the increased contaminant concentrations in the perched zone samples obtained from extraction Well 299-E33-344, uranium, technetium-99, and nitrate concentration increases began shortly thereafter in groundwater monitoring Well 299-E33-18 (Figure 2-5), followed by increases in groundwater monitoring Well 299-E33-345 (Figure 2-4). Both groundwater monitoring Wells 299-E33-18 and 299-E33-345 are less than 3.5 m (11.5 ft) from perched zone extraction Well 299-E33-344. Technetium-99 concentrations in both groundwater monitoring wells were already higher than in the perched zone well prior to initiation of perched water extraction. However, uranium and nitrate concentrations in the groundwater monitoring wells were lower than in the perched zone extraction well prior to initiation of perched water extraction. This indicates that the unconfined aquifer beneath the perched zone was already contaminated with technetium-99 and low levels of the other contaminants.

Geophysical logging results for Well 299-E33-18 have shown that increasing uranium concentrations occurred over time along the outside of the casing downward toward the water table (Figure A-23 in SGW-53604). These data indicate that Well 299-E33-18, an older unsealed well, may have been providing a more direct travel pathway for the perched water vadose zone contamination to migrate to the unconfined aquifer. Well 299-E33-18 was plugged with cement grout and decommissioned on June 26, 2013, to eliminate the potential for contaminant migration along the unsealed well (Section 6.3). Groundwater monitoring results from nearby wells will be evaluated to determine if concentrations changed (decreased) as a result of the well decommissioning.

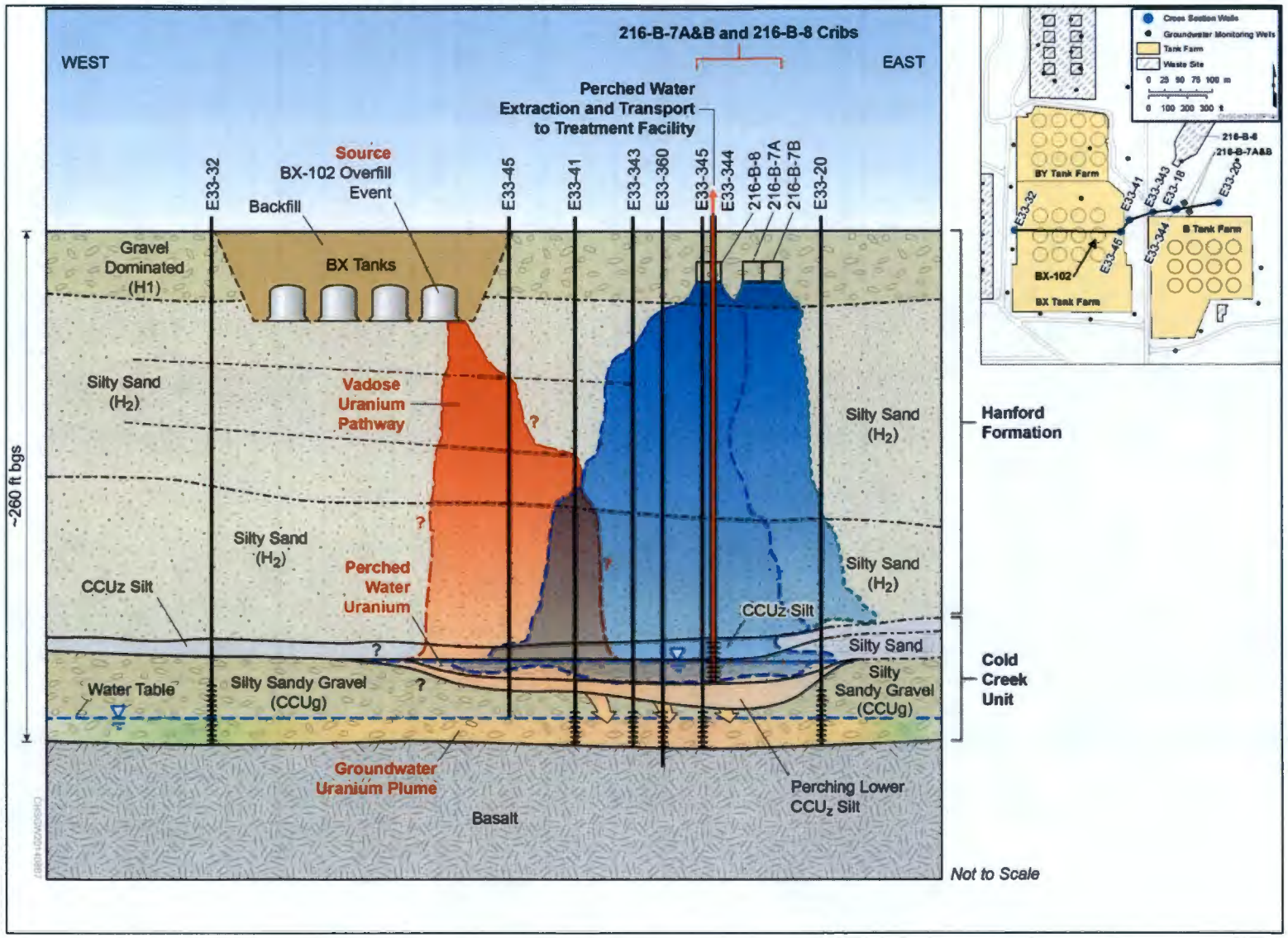


Figure 4-1. Conceptual Site Model of the Cold Creek Unit Perching Zone

The two new perched water wells (299-E33-350 and 299-E33-351) and the new groundwater monitoring well (299-E33-360) also encountered the CCU interval and the highly contaminated perched water. The characterization results (Section 3.0) confirm the existing CSM, indicating that the lateral extent of the contaminated perched water is within the region mapped (Figure 1-2) and supporting the conclusion that this highly contaminated perched water is slowly leaking through the $CCU_{z\ lower}$ and impacting the unconfined aquifer.

The perched water extraction system installed in Well 299-E33-344 has operated for 896 days since pumping began in August 2011. The 882,000 L (233,000 gal) recovered through September 30, 2014 represents approximately 12 percent of the estimated 7.6 million L (2 million gal) of perched water contained within the sand layer (PNNL-22499, *Perched-Water Evaluation for the Deep Vadose Zone Beneath the B, BX, and BY Tank Farms Area of the Hanford Site*).

The CSM for the perched water zone provides the basis for identifying uncertainties associated with the nature and extent of the contaminated perched water. Hydraulic parameters derived from hydraulic testing completed in the two new Wells 299-E33-350 and 299-E33-351 (PNNL-23380), along with water level observations and initial pumping conditions to be obtained from the new perched water wells, will be further evaluated to develop estimates of the volume of remaining perched water. The new information and data support the evaluation of the extent and thickness of the perched water zone and the area of potential groundwater impact from the perched water zone.

Pacific Northwest National Laboratory (PNNL) simulated surface water recharge and perched water conditions within the perched region, and concluded that a coupled approach of perched water removal and recharge rate reduction would create the most significant decrease in contaminant flux to the groundwater (PNNL-22499).

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5 Status and Path Forward for Remedial Action

Perched water extraction using Well 299-E33-344 continued during FY 2014 as phase 1 of the treatability test (DOE/RL-2011-40). The two new 200-DV-1 OU perched water wells (299-E33-350 and 299-E33-351) are anticipated to be added to the extraction system and to begin pumping during FY 2015. Data will be collected during the initial pumping to support the interpretation of the volume of perched water remaining and evaluate the need for the proposed phase 2 (enhanced vacuum recovery) and phase 3 (pore water extraction) of the treatability test. Extraction data using the two new wells will be used to refine the CSM. Extraction from the new wells will result in accelerated perched zone remediation. Groundwater monitoring beneath the perched zone in the new 200-BP-5 OU well (299-E33-360) also will support the evaluation of continued groundwater impacts from the perched interval.

Perched water extraction is being transitioned from operating as a treatability test to operating as a CERCLA non-time-critical removal action. Table 5-1 lists the documents prepared in FY 2014 as part of the transition.

The alternative selected in the Action Memorandum (DOE/RL-2014-34) is continued extraction of perched water and transfer of the water by truck to the 200 West Pump and Treat (P&T), where the water will be treated and then injected into the aquifer below the 200 West Area. When available, the perched water may alternatively be transferred to 200 West P&T by pipeline.

The three extraction wells (299-E33-344, 299-E33-350, and 299-E33-351) that support the perched water treatability test will be used to extract perched water for the removal action. The treatability test is planned to continue until the uranium treatment train is installed at the 200 West P&T. Once the train is operational, the removal action will be initiated in accordance with the removal action work plan. If testing of vacuum-enhanced recovery (phase 2 of the treatability test) and pore water extraction (phase 3 of the treatability test) are not completed under the treatability test, then these tests may occur as part of the removal action.

Table 5-1. Documents Prepared in Fiscal Year 2014 to Transition Extraction of Perched Water to a Non-Time-Critical Removal Action

Date	Document	Scope
January, 2014	DOE/RL-2013-37, *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction*, Rev. 0	The EE/CA that evaluates alternatives for continued extraction of perched water as a non-time-critical removal action under CERCLA was issued.
February 3 to March 3, 2014	DOE/RL-2013-37, *Engineering Evaluation/Cost Analysis for Perched Water Pumping/Pore Water Extraction*, Rev. 0	A 30-day public and Tribal Nations review of the EE/CA was held.
June, 2014	DOE/RL-2014-34, *Action Memorandum for 200-DV-1 Operable Unit Perched Water Pumping/Pore Water Extraction*, Draft A	Draft A of the Action Memorandum that documents selection of the alternative for extraction and treatment of the perched water as a non-time-critical removal action was provided to Ecology for review.

Draft A of the Remedial Investigation (RI)/Feasibility Study (FS) and RCRA Facility Investigation (RFI)/Corrective Measures Study (CMS) work plan for the 200-DV-1 OU will be provided to Ecology for review by March 2015 in accordance with TPA (Ecology et al., 1989) Milestone M-015-110A. Additional perched water actions, if needed, will be identified in the 200-DV-1 OU record of decision.

6 Status of Fiscal Year 2013 Recommendations for Additional Activities for the Perched Water Zone Remediation

This section provides the status of the five recommendations included in the FY 2013 annual perched water report for FY 2014 (SGW-53604).

6.1 Continued Perched Water Extraction

Recommendation

Perched water extraction continues around the clock using an automated water-level transducer to trigger the pump on and off as the perched water level increases and decreases due to the pumping cycles. Perched water extraction will continue. The FY 2013 annual perched water report (SGW-53604) recommendations for 2014 included the following:

1. Application of a vacuum of 254 to 280 cm (100 to 110 in.) of water on the perched water extraction well (299-E33-344). The enhanced vacuum system is expected to accelerate recharge into the well, thus increasing the overall removal capacity. The system will be operated for an extended period and comparisons of the system before and after incorporation of the vacuum system will be reported.

2. Installation of more accurate water level and barometric monitoring instrumentation (absolute pressure transducers) in the perched water extraction well.

3. Monthly or quarterly pumping shutdowns for a 24-hour period to collect water-level data. These data, along with other pumping information, will be used to determine perched zone pumping impacts, recovery rates, and water-level declines.

Status

Extraction of the contaminated perched water from Well 299-E33-344 using an automated water-level transducer to trigger the pump on and off continued in FY 2014 to remove the primary source of uranium contamination to the underlying groundwater in the B Complex Area. As of September 30, 2014, approximately 882,000 L (233,000 gal) of contaminated perched water had been removed. Extraction of the contaminated perched water from Well 299-E33-344 using an automated water-level transducer to trigger the pump on and off will be continued in FY 2015.

Six samples were collected from perched water Well 299-E33-344 during FY 2014 (Table 2-1). Two depth-discrete perched water samples were collected from each of the two new perched water wells, 299-E33-350 and 299-E33-351, in FY 2014 (Figure 3-10 and Figure 3-16). Perched water samples will continue to be collected from all three wells during pumping operations to derive the estimated mass of contaminant removed.

The status of the three recommendations for FY 2014 is as follows:

1. Application of a vacuum on the perched water extraction Well 299-E33-344 (phase 2 of the treatability test) was not implemented in FY 2014. Application of a vacuum has been deferred and will be considered during implementation of the non-time-critical removal action in accordance with the Action Memorandum (DOE/RL-2014-34). During 2014, the two new Wells 299-E33-350 and 299-E33-351 were constructed with downhole pressure ports that can be used to monitor applied vacuum.

2. More accurate water level and barometric monitoring instrumentation was not installed in the perched water extraction Well 299-E33-344 in FY 2014. However, this instrumentation was included in the

design of the two new perched water extraction Wells 299-E33-350 and 299-E33-351 constructed in 2014 (SGW-57488).

3. Monthly or quarterly pumping shutdowns to collect water-level data did not occur in FY 2014. These measurements may be implemented in FY 2015.

6.2 Geophysical Logging Evaluation

Recommendation

Geophysical logging was performed in Well 299-E33-18 (located in the perched zone) in October 2012 to evaluate the potential for radiological contamination within the perched water to migrate down the outside of the unsealed well casing to the groundwater. The FY 2013 annual perched water report (SGW-53604) recommended that geophysical logging of key boreholes continue, as necessary, to evaluate the nature and extent of perched contamination in new and existing wells.

Status

Borehole geophysical logging in area wells provided critical data that were used to delineate the perched uranium contamination and define the extent of the saturated perched interval beneath the B Complex (SGW-53604). Borehole geophysical logging was conducted in the two new 200-DV-1 OU perched water wells (299-E33-350 and 299-E33-351) and in the new 200-BP-5 OU groundwater monitoring well (299-E33-360) in FY 2014. The logging results were used to assess and delineate the vertical extent and concentration of uranium contamination within the perched zone in the CCU at these locations (Figures 3-2 and 3-3). In addition, these geophysical borehole data were critical in the evaluation and interpretation of the CCU perched zone stratigraphy and correlation to other boreholes in the area.

Periodic spectral gamma logging profiles have shown changes in uranium concentration and extent in unsealed wells (e.g., Well 299-E33-18), and neutron moisture logging profiles have shown changes in vadose zone moisture content (Appendix A of SGW-53604). These data are being used to evaluate locations and magnitudes of historical subsurface sources contributing uranium and other contaminants to groundwater and to assess the effectiveness of the perched water extraction to reduce migration of contaminated perched water and uranium to groundwater.

Following initiation of perched water extraction from Well 299-E33-344, the concentrations of uranium and technetium-99 increased in groundwater samples from nearby Well 299-E33-18. Well 299-E33-18 was drilled in 1950 and constructed without annular seals. The initiation of perched water pumping may have caused contaminated perched water to migrate to Well 299-E33-18 and then to migrate to the groundwater along a preferential pathway outside the unsealed casing. A borehole camera survey of the inside of the well casing in March 2012 indicated that it was dry. However, the annular space around the outside of the casing is suspected of providing the pathway.

Additional geophysical logging of Well 299-E33-18 was conducted in October 2012 to evaluate and update the uranium contaminant profile in the deep vadose zone at this location. Geophysical logging has been conducted in this well periodically every three to five years since approximately 1992. Plotting the results of the manmade uranium analyses indicates a continued increase in uranium concentrations within the perched zone and in the vadose interval below the perching silt zone and above the water table. The 2012 results revealed that contaminant levels continued to increase both within the perched zone and deeper below the perched zone near the water table (Figure A-23 in Appendix A of SGW-53604). These data indicate that contamination was migrating deeper along the well casing at Well 299-E33-18 than it had previously and probably contributed to the groundwater contamination beneath the perched zone via an annular space preferential pathway.

6.3 Decommissioning and Replacement of Groundwater Well 299-E33-18

Recommendation

Well 299-E33-18 was decommissioned on June 26, 2013. The FY 2013 annual perched water report (SGW-53604) proposed one replacement groundwater monitoring well to provide assessment of groundwater contamination moving beneath the perched zone.

Status

Well 299-E33-360 (C8923) is being installed in 2014 as a replacement groundwater monitoring well for Well 299-E33-18 to provide assessment of groundwater contamination moving beneath the perched zone. Well 299-E33-360 is located approximately 11 m (36 ft) west of perched water extraction Well 299-E33-344; 28 m (93 ft) east of groundwater monitoring Well 299-E33-343; and 7 m (24 ft) from decommissioned groundwater Well 299-E33-18 (Figure 1-2). Sampling of the perched zone was conducted in August 2014 in accordance with SGW-57810. Construction of the groundwater monitoring well will be completed in FY 2015. Available characterization data from this borehole have been incorporated into this report. Results of the analyses of the two depth-discrete sediment samples collected from the perched water zone are anticipated to be available in FY 2015.

6.4 Surface Geophysical Data Evaluation

Recommendation

Surface resistivity data, collected as part of the ongoing B-BX-BY Tank Farm investigation, have been re-evaluated by PNNL. The modeled results provide a significant improvement in electrical resistivity tomography (ERT) image resolution. The FY 2013 annual perched water report (SGW-53604) recommended time-lapse ERT to provide some useful information about vadose contaminant transport pathways.

Status

Existing surface geophysical data, including seismic and resistivity line data collected with ERT technology, are available for the B Complex area. The ERT data, collected as part of the ongoing B-BX-BY Tank Farm investigation, were re-evaluated by PNNL in support of the Deep Vadose Zone Applied Field Research Initiative (PNNL-22520, *Re-inversion of Surface Electrical Resistivity Tomography Data from the Hanford Site B-Complex*), generating an improved model of the subsurface electrical conductivity anomalies beneath the surrounding B Complex waste sites. The modeled results provide a significant improvement in ERT image resolution. However, based on the analysis, the reprocessed ERT data cannot resolve the perched zone; the perched water boundaries are not detected. The best case modeling scenario indicates that further surface ERT characterization will not likely resolve perched water boundaries. However, time-lapse ERT may provide some useful information about vadose contaminant transport pathways resulting from fluid conductivity changes in the perched zone due to continued pumping and changes in water chemistry. Three-dimensional modeling of the subsurface conductivity anomalies is being applied to the hydrogeologic solid model and additional ERT data gathering is proposed to determine if perching boundaries and temporal electrical conductivity changes can be defined. This work is being led by PNNL.

In FY 2014, PNNL conducted a modeling analysis to evaluate the feasibility of using time-lapse ERT for imaging the boundaries of the B-Complex perched water plume during extraction. The analysis suggests that current channeling through near-surface piping in the B-Complex Area limits the capability of ERT to image changes in conductivity at depth resulting from perched water extraction. Based on the results of

the PNNL evaluation, ERT would be difficult to apply effectively for monitoring the perched water extraction without significant additional electrode installation.

To date, no reprocessing of the geophysical seismic profiles has been completed. Initially, short segments of geophysical profiles collected near the B Complex perched water could be reprocessed to determine whether the reprocessed data are able to identify geologic reflectors at the depth of the CCU. If this method is successful, additional segments of geophysical profiles could be reprocessed. Reprocessing would use a depth to basalt (the bedrock base of the unconfined aquifer) typical for the B Complex Area. Check shots would be performed in wells to refine the vertical profile of seismic travel times to support the reprocessing.

The reprocessed geophysical data will be used to delineate the lateral and vertical extents of the CCU_z silt interval and the CCU saturated zone. In addition, the data will be used to optimize the locations for additional perched water wells, if needed.

6.5 Installation of Additional Perched Water Wells for Characterization and Remediation

Recommendation

The FY 2013 annual perched water report (SGW-53604) proposed installation and operation of two new perched zone extraction wells.

Status

Two new perched water extraction wells, 299-E33-350 (C8914) and 299-E33-351 (C8915), were drilled, sampled, and constructed in FY 2014.

The volume of water contained above the perching silt is estimated to be at least 7.6 million L (2 million gal) (PNNL-22499). Based on the volume pumped from the perched zone extraction Well 299-E33-344 between August 2011 and September 2014, approximately 88 percent of the perched volume remains.

Continued perched water removal by pumping will reduce this volume. To accelerate the removal, installation of two additional perched water wells, 299-E33-350 (C8914) and 299-E33-351 (C8915), was completed during FY 2014 (Figure 1-2). These wells allowed additional characterization of the perched water zone at the B Complex Area. Data collected during drilling have improved the understanding of the vertical and lateral extents of the CCU_z silt, which supports better delineation of contaminant sources. These new wells will be used to extract contaminated perched water, accelerating removal of the source of continuing uranium contribution to groundwater, or to monitor perched water during extraction from Well 299-E33-344.

The highest priority well (299-E33-350 [C8914]) is located north of Well 299-E33-344 between the B Tank Farm and the 216-B-8 Crib (Figure 1-2). This location is potentially where the structural low in the CCU is deepest and the sand lens is the thickest. Data collected during drilling at this location supported characterization of the northeastern extent of the sand lens within the CCU_z silt layer and will support evaluation of the 216-B-8 Crib as a source of water and contaminants in the perched zone.

