SGW-58920
Revision 0

RCRA Groundwater Quarterly Report for October through December 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

P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
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By Ashley R Jenkins at 8:32 am, Aug 03, 2015

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Terms

AEA	*Atomic Energy Act of 1954*
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CHPRC	CH2M HILL Plateau Remediation Company
Cr(VI)	hexavalent chromium
DOE	U.S. Department of Energy
DWS	drinking water standard
HEIS	Hanford Environmental Information System
LLWMA	low-level waste management area
LOQ	limit of quantitation
NTU	nephelometric turbidity unit
QC	quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
SST	single-shell tank
TASL	Test America St. Louis
Tc-99	Technetium-99
TOC	total organic carbon
TOX	total organic halides
WMA	waste management area

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1 Introduction

The CH2M HILL Plateau Remediation Company (CHPRC) Soil and Groundwater Remediation Project presents data in this project document describing sampling performed in accordance with the *Resource Conservation and Recovery Act of 1976* (RCRA) during the October through December 2014 reporting period.

Groundwater monitoring objectives of RCRA, the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), and the *Atomic Energy Act of 1954* (AEA) often differ slightly, and the contaminants monitored are not always the same. For RCRA-regulated units, monitoring focuses on nonradioactive dangerous waste constituents. While radionuclides (source, special nuclear, and byproduct materials) may be monitored in some RCRA unit wells to support objectives of monitoring under AEA and/or CERCLA, they are not subject to RCRA regulation. Pursuant to RCRA, the source, special nuclear, and byproduct material components of radioactive mixed waste are regulated by the U.S. Department of Energy (DOE), acting in accordance with its AEA authority. Therefore, while this report is used to satisfy RCRA reporting requirements, the inclusion of information on radionuclides in such a context is for information only and may not be used to create conditions or other restrictions set forth in any RCRA Permit.

Quarterly information is provided to status sampling, summarize recent and pending monitoring changes, and report statistical exceptions. Groundwater monitoring result highlights and site maps are provided only if changes are determined to be significant. Data are officially reported and accessed through the DOE 2015 Environmental Dashboard Application.

Chapters 2 and 3 identify any quality control (QC) or laboratory issues and the sampling and analysis status for the reporting period. Chapters 4, 5, and 6 present a general status update including sampling activity, significant results, and applicable trend charts.

2 Quality Control and Laboratory Issues

No laboratory or QC issues were identified for the reporting period.

3 Sampling and Analysis Status

This section lists missed or delayed samples.

3.1 Missed Sampling

Table 1 presents samples scheduled but not collected during the quarter. The table includes the site, scheduled period that was not collected, frequency of sampling, and any comments. Further information is included in the site-specific discussion.

Table 1. Sampling Not Completed

Well	Site	Scheduled	Frequency	Comments
N/A	N/A	N/A	N/A	N/A

3.2 Sampling Completed after Quarterly Reporting Period

Table 2 shows wells scheduled but collected after completion of the quarter. The table includes the site, scheduled period that was not collected, frequency of sampling, and any comments. Further information is included in the site-specific discussion.

Table 2. Sampling Completed after Quarter

Well	Site	Scheduled	Frequency	Comments
299-W22-95	S-SX	December	Quarterly	Delayed for well cap repair, was sampled in January.
299-W22-113	S-SX	December	Quarterly	Sampled in January, after pump was installed.
299-W14-15	TX-TY	November	Quarterly	Sampled in January after repair.

3.3 Stop Work

No stop work orders affecting groundwater sampling were in effect during the reporting period.

4 Inactive Waste Management Areas

The following closed and inactive treatment, storage, and disposal units received nonradioactive dangerous waste for active management after RCRA regulation became jurisdictionally applicable to that activity. Groundwater monitoring around the units must continue in order to detect releases to groundwater of residual dangerous wastes in each unit. Summary status and monitoring highlights of results by exception are provided for each area.

4.1 1301-N Liquid Waste Disposal Facility (Final Status, Detection Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is March 2015.

4.2 1324-N/NA Facilities (Final Status, Detection Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is March 2015.

4.3 1325-N Liquid Waste Disposal Facility (Final Status, Detection Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is March 2015.

4.4 183-H Solar Evaporation Basins (Final Status, Corrective Action Monitoring)

The annual sampling event was conducted in November. Wells 199-H4-84, 199-H4-8, 199-H4-12A and 199-H4-12C were all sampled for total chromium, hexavalent chromium [Cr(VI)], nitrate, fluoride, technetium-99 (Tc-99) and uranium.

The highest concentration of total chromium (filtered) in the unconfined aquifer was 14.00 µg/L in Well 199-H4-12A, and filtered Cr(VI) concentrations were similar, at 14.40 µg/L. Uranium concentrations were highest in Well 199-H4-12A, at 14.6 µg/L during the reporting period.

The concentrations for nitrate, fluoride, and Tc-99 were all well below the permit limits, with the highest concentrations in Well 199-H4-84. The maximum values were: nitrate at 26.4 mg/L, fluoride at 180 µg/L, and Tc-99 at 27.50 µg/L. Cr(VI) and uranium are directly correlated to water table fluctuations in Well 199-H4-84, therefore, it tends to have lower concentrations of those constituents during the winter months when water levels are lowest.

Well 199-H4-12C is completed in the Ringold Formation upper mud unit and is connected to the HX pump-and-treat system as an extraction well. In November, total (filtered) chromium in Well 199-H4-12C

was at 118 µg/L and Cr(VI) was 120 µg/L (filtered). These results are consistent with previous monitoring results. Concentrations of the other RCRA constituents were all below permit limits with the following values: nitrate at 12 mg/L, fluoride at 160 µg/L, Tc-99 at 15.4 µg/L and uranium at 1.20 µg/L.

4.5 300 Area Process Trenches (Final Status, Corrective Action Monitoring)

All eight wells were sampled as scheduled in December. The next sampling event is scheduled for January 2015.

The concentration of cis-1,2-dichloroethene continues to exceed the 70 µg/L drinking water standard (DWS) at Well 399-1-16B (207 µg/L), which is screened in the lower unconfined aquifer. The origin for cis-1,2- dichloroethene is attributed to degradation of trichloroethene disposed to the 300 Area Process Trenches and/or North Process Pond.

The concentration of uranium has continued to exceed the 30 µg/L DWS at Well 399-1-17A (41.5, 45.0 µg/L) at the southern end of process trenches. The concentration of uranium also exceeded the 30 µg/L DWS at Well 399-1-16A (64.5 µg/L), southeast of the process trenches. The concentrations at Well 399-1-16A, which is near the Columbia River, increase during low river stage with the arrival of uranium that has been remoblized upgradient.

4.6 216-A-29 Ditch (Interim Status, Indicator Evaluation Monitoring)

Semiannual and annual sampling of seven network wells was completed as scheduled in October. Sampling of Well 299-E26-13 was delayed because the road utilized for access required repair. Sampling of this well was conducted in late November. The next scheduled sampling event is April 2015.

Results for pH, specific conductance, total organic carbon (TOC), and total organic halides (TOX) were loaded into Hanford Environmental Information System (HEIS) during the quarter. Reported values for pH were within the 2014 critical mean range and TOC and TOX reported values were less than the 2014 critical mean and/or laboratory limit of quantification (LOQ).

Specific conductance measurements at Wells 299-E25-32P, 299-E25-35 and 299-E25-48 exceeded the 2014 critical mean value. Groundwater assessment WHC-SD-EN-EV-032, Rev. 0,*"Results of the Groundwater Quality Assessment Program at the 216-A-29 Ditch RCRA Facility"*, dated October 1995, determined that elevated specific conductance for 216-A-29 was from elevated sulfate, sodium, and calcium, and not from a dangerous waste, so the site was returned to interim status monitoring.

4.7 216-B-3 Pond (Interim Status, Indicator Evaluation Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is January 2015.

4.8 216-B-63 Trench (Interim Status, Indicator Evaluation Monitoring)

All six monitoring wells were sampled as scheduled and results were loaded into HEIS during the quarter. None of the indicator parameter sample results exceeded the derived critical mean values. The next scheduled semiannual sampling event is April 2015.

The current derivation of the 216-B-63 Trench critical mean values is discussed in ECF-Hanford-14-0043, *Calculation of Critical Means for Calendar Year 2014 RCRA Groundwater Monitoring*. Because there were too many nondetect TOX values to calculate a critical mean using a parametric statistical test, the double quantification rule was used to define a non-parametric prediction limit according to the

unified guidance[1]. In these situations DOE uses the LOQ as the critical mean. The only TOX result above the detection limits this quarter were reported by Test America, St. Louis laboratory (TASL), thus the LOQ for TASL was used. As shown in Table 3, TOX was below the LOQ.

Other analytical results loaded into HEIS this quarter included: alkalinity, anions, cations, phenols, and trace metals used to evaluate groundwater quality. All the phenol groundwater quality parameter results were less than detection. Chloride, sodium, and sulfate results, which are other groundwater quality parameters, are shown in Table 3. The groundwater quality parameter concentrations were similar in all the wells with a slight increase in the upgradient wells, indicating the wells are being affected by migrating BY Crib contaminant plumes. The other groundwater quality parameters, iron and manganese, are generally below detection levels for filtered samples. The unfiltered iron samples are generally just above detection limits and indicated minor well screen corrosion, which has been verified by television surveys in other nearby wells. Because of the well screen corrosion, nickel is also slightly elevated in the wells. Chromium is not a good indicator of well screen corrosion in these wells because of the migrating hexavalent chromium plume from the 216-B-8 Crib, which received liquid sodium dichromate as part of the secondary decontamination waste disposal efforts.

Table 3. Groundwater Quality Parameter Ranges

Parameter	Range of October 2014 Values
Chloride	18,900 to 22,400 µg/L
Sodium	21,800 to 26,000 µg/L
Sulfate	84,400 to 95,700 µg/L

4.9 216-S-10 Pond and Ditch (Interim Status, Indicator Evaluation Monitoring)

Four network wells were sampled as scheduled and analytical results were loaded into HEIS during the quarter. The next scheduled sampling event is May 2015.

There were no exceedances of an indicator parameter during the November sampling. Chromium concentrations continue to increase at 299-W26-13 (Figure 1). The result for Cr(VI) was 122 µg/L, an increase from 106 µg/L last May. Results for total chromium were between 120 and 127 µg/L. The nitrate trend in this well has stabilized at approximately 30 mg/L (Figure 2).

[1] EPA-530-R-09-007, “Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities,” March 2009, Office of Resource Conservation and Recovery Program Implementation and Information Division U.S. Environmental Protection Agency.