The second well (299-E33-351 [C8915]) is located between Well 299-E33-344 and the BX Tank Farm. This location is potentially in the path followed by the contaminated liquids that were released from Tank 241-BX-102 and accumulated in the CCU sand lens. Data collected during drilling at this location

supported characterization of the northwestern extent of the sand lens within the CCU_z silt layer and will support evaluation of Tank 241-BX-102 as a source of water and contaminants in the perched zone.

Both wells were drilled to (but not through) the CCU lower silt to characterize the CCU perching interval (SGW-57488). Samples of deep vadose zone sediments and perched water were collected during drilling (Appendix A and Appendix B). In addition, perched zone hydraulic tests were completed to determine hydraulic conditions and improve recovery calculations (PNNL-23380). The wells will be used for perched water zone extraction/monitoring in FY 2015.

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Appendix A

Laboratory Report for Analysis of Sediment Core Samples Collected from Well 299-E33-350 (C8914) and Well 299-E33-351 (C8915)

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This appendix provides the analytical data report for sediment samples collected from new perched water extraction Wells 299-E33-350 (C8914) and 299-E33-351 (C8915). The report was prepared by Pacific Northwest National Laboratory for CH2M HILL Plateau Remediation Company. The report contains the following information for samples from these wells:

- Cover Sheet
- Narrative
- Analytical Results
- Quality Control
- Geologic Logs
- Geologic Photographs

The sample depths corresponding to the Hanford Environmental Information System (HEIS) sample numbers in this report are provided on the geologic photographs in this appendix and in Table 3-3 in this report.

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Pacific Northwest
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To: Glen Chronister

From: Michelle Snyder and Kirk Cantrell

Environmental Sciences Laboratory
Energy and Environment Directorate, Pacific Northwest National Laboratory

Subject: Analytical Data Report of Sediment Samples Collected From 200-DV-1 OU Boreholes C8914 and C8915, SAF Number F14-005.

This letter contains the following information for samples from Boreholes C8914 and C8915

- Cover Sheet
- Narrative
- Analytical Results
- Quality Control
- Geologic Logs
- Geologic Photos

Introduction

Between January 30, 2014 and February 24, 2014 sediment samples were received from the 200-DV-1 OU, boreholes C8914 and C8915, for geochemical analyses.

Analytical Results/Methodology

The analyses for this project were performed at the 331 building located in the 300 Area of the Hanford Site. The analyses were performed according to Pacific Northwest National Laboratory (PNNL) approved procedures and/or nationally recognized test procedures. The data sets include the sample identification numbers, analytical results, estimated quantification limits (EQL), and quality control data.

Quality Control

The preparatory and analytical quality control requirements, calibration requirements, acceptance criteria, and failure actions are defined in the on-line QA plan "Conducting Analytical Work in Support of Regulatory Programs" (CAW). This QA plan implements the Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD) for PNNL.

Definitions

Dup	Duplicate
RPD	Relative Percent Difference
NR	No Recovery (percent recovery less than zero)
ND	Non-Detectable
%REC	Percent Recovery

Sample Receipt

Samples were received with a chain of custody (COC) and were analyzed according to the sample identification numbers supplied by the client. All Samples were refrigerated upon receipt until prepared for analysis.

All samples were received with custody seals intact.

Holding Times

Holding time is defined as the time from sample preparation to the time of analyses. The prescribed holding times were met for all analytes.

Analytical Results

All reported analytical results meet the requirements of the CAW or client specified SOW unless otherwise noted.

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PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RLOJ830

The following analyses were performed on the following samples included in this report:

Metals 1:1 DI Water Extract by ICPMS
Alkalinity, Titrimetic (pH 4.5)
Anions By Ion Chromatography
Hexavalent Chromium by Colorimetric Determination
Metals 1:1 Water Extract by ICPOES
Iodine-129 1:1 Water Extract by ICPMS
Moisture Content
pH of Waters By Electrode
Specific Conductance
Tc_U 1:1 DI Water Extract by ICPMS
Particle Size Distribution (Dry Sieve)
Particle Density
Bulk Density
Carbon-14 1:1 Water Extract by LSC
Tritium by Lachat Micro-Distillation
Saturated Hydraulic Conductivity Constant-Head Method

SAMPLES ANALYZED IN THIS REPORT

Sample No.	Laboratory ID	Matrix	Date Collected	Date Received
B2VWR9	1401016-04	SOIL	1/27/14 11:50	1/30/14 10:00
B2VWT3	1401016-07	SOIL	1/27/14 13:45	1/30/14 10:00
B2VWT4	1401016-08	SOIL	1/27/14 13:45	1/30/14 10:00
B2VWT7	1401016-10	SOIL	1/28/14 08:45	1/30/14 10:00
B2VWT8	1401016-11	SOIL	1/28/14 08:45	1/30/14 10:00
B2VWT9	1401016-12	SOIL	1/28/14 08:45	1/30/14 10:00
B2W1N4	1402011-05	SOIL	2/4/14 09:00	2/24/14 14:00
B2W1N5	1402011-09	SOIL	2/4/14 13:55	2/24/14 14:00
B2W1P3	1402011-10	SOIL	2/5/14 10:55	2/24/14 14:00
B2W1P5	1402011-16	SOIL	2/11/14 11:00	2/24/14 14:00
B2W1R4	1402011-20	SOIL	2/18/14 09:35	2/24/14 14:00
B2W1R9	1402011-24	SOIL	2/18/14 13:15	2/24/14 14:00
B2W1T3	1402011-27	SOIL	2/19/14 08:20	2/24/14 14:00
B2W1T4	1402011-28	SOIL	2/19/14 08:20	2/24/14 14:00
B2W1T3	1402011-31	SOIL	2/19/14 10:05	2/24/14 14:00
B2W1T9	1402011-32	SOIL	2/19/14 10:05	2/24/14 14:00

Wet Chemistry

Alkalinity as CaCO3 (ug/g dry) by Standard Methods 2320B

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
1401016-04	B2VWR9	3.02E1	2.36E1	3/19/14	4C19001
1401016-08	B2VWT4	6.73E1	2.63E1	3/19/14	4C19001
1401016-10	B2VWT7	7.07E1	2.50E1	3/19/14	4C19001
1401016-12	B2VWT9	6.54E1	2.56E1	3/19/14	4C19001
1402011-05	B2W1N4	3.04E1	2.36E1	3/19/14	4C19001
1402011-09	B2W1N5	4.13E1	2.36E1	3/19/14	4C19001
1402011-10	B2W1P3	1.17E2	2.37E1	3/19/14	4C19001
1402011-16	B2W1P5	6.26E1	2.36E1	3/19/14	4C19001
1402011-20	B2W1R4	2.90E1	2.35E1	3/19/14	4C19001
1402011-24	B2W1R9	3.05E1	2.35E1	3/19/14	4C19001
1402011-28	B2W1T4	2.05E2	2.58E1	3/19/14	4C19001
1402011-32	B2W1T9	3.42E2	2.53E1	3/19/14	4C19001

Wet Chemistry

Specific Conductance (EC) (mS/cm) by EPA 120.1

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
1401016-04	B2VWR9	1.96E-1	1.00E-2	3/06/14	4C06002
1401016-08	B2VWT4	4.99E-1	1.00E-2	3/06/14	4C06002
1401016-10	B2VWT7	5.98E-1	1.00E-2	3/06/14	4C06002
1401016-12	B2VWT9	1.03E0	1.00E-2	3/06/14	4C06002
1402011-05	B2W1N4	1.72E-1	1.00E-2	3/06/14	4C06002
1402011-09	B2W1N5	2.31E-1	1.00E-2	3/06/14	4C06002
1402011-10	B2W1P3	3.50E-1	1.00E-2	3/06/14	4C06002
1402011-16	B2W1P5	2.19E-1	1.00E-2	3/06/14	4C06002
1402011-20	B2W1R4	7.52E-2	1.00E-2	3/06/14	4C06002
1402011-24	B2W1R9	6.74E-2	1.00E-2	3/06/14	4C06002
1402011-28	B2W1T4	9.30E-1	1.00E-2	3/06/14	4C06002
1402011-32	B2W1T9	1.69E0	1.00E-2	3/06/14	4C06002

Wet Chemistry

Moisture Content (% by Weight) by AGG-WC-001

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
1401016-04	B2VWR9	3.07E0	N/A	3/10/14	4C03001
1401016-08	B2VWT4	3.07E1	N/A	3/10/14	4C03001
1401016-10	B2VWT7	2.06E1	N/A	3/10/14	4C03001
1401016-12	B2VWT9	2.60E1	N/A	3/10/14	4C03001
1402011-05	B2W1N4	4.60E0	N/A	3/10/14	4C03001
1402011-09	B2W1N5	4.25E0	N/A	3/10/14	4C03001
1402011-10	B2W1P3	7.36E0	N/A	3/10/14	4C03001
1402011-16	B2W1P5	4.88E0	N/A	3/10/14	4C03001
1402011-20	B2W1R4	2.59E0	N/A	3/10/14	4C03001
1402011-24	B2W1R9	2.33E0	N/A	3/10/14	4C03001
1402011-28	B2W1T4	2.74E1	N/A	3/10/14	4C03001
1402011-32	B2W1T9	2.34E1	N/A	3/10/14	4C03001

Wet Chemistry

pH (pH Units) by AGG-pH-001

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
1401016-04	B2VWR9	7.75E0	N/A	3/06/14	4C06002
1401016-08	B2VWT4	7.79E0	N/A	3/06/14	4C06002
1401016-10	B2VWT7	7.78E0	N/A	3/06/14	4C06002
1401016-12	B2VWT9	7.65E0	N/A	3/06/14	4C06002
1402011-05	B2W1N4	7.65E0	N/A	3/06/14	4C06002
1402011-09	B2W1N5	7.75E0	N/A	3/06/14	4C06002
1402011-10	B2W1P3	8.84E0	N/A	3/06/14	4C06002
1402011-16	B2W1P5	8.01E0	N/A	3/06/14	4C06002
1402011-20	B2W1R4	7.74E0	N/A	3/06/14	4C06002
1402011-24	B2W1R9	7.63E0	N/A	3/06/14	4C06002
1402011-28	B2W1T4	8.45E0	N/A	3/06/14	4C06002
1402011-32	B2W1T9	8.91E0	N/A	3/06/14	4C06002

Anions by Ion Chromatography

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2VWR9**		**Lab ID:**	**1401016-04**			
16984-48-8	Fluoride	<1.00E0	ug/g dry	1.00E0	3/06/14	4C06001	AGG-IC-001
16887-00-6	Chloride	<2.51E0	ug/g dry	2.51E0	3/06/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.01E0	ug/g dry	5.01E0	3/06/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	<5.01E0	ug/g dry	5.01E0	3/06/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	1.06E1	ug/g dry	7.52E0	3/06/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.52E0	ug/g dry	7.52E0	3/06/14	4C06001	AGG-IC-001
HEIS No.	**B2VWT4**		**Lab ID:**	**1401016-08**			
16984-48-8	Fluoride	<2.79E0	ug/g dry	2.79E0	3/06/14	4C06001	AGG-IC-001
16887-00-6	Chloride	1.55E1	ug/g dry	6.98E0	3/06/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<1.40E1	ug/g dry	1.40E1	3/06/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	4.96E1	ug/g dry	1.40E1	3/06/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	1.18E2	ug/g dry	2.09E1	3/06/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<2.09E1	ug/g dry	2.09E1	3/06/14	4C06001	AGG-IC-001
HEIS No.	**B2VWT7**		**Lab ID:**	**1401016-10**			
16984-48-8	Fluoride	<1.06E0	ug/g dry	1.06E0	3/06/14	4C06001	AGG-IC-001
16887-00-6	Chloride	1.19E1	ug/g dry	2.65E0	3/06/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.31E0	ug/g dry	5.31E0	3/06/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	1.40E2	ug/g dry	5.31E0	3/06/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	9.53E1	ug/g dry	7.96E0	3/06/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.96E0	ug/g dry	7.96E0	3/06/14	4C06001	AGG-IC-001
HEIS No.	**B2VWT9**		**Lab ID:**	**1401016-12**			
16984-48-8	Fluoride	<1.09E0	ug/g dry	1.09E0	3/06/14	4C06001	AGG-IC-001
16887-00-6	Chloride	2.23E1	ug/g dry	2.72E0	3/06/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.45E0	ug/g dry	5.45E0	3/06/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	3.13E2	ug/g dry	5.45E0	3/06/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	1.69E2	ug/g dry	8.17E0	3/06/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<8.17E0	ug/g dry	8.17E0	3/06/14	4C06001	AGG-IC-001
HEIS No.	**B2W1N4**		**Lab ID:**	**1402011-05**			
16984-48-8	Fluoride	<1.00E0	ug/g dry	1.00E0	3/06/14	4C06001	AGG-IC-001
16887-00-6	Chloride	<2.51E0	ug/g dry	2.51E0	3/06/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.02E0	ug/g dry	5.02E0	3/06/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	2.82E1	ug/g dry	5.02E0	3/06/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	1.07E1	ug/g dry	7.52E0	3/06/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.52E0	ug/g dry	7.52E0	3/06/14	4C06001	AGG-IC-001
HEIS No.	**B2W1N5**		**Lab ID:**	**1402011-09**			
16984-48-8	Fluoride	<1.00E0	ug/g dry	1.00E0	3/06/14	4C06001	AGG-IC-001
16887-00-6	Chloride	5.50E0	ug/g dry	2.51E0	3/06/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.02E0	ug/g dry	5.02E0	3/06/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	1.22E1	ug/g dry	5.02E0	3/06/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	4.75E1	ug/g dry	7.52E0	3/06/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.52E0	ug/g dry	7.52E0	3/06/14	4C06001	AGG-IC-001

Anions by Ion Chromatography

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2W1P3**		**Lab ID:**	**1402011-10**			
16984-48-8	Fluoride	<1.01E0	ug/g dry	1.01E0	3/07/14	4C06001	AGG-IC-001
16887-00-6	Chloride	8.70E0	ug/g dry	2.52E0	3/07/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.04E0	ug/g dry	5.04E0	3/07/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	2.17E1	ug/g dry	5.04E0	3/07/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	2.43E1	ug/g dry	7.57E0	3/07/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.57E0	ug/g dry	7.57E0	3/07/14	4C06001	AGG-IC-001
HEIS No.	**B2W1P5**		**Lab ID:**	**1402011-16**			
16984-48-8	Fluoride	<1.00E0	ug/g dry	1.00E0	3/07/14	4C06001	AGG-IC-001
16887-00-6	Chloride	5.93E0	ug/g dry	2.51E0	3/07/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.02E0	ug/g dry	5.02E0	3/07/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	1.09E1	ug/g dry	5.02E0	3/07/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	4.25E1	ug/g dry	7.53E0	3/07/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.53E0	ug/g dry	7.53E0	3/07/14	4C06001	AGG-IC-001
HEIS No.	**B2W1R4**		**Lab ID:**	**1402011-20**			
16984-48-8	Fluoride	<1.00E0	ug/g dry	1.00E0	3/07/14	4C06001	AGG-IC-001
16887-00-6	Chloride	<2.50E0	ug/g dry	2.50E0	3/07/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.00E0	ug/g dry	5.00E0	3/07/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	<5.00E0	ug/g dry	5.00E0	3/07/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	<7.51E0	ug/g dry	7.51E0	3/07/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.51E0	ug/g dry	7.51E0	3/07/14	4C06001	AGG-IC-001
HEIS No.	**B2W1R9**		**Lab ID:**	**1402011-24**			
16984-48-8	Fluoride	<1.00E0	ug/g dry	1.00E0	3/07/14	4C06001	AGG-IC-001
16887-00-6	Chloride	<2.50E0	ug/g dry	2.50E0	3/07/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.00E0	ug/g dry	5.00E0	3/07/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	<5.00E0	ug/g dry	5.00E0	3/07/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	8.56E0	ug/g dry	7.50E0	3/07/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	<7.50E0	ug/g dry	7.50E0	3/07/14	4C06001	AGG-IC-001
HEIS No.	**B2W1T4**		**Lab ID:**	**1402011-28**			
16984-48-8	Fluoride	<1.10E0	ug/g dry	1.10E0	3/07/14	4C06001	AGG-IC-001
16887-00-6	Chloride	1.01E1	ug/g dry	2.74E0	3/07/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.48E0	ug/g dry	5.48E0	3/07/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	1.57E2	ug/g dry	5.48E0	3/07/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	1.20E2	ug/g dry	8.23E0	3/07/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	1.82E1	ug/g dry	8.23E0	3/07/14	4C06001	AGG-IC-001
HEIS No.	**B2W1T9**		**Lab ID:**	**1402011-32**			
16984-48-8	Fluoride	4.47E1	ug/g dry	1.08E0	3/07/14	4C06001	AGG-IC-001
16887-00-6	Chloride	1.58E1	ug/g dry	2.69E0	3/07/14	4C06001	AGG-IC-001
14797-65-0	Nitrite	<5.38E0	ug/g dry	5.38E0	3/07/14	4C06001	AGG-IC-001
14797-55-8	Nitrate	2.96E2	ug/g dry	5.38E0	3/07/14	4C06001	AGG-IC-001
14808-79-8	Sulfate	1.64E2	ug/g dry	8.07E0	3/07/14	4C06001	AGG-IC-001
14265-44-2	Phosphate	1.73E1	ug/g dry	8.07E0	3/07/14	4C06001	AGG-IC-001

Hexavalent Chromium/Soil

Chromium, Hexavalent (ug/g dry) by Colorimetric Determination

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
1401016-04	B2VWR9	<5.09E-1	5.09E-1	3/17/14	4E01001
1401016-08	B2VWT4	<6.50E-1	6.50E-1	3/17/14	4E01001
1401016-10	B2VWT7	<5.97E-1	5.97E-1	3/17/14	4E01001
1401016-12	B2VWT9	<6.24E-1	6.24E-1	3/17/14	4E01001
1402011-05	B2W1N4	<5.34E-1	5.34E-1	3/17/14	4E01001
1402011-09	B2W1N5	<5.12E-1	5.12E-1	3/17/14	4E01001
1402011-10	B2W1P3	<5.35E-1	5.35E-1	3/17/14	4E01001
1402011-16	B2W1P5	<5.23E-1	5.23E-1	3/17/14	4E01001
1402011-20	B2W1R4	<5.16E-1	5.16E-1	3/17/14	4E01001
1402011-24	B2W1R9	<5.04E-1	5.04E-1	3/17/14	4E01001
1402011-28	B2W1T4	<6.33E-1	6.33E-1	3/17/14	4E01001
1402011-32	B2W1T9	6.34E-1	6.10E-1	3/17/14	4E01001

Total Metals by PNNL-AGG-ICP-AES/1:1 Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2VWR9**	**Lab ID:**		**1401016-04**			
7429-90-5	Aluminum	<9.40E-2	ug/g dry	9.40E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.24E-1	ug/g dry	1.24E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	4.66E0	ug/g dry	4.54E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	1.19E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.26E0	ug/g dry	1.29E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.30E0	ug/g dry	4.90E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.26E-2	ug/g dry	6.26E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.70E-2	ug/g dry	9.70E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.34E-1	ug/g dry	1.34E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.80E-2	ug/g dry	9.80E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	9.00E0	ug/g dry	7.99E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2VWT4**	**Lab ID:**		**1401016-08**			
7429-90-5	Aluminum	<1.05E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.38E-1	ug/g dry	1.38E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	4.45E1	ug/g dry	5.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.46E-1	ug/g dry	1.46E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	<1.17E-1	ug/g dry	1.17E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	4.87E0	ug/g dry	1.44E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.30E1	ug/g dry	5.46E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.98E-2	ug/g dry	6.98E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<1.08E-1	ug/g dry	1.08E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.49E-1	ug/g dry	1.49E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	3.45E-1	ug/g dry	1.09E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	3.23E1	ug/g dry	8.91E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2VWT7**	**Lab ID:**		**1401016-10**			
7429-90-5	Aluminum	<9.95E-2	ug/g dry	9.95E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	1.78E1	ug/g dry	4.80E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.39E-1	ug/g dry	1.39E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	<1.11E-1	ug/g dry	1.11E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	6.50E0	ug/g dry	1.37E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	4.71E0	ug/g dry	5.19E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.63E-2	ug/g dry	6.63E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<1.03E-1	ug/g dry	1.03E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.41E-1	ug/g dry	1.41E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<1.04E-1	ug/g dry	1.04E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	9.81E1	ug/g dry	8.46E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2VWT9**	**Lab ID:**		**1401016-12**			
7429-90-5	Aluminum	<1.02E-1	ug/g dry	1.02E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.35E-1	ug/g dry	1.35E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	4.71E1	ug/g dry	4.93E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.43E-1	ug/g dry	1.43E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	<1.14E-1	ug/g dry	1.14E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	8.86E0	ug/g dry	1.41E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.28E1	ug/g dry	5.33E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.81E-2	ug/g dry	6.81E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<1.05E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.45E-1	ug/g dry	1.45E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<1.07E-1	ug/g dry	1.07E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	1.47E2	ug/g dry	8.69E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES