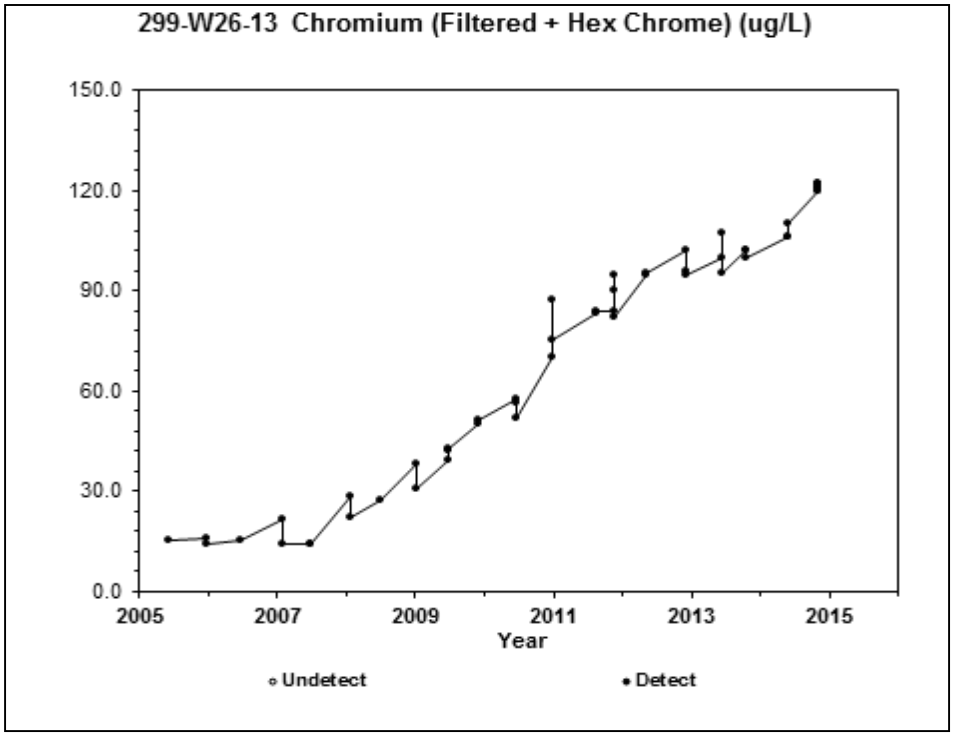

Figure 1. Hexavalent and Filtered Total Chromium in Well 299-W26-13

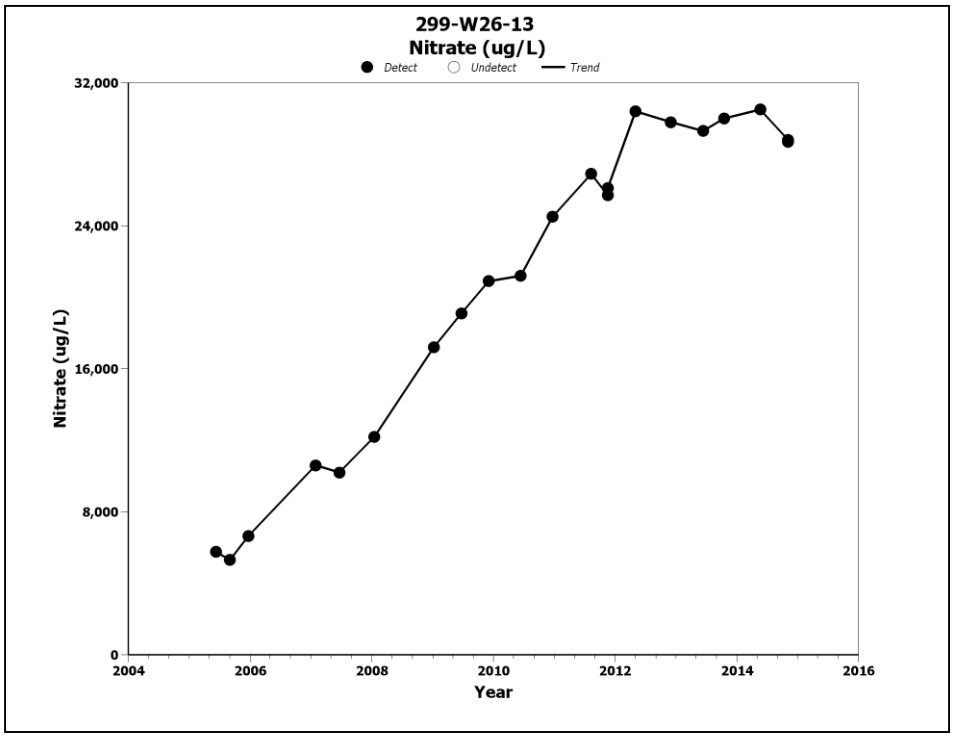

Figure 2. Nitrate in Well 299-W26-13

4.10 Nonradioactive Dangerous Waste Landfill (Interim Status, Indicator Evaluation Monitoring)

Scheduled sampling to be conducted in late October and early November was completed. Results were loaded into HEIS and there were no exceedances of critical mean values or ranges. The next scheduled sampling is April 2015.

4.11 216-A-36B Crib (Interim Status, Indicator Evaluation Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is January 2015.

4.12 216-A-37-1 Crib (Interim Status, Indicator Evaluation Monitoring)

Planned sampling of Well 299-E25-17 during the previous quarter was delayed because of a pump failure. A new pump and stainless steel riser pipe was installed on August 13, and the well was successfully sampled on August 22. Anomolously high quadruplicate TOC results for Well 299-E25-17 that exceeded the 2014 critical mean iniated a request for a data review and reanalysis of the samples by the laboratory.

Results from the laboratory were received in November and confirmed the high TOC values. Verification sampling for TOC was completed on November 12. Quadruplicate TOC values exceeding the critical mean were received from both laboratories. TOC results from GEL were loaded into HEIS in November, with preliminary data provided by TASL.The beginning of the elevated TOC concentrations correlate with removal of the older pump and connections and installation of new equipment in Well 299-E25-17. It is suspected the pump removal and installation process back in August resulted in dislodging organic residue from the casing walls.

Cleaning (swabbing/brushing) of the inner well casing, redevelopment of the well, and resampling was conducted in December 9 and 10 to evaluate the impact to TOC concentrations. Sampling was performed on December 12 following the well cleaning and redevelopment. A 15 day turnaround was requested for TOC sample results for the sample splits provided to two laboroatries. Results were loaded into HEIS in December. Both laboratories reported TOC concentrations below the critical mean. The next scheduled semiannual sampling event is January 2015.

5 Groundwater Monitoring Single-Shell Tank Farm Waste Management Areas

RCRA units that have not yet achieved fully permitted status are monitored under interim status groundwater monitoring programs. Single-shell tank (SST) farms are all monitored under RCRA groundwater assessment and are designated as waste management areas (WMAs). Summary status and monitoring highlights of results are provided for each area.

5.1 SST WMA A-AX (Interim Status, Assessment Monitoring)

All eight network wells were sampled as scheduled this quarter and results were loaded into HEIS. Ranges for the December sampling event were generally consistent with recent levels and trends. The next scheduled quarterly sampling event is March.

Nitrate concentrations in Wells 299-E24-33, 299-E25-41, and 299-E25-2, has been increasing since 2006, but remain below the DWS (Figure 3). The concentration of nitrate in Wells 299-E24-20 (60,200 μg/L) and 299-E25-93 (53,600 μg/L) was above the DWS of 45,000 μg/L. Since March of 2013, nitrate has been above the DWS in Well 299-E24-20, and dropped below the DWS in Well 299-E25-93, continuing to fluctuate above and below the DWS. December concentrations were increasing (Figure 4).

The concentration of Tc-99 in Wells 299-E24-22 (1,840 pCi/L), 299-E24-33 (976 pCi/L), 299-E25-41 (1,030 pCi/L), and 299-E25-93 (1,260 pCi/L) were above the DWS of 900 pCi/L. Tc-99 concentrations

have been increasing (Figure 5) in upgradient Wells 299-E24-22 (since March of 2011) and 299-E24-33 (since late 2012). Downgradient Well 299-E25-41 started displaying increasing Tc-99 levels in December 2012, with Well 299-E25-93 having more stable levels that fluctuate above and below the Tc-99 DWS beginning in mid-2013 (Figure 6).

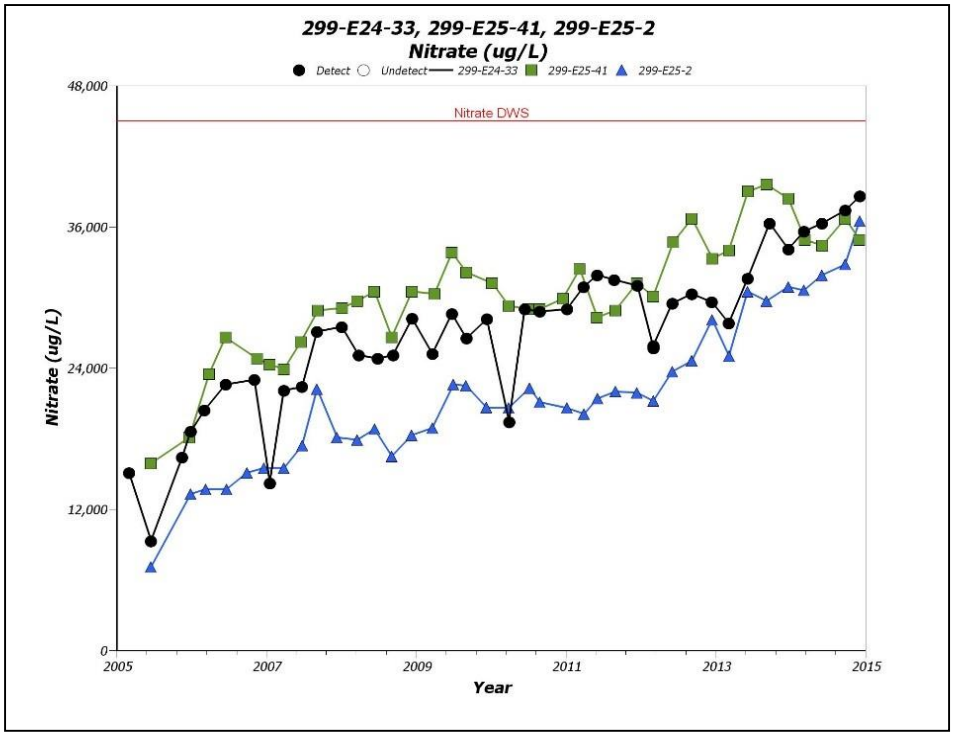

Figure 3. Nitrate in WMA A-AX Wells 299-E24-33, 299-E25-41, and 299-E25-2

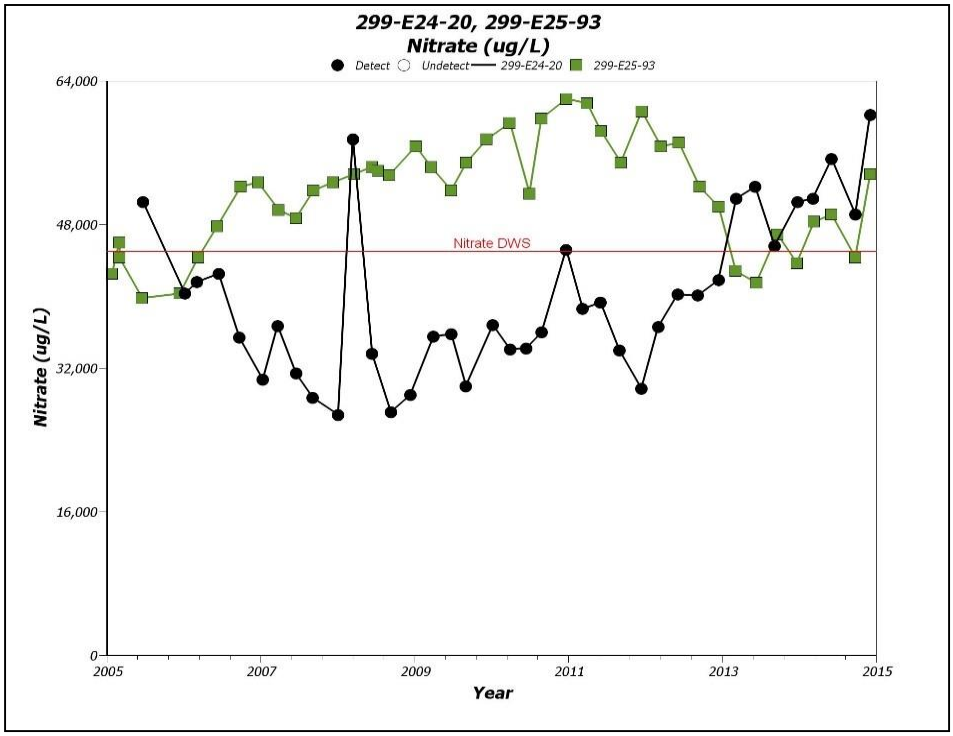

Figure 4. Nitrate in WMA A-AX Wells 299-E24-20 and 299-E24-93

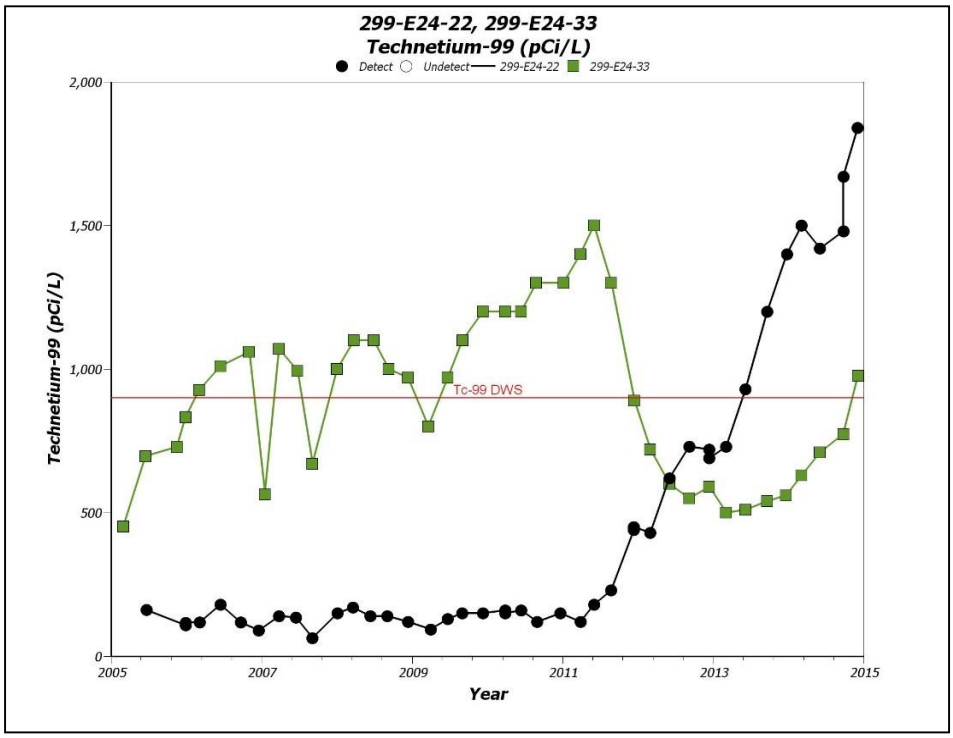