Total Metals by PNNL-AGG-ICP-AES/1:1 Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2W1N4**		**Lab ID:**	**1402011-05**			
7429-90-5	Aluminum	<9.40E-2	ug/g dry	9.40E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.24E-1	ug/g dry	1.24E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	9.17E0	ug/g dry	4.54E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	<1.05E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.87E0	ug/g dry	1.30E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	2.30E0	ug/g dry	4.90E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.27E-2	ug/g dry	6.27E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.70E-2	ug/g dry	9.70E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.34E-1	ug/g dry	1.34E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.81E-2	ug/g dry	9.81E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	9.95E0	ug/g dry	8.00E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2W1N5**		**Lab ID:**	**1402011-09**			
7429-90-5	Aluminum	<9.40E-2	ug/g dry	9.40E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.24E-1	ug/g dry	1.24E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	3.86E0	ug/g dry	4.54E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	<1.05E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	4.65E0	ug/g dry	1.30E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.51E0	ug/g dry	4.90E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.27E-2	ug/g dry	6.27E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.70E-2	ug/g dry	9.70E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.34E-1	ug/g dry	1.34E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.81E-2	ug/g dry	9.81E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	3.69E1	ug/g dry	8.00E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2W1P3**		**Lab ID:**	**1402011-10**			
7429-90-5	Aluminum	5.18E-1	ug/g dry	9.45E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.25E-1	ug/g dry	1.25E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	<4.56E-1	ug/g dry	4.56E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.32E-1	ug/g dry	1.32E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	6.63E-1	ug/g dry	1.06E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	2.11E0	ug/g dry	1.30E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	2.30E-1	ug/g dry	4.93E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.30E-2	ug/g dry	6.30E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.76E-2	ug/g dry	9.76E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.34E-1	ug/g dry	1.34E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.86E-2	ug/g dry	9.86E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	7.64E1	ug/g dry	8.04E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2W1P5**		**Lab ID:**	**1402011-16**			
7429-90-5	Aluminum	2.05E-1	ug/g dry	9.41E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.24E-1	ug/g dry	1.24E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	8.13E-1	ug/g dry	4.54E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	2.01E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.59E0	ug/g dry	1.30E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	2.49E-1	ug/g dry	4.91E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.27E-2	ug/g dry	6.27E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.72E-2	ug/g dry	9.72E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.34E-1	ug/g dry	1.34E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.82E-2	ug/g dry	9.82E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	5.14E1	ug/g dry	8.01E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES

Total Metals by PNNL-AGG-ICP-AES/1:1 Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2W1R4**		**Lab ID:**	**1402011-20**			
7429-90-5	Aluminum	1.62E-1	ug/g dry	9.38E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.24E-1	ug/g dry	1.24E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	4.05E0	ug/g dry	4.53E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	2.06E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.27E0	ug/g dry	1.29E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.09E0	ug/g dry	4.89E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.25E-2	ug/g dry	6.25E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.68E-2	ug/g dry	9.68E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.33E-1	ug/g dry	1.33E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.78E-2	ug/g dry	9.78E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	7.40E0	ug/g dry	7.98E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2W1R9**		**Lab ID:**	**1402011-24**			
7429-90-5	Aluminum	1.20E-1	ug/g dry	9.38E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.24E-1	ug/g dry	1.24E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	4.46E0	ug/g dry	4.53E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.31E-1	ug/g dry	1.31E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	1.68E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.41E0	ug/g dry	1.29E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.22E0	ug/g dry	4.89E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.25E-2	ug/g dry	6.25E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<9.68E-2	ug/g dry	9.68E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.33E-1	ug/g dry	1.33E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	<9.78E-2	ug/g dry	9.78E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	7.82E0	ug/g dry	7.98E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2W1T4**		**Lab ID:**	**1402011-28**			
7429-90-5	Aluminum	<1.03E-1	ug/g dry	1.03E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.36E-1	ug/g dry	1.36E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	3.04E0	ug/g dry	4.96E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.43E-1	ug/g dry	1.43E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	<1.15E-1	ug/g dry	1.15E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	4.60E0	ug/g dry	1.42E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.83E0	ug/g dry	5.36E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.85E-2	ug/g dry	6.85E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<1.06E-1	ug/g dry	1.06E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.46E-1	ug/g dry	1.46E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	1.45E-1	ug/g dry	1.07E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	1.96E2	ug/g dry	8.74E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
HEIS No.	**B2W1T9**		**Lab ID:**	**1402011-32**			
7429-90-5	Aluminum	3.90E0	ug/g dry	1.01E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-39-3	Barium	<1.33E-1	ug/g dry	1.33E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-70-2	Calcium	1.65E0	ug/g dry	4.86E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-48-4	Cobalt	<1.41E-1	ug/g dry	1.41E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-89-6	Iron	2.19E0	ug/g dry	1.13E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.15E0	ug/g dry	1.39E0	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	8.29E-1	ug/g dry	5.26E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7439-96-5	Manganese	<6.72E-2	ug/g dry	6.72E-2	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-02-0	Nickel	<1.04E-1	ug/g dry	1.04E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-62-2	Vanadium	<1.43E-1	ug/g dry	1.43E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-66-6	Zinc	1.51E-1	ug/g dry	1.05E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	3.89E2	ug/g dry	8.57E-1	3/11/14	4C11001	PNNL-AGG-ICP-AES

Radionuclides by ICP-MS/1:1 Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2VWR9**		**Lab ID:**	**1401016-04**			
14133-76-7	Technetium-99	<3.91E-5	ug/g dry	3.91E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	<8.02E-5	ug/g dry	8.02E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2VWT4**		**Lab ID:**	**1401016-08**			
14133-76-7	Technetium-99	<4.36E-5	ug/g dry	4.36E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	<8.94E-5	ug/g dry	8.94E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2VWT7**		**Lab ID:**	**1401016-10**			
14133-76-7	Technetium-99	1.62E-4	ug/g dry	4.14E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	5.77E0	ug/g dry	8.49E-2	3/12/14	4C12001	PNNL-AGG-415
HEIS No.	**B2VWT9**		**Lab ID:**	**1401016-12**			
14133-76-7	Technetium-99	3.05E-4	ug/g dry	4.25E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	6.34E0	ug/g dry	8.72E-2	3/12/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1N4**		**Lab ID:**	**1402011-05**			
14133-76-7	Technetium-99	<3.91E-5	ug/g dry	3.91E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	<8.03E-5	ug/g dry	8.03E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1N5**		**Lab ID:**	**1402011-09**			
14133-76-7	Technetium-99	<3.91E-5	ug/g dry	3.91E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	2.13E-4	ug/g dry	8.03E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1P3**		**Lab ID:**	**1402011-10**			
14133-76-7	Technetium-99	<3.93E-5	ug/g dry	3.93E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	4.33E-3	ug/g dry	8.07E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1P5**		**Lab ID:**	**1402011-16**			
14133-76-7	Technetium-99	<3.92E-5	ug/g dry	3.92E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	6.00E-4	ug/g dry	8.04E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1R4**		**Lab ID:**	**1402011-20**			
14133-76-7	Technetium-99	<3.90E-5	ug/g dry	3.90E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	<8.01E-5	ug/g dry	8.01E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1R9**		**Lab ID:**	**1402011-24**			
14133-76-7	Technetium-99	<3.90E-5	ug/g dry	3.90E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	<8.01E-5	ug/g dry	8.01E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1T4**		**Lab ID:**	**1402011-28**			
14133-76-7	Technetium-99	<4.28E-5	ug/g dry	4.28E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	1.86E-3	ug/g dry	8.77E-5	3/27/14	4C12001	PNNL-AGG-415
HEIS No.	**B2W1T9**		**Lab ID:**	**1402011-32**			
14133-76-7	Technetium-99	<4.19E-5	ug/g dry	4.19E-5	3/27/14	4C12001	PNNL-AGG-415
U-238	Uranium 238	1.07E-2	ug/g dry	8.60E-5	3/27/14	4C12001	PNNL-AGG-415

Radionuclides by ICPMS/1:1 Water Extract

Uranium isotopes (ratios) by ICPMS

Lab ID	HEIS No.	233/238	234/238	235/238
1402011-9	B2W1N5	1.88E-04	1.19E-04	6.87E-03
1402011-10	B2W1P3	1.40E-05	5.80E-05	8.15E-03
1402011-16	B2W1P5	4.20E-05	1.03E-04	7.14E-03
1402011-28	B2W1T4	5.60E-05	7.60E-05	7.10E-03
1402011-32	B2W1T9	2.00E-05	7.20E-05	7.16E-03
1401016-10	B2VWT7	3.70E-05	5.70E-05	6.79E-03
1401016-12	B2VWT9	4.80E-05	6.80E-05	6.52E-03

Carbon-14 By Liquid Scintillation/1:1 Water Extract

Carbon-14 by Liquid Scintillation

Lab ID	HEIS No.	C-14	Units
1401016-04	B2VWR9	ND	pCi/g
1401016-08	B2VWT4	ND	pCi/g
1401016-10	B2VWT7	3.67E+00	pCi/g
1401016-12	B2VWT9	4.67E+00	pCi/g
1402011-05	B2W1N4	ND	pCi/g
1402011-09	B2W1N5	ND	pCi/g
1402011-10	B2W1P3	ND	pCi/g
1402011-16	B2W1P5	ND	pCi/g
1402011-20	B2W1R4	ND	pCi/g
1402011-24	B2W1R9	ND	pCi/g
1402011-28	B2W1T4	ND	pCi/g
1402011-32	B2W1T9	ND	pCi/g

Tritium By Liquid Scintillation/1:1 Water Extract

Tritium by Liquid Scintillation

Lab ID	HEIS No.	Tritium	Units
1401016-04	B2VWR9	ND	pCi/g
1401016-08	B2VWT4	ND	pCi/g
1401016-10	B2VWT7	ND	pCi/g
1401016-12	B2VWT9	ND	pCi/g
1402011-05	B2W1N4	ND	pCi/g
1402011-09	B2W1N5	ND	pCi/g
1402011-10	B2W1P3	ND	pCi/g
1402011-16	B2W1P5	ND	pCi/g
1402011-20	B2W1R4	ND	pCi/g
1402011-24	B2W1R9	ND	pCi/g
1402011-28	B2W1T4	ND	pCi/g
1402011-32	B2W1T9	ND	pCi/g

RCRA Metals By PNNL-AGG-415/1:1 Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2VWR9**		**Lab ID:**	**1401016-04**			
14092-98-9	Chromium	<6.91E-3	ug/g dry	6.91E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.04E-2	ug/g dry	2.04E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	<5.69E-3	ug/g dry	5.69E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.27E-3	ug/g dry	6.27E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.15E-3	ug/g dry	1.15E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2VWT4**		**Lab ID:**	**1401016-08**			
14092-98-9	Chromium	<7.70E-3	ug/g dry	7.70E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.27E-2	ug/g dry	2.27E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	<6.34E-3	ug/g dry	6.34E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.99E-3	ug/g dry	6.99E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.28E-3	ug/g dry	1.28E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.47E-3	ug/g dry	1.47E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2VWT7**		**Lab ID:**	**1401016-10**			
14092-98-9	Chromium	<7.31E-3	ug/g dry	7.31E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.16E-2	ug/g dry	2.16E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	8.09E-3	ug/g dry	6.02E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.64E-3	ug/g dry	6.64E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.22E-3	ug/g dry	1.22E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.40E-3	ug/g dry	1.40E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2VWT9**		**Lab ID:**	**1401016-12**			
14092-98-9	Chromium	<7.51E-3	ug/g dry	7.51E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.21E-2	ug/g dry	2.21E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	<6.18E-3	ug/g dry	6.18E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.82E-3	ug/g dry	6.82E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.25E-3	ug/g dry	1.25E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.44E-3	ug/g dry	1.44E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1N4**		**Lab ID:**	**1402011-05**			
14092-98-9	Chromium	<6.91E-3	ug/g dry	6.91E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.04E-2	ug/g dry	2.04E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	6.95E-3	ug/g dry	5.69E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.28E-3	ug/g dry	6.28E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.15E-3	ug/g dry	1.15E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.32E-3	ug/g dry	1.32E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1N5**		**Lab ID:**	**1402011-09**			
14092-98-9	Chromium	<6.91E-3	ug/g dry	6.91E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.04E-2	ug/g dry	2.04E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	8.44E-3	ug/g dry	5.69E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.27E-3	ug/g dry	6.27E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.15E-3	ug/g dry	1.15E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.32E-3	ug/g dry	1.32E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1P3**		**Lab ID:**	**1402011-10**			
14092-98-9	Chromium	<6.95E-3	ug/g dry	6.95E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.05E-2	ug/g dry	2.05E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	6.43E-2	ug/g dry	5.72E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.31E-3	ug/g dry	6.31E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.16E-3	ug/g dry	1.16E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	1.51E-3	ug/g dry	1.33E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1P5**		**Lab ID:**	**1402011-16**			
14092-98-9	Chromium	<6.92E-3	ug/g dry	6.92E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.04E-2	ug/g dry	2.04E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	1.33E-2	ug/g dry	5.70E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.28E-3	ug/g dry	6.28E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.15E-3	ug/g dry	1.15E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.32E-3	ug/g dry	1.32E-3	3/11/14	4C11002	PNNL-AGG-415

RCRA Metals By PNNL-AGG-415/1:1 Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B2W1R4**		**Lab ID:**	**1402011-20**			
14092-98-9	Chromium	<6.89E-3	ug/g dry	6.89E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.03E-2	ug/g dry	2.03E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	<5.68E-3	ug/g dry	5.68E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.26E-3	ug/g dry	6.26E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.15E-3	ug/g dry	1.15E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.32E-3	ug/g dry	1.32E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1R9**		**Lab ID:**	**1402011-24**			
14092-98-9	Chromium	<6.89E-3	ug/g dry	6.89E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.03E-2	ug/g dry	2.03E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	5.69E-3	ug/g dry	5.68E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.26E-3	ug/g dry	6.26E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.15E-3	ug/g dry	1.15E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.32E-3	ug/g dry	1.32E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1T4**		**Lab ID:**	**1402011-28**			
14092-98-9	Chromium	4.54E-2	ug/g dry	7.56E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.23E-2	ug/g dry	2.23E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	4.91E-2	ug/g dry	6.22E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.86E-3	ug/g dry	6.86E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.26E-3	ug/g dry	1.26E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	<1.44E-3	ug/g dry	1.44E-3	3/11/14	4C11002	PNNL-AGG-415
HEIS No.	**B2W1T9**		**Lab ID:**	**1402011-32**			
14092-98-9	Chromium	8.61E-2	ug/g dry	7.41E-3	3/11/14	4C11002	PNNL-AGG-415
14191-84-5	Copper	<2.18E-2	ug/g dry	2.18E-2	3/11/14	4C11002	PNNL-AGG-415
7440-38-2	Arsenic	7.56E-2	ug/g dry	6.10E-3	3/11/14	4C11002	PNNL-AGG-415
14378-37-1	Silver	<6.73E-3	ug/g dry	6.73E-3	3/11/14	4C11002	PNNL-AGG-415
14336-64-2	Cadmium	<1.23E-3	ug/g dry	1.23E-3	3/11/14	4C11002	PNNL-AGG-415
14265-72-6	Antimony	< 1.42E-3	ug/g dry	1.42E-3	3/11/14	4C11002	PNNL-AGG-415

Radionuclides by ICP-MS/1:1 Water Extract

Lab ID	HEIS No.	Analyte	Results	Units	EQL	Method
1402011-28	B2W1T4	Iodine-129	<1.22E-2	ug/g dry	1.22E-2	PNNL-AGG-415
1402011-20	B2W1R4	Iodine-129	<1.12E-2	ug/g dry	1.12E-2	PNNL-AGG-415
1402011-24	B2W1R9	Iodine-129	<1.12E-2	ug/g dry	1.12E-2	PNNL-AGG-415
1401016-04	B2VWR9	Iodine-129	<1.12E-2	ug/g dry	1.12E-2	PNNL-AGG-415
1402011-05	B2W1N4	Iodine-129	<1.12E-2	ug/g dry	1.12E-2	PNNL-AGG-415
1402011-16	B2W1P5	Iodine-129	<1.12E-2	ug/g dry	1.12E-2	PNNL-AGG-415
1401016-10	B2VWT7	Iodine-129	<1.18E-2	ug/g dry	1.18E-2	PNNL-AGG-415
1402011-32	B2W1T9	Iodine-129	<1.20E-2	ug/g dry	1.20E-2	PNNL-AGG-415
1401016-08	B2VWT4	Iodine-129	<1.25E-2	ug/g dry	1.25E-2	PNNL-AGG-415
1401016-12	B2VWT9	Iodine-129	<1.22E-2	ug/g dry	1.22E-2	PNNL-AGG-415
1402011-09	B2W1N5	Iodine-129	<1.12E-2	ug/g dry	1.12E-2	PNNL-AGG-415
1402011-10	B2W1P3	Iodine-129	<1.13E-2	ug/g dry	1.13E-2	PNNL-AGG-415

Bulk Density

Lab ID	HEIS No.	bulk density	Units
1402011-05	B2W1N4	1.42	g/cm3 dry sediment
1402011-09	B2W1N5	1.66	g/cm3 dry sediment
1402011-10	B2W1P3	1.59	g/cm3 dry sediment
1402011-16	B2W1P5	1.71	g/cm3 dry sediment
1402011-20	B2W1R4	1.65	g/cm3 dry sediment
1402011-24	B2W1R9	1.60	g/cm3 dry sediment
1402011-27	BTW1T3	1.71	g/cm3 wet sediment
1402011-28	B2W1T4	1.20	g/cm3 dry sediment
1402011-31	B2W1T8	1.88	g/cm3 wet sediment
1402011-32	B2W1T9	1.25	g/cm3 dry sediment
1401016-04	B2VWR9	1.55	g/cm3 dry sediment
1401016-07	B2VWT3	1.98	g/cm3 wet sediment
1401016-08	B2VWT4	1.11	g/cm3 dry sediment
1401016-10	B2VWT7	1.63	g/cm3 dry sediment
1401016-11	B2VWT8	2.02	g/cm3 wet sediment
1401016-12	B2VWT9	1.22	g/cm3 dry sediment

Particle Density

Lab ID	HEIS No.	results	units
1402011-05	B2W1N4	2.67	g/cm3
1402011-09	B2W1N5	2.71	g/cm3
1402011-10	B2W1P3	2.71	g/cm3
1402011-16	B2W1P5	2.70	g/cm3
1402011-20	B2W1R4	2.74	g/cm3
1402011-24	B2W1R9	2.68	g/cm3
1402011-28	B2W1T4	2.68	g/cm3
1402011-32	B2W1T9	2.71	g/cm3
1401016-04	B2VWR9	2.78	g/cm3
1401016-08	B2VWT4	2.69	g/cm3
1401016-10	B2VWT7	2.68	g/cm3
1401016-12	B2VWT9	2.60	g/cm3

Particle Size Distribution (Dry Sieve)

HEIS No. B2W1N4 **Lab ID: 1402011-05**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	9.98E+01	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	9.88E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	8.89E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	4.24E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	1.04E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	5.43E+00	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	2.13E+00	% Passing	N/A	ASTM D422-63

HEIS No. B2W1N5 **Lab ID: 1402011-09**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	9.96E+01	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	9.54E+01	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	8.40E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	3.99E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	9.88E+00	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	3.88E+00	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	2.32E+00	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	1.14E+00	% Passing	N/A	ASTM D422-63

HEIS No. B2W1P3 **Lab ID: 1402011-10**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	9.95E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	9.70E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	9.39E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	9.20E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	7.72E+01	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	1.95E+01	% Passing	N/A	ASTM D422-63

Particle Size Distribution (Dry Sieve)

HEIS No. B2W1P5 **Lab ID: 1402011-16**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	9.91E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	8.26E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	4.12E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	1.57E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	7.98E+00	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	3.46E+00	% Passing	N/A	ASTM D422-63

HEIS No. B2W1R4 **Lab ID: 1402011-20**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	9.39E+01	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	8.57E+01	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	6.22E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	3.06E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	1.62E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	8.82E+00	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	5.92E+00	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	2.81E+00	% Passing	N/A	ASTM D422-63

HEIS No. B2W1R9 **Lab ID: 1402011-24**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	9.62E+01	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	8.92E+01	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	6.74E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	3.94E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	2.02E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	9.66E+00	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	4.68E+00	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	2.68E+00	% Passing	N/A	ASTM D422-63

Particle Size Distribution (Dry Sieve)

HEIS No. B2W1T4 **Lab ID: 1402011-28**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	9.98E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	9.97E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	9.97E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	9.96E+01	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	9.34E+01	% Passing	N/A	ASTM D422-63

HEIS No. B2W1T9 **Lab ID: 1402011-32**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	9.98E+01	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	8.72E+01	% Passing	N/A	ASTM D422-63

HEIS No. B2VWR9 **1401016-04**

CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	9.83E+01	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	8.87E+01	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	5.74E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	2.91E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	1.60E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	9.17E+00	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	5.25E+00	% Passing	N/A	ASTM D422-63

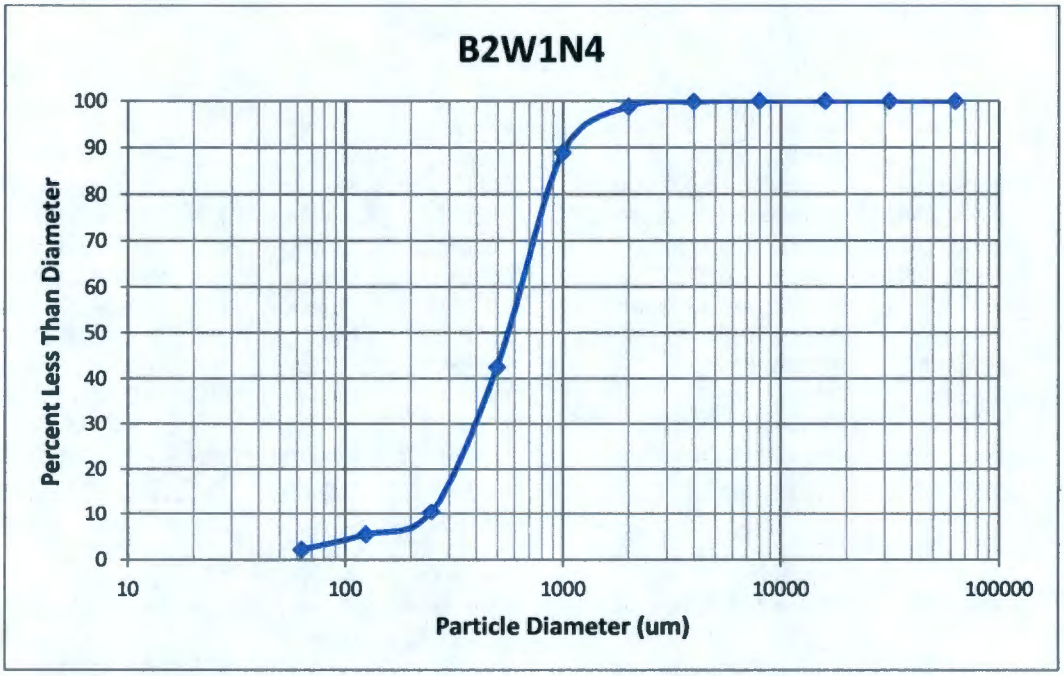
Particle Size Distribution (Dry Sieve)

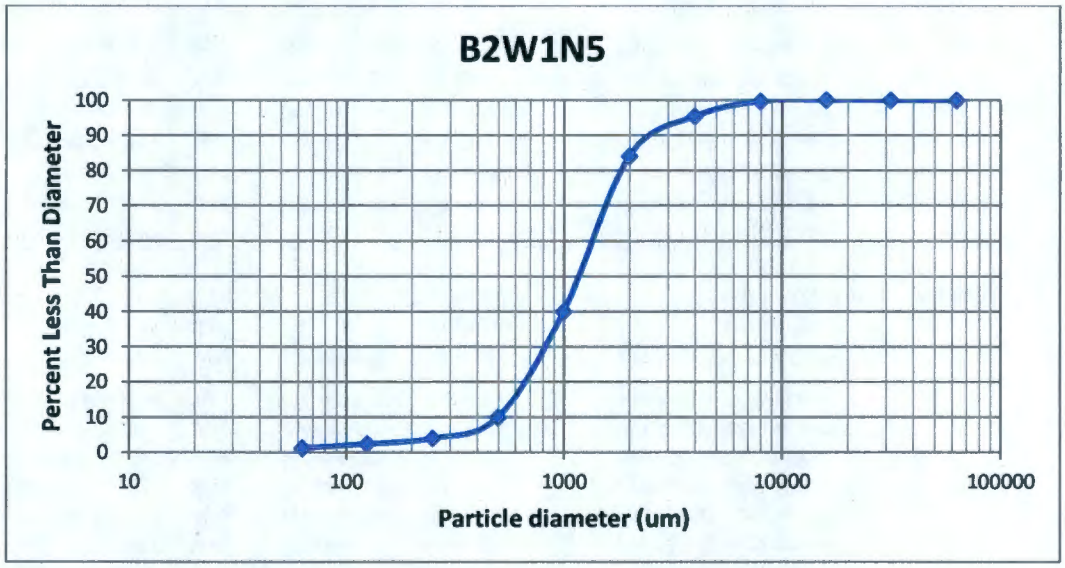
HEIS No.	B2VWT4	1401016-08			
CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	9.98E+01	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	9.97E+01	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	9.97E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	9.96E+01	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	9.34E+01	% Passing	N/A	ASTM D422-63

HEIS No.	B2VWT7	1401016-10			
CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	9.99E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	8.06E+01	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	3.02E+01	% Passing	N/A	ASTM D422-63

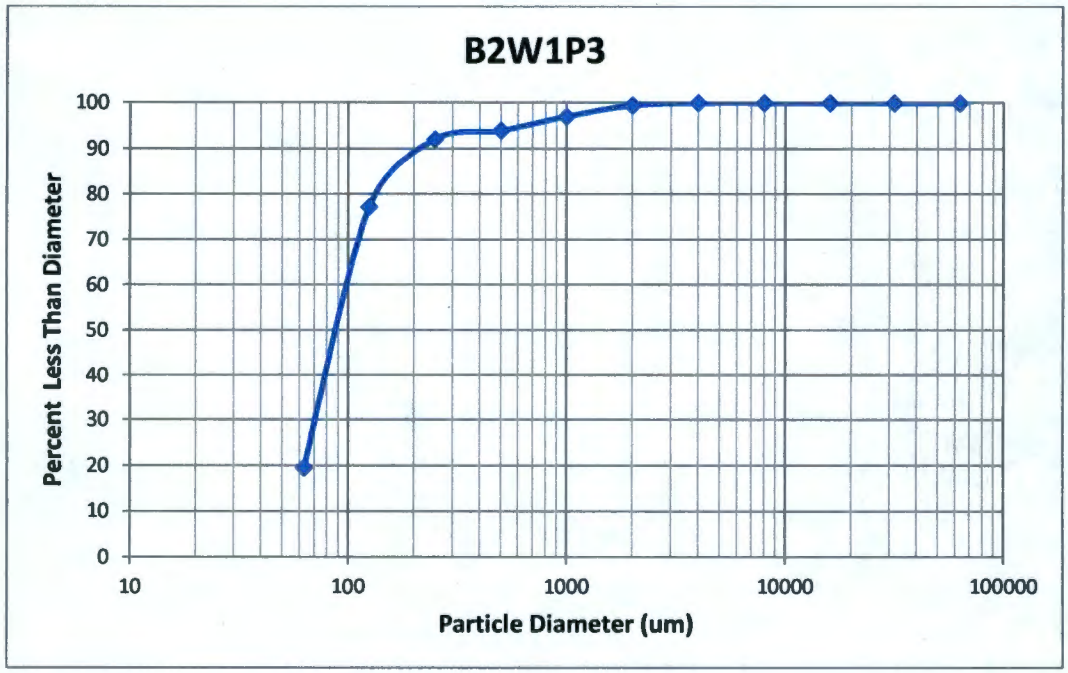
HEIS No.	B2VWT9	1401016-12			
CAS #	Analyte	Results	Units	EQL	Method
PAS2.5IN	Particle Size 63000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS1.25IN	Particle Size31500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/8IN	Particle Size 16000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS5/16IN	Particle Size 8000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#5	Particle Size 4000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#10	Particle Size 2000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#18	Particle Size 1000 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#35	Particle Size 500 uM	1.00E+02	% Passing	N/A	ASTM D422-63
PAS#60	Particle Size 250 uM	9.99E+01	% Passing	N/A	ASTM D422-63
PAS#120	Particle Size 125 uM	8.34E+01	% Passing	N/A	ASTM D422-63
PAS#230	Particle Size 63 uM	3.05E+01	% Passing	N/A	ASTM D422-63

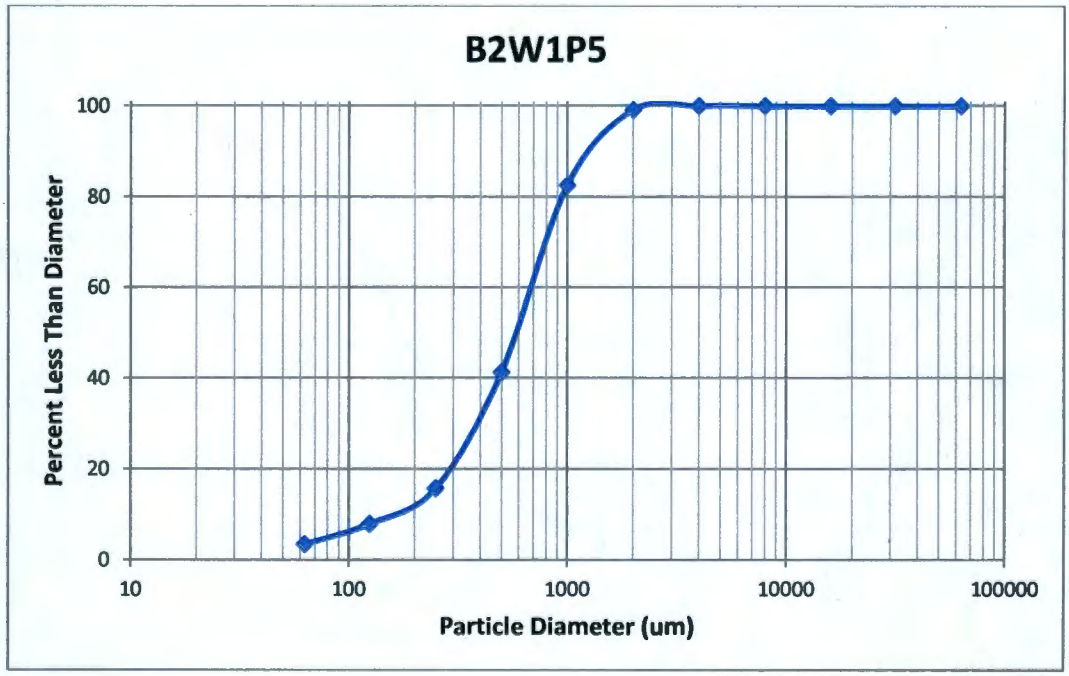
Particle Size Distribution (Dry Sieve)



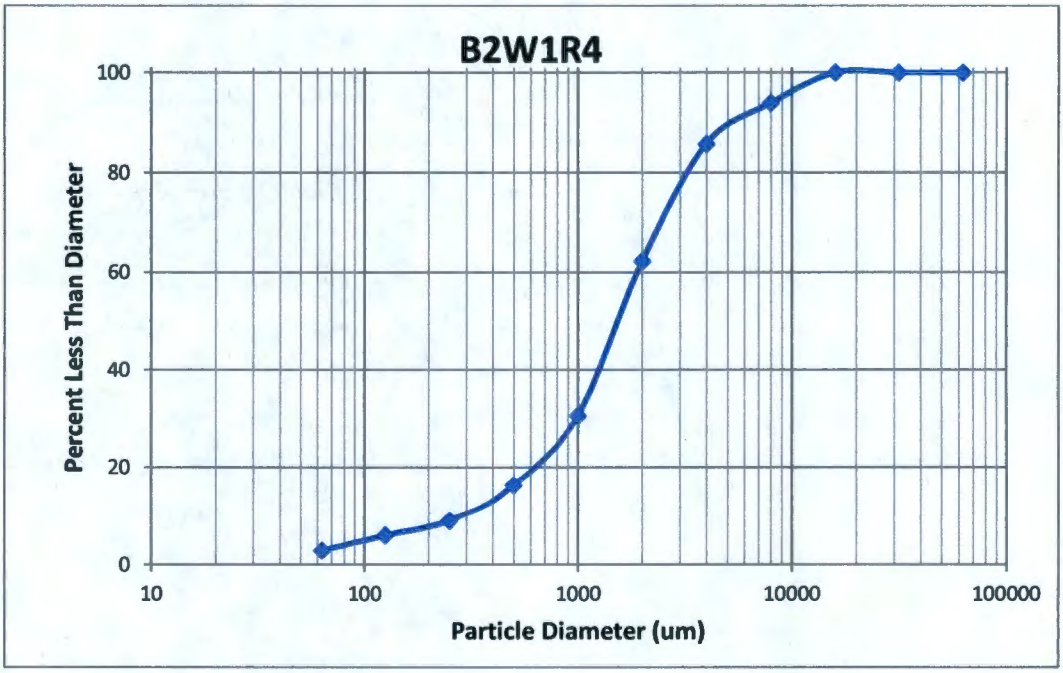


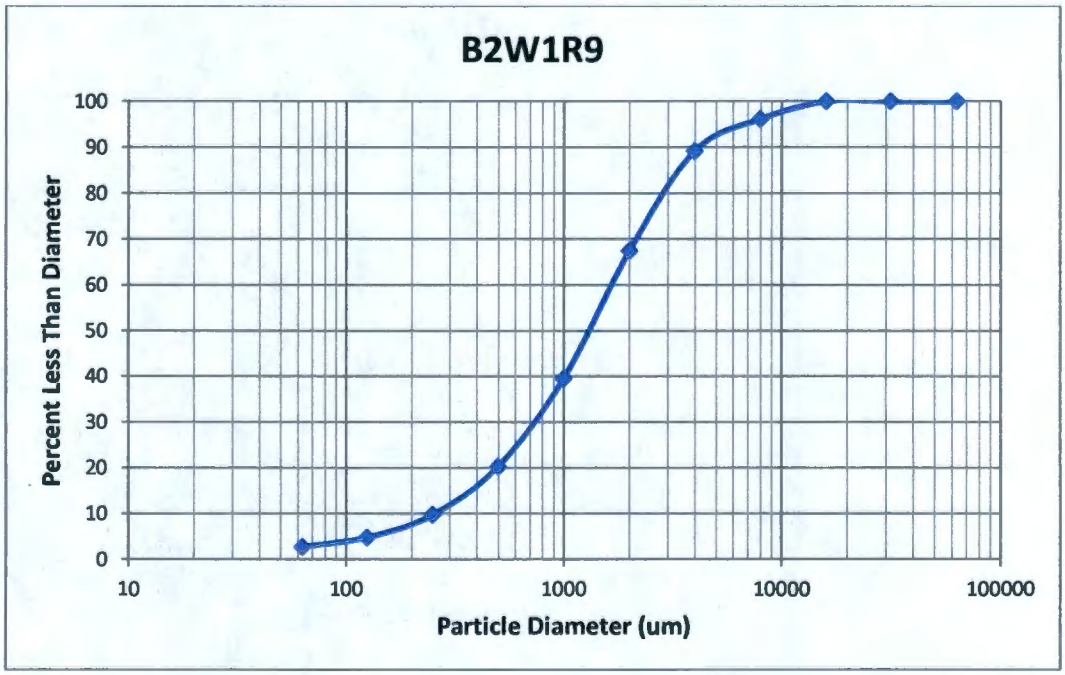
Particle Size Distribution (Dry Sieve)



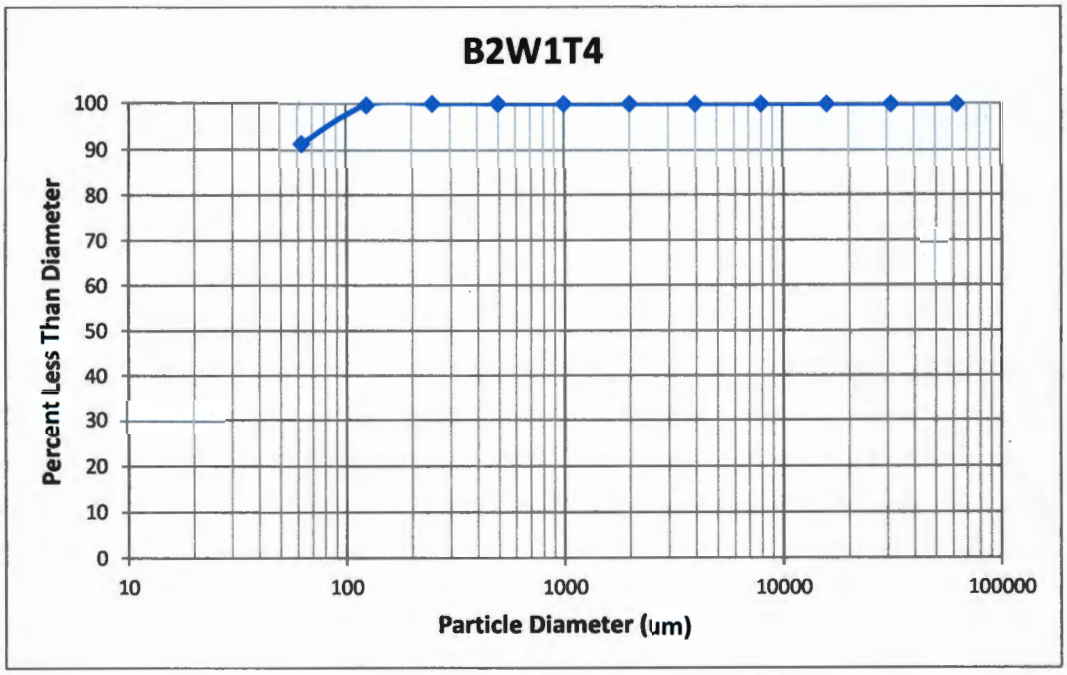


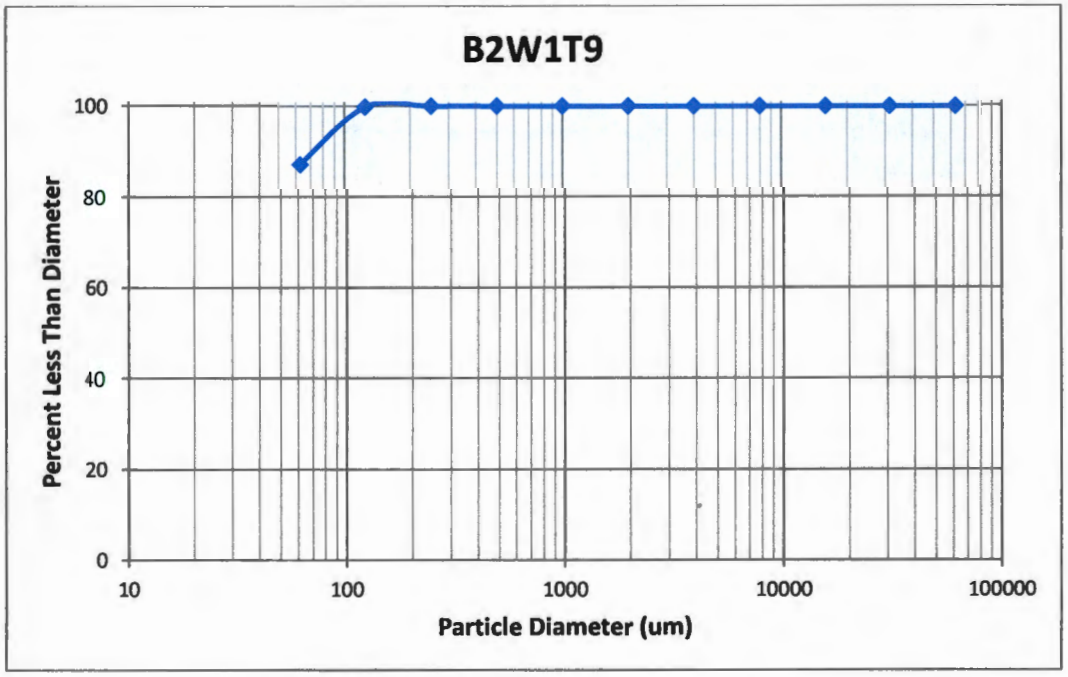
Particle Size Distribution (Dry Sieve)