Figure 5. Technetium-99 in WMA A-AX Upgradient Wells 299-E24-22 and 299-E24-33

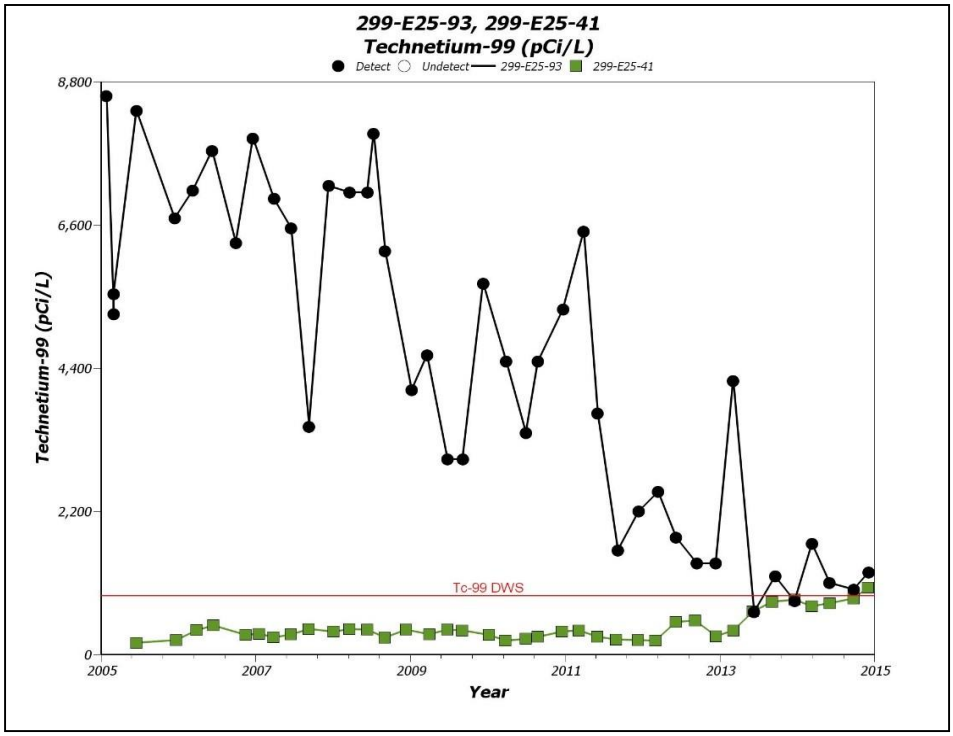

Figure 6. Technetium-99 in WMA A-AX Downgradient Wells 299-E25-93 and 299-E25-41

5.2 SST WMA B-BX-BY (Interim Status, Assessment Monitoring)

All fifteen monitoring wells were sampled as scheduled and analytical results were loaded into HEIS during the quarter. The sample results included alkalinity, anions, cyanide, and metals as required by DOE/RL-2012-53, *Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area B-BX-BY*. The next scheduled sampling event is February 2015.

Specific conductance and pH results declined in most wells. The specific conductance ranged from 591 to 3,006 µS/cm compared to 627 to 3,002 µS/cm in August. The highest value continued to be at Well 299-E33-47, which has been determined to be associated with a 1950s unplanned release from the 241-B Tank Farm. The next highest value, 2,479 µS/cm, continued to be at Well 299-E33-44, which is primarily associated with migrating contamination from the BY Cribs. The pH results ranged from 7.05 to 7.8 compared to 7.53 to 8.03 in August. The lowest pH level was associated with Well 299-E33-47 and the highest pH level was associated with Well 299-E33-334.