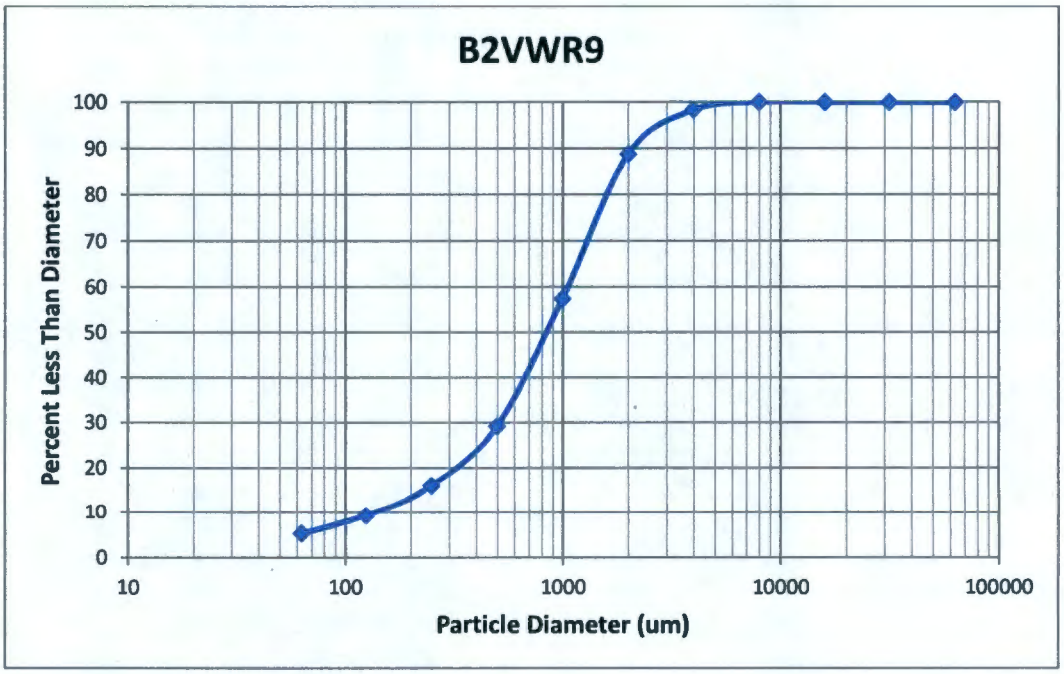


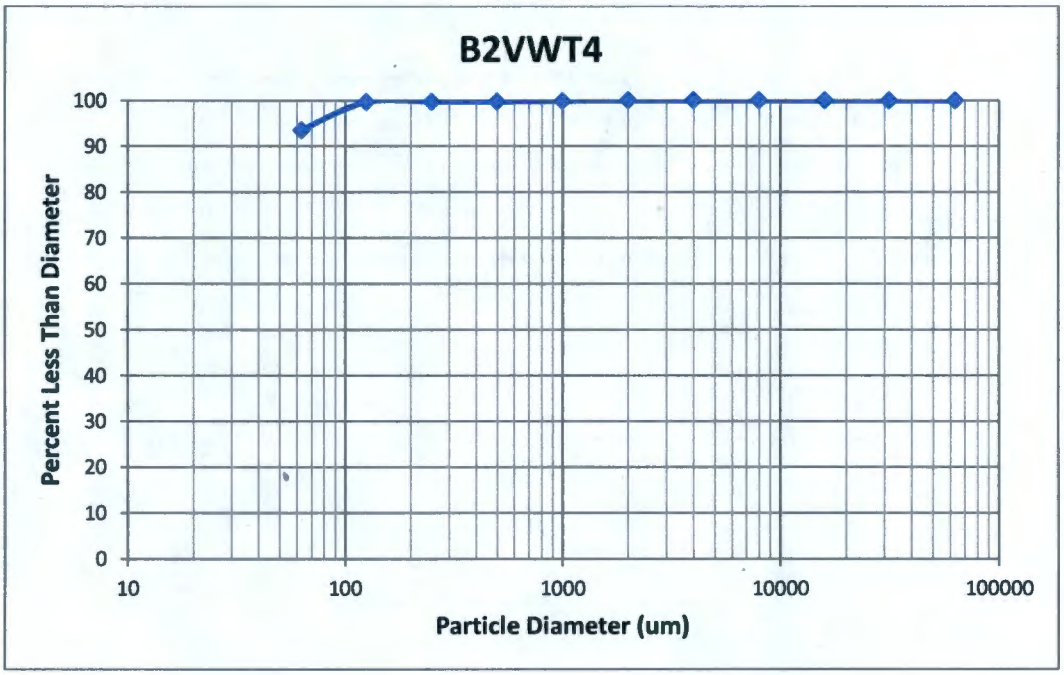
Particle Size Distribution (Dry Sieve)



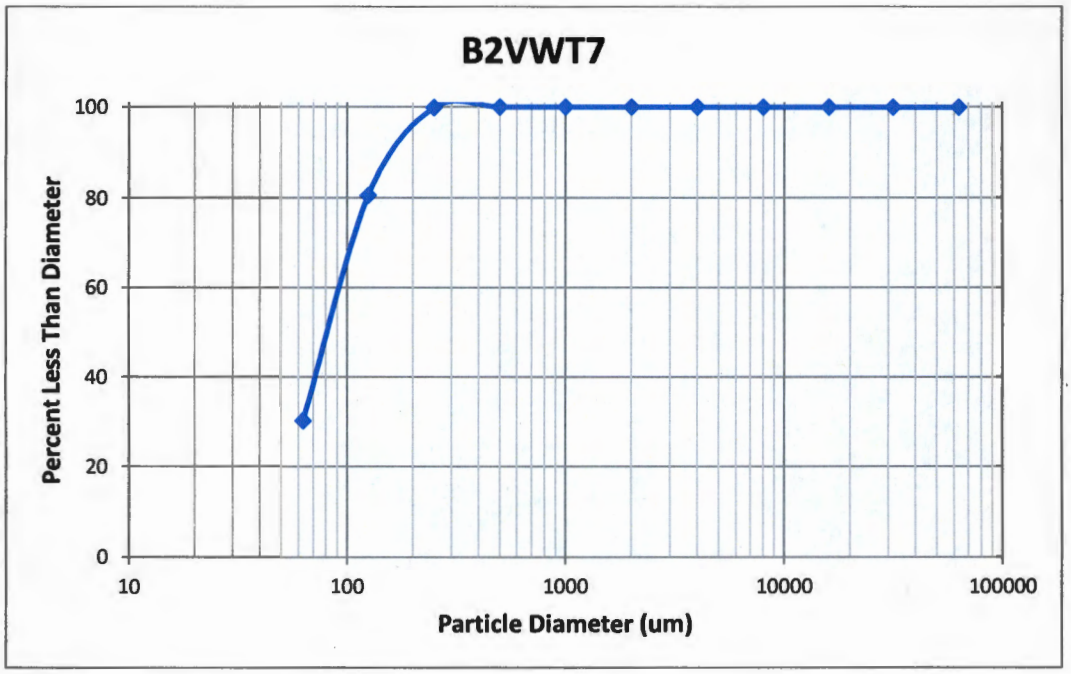


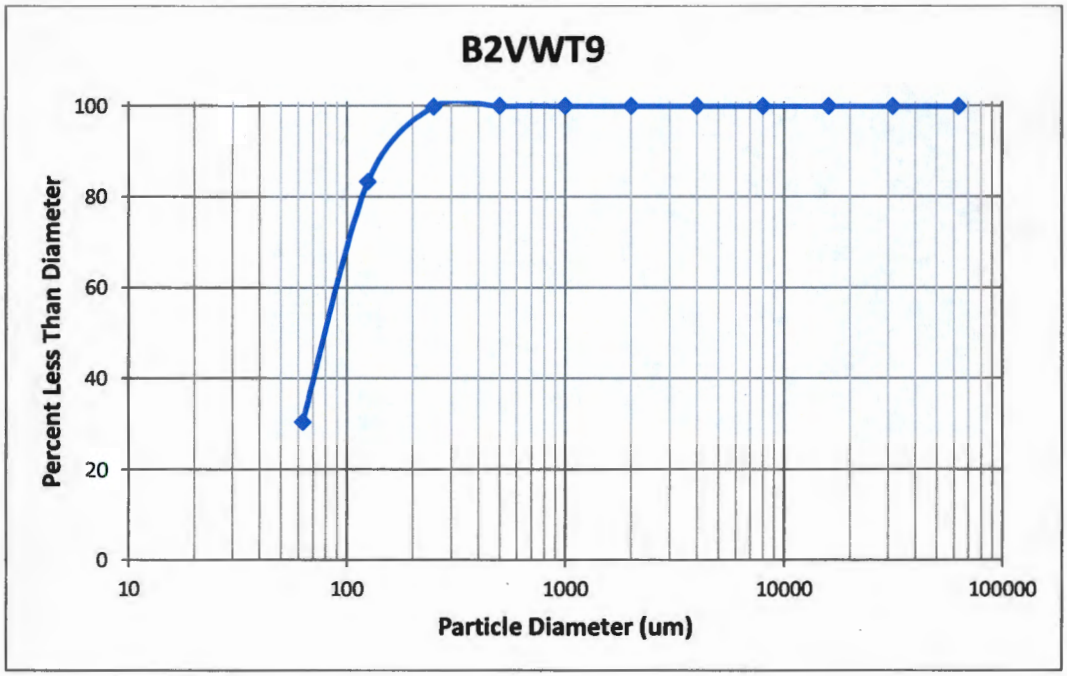
Particle Size Distribution (Dry Sieve)





Particle Size Distribution (Dry Sieve)





Saturated Hydraulic Conductivity Constant-Head Method

Lab ID	HEIS No.	Results	Units
1402011-27	B2W1T3	1.48E-07	cm/s
1402011-31	B2W1T8	2.54E-06	cm/s
1401016-07	B2VWT3	3.94E-07	cm/s
1401016-11	B2VWT8	1.58E-04	cm/s

Wet Chemistry - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4C06002 - 1:1 Water Extract (pH_EC_Alk)										
Blank (4C06002-BLK1)				Prepared & Analyzed: 03/06/14						
Specific Conductance (EC)	<1.00E-2	1.00E-2	mS/cm							
pH	5.78E0	N/A	pH Units							
Blank (4C06002-BLK2)				Prepared & Analyzed: 03/06/14						
pH	5.42E0	N/A	pH Units							
Specific Conductance (EC)	<1.00E-2	1.00E-2	mS/cm							
Duplicate (4C06002-DUP1)		**Source: 1402011-10**		Prepared & Analyzed: 03/06/14						
pH	8.89E0	N/A	pH Units		8.84E0			0.564	35	
Specific Conductance (EC)	3.46E-1	1.00E-2	mS/cm		3.50E-1			1.26	35	
Duplicate (4C06002-DUP2)		**Source: 1402011-28**		Prepared & Analyzed: 03/06/14						
Specific Conductance (EC)	9.13E-1	1.00E-2	mS/cm		9.30E-1			1.84	35	
pH	8.41E0	N/A	pH Units		8.45E0			0.474	35	
Batch 4C19001 - 1:1 Water Extract (pH_EC_Alk)										
Blank (4C19001-BLK1)				Prepared & Analyzed: 03/19/14						
Alkalinity as CaCO3	<2.35E1	2.35E1[a]	ug/g wet							
Blank (4C19001-BLK2)	Prepared & Analyzed: 03/19/14									
Alkalinity as CaCO3	<2.35E1	2.35E1	ug/g wet							
Duplicate (4C19001-DUP1)		**Source: 1402011-10**		Prepared & Analyzed: 03/19/14						
Alkalinity as CaCO3	1.09E2	2.37E1	ug/g dry		1.17E2			7.04	35	
Duplicate (4C19001-DUP2)		**Source: 1402011-28**		Prepared & Analyzed: 03/19/14						
Alkalinity as CaCO3	2.12E2	2.58E1	ug/g dry		2.05E2			3.28	35	

Anions by Ion Chromatography - Quality Control
Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4C06001 - 1:1 Water Extract (IC)										
Blank (4C06001-BLK1)				Prepared: 03/05/14		Analyzed: 03/06/14				
Fluoride	<1.00E0	1.00E0	ug/g wet							
Chloride	<2.50E0	2.50E0	"							
Nitrite	<5.00E0	5.00E0	"							
Nitrate	<5.00E0	5.00E0	"							
Sulfate	<7.50E0	7.50E0	"							
Phosphate	<7.50E0	7.50E0	"							
Blank (4C06001-BLK2)				Prepared: 03/05/14		Analyzed: 03/06/14				
Fluoride	<1.00E0	1.00E0	ug/g wet							
Chloride	<2.50E0	2.50E0	"							
Nitrite	<5.00E0	5.00E0	"							
Nitrate	<5.00E0	5.00E0	"							
Sulfate	<7.50E0	7.50E0	"							
Phosphate	<7.50E0	7.50E0	"							
LCS (4C06001-BS1)				Prepared: 03/05/14		Analyzed: 03/06/14				
Fluoride	1.98E0	1.00E0	ug/g wet	2.00E0		99.0	80-120			
Chloride	5.29E0	2.50E0	"	5.00E0		106	80-120			
Nitrite	9.50E0	5.00E0	"	1.00E1		95.0	80-120			
Nitrate	1.13E1	5.00E0	"	1.00E1		113	80-120			
Sulfate	1.55E1	7.50E0	"	1.50E1		103	80-120			
Phosphate	1.48E1	7.50E0	"	1.50E1		98.7	80-120			
Duplicate (4C06001-DUP1)		**Source: 1402011-10**		Prepared: 03/05/14		Analyzed: 03/07/14				
Fluoride	1.98E0	1.00E0	ug/g wet	2.00E0		99.0	80-120			
Chloride	5.29E0	2.50E0	"	5.00E0		106	80-120			
Nitrite	9.50E0	5.00E0	"	1.00E1		95.0	80-120			
Nitrate	1.13E1	5.00E0	"	1.00E1		113	80-120			
Sulfate	1.55E1	7.50E0	"	1.50E1		103	80-120			
Phosphate	1.48E1	7.50E0	"	1.50E1		98.7	80-120			
Duplicate (4C06001-DUP1)		**Source: 1402011-10**		Prepared: 03/05/14		Analyzed: 03/07/14				
Fluoride	1.98E0	1.00E0	ug/g wet	2.00E0		99.0	80-120			
Chloride	5.29E0	2.50E0	"	5.00E0		106	80-120			
Nitrite	9.50E0	5.00E0	"	1.00E1		95.0	80-120			
Nitrate	1.13E1	5.00E0	"	1.00E1		113	80-120			
Sulfate	1.55E1	7.50E0	"	1.50E1		103	80-120			
Phosphate	1.48E1	7.50E0	"	1.50E1		98.7	80-120			

Hexavalent Chromium/Soil - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4E01001 - Hexavalent Chromium Digest										
Blank (4E01001-BLK1)				Prepared & Analyzed: 03/17/14						
Chromium, Hexavalent	<5.00E-2	5.00E-2	ug/g wet							
LCS (4E01001-BS1)				Prepared & Analyzed: 03/17/14						
Chromium, Hexavalent	4.90E-1	5.00E-2	ug/g wet	5.00E-1		98.0	80-120			
Duplicate (4E01001-DUP1)		**Source: 1402011-28**		Prepared & Analyzed: 03/17/14						
Chromium, Hexavalent	<6.26E-1	6.26E-1	ug/g dry		ND				20	
Matrix Spike (4E01001-MS1)		**Source: 1401016-04**		Prepared & Analyzed: 03/17/14						
Chromium, Hexavalent	2.59E-1	5.12E-1	ug/g dry	5.00E-1	2.00E-3	51.4	75-125			

Note: The Matrix Spike for hexavalent chromium was below the acceptance limit (75-125) for 4E01001-MS1for Hexavalent Chromium Digest. All other duplicates and QC associated with the batch were in limits. One sample reported a value above EQL that may potentially be impacted.

Total Metals by PNNL-AGG-ICP-AES/1:1 Water Extract - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4C11001 - 1:1 Water Extract (ICP/ICPMS)										
Blank (4C11001-BLK1)				Prepared: 03/05/14	Analyzed: 03/11/14					
Aluminum	<9.37E-2	9.37E-2	ug/g wet							
Barium	<1.24E-1	1.24E-1	"							
Calcium	<4.52E-1	4.52E-1	"							
Cobalt	<1.31E-1	1.31E-1	"							
Iron	<1.05E-1	1.05E-1	"							
Potassium	<1.29E0	1.29E0	"							
Magnesium	<4.89E-2	4.89E-2	"							
Manganese	<6.25E-2	6.25E-2	"							
Nickel	<9.67E-2	9.67E-2	"							
Vanadium	<1.33E-1	1.33E-1	"							
Zinc	<9.77E-2	9.77E-2	"							
Sodium	<7.97E-1	7.97E-1	"							
Blank (4C11001-BLK2)				Prepared: 03/05/14	Analyzed: 03/11/14					
Aluminum	<9.37E-2	9.37E-2	ug/g wet							
Barium	<1.24E-1	1.24E-1	"							
Calcium	<4.52E-1	4.52E-1	"							
Cobalt	<1.31E-1	1.31E-1	"							
Iron	<1.05E-1	1.05E-1	"							
Potassium	<1.29E0	1.29E0	"							
Magnesium	<4.89E-2	4.89E-2	"							
Manganese	<6.25E-2	6.25E-2	"							
Nickel	<9.67E-2	9.67E-2	"							
Vanadium	<1.33E-1	1.33E-1	"							
Zinc	<9.77E-2	9.77E-2	"							
Sodium	<7.97E-1	7.97E-1	"							
LCS (4C11001-BS1)				Prepared: 03/05/14	Analyzed: 03/11/14					
Aluminum	5.03E0	9.37E-2	ug/g wet	5.00E0		101	80-120			
Barium	4.72E0	1.24E-1	"	5.00E0		94.4	80-120			
Calcium	4.91E0	4.52E-1	"	5.00E0		98.1	80-120			
Cobalt	4.80E0	1.31E-1	"	5.00E0		96.0	80-120			
Iron	4.88E0	1.05E-1	"	5.00E0		97.6	80-120			
Potassium	4.94E1	1.29E0	"	5.00E1		98.8	80-120			
Magnesium	4.94E0	4.89E-2	"	5.00E0		98.9	80-120			
Manganese										

Nickel	4.97E0	6.25E-2	"	5.00E0	99.4	80-120
Vanadium	4.89E0	9.67E-2	"	5.00E0	97.9	80-120
Zinc	4.77E0	1.33E-1	"	5.00E0	95.3	80-120
Sodium	5.01E0	9.77E-2	"	5.00E0	100	80-120
	5.56E0	7.97E-1	"	5.00E0	111	80-120

Duplicate (4C11001-DUP1) **Source: 1402011-10** Prepared: 03/05/14 Analyzed: 03/11/14

Aluminum	3.66E-1	9.45E-2	ug/g dry	5.18E-1	34.3	35
Barium	<1.25E-1	1.25E-1	"	ND		35
Calcium	<4.56E-1	4.56E-1	"	ND		35
Cobalt	<1.32E-1	1.32E-1	"	ND		35
Iron	4.34E-1	1.06E-1	"	6.63E-1	41.7	35
Potassium	1.92E0	1.30E0	"	2.11E0	9.18	35
Magnesium	1.53E-1	4.93E-2	"	2.30E-1	40.7	35
Manganese	<6.30E-2	6.30E-2	"	ND		35
Nickel	<9.75E-2	9.75E-2	"	ND		35
Vanadium	<1.34E-1	1.34E-1	"	ND		35
Zinc	<9.86E-2	9.86E-2	"	ND		35
Sodium	7.54E1	8.04E-1	"	7.64E1	1.33	35

Note: Duplicate RPD for Magnesium and Iron were above the acceptance limit (35) for 4C11001-DUP1 for ICP-OES Vadoes-WE. All other duplicates and QC associated with the batch were in limits. Duplicate failure may be due to sample heterogeneity. There should be no impact to sample data as reported.