Detection of the dangerous waste constituent cyanide at Well 299-E33-47 continues to exceed the DWS. The November result was 1,500 µg/L, which is an increase from 1,050 µg/L in August 2014. Cyanide is also present at levels exceeding the DWS at other wells at WMA B-BX-BY, but is generally associated with southeast migration associated with the BY Cribs. The exception is Well 299-E33-338, which is also associated with the dangerous waste constituent cyanide from the 241-B Tank Farm like Well 299-E33-47; however, the concentration at Well 299-E33-338 is much lower (99 µg/L).

Nitrate values continue to exceed the DWS across WMA B-BX-BY with the highest concentration at Well 299-E33-47. The nitrate concentration at Well 299-E33-47 decreased between August and November, decreasing from 1,430 mg/L to 1,320 mg/L. The next highest values in the network are at Wells 299-E33-20 and 299-E33-44, (863 mg/L and 961 mg/L, respectively). Similar to cyanide, the elevated nitrate at Wells 299-E33-20 and 299-E33-44 is mainly associated with migration from the BY

Cribs. However, the nitrate concentration at Well 299-E33-47 is associated with a localized unplanned release within the 241-B Tank Farm as discussed in DOE/RL-2012-53.

The groundwater geochemistry is predominantly a calcium-nitrate blend. One exception is at Well 299-E33-47, where a high milliequivalent of sodium rather than calcium exists. This indicates a relatively close infiltration location from the vadose zone into the aquifer because of the rapid equilibrium affects the aquifer has on sodium. TOC is also elevated at Well 299-E33-47, reflective of the elevated cyanide.

Filtered chromium levels are elevated, but do not exceed any federal DWS or state derived cleanup standards. The elevated filtered chromium results reflect plume migration originating from the 216-B-8 Crib. This crib received secondary decontamination liquid waste in the late 1940s and early 1950s and contaminants continue to infiltrate into the aquifer from this waste site. Part of the waste inventory received at the 216-B-8 Crib included Cr(VI). The Cr(VI) was in the form of sodium dichromate which was used for plutonium oxidation.

Nickel levels are elevated in most wells. The nickel has been determined to be associated with well screen corrosion based on 2014 sample results, television surveys, and literature search.

5.3 SST WMA C (Interim Status, Assessment Monitoring)

All twelve WMA C wells were sampled as scheduled and results were loaded into HEIS. The next quarterly sampling event is scheduled for March, 2015.

The RCRA assessment sample results included alkalinity, anions, cyanide, and metals. The field parameters included pH, specific conductance, temperature, and turbidity. The only dangerous waste or dangerous waste constituent associated with WMA C is cyanide. Some metals are still evaluated for geochemical parameters, but all other dangerous waste or dangerous waste constituents have been excluded through the assessment process as discussed in Section 4 of *Groundwater Quality Assessment Plan for the Single-Shell tank Waste Management Area-C*, DOE/RL-2009-77.

The dangerous waste constituent cyanide was detected at four wells (299-E27-4, 299-E27-7, 299-E27-14, and 299-E27-23). Concentrations ranged from 3.24 to 7.9 µg/L, which is significantly lower than the 200 µg/L DWS. Well 299-E27-24, screened across the lower part of the aquifer, had the highest concentration, and has ranged between 7.9 and 15.3 µg/L since being installed in 2010. Based on results history, cyanide is present at low levels to the south and southwest of WMA C, and extends to the bottom of the aquifer.

Nitrate continued to exceed 45,000 µg/L at three of the WMA C monitoring wells in December (299-E27-14, 299-E27-24, and 299-E27-25). Downgradient Wells 299-E27-14 and 299-E27-24 nitrate concentrations have been relatively stable the past three years, while Well 299-E27-25 (upgradient), is influenced by plume migration from the north.

5.4 SST WMA S-SX (Interim Status, Assessment Monitoring)

Seven of the network wells were scheduled for sampling during the quarter. The two wells (299-W22-95 and 299-W22-113) not sampled successfully in December were sampled in January. Well 299-W22-95 was delayed for repairs needed on the well cap, and new Well 299-W22-113 (replacement for dry Well 299-W22-49) needed the sample pump installed. The next quarterly sampling is scheduled for March.

Chromium declined to below the 48 µg/L cleanup level at 299-W22-86 and nitrate declined below the 45 mg/L cleanup level at 299-W22-85. The chromium decline at 299-W22-86 (Figure 7) can be attributed to operation of the WMA S-SX groundwater extraction system, which began operating in 2012. Nitrate began declining at 299-W22-85 (Figure 8) in 2011 prior to startup of the groundwater extraction system.

Chromium and nitrate concentrations are increasing at 299-W22-95 (Figures 9 and 10), downgradient from S Tank Farm, on the north side of the 216-S-9 Crib. Chromium concentrations are currently half the

48 µg/L cleanup level, but nitrate has exceeded its 45 mg/L cleanup level. Increasing concentrations were expected as the portion of the S Tank Farm plumes downgradient of extraction Well 299-W22-90 migrate toward 299-W22-95 (2013 replacement for 299-W22-26).

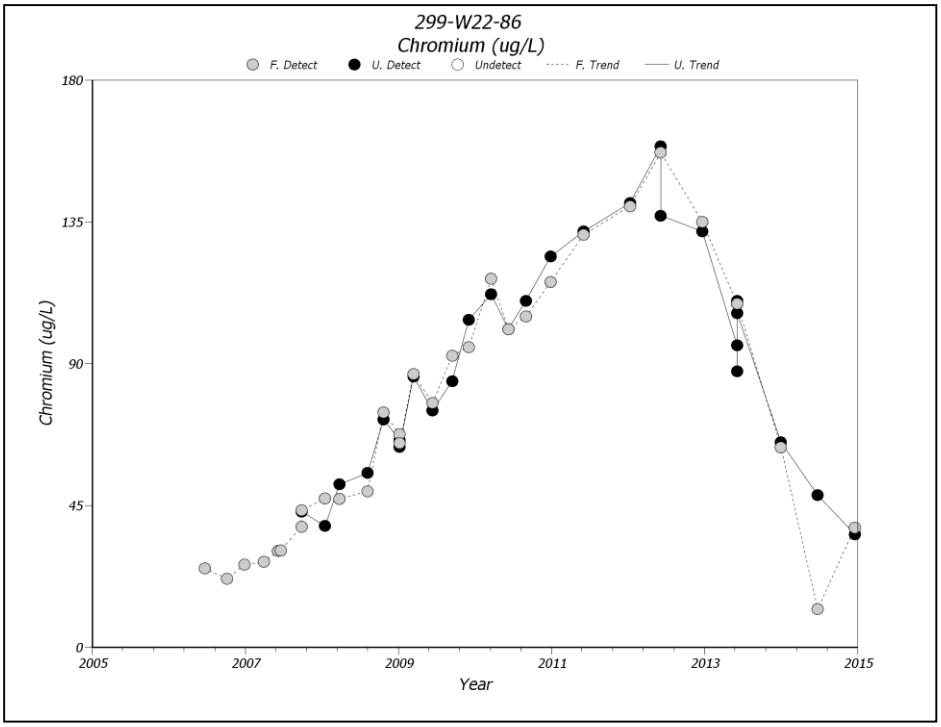

Figure 7. Chromium in S-SX Well 299-W22-86

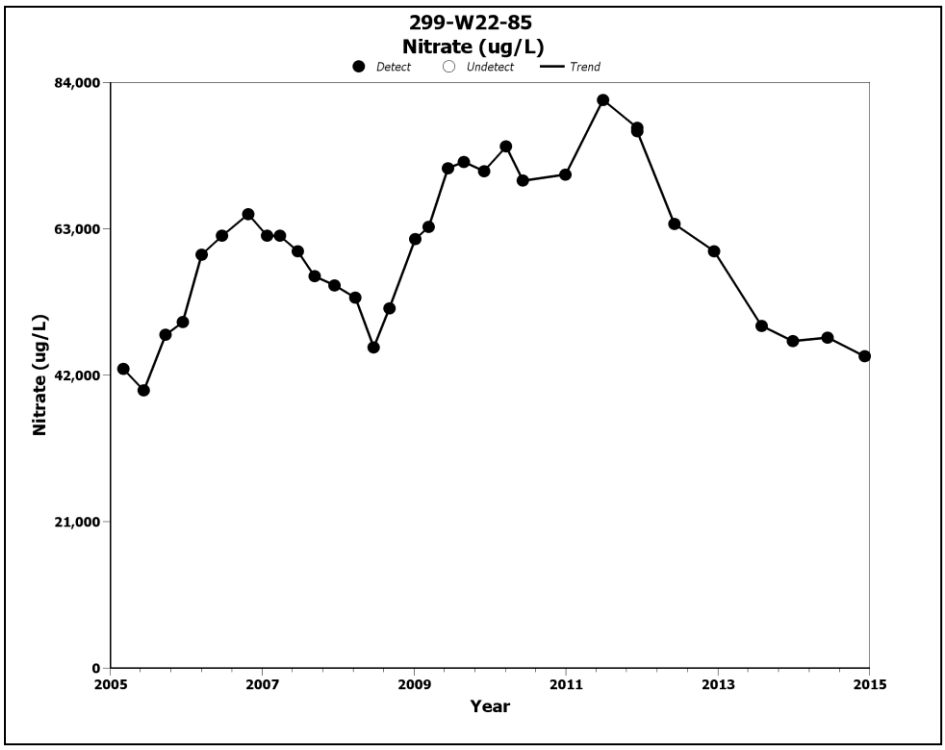

Figure 8. Nitrate in S-SX Well 299-W22-85

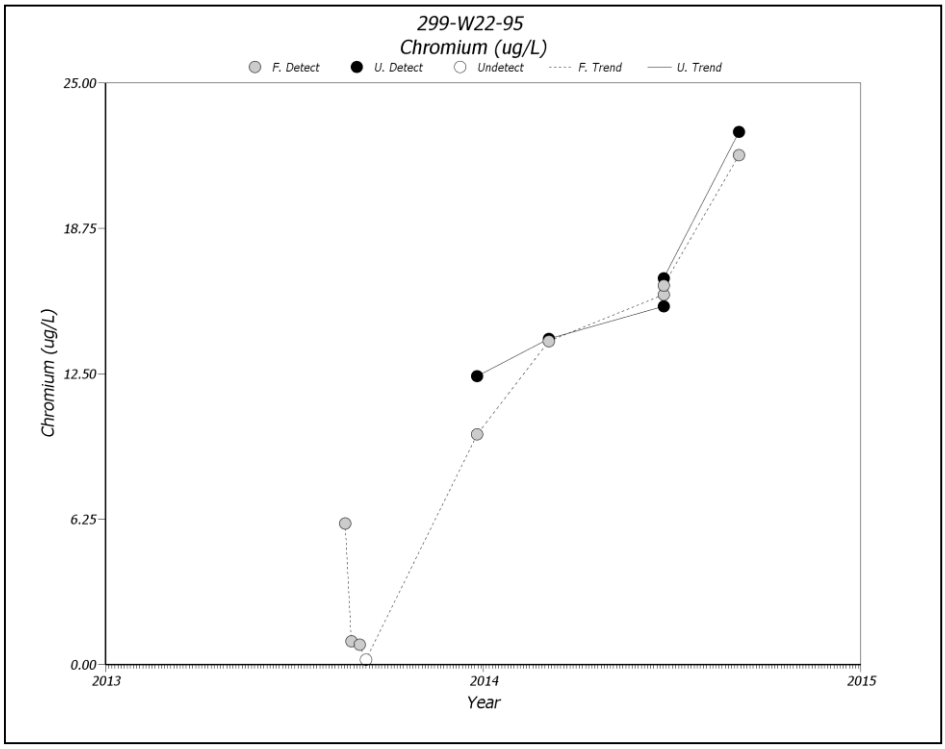

Figure 9. Chromium in S-SX Well 299-W22-95

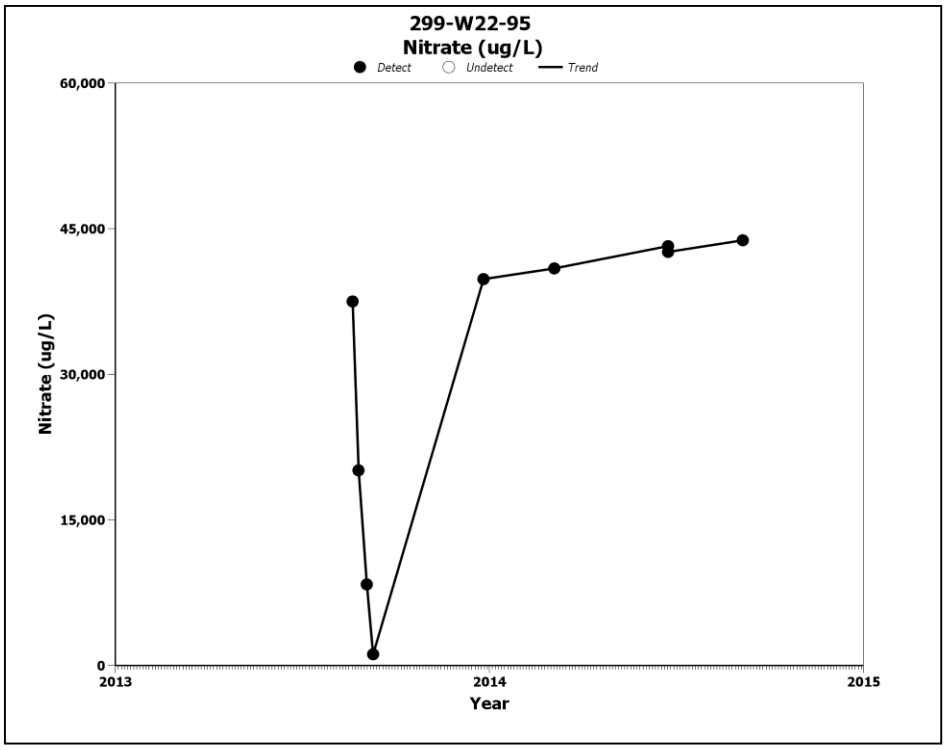

Figure 10. Nitrate in S-SX Well 299-W22-95

5.5 SST WMA T (Interim Status, Assessment Monitoring)

Nine of ten wells were sampled in November as scheduled during the quarter. Sampling of 299-W11-45 was delayed because of maintenance issues and was sampled in December. Except for 299-W10-24, Cr(VI) concentrations continue to decrease in downgradient wells compared to 2013 average concentrations (Table 4). Wells 299-W10-1 and 299-W10-28 are upgradient wells. The next scheduled sampling event is February 2015.

Table 4. WMA T Assessment Sampling Summary 2014 Compared to 2013

Well Name	Cr(VI) (µg/L)		pH		Specific Conductance (µS/cm)		Dissolved Oxygen (µg/L)		Turbidity (NTU)	
	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013
299-W10-1	7.5	2.0	8.00	8.02	486	548	7,960	8,990	4.62	33.9
299-W10-24	43	30	8.42	8.67	806	825	9,165	9,440	3.98	1.03
299-W10-28	51	32	7.80	7.91	723	764	9,020	9,270	27.6	12.1
299-W11-39	31	34	8.41	8.54	661	725	10,220	12,070	3.64	4.76
299-W11-40	54	70	7.84	7.87	879	1,186	8,855	7,405	4.52	4.71
299-W11-41	53	91	7.85	7.84	996	1,407	8,113	6,176	2.62	2.71
299-W11-42	51	60	7.96	8.13	736	980	9,263	9,148	1.54	2.01
299-W11-45*	79	NA	7.84	NA	841	NA	NA	NA	1.81	NA