Duplicate (4C11001-DUP2) **Source: 1402011-28** Prepared: 03/05/14 Analyzed: 03/11/14

Aluminum	1.55E-1	1.03E-1	ug/g dry	ND		35
Barium	<1.36E-1	1.36E-1	"	ND		35
Calcium	2.34E0	4.97E-1	"	3.04E0	25.8	35
Cobalt	<1.44E-1	1.44E-1	"	ND		35
Iron	<1.15E-1	1.15E-1	"	ND		35
Potassium	4.55E0	1.42E0	"	4.60E0	1.06	35
Magnesium	1.44E0	5.37E-2	"	1.83E0	23.5	35
Manganese	<6.86E-2	6.86E-2	"	ND		35
Nickel	<1.06E-1	1.06E-1	"	ND		35
Vanadium	<1.46E-1	1.46E-1	"	ND		35
Zinc	1.82E-1	1.07E-1	"	1.45E-1	22.7	35
Sodium	1.96E2	8.76E-1	"	1.96E2	0.0662	35

Total Metals by PNNL-AGG-ICP-AES/1:1 Water Extract - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Post Spike (4C11001-PS1)		**Source: 1402011-16**		Prepared & Analyzed: 03/11/14						
Aluminum	5.92E2	N/A	ug/L	5.00E2	6.79E1	105	75-125			
Barium	2.42E2	N/A	"	2.50E2	3.38E0	95.5	75-125			
Calcium	7.55E2	N/A	"	5.00E2	2.70E2	97	75-125			
Cobalt	2.48E2	N/A	"	2.50E2	ND	99.7	75-125			
Iron	5.79E2	N/A	"	5.00E2	6.67E1	102	75-125			
Potassium	2.42E3	N/A	"	1.25E3	1.19E3	98.6	75-125			
Magnesium	6.01E2	N/A	"	5.00E2	8.26E1	104	75-125			
Manganese	2.58E2	N/A	"	2.50E2	ND	104	75-125			
Nickel	4.93E2	N/A	"	5.00E2	ND	102	75-125			
Vanadium	2.48E2	N/A	"	2.50E2	5.10E0	97.2	75-125			
Zinc	2.80E2	N/A	"	2.50E2	2.50E1	102	75-125			
Sodium	1.76E4	N/A	"	5.00E2	1.70E4	121	75-125			

Radionuclides by ICP-MS/1:1 Water Extract - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4C12001 - 1:1 Water Extract (ICP/ICPMS)										
Blank (4C12001-BLK1)				Prepared: 03/05/14		Analyzed: 03/27/14				
Technetium-99	<3.90E-5	3.90E-5	ug/g wet							
Uranium 238	<8.00E-5	8.00E-5	"							
Blank (4C12001-BLK2)				Prepared: 03/05/14		Analyzed: 03/27/14				
Technetium-99	<3.90E-5	3.90E-5	ug/g wet							
Uranium 238	<8.00E-5	8.00E-5	"							
LCS (4C12001-BS1)				Prepared: 03/05/14		Analyzed: 03/27/14				
Technetium-99	1.20E-4	3.90E-5	ug/g wet				80-120			
Uranium 238	<8.00E-5	8.00E-5	"				80-120			
Duplicate (4C12001-DUP1)		**Source: 1402011-10**		Prepared: 03/05/14		Analyzed: 03/27/14				
Technetium-99	<3.93E-5	3.93E-5	ug/g dry		ND				35	
Uranium 238	3.94E-3	8.07E-5	"		4.33E-3			9.49	35	
Duplicate (4C12001-DUP2)		**Source: 1402011-28**		Prepared: 03/05/14		Analyzed: 03/27/14				
Technetium-99	<4.29E-5	4.29E-5	ug/g dry		ND				35	
Uranium 238	1.97E-3	8.79E-5	"		1.86E-3			5.75	35	
Post Spike (4C12001-PS1)		**Source: 1402011-20**		Prepared: 03/12/14		Analyzed: 03/27/14				
Technetium-99	1.08E0	N/A	ug/L	1.01E0	ND	106	75-125			
Uranium 238	1.10E0	N/A	"	1.00E0	1.52E-2	109	75-125			

RCRA Metals By PNNL-AGG-415/1:1 Water Extract - Quality Control

Environmental Science Laboratory

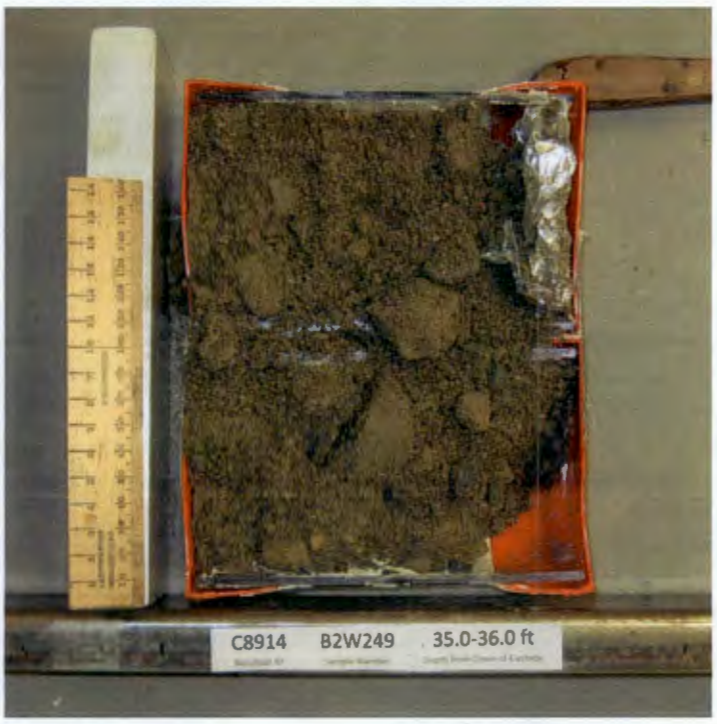
Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4C11002 - 1:1 Water Extract (ICP/ICPMS)										
Blank (4C11002-BLK1)				Prepared: 03/05/14		Analyzed: 03/11/14				
Chromium	<6.89E-3	6.89E-3	ug/g wet							
Copper	<2.03E-2	2.03E-2	"							
Arsenic	<5.67E-3	5.67E-3	"							
Silver	<6.26E-3	6.26E-3	"							
Cadmium	<1.15E-3	1.15E-3	"							
Antimony	<1.32E-3	1.32E-3	"							
Blank (4C11002-BLK2)				Prepared: 03/05/14		Analyzed: 03/11/14				
Chromium	<6.89E-3	6.89E-3	ug/g wet							
Copper	<2.03E-2	2.03E-2	"							
Arsenic	<5.67E-3	5.67E-3	"							
Silver	<6.26E-3	6.26E-3	"							
Cadmium	<1.15E-3	1.15E-3	"							
Antimony	<1.32E-3	1.32E-3	"							
LCS (4C11002-BS1)				Prepared: 03/05/14		Analyzed: 03/11/14				
Chromium	4.82E0	1.38E0	ug/g wet	5.00E0		96.3	80-120			
Copper	4.84E0	4.06E0	"	5.00E0		96.9	80-120			
Arsenic	4.92E0	1.13E0	"	5.00E0		98.4	80-120			
Silver	4.58E0	1.25E0	"	5.00E0		91.7	80-120			
Cadmium	4.88E0	2.29E-1	"	5.00E0		97.5	80-120			
Duplicate (4C11002-DUP1)		**Source: 1402011-10**		Prepared: 03/05/14		Analyzed: 03/11/14				
Chromium	<6.95E-3	6.95E-3	ug/g dry		ND				35	
Copper	<2.05E-2	2.05E-2	"		ND				35	
Arsenic	5.59E-2	5.72E-3	"		6.43E-2			13.9	35	
Silver	<6.31E-3	6.31E-3	"		ND				35	
Cadmium	<1.16E-3	1.16E-3	"		ND				35	
Antimony	<1.33E-3	1.33E-3	"		1.51E-3				35	

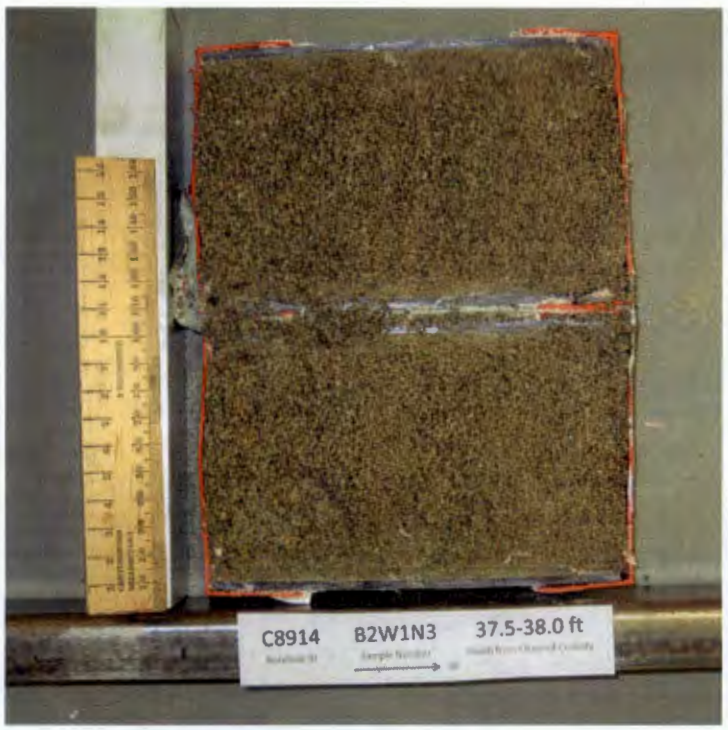
RCRA Metals By PNNL-AGG-415/1:1 Water Extract - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4C11002 - 1:1 Water Extract (ICP/ICPMS)										
Duplicate (4C11002-DUP2)		**Source: 1402011-28**		Prepared: 03/05/14	Analyzed: 03/11/14					
Chromium	4.49E-2	7.57E-3	ug/g dry		4.54E-2			1.09	35	
Copper	<2.23E-2	2.23E-2	"		ND				35	
Arsenic	4.58E-2	6.23E-3	"		4.91E-2			6.95	35	
Silver	<6.87E-3	6.87E-3	"		ND				35	
Cadmium	<1.26E-3	1.26E-3	"		ND				35	
Antimony	<1.45E-3	1.45E-3	"		ND				35	
Post Spike (4C11002-PS1)		**Source: 1402011-20**		Prepared & Analyzed: 03/11/14						
Chromium	2.45E0	N/A	ug/L	2.50E0	1.60E-3	98	75-125			
Copper	2.44E0	N/A	"	2.50E0	4.59E-2	95.9	75-125			
Arsenic	2.91E0	N/A	"	2.50E0	4.69E-1	97.5	75-125			
Silver	2.24E0	N/A	"	2.50E0	2.52E-3	89.4	75-125			
Cadmium	2.42E0	N/A	"	2.50E0	3.90E-4	96.8	75-125			
Antimony	2.46E0	N/A	"	2.50E0	8.14E-2	95.2	75-125			

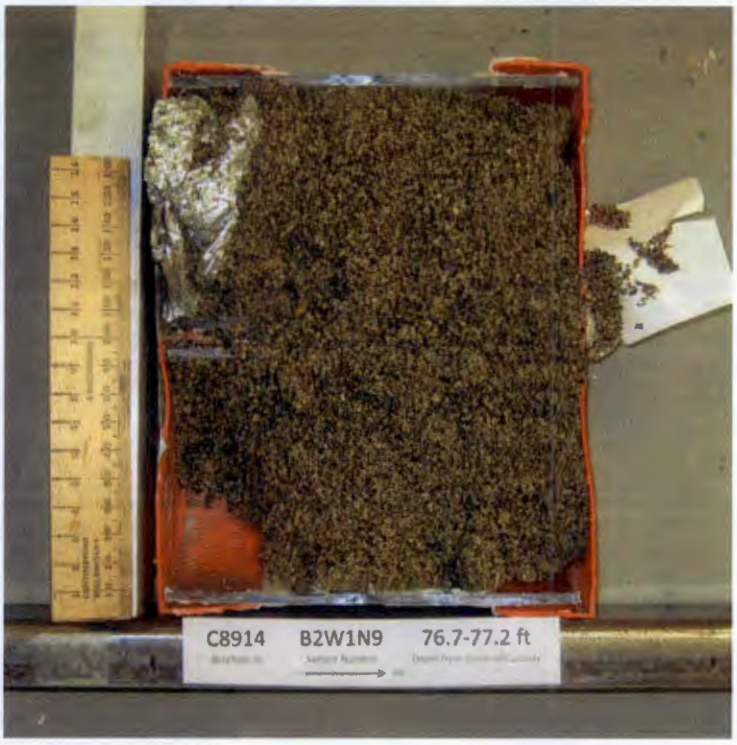
Photographs




C8914
B2W1N3
37.5-38.0 ft

C8914
Borehole ID
B2W1N2
37.0-37.5 ft

C8914
B2W1N4
38.0-38.5 ft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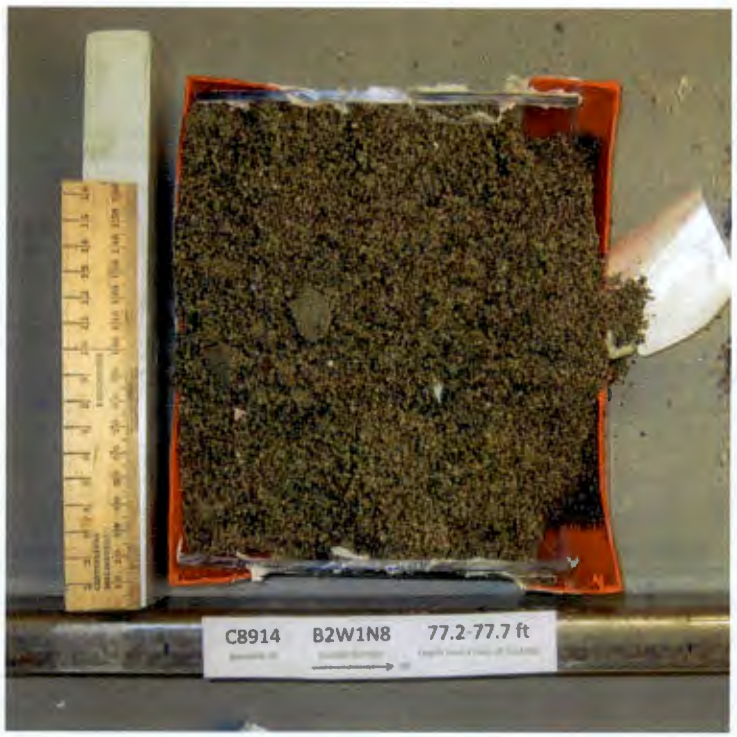
B2W1N9
76.7-77.2 ft


C8914
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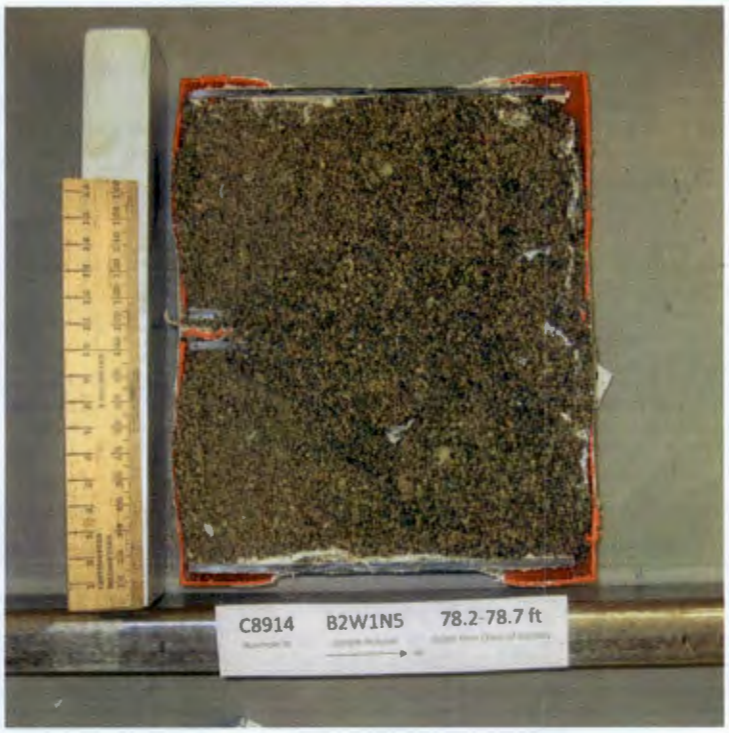
77.2-77.7 ft

C8914
B2W1N7
77.7-78.2 ft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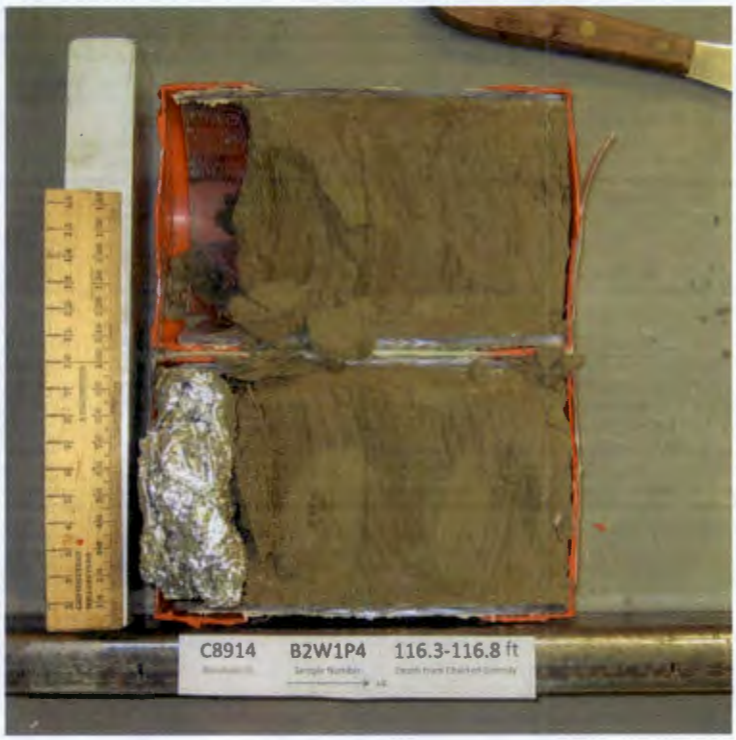
B2W1N5
78.2-78.7 ft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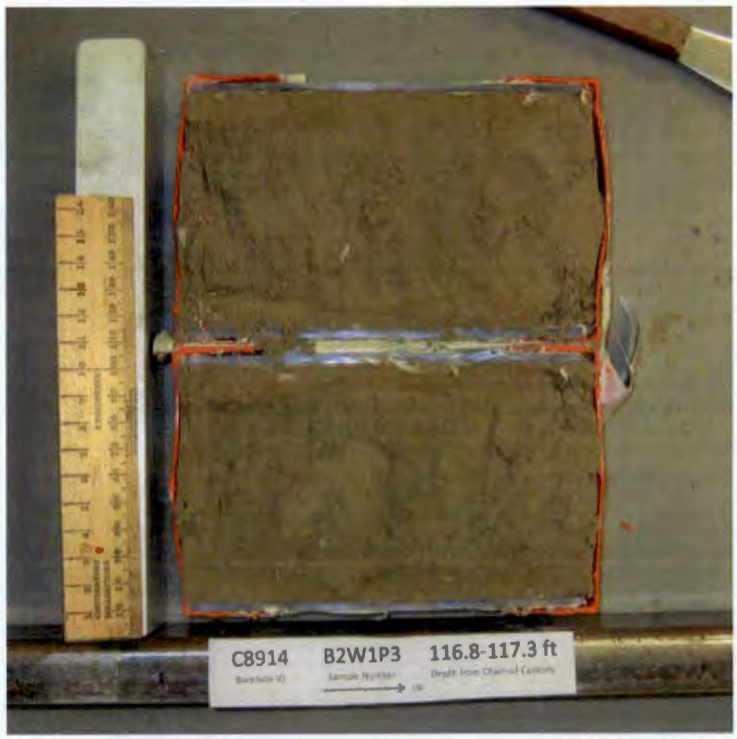
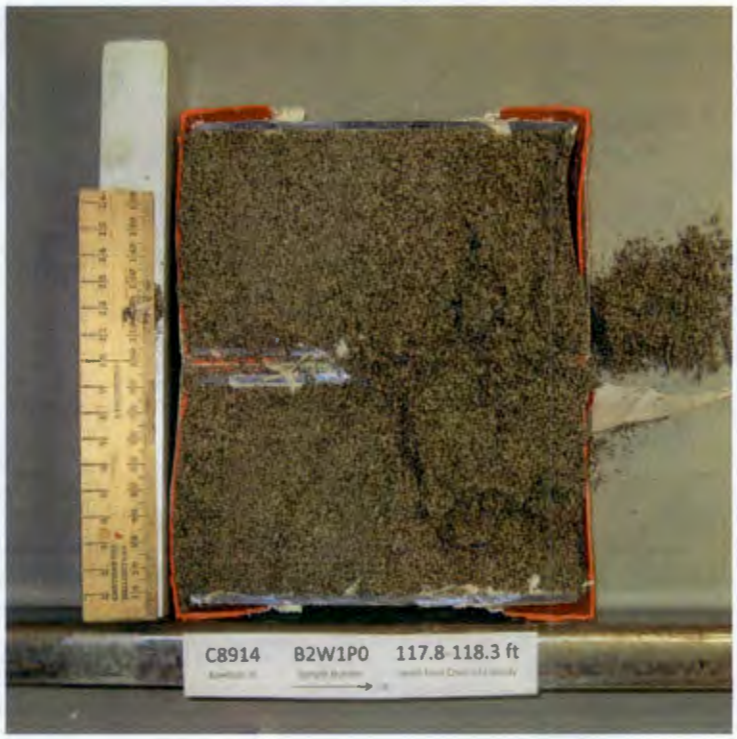
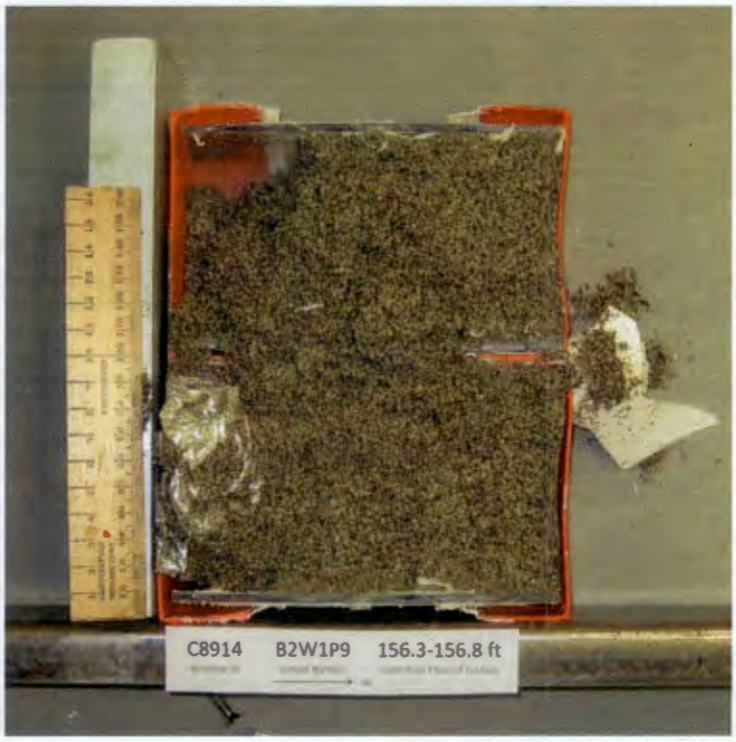
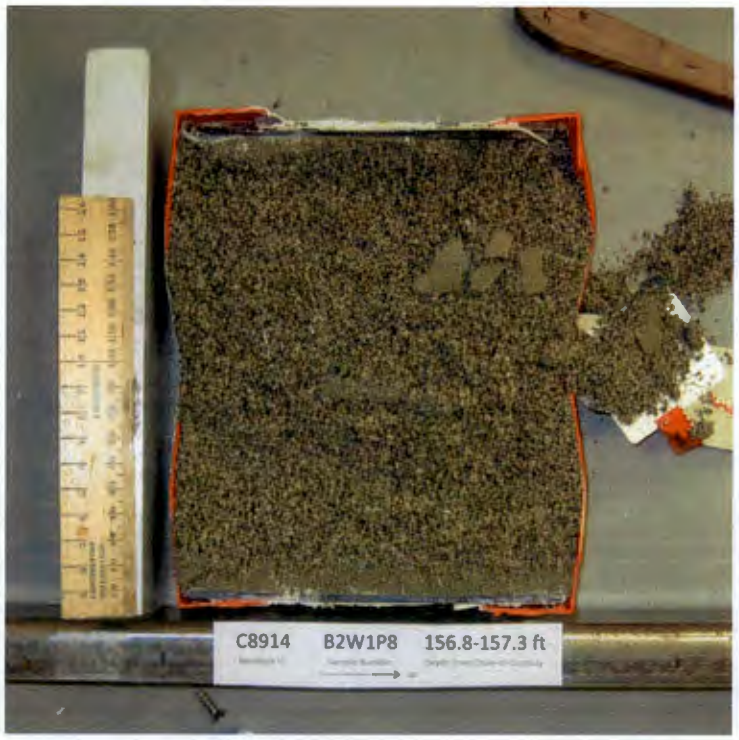
B2W1P4
116.3-116.8 ft


C8914
B2W1P3
116.8-117.3 ft

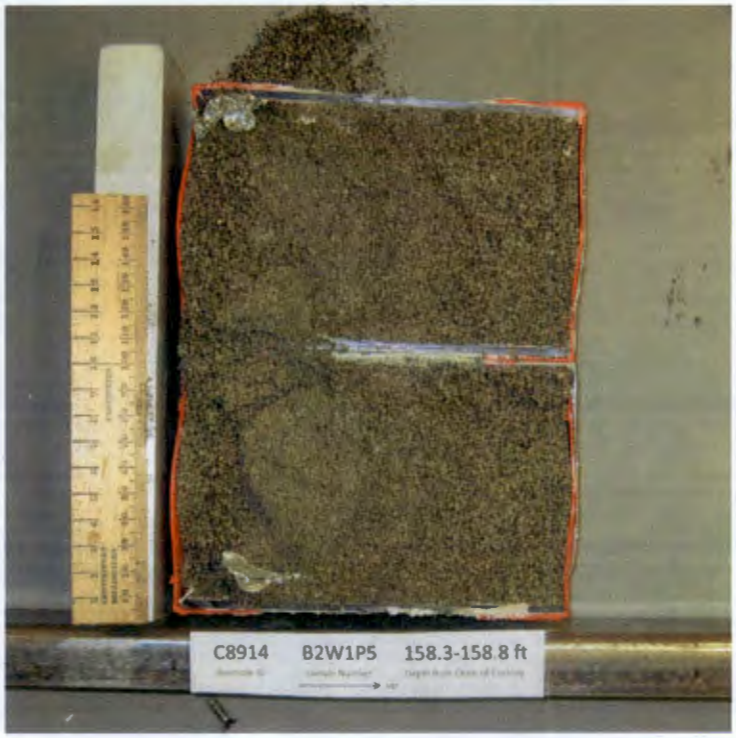
C8914
B2W1P2
117.3-117.8 ft


C8914
B2W1P0
117.8-118.3 ft


C8914
B2W1P9
156.3-156.8 ft


C8914
B2W1P8
156.8-157.3 ft

C8914
B2W1P7
157.3-157.8 ft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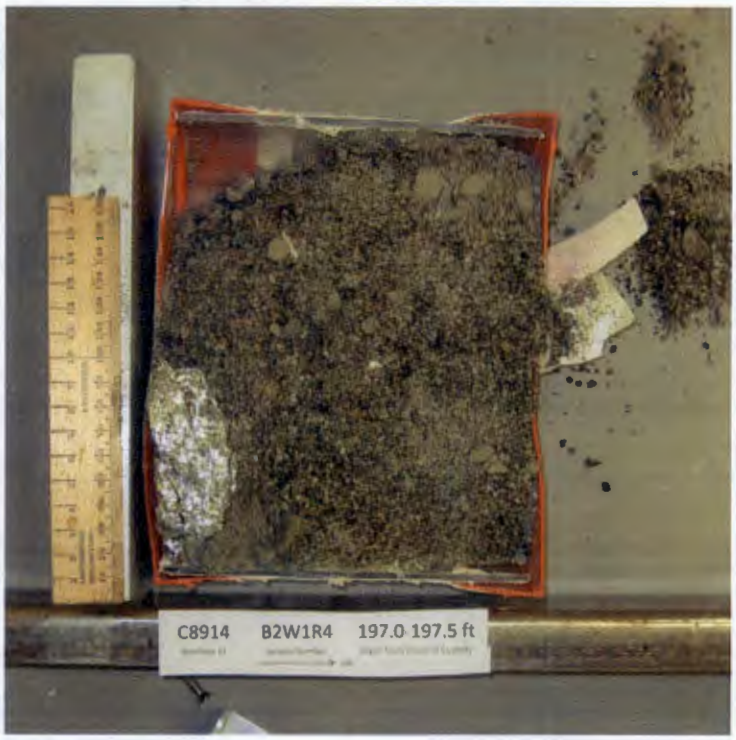
B2W1P5
158.3-158.8 ft

C8914
B2W1R0
195.5-196.0 ft

C8914
B2W1R2
196.0-196.5 ft

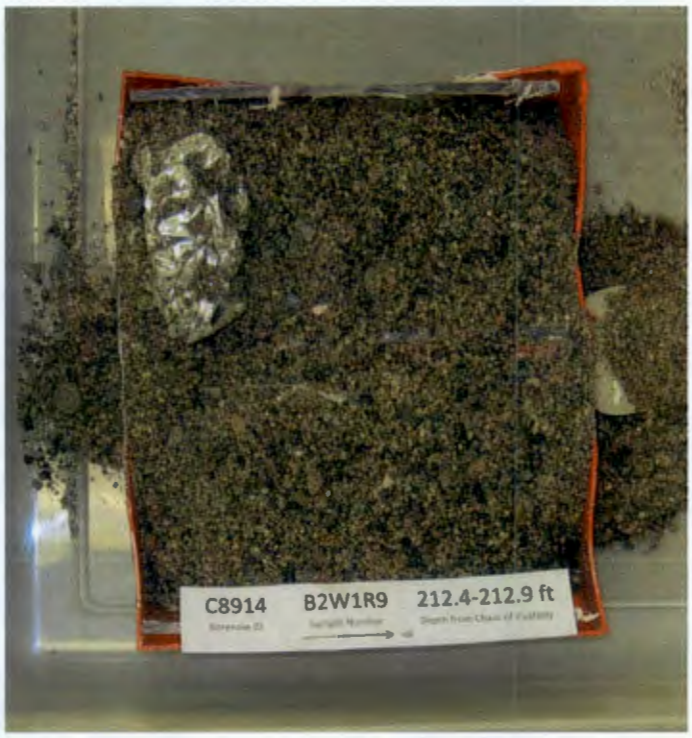
C8914
B2W1R3
196.5-197.0 ft


C8914
B2W1R4
197.0-197.5 ft

C8914
Borehole ID
B2W1R5
Sample Number
up
210.9-211.4 ft
Depth from Chain-of Custody

C8914
Borehole ID
B2W1R7
Sample Number
up
211.4-211.9 ft
Depth from Chain-of-Custody

C8914
B2W1R8
211.9-212.4 ft


C8914
B2W1R9
212.4-212.9 ft

C8914
B2W1T0
216.5-217.0 ft

C8914
B2W1T3
217.5-218.0 ft

C8914
B2W1T4
218.0-218.5 ft

C8915
Borehole ID
B2VWT5
225.1-225.6 ft
up

C8914
B2W1T8
223.5-224.0 ft

C8914
Borehole ID
B2W1T7
Sample Number
up
223.0-223.5 ft
Depth from Chain-of-Custody

C8914
B2W1T9
224.0-224.5 ft

C8915
Borehole ID
B2VWR5
Sample Number
up
209.6-210.1 ft
Depth from Chain-of-Custody

C8915
B2VWR7
210.1-210.6 ft

C8915
Borehole ID
B2VWR8
Sample Number
up
210.6-211.1 ft
Depth from Chain-of-Custody

C8915
Borehole ID
B2VWR9
Sample Number
up
211.1-211.6 ft
Depth from Chain-of-Custody

C8915
Borehole ID
B2VWT0
Sample Number
up
214.5-215.0 ft
Depth from Chain-of-Custody

C8915
B2VWT2
215.0-215.5 ft

C8915
B2VWT3
215.5-216.0 ft

C8915
Borehole ID
B2VWT4
Sample Number
up
216.0-216.5 ft
Depth from Chain-of-Custody

C8915
Borehole ID
B2VWT5
Sample Number
up
225.1-225.6 ft
Depth from Chain-of-Custody

C8915
Borehole ID
B2VWT7
Sample Number
up
225.6-226.1 ft
Depth from Chain-of-Custody

C8915
Borehole ID
B2VWT8
Sample Number
226.1-226.6 ft
Depth from Chain-of-Custody
up

C8915
Borehole ID
B2VWT9
Sample Number
226.6-227.1 ft
Depth from Chain-of-Custody
up

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Appendix B

Analytical Results for Perched Water Samples Collected from Well 299-E33-350 (C8914) and Well 299-E33-351 (C8915)

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This appendix provides the analytical data for perched water samples collected from new perched water extraction Wells 299-E33-350 (C8914) and 299-E33-351 (C8915). Data were retrieved from the Hanford Environmental Information System (HEIS) on November 17, 2014.

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SAMP_NUM	SAMP_DATE_TIME	MEDIA	WELL_NAME	WELL_ID	CON_ID	CON_LONG_NAME	STD_CON_ID	STD_VALUE_RPTD	STD_ANAL_UNITS_RPTD	LAB_QUALIFIER	REVIEW_QUALIFIER	RESULT_COMMENT	SAMP_INTERVAL_TOP	SAMP_INTERVAL_BOTTOM	SAMP_INTERVAL_UNITS	FILTERED_FLAG
B2W499	24-Feb-14	GW	299-E33-350	C8914	14133-76-7	Technetium-99	14133-76-7	9900	pCi/L			Laboratory Method ID is LA-508-421		235	ft	N
B2W4B0	24-Feb-14	GW	299-E33-350	C8914	14133-76-7	Technetium-99	14133-76-7	8900	pCi/L			Laboratory Method ID is LA-508-421		235	ft	N
B2W1W6A	24-Feb-14	GW	299-E33-350	C8914	14808-79-8	Sulfate	14808-79-8	1400000	µg/L	D				235	ft	N
B2W1W6A	24-Feb-14	GW	299-E33-350	C8914	16887-00-6	Chloride	16887-00-6	205000	µg/L	D				235	ft	N
B2W1W6A	24-Feb-14	GW	299-E33-350	C8914	16984-48-8	Fluoride	16984-48-8	347	µg/L	B				235	ft	N
B2W1W6A	24-Feb-14	GW	299-E33-350	C8914	NO2-N	Nitrogen in Nitrite	14797-65-0	8210	µg/L	X	H	Holding time exceeded / H Review Qualifier added 7/2/2014 JGD		235	ft	N
B2W1W6A	24-Feb-14	GW	299-E33-350	C8914	NO3-N	Nitrogen in Nitrate	14797-55-8	1850000	µg/L	DX	H	Holding time exceeded / H Review Qualifier added 7/2/2014 JGD		235	ft	N
B2W1W3A	24-Feb-14	GW	299-E33-350	C8914	14808-79-8	Sulfate	14808-79-8	1400000	µg/L	D				235	ft	N
B2W1W3A	24-Feb-14	GW	299-E33-350	C8914	16887-00-6	Chloride	16887-00-6	202000	µg/L	D				235	ft	N
B2W1W3A	24-Feb-14	GW	299-E33-350	C8914	16984-48-8	Fluoride	16984-48-8	341	µg/L	B				235	ft	N
B2W1W3A	24-Feb-14	GW	299-E33-350	C8914	NO2-N	Nitrogen in Nitrite	14797-65-0	8210	µg/L	X	H	Holding time exceeded / H Review Qualifier added 7/2/2014 JGD		235	ft	N
B2W1W3A	24-Feb-14	GW	299-E33-350	C8914	NO3-N	Nitrogen in Nitrate	14797-55-8	1840000	µg/L	DX	H	Holding time exceeded / H Review Qualifier added 7/2/2014 JGD		235	ft	N
B2W1V5	20-Feb-14	GW	299-E33-350	C8914	14762-75-5	Carbon-14	14762-75-5	553	pCi/L					229.3	ft	N
B2W1V5	20-Feb-14	GW	299-E33-350	C8914	15046-84-1	Iodine-129	15046-84-1	1.25	pCi/L	U				229.3	ft	N
B2W1V6	20-Feb-14	GW	299-E33-350	C8914	18540-29-9	Hexavalent Chromium	18540-29-9	4.2	µg/L	B		Laboratory Method ID is LA-265-403		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	10028-17-8	Tritium	10028-17-8	8100	pCi/L			Laboratory Method ID is LA-508-421		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	14808-79-8	Sulfate	14808-79-8	612000	µg/L	D		Laboratory Method ID is LA-533-410		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	15117-96-1	Uranium-235	15117-96-1	440	pCi/L			Laboratory Method ID is LA-508-471		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	16887-00-6	Chloride	16887-00-6	105000	µg/L	D		Laboratory Method ID is LA-533-410		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	16984-48-8	Fluoride	16984-48-8	905	µg/L	BD		Laboratory Method ID is LA-533-410		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7429-90-5	Aluminum	7429-90-5	20	µg/L	UD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7439-89-6	Iron	7439-89-6	200	µg/L			Laboratory Method ID is LA-505-411		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7439-92-1	Lead	7439-92-1	0.1	µg/L	UD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7439-95-4	Magnesium	7439-95-4	83700	µg/L			Laboratory Method ID is LA-505-411		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7439-98-7	Molybdenum	7439-98-7	48.4	µg/L	D		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-09-7	Potassium	7440-09-7	12000	µg/L			Laboratory Method ID is LA-505-411		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-22-4	Silver	7440-22-4	0.1	µg/L	UD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-23-5	Sodium	7440-23-5	305000	µg/L	D		Laboratory Method ID is LA-505-411		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-36-0	Antimony	7440-36-0	1.17	µg/L	BD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-38-2	Arsenic	7440-38-2	0.4	µg/L	UD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-39-3	Barium	7440-39-3	61.1	µg/L	D		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-41-7	Beryllium	7440-41-7	0.2	µg/L	UD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-43-9	Cadmium	7440-43-9	0.1	µg/L	UD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-47-3	Chromium	7440-47-3	0.428	µg/L	BD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-48-4	Cobalt	7440-48-4	7.04	µg/L	D		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-50-8	Copper	7440-50-8	1.43	µg/L	BD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-61-1	Uranium	7440-61-1	16400	µg/L	D		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7440-70-2	Calcium	7440-70-2	194000	µg/L	D		Laboratory Method ID is LA-505-411		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	7782-49-2	Selenium	7782-49-2	9.64	µg/L	BD		Laboratory Method ID is LA-505-412		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	ALKALINITY	Alkalinity	ALKALINITY	200000	µg/L			Laboratory Method ID is LA-531-411		229.3	ft	N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	NO2-N	Nitrogen in Nitrite	14797-65-0	328	µg/L	UD		Laboratory Method ID is LA-533-410		229.3	ft	N

SAMP_NUM	SAMP_DATE_TIME	MEDIA	WELL_NAME	WELL_ID	CON_ID	CON_LONG_NAME	STD_CON_ID	STD_VALUE_RPTD	STD_ANAL_UNITS_RPTD	LAB_QUALIFIER	REVIEW_QUALIFIER	RESULT_COMMENT	SAMP_INTERVAL_TOP	SAMP_INTERVAL_BOTTOM	SAMP_INTERVAL_UNITS	FILTERED_FLAG
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	NO3-N	Nitrogen in Nitrate	14797-55-8	460000	µg/L	D		Laboratory Method ID is LA-533-410	229.3	ft		N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	U-233/234	Uranium-233/234	U-233/234	5800	pCi/L			Laboratory Method ID is LA-508-471	229.3	ft		N
B2W1V7	20-Feb-14	GW	299-E33-350	C8914	U-238	Uranium-238	U-238	5800	pCi/L			Laboratory Method ID is LA-508-471	229.3	ft		N
B2W1W1	24-Feb-14	GW	299-E33-350	C8914	14762-75-5	Carbon-14	14762-75-5	1330	pCi/L				235	ft		N
B2W1W2	24-Feb-14	GW	299-E33-350	C8914	18540-29-9	Hexavalent Chromium	18540-29-9	8	µg/L	U			235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	10028-17-8	Tritium	10028-17-8	28000	pCi/L			Laboratory Method ID is LA-508-421	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	15117-96-1	Uranium-235	15117-96-1	2000	pCi/L			Laboratory Method ID is LA-508-471	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7429-90-5	Aluminum	7429-90-5	20	µg/L	UD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7439-89-6	Iron	7439-89-6	40	µg/L	U		Laboratory Method ID is LA-505-411	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7439-92-1	Lead	7439-92-1	0.1	µg/L	UD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7439-95-4	Magnesium	7439-95-4	101000	µg/L			Laboratory Method ID is LA-505-411	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7439-98-7	Molybdenum	7439-98-7	110	µg/L	D		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-09-7	Potassium	7440-09-7	17700	µg/L			Laboratory Method ID is LA-505-411	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-22-4	Silver	7440-22-4	0.1	µg/L	UD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-23-5	Sodium	7440-23-5	365000	µg/L			Laboratory Method ID is LA-505-411	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-36-0	Antimony	7440-36-0	3.12	µg/L	BD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-38-2	Arsenic	7440-38-2	1.34	µg/L	BD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-39-3	Barium	7440-39-3	73.5	µg/L	D		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-41-7	Beryllium	7440-41-7	0.2	µg/L	UD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-43-9	Cadmium	7440-43-9	0.1	µg/L	UD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-47-3	Chromium	7440-47-3	0.322	µg/L	BD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-48-4	Cobalt	7440-48-4	4.34	µg/L	D		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-50-8	Copper	7440-50-8	2.55	µg/L	D		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-61-1	Uranium	7440-61-1	107000	µg/L	D		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7440-70-2	Calcium	7440-70-2	238000	µg/L			Laboratory Method ID is LA-505-411	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	7782-49-2	Selenium	7782-49-2	11.3	µg/L	BD		Laboratory Method ID is LA-505-412	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	U-233/234	Uranium-233/234	U-233/234	34000	pCi/L			Laboratory Method ID is LA-508-471	235	ft		N
B2W1W3	24-Feb-14	GW	299-E33-350	C8914	U-238	Uranium-238	U-238	33000	pCi/L			Laboratory Method ID is LA-508-471	235	ft		N
B2W1W4	24-Feb-14	GW	299-E33-350	C8914	14762-75-5	Carbon-14	14762-75-5	1250	pCi/L				235	ft		N
B2W1W5	24-Feb-14	GW	299-E33-350	C8914	18540-29-9	Hexavalent Chromium	18540-29-9	8	µg/L	U			235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	10028-17-8	Tritium	10028-17-8	28000	pCi/L			Laboratory Method ID is LA-508-421	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	15117-96-1	Uranium-235	15117-96-1	2200	pCi/L			Laboratory Method ID is LA-508-471	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7429-90-5	Aluminum	7429-90-5	20	µg/L	UD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7439-89-6	Iron	7439-89-6	74.1	µg/L			Laboratory Method ID is LA-505-411	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7439-92-1	Lead	7439-92-1	0.1	µg/L	UD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7439-95-4	Magnesium	7439-95-4	101000	µg/L			Laboratory Method ID is LA-505-411	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7439-98-7	Molybdenum	7439-98-7	112	µg/L	D	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151	235	ft		N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-09-7	Potassium	7440-09-7	17600	µg/L			Laboratory Method ID is LA-505-411	235	ft		N

SAMP_NUM	SAMP_DATE_TIME	MEDIA	WELL_NAME	WELL_ID	CON_ID	CON_LONG_NAME	STD_CON_ID	STD_VALUE_RPTD	STD_ANAL_UNITS_RPTD	LAB_QUALIFIER	REVIEW_QUALIFIER	RESULT_COMMENT	SAMP_INTERVAL_TOP	SAMP_INTERVAL_BOTTOM	SAMP_INTERVAL_UNITS	FILTERED_FLAG
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-22-4	Silver	7440-22-4	0.1	µg/L	UD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-23-5	Sodium	7440-23-5	365000	µg/L			Laboratory Method ID is LA-505-411		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-36-0	Antimony	7440-36-0	3.18	µg/L	BD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-38-2	Arsenic	7440-38-2	1.35	µg/L	BD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-39-3	Barium	7440-39-3	74.7	µg/L	D	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-41-7	Beryllium	7440-41-7	0.2	µg/L	UD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-43-9	Cadmium	7440-43-9	0.29	µg/L	BD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-47-3	Chromium	7440-47-3	0.2	µg/L	UD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-48-4	Cobalt	7440-48-4	4.37	µg/L	D	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-50-8	Copper	7440-50-8	2.62	µg/L	D	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-61-1	Uranium	7440-61-1	106000	µg/L	D	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7440-70-2	Calcium	7440-70-2	234000	µg/L			Laboratory Method ID is LA-505-411		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	7782-49-2	Selenium	7782-49-2	11.2	µg/L	BD	G	Laboratory Method ID is LA-505-412 "G" Review flag added per RDR 140407WSCF-R8151		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	U-233/234	Uranium-233/234	U-233/234	33000	pCi/L			Laboratory Method ID is LA-508-471		235	ft	N
B2W1W6	24-Feb-14	GW	299-E33-350	C8914	U-238	Uranium-238	U-238	35000	pCi/L			Laboratory Method ID is LA-508-471		235	ft	N
B2W1W7	20-Feb-14	GW	299-E33-350	C8914	CONDUCT	Specific Conductance	CONDUCT	2742	µS/cm					229.3	ft	N
B2W1W7	20-Feb-14	GW	299-E33-350	C8914	DO	Dissolved oxygen	DO	2260	µg/L					229.3	ft	N
B2W1W7	20-Feb-14	GW	299-E33-350	C8914	EH	Oxidation Reduction Potential	EH	-68.2	mV					229.3	ft	N
B2W1W7	20-Feb-14	GW	299-E33-350	C8914	PH	pH Measurement	PH	7.45	unitless					229.3	ft	N
B2W1W7	20-Feb-14	GW	299-E33-350	C8914	TEMPERATURE	Temperature	TEMPERATURE	17.6	Deg C					229.3	ft	N
B2W1W7	20-Feb-14	GW	299-E33-350	C8914	TURBIDITY	Turbidity	TURBIDITY	199	NTU					229.3	ft	N
B2W1W8	24-Feb-14	GW	299-E33-350	C8914	CONDUCT	Specific Conductance	CONDUCT	3571	µS/cm					235	ft	N
B2W1W8	24-Feb-14	GW	299-E33-350	C8914	EH	Oxidation Reduction Potential	EH	2.43	mV					235	ft	N

SAMP_NUM	SAMP_DATE_TIME	MEDIA	WELL_NAME	WELL_ID	CON_ID	CON_LONG_NAME	STD_CON_ID	STD_VALUE_RPTD	STD_ANAL_UNITS_RPTD	LAB_QUALIFIER	REVIEW_QUALIFIER	RESULT_COMMENT	SAMP_INTERVAL_TOP	SAMP_INTERVAL_BOTTOM	SAMP_INTERVAL_UNITS	FILTERED_FLAG
B2W1W8	24-Feb-14	GW	299-E33-350	C8914	PH	pH Measurement	PH	7.79	unitless					235	ft	N
B2W1W8	24-Feb-14	GW	299-E33-350	C8914	TEMPERATURE	Temperature	TEMPERATURE	16.5	Deg C					235	ft	N
B2W1W8	24-Feb-14	GW	299-E33-350	C8914	TURBIDITY	Turbidity	TURBIDITY	624	NTU					235	ft	N
B2W1W9	20-Feb-14	GW	299-E33-350	C8914	14133-76-7	Technetium-99	14133-76-7	4100	pCi/L			Laboratory Method ID is LA-508-421		229.3	ft	N
B2VWV0	30-Jan-14	GW	299-E33-351	C8915	14762-75-5	Carbon-14	14762-75-5	502	pCi/L					231	ft	N
B2VWV0	30-Jan-14	GW	299-E33-351	C8915	15046-84-1	Iodine-129	15046-84-1	-7.66	pCi/L	U				231	ft	N
B2VWV1	30-Jan-14	GW	299-E33-351	C8915	14133-76-7	Technetium-99	14133-76-7	30000	pCi/L			Laboratory Method ID is LA-508-421		231	ft	N
B2VWV1	30-Jan-14	GW	299-E33-351	C8915	18540-29-9	Hexavalent Chromium	18540-29-9	2	µg/L	U	H	Laboratory Method ID is LA-265-403 / H Review Qualifier added 7/2/2014 JGD		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	10028-17-8	Tritium	10028-17-8	15000	pCi/L			Laboratory Method ID is LA-508-421		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	14808-79-8	Sulfate	14808-79-8	1440000	µg/L	D		Laboratory Method ID is LA-533-410		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	15117-96-1	Uranium-235	15117-96-1	1600	pCi/L			Laboratory Method ID is LA-508-471		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	16887-00-6	Chloride	16887-00-6	193000	µg/L	D		Laboratory Method ID is LA-533-410		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	16984-48-8	Fluoride	16984-48-8	500	µg/L	UD		Laboratory Method ID is LA-533-410		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7429-90-5	Aluminum	7429-90-5	20	µg/L	UD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7439-89-6	Iron	7439-89-6	531	µg/L			Laboratory Method ID is LA-505-411		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7439-92-1	Lead	7439-92-1	0.1	µg/L	UD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7439-95-4	Magnesium	7439-95-4	279000	µg/L			Laboratory Method ID is LA-505-411		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7439-98-7	Molybdenum	7439-98-7	32.7	µg/L	D		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-09-7	Potassium	7440-09-7	44600	µg/L			Laboratory Method ID is LA-505-411		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-22-4	Silver	7440-22-4	0.1	µg/L	UD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-23-5	Sodium	7440-23-5	916000	µg/L	D	G	Laboratory Method ID is LA-505-411 "G" Review flag added per RDR 140320WSCF-R8149		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-36-0	Antimony	7440-36-0	0.896	µg/L	BD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-38-2	Arsenic	7440-38-2	0.4	µg/L	UD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-39-3	Barium	7440-39-3	82.3	µg/L	D		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-41-7	Beryllium	7440-41-7	0.2	µg/L	UD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-43-9	Cadmium	7440-43-9	0.378	µg/L	BD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-47-3	Chromium	7440-47-3	0.238	µg/L	BD		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-48-4	Cobalt	7440-48-4	27.5	µg/L	D		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-50-8	Copper	7440-50-8	2.38	µg/L	D		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-61-1	Uranium	7440-61-1	49800	µg/L	D		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7440-70-2	Calcium	7440-70-2	1000000	µg/L			Laboratory Method ID is LA-505-411		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	7782-49-2	Selenium	7782-49-2	29.6	µg/L	D		Laboratory Method ID is LA-505-412		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	NO2-N	Nitrogen in Nitrite	14797-65-0	1310	µg/L	UD		Laboratory Method ID is LA-533-410		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	NO3-N	Nitrogen in Nitrate	14797-55-8	5930000	µg/L	D		Laboratory Method ID is LA-533-410		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	U-233/234	Uranium-233/234	U-233/234	17000	pCi/L			Laboratory Method ID is LA-508-471		231	ft	N
B2VWV2	30-Jan-14	GW	299-E33-351	C8915	U-238	Uranium-238	U-238	18000	pCi/L			Laboratory Method ID is LA-508-471		231	ft	N
B2VWV7	29-Jan-14	GW	299-E33-351	C8915	14133-76-7	Technetium-99	14133-76-7	8000	pCi/L			Laboratory Method ID is LA-508-421		227.7	ft	N
B2VWV7	29-Jan-14	GW	299-E33-351	C8915	18540-29-9	Hexavalent Chromium	18540-29-9	2	µg/L	U		Laboratory Method ID is LA-265-403		227.7	ft	N
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	10028-17-8	Tritium	10028-17-8	9800	pCi/L			Laboratory Method ID is LA-508-421		227.7	ft	N
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	14808-79-8	Sulfate	14808-79-8	563000	µg/L	D		Laboratory Method ID is LA-533-410		227.7	ft	N
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	15117-96-1	Uranium-235	15117-96-1	1100	pCi/L			Laboratory Method ID is LA-508-471		227.7	ft	N
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	16887-00-6	Chloride	16887-00-6	74400	µg/L	D		Laboratory Method ID is LA-533-410		227.7	ft	N

SAMP_NUM	SAMP_DATE_TIME	MEDIA	WELL_NAME	WELL_ID	CON_ID	CON_LONG_NAME	STD_CON_ID	STD_VALUE_RPTD	STD_ANAL_UNITS_RPTD	LAB_QUALIFIER	REVIEW_QUALIFIER	RESULT_COMMENT	SAMP_INTERVAL_TOP	SAMP_INTERVAL_BOTTOM	SAMP_INTERVAL_UNITS	FILTERED_FLAG
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	16984-48-8	Fluoride	16984-48-8	312	µg/L	BD		Laboratory Method ID is LA-533-410	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7429-90-5	Aluminum	7429-90-5	20	µg/L	UD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7439-89-6	Iron	7439-89-6	40	µg/L	U		Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7439-92-1	Lead	7439-92-1	0.1	µg/L	UD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7439-95-4	Magnesium	7439-95-4	51900	µg/L			Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7439-98-7	Molybdenum	7439-98-7	30.1	µg/L	D		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-09-7	Potassium	7440-09-7	17800	µg/L			Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-22-4	Silver	7440-22-4	0.1	µg/L	UD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-23-5	Sodium	7440-23-5	386000	µg/L			Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-36-0	Antimony	7440-36-0	0.742	µg/L	BD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-38-2	Arsenic	7440-38-2	0.4	µg/L	UD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-39-3	Barium	7440-39-3	51.8	µg/L	D		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-41-7	Beryllium	7440-41-7	0.2	µg/L	UD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-43-9	Cadmium	7440-43-9	0.1	µg/L	UD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-47-3	Chromium	7440-47-3	18.8	µg/L	D		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-48-4	Cobalt	7440-48-4	8.09	µg/L	D		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-50-8	Copper	7440-50-8	1.62	µg/L	BD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-61-1	Uranium	7440-61-1	30700	µg/L	D		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7440-70-2	Calcium	7440-70-2	195000	µg/L	D		Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	7782-49-2	Selenium	7782-49-2	7.33	µg/L	BD		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	ALKALINITY	Alkalinity	ALKALINITY	180000	µg/L			Laboratory Method ID is LA-531-411	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	NO2-N	Nitrogen in Nitrite	14797-65-0	700	µg/L	BD		Laboratory Method ID is LA-533-410	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	NO3-N	Nitrogen in Nitrate	14797-55-8	1000000	µg/L	D		Laboratory Method ID is LA-533-410	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	U-233/234	Uranium-233/234	U-233/234	7700	pCi/L			Laboratory Method ID is LA-508-471	227.7	ft	N	
B2VWV8	29-Jan-14	GW	299-E33-351	C8915	U-238	Uranium-238	U-238	9300	pCi/L			Laboratory Method ID is LA-508-471	227.7	ft	N	
B2VWV9	29-Jan-14	GW	299-E33-351	C8915	14762-75-5	Carbon-14	14762-75-5	553	pCi/L				227.7	ft	N	
B2VWV9	29-Jan-14	GW	299-E33-351	C8915	15046-84-1	Iodine-129	15046-84-1	0.536	pCi/L	U			227.7	ft	N	
B2VWW0	29-Jan-14	GW	299-E33-351	C8915	14133-76-7	Technetium-99	14133-76-7	6200	pCi/L			Laboratory Method ID is LA-508-421	227.7	ft	N	
B2VWW0	29-Jan-14	GW	299-E33-351	C8915	18540-29-9	Hexavalent Chromium	18540-29-9	2	µg/L	U		Laboratory Method ID is LA-265-403	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	10028-17-8	Tritium	10028-17-8	9600	pCi/L			Laboratory Method ID is LA-508-421	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	14808-79-8	Sulfate	14808-79-8	562000	µg/L	D		Laboratory Method ID is LA-533-410	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	15117-96-1	Uranium-235	15117-96-1	870	pCi/L			Laboratory Method ID is LA-508-471	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	16887-00-6	Chloride	16887-00-6	74300	µg/L	D		Laboratory Method ID is LA-533-410	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	16984-48-8	Fluoride	16984-48-8	381	µg/L	BD		Laboratory Method ID is LA-533-410	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7429-90-5	Aluminum	7429-90-5	14.3	µg/L	B		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7439-89-6	Iron	7439-89-6	41.7	µg/L	B		Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7439-92-1	Lead	7439-92-1	0.05	µg/L	U		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7439-95-4	Magnesium	7439-95-4	50900	µg/L			Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7439-98-7	Molybdenum	7439-98-7	24.9	µg/L			Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-09-7	Potassium	7440-09-7	17500	µg/L			Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-22-4	Silver	7440-22-4	0.05	µg/L	U		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-23-5	Sodium	7440-23-5	384000	µg/L			Laboratory Method ID is LA-505-411	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-36-0	Antimony	7440-36-0	0.574	µg/L	B		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-38-2	Arsenic	7440-38-2	0.265	µg/L	B		Laboratory Method ID is LA-505-412	227.7	ft	N	
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-39-3	Barium	7440-39-3	41.7	µg/L			Laboratory Method ID is LA-505-412	227.7	ft	N	

SAMP_NUM	SAMP_DATE_TIME	MEDIA	WELL_NAME	WELL_ID	CON_ID	CON_LONG_NAME	STD_CON_ID	STD_VALUE_RPTD	STD_ANAL_UNITS_RPTD	LAB_QUALIFIER	REVIEW_QUALIFIER	RESULT_COMMENT	SAMP_INTERVAL_TOP	SAMP_INTERVAL_BOTTOM	SAMP_INTERVAL_UNITS	FILTERED_FLAG
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-41-7	Beryllium	7440-41-7	0.1	µg/L	U		Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-43-9	Cadmium	7440-43-9	0.05	µg/L	U		Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-47-3	Chromium	7440-47-3	15.9	µg/L			Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-48-4	Cobalt	7440-48-4	6.32	µg/L			Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-50-8	Copper	7440-50-8	1.52	µg/L			Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-61-1	Uranium	7440-61-1	24700	µg/L			Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7440-70-2	Calcium	7440-70-2	198000	µg/L	D		Laboratory Method ID is LA-505-411		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	7782-49-2	Selenium	7782-49-2	6.62	µg/L	B		Laboratory Method ID is LA-505-412		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	ALKALINITY	Alkalinity	ALKALINITY	180000	µg/L			Laboratory Method ID is LA-531-411		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	NO2-N	Nitrogen in Nitrite	14797-65-0	696	µg/L	BD		Laboratory Method ID is LA-533-410		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	NO3-N	Nitrogen in Nitrate	14797-55-8	1000000	µg/L	D		Laboratory Method ID is LA-533-410		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	U-233/234	Uranium-233/234	U-233/234	13000	pCi/L			Laboratory Method ID is LA-508-471		227.7	ft	N
B2VWW1	29-Jan-14	GW	299-E33-351	C8915	U-238	Uranium-238	U-238	11000	pCi/L			Laboratory Method ID is LA-508-471		227.7	ft	N
B2VWW2	30-Jan-14	GW	299-E33-351	C8915	DO	Dissolved oxygen	DO	3270	µg/L					231	ft	N
B2VWW2	30-Jan-14	GW	299-E33-351	C8915	EH	Oxidation Reduction Potential	EH	7.7	mV					231	ft	N
B2VWW2	30-Jan-14	GW	299-E33-351	C8915	PH	pH Measurement	PH	7.1	unitless					231	ft	N
B2VWW2	30-Jan-14	GW	299-E33-351	C8915	TEMPERATURE	Temperature	TEMPERATURE	16.6	Deg C					231	ft	N
B2VWW2	30-Jan-14	GW	299-E33-351	C8915	TURBIDITY	Turbidity	TURBIDITY	1000	NTU	>E				231	ft	N
B2VWW3	29-Jan-14	GW	299-E33-351	C8915	CONDUCT	Specific Conductance	CONDUCT	3249	µS/cm					227.7	ft	N
B2VWW3	29-Jan-14	GW	299-E33-351	C8915	DO	Dissolved oxygen	DO	3430	µg/L					227.7	ft	N
B2VWW3	29-Jan-14	GW	299-E33-351	C8915	EH	Oxidation Reduction Potential	EH	98	mV					227.7	ft	N
B2VWW3	29-Jan-14	GW	299-E33-351	C8915	PH	pH Measurement	PH	7.4	unitless					227.7	ft	N
B2VWW3	29-Jan-14	GW	299-E33-351	C8915	TEMPERATURE	Temperature	TEMPERATURE	16.7	Deg C					227.7	ft	N
B2VWW3	29-Jan-14	GW	299-E33-351	C8915	TURBIDITY	Turbidity	TURBIDITY	1000	NTU	>E				227.7	ft	N
B2VWV6	29-Jan-14	GW	299-E33-351	C8915	14762-75-5	Carbon-14	14762-75-5	502	pCi/L					227.7	ft	N
B2VWV6	29-Jan-14	GW	299-E33-351	C8915	15046-84-1	Iodine-129	15046-84-1	-6.61	pCi/L	U				227.7	ft	N