299-W11-47	60	102	7.72	7.83	866	1,250	8,988	7,445	3.09	4.01

*No 2013 data available because 299-W11-45 was waiting to be converted to a monitoring well in 2013. No 2014 dissolved oxygen data in HEIS because the instrument reading was out of range at the time of sampling.
NTU = nephelometric turbidity unit

5.6 SST WMA TX-TY (Interim Status, Assessment Monitoring)

Ten of thirteen wells were successfully sampled in November as scheduled during the quarter. Sampling of Wells 299-W15-44 and 299-W15-763 was delayed because of maintenance issues. They were successfully sampled in December. Well 299-W14-15 needed repairs and was sampled in January. The next scheduled sampling event is February 2015.

Results from the January through December 2014 sampling events are presented in Table 5 and compared to 2013 average values. Results are on trend with slight Cr(VI) increases in eight wells, and slight decreases in four wells.

Table 5. WMA TX-TY Assessment Sampling Summary 2014 Compared to 2013

Well Name	Cr(VI) (µg/L)		pH		Specific Conductance (µS/cm)		Dissolved Oxygen (µg/L)		Turbidity (NTU)	
	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013
299-W10-26	106	106	7.61	7.64	1,157	1,525	8,320	7,930	1.60	1.32
299-W10-27	30	56	7.99	8.01	969	1,622	10,818	10,810	159	4.90
299-W14-11	40	28	7.53	7.60	1,103	749	8,445	8,920	0.73	1.15
299-W14-13	16	18	7.69	7.76	1,230	762	8,528	8,278	3.45	8.09
299-W14-14	10	6	7.81	7.97	635	664	8,875	9,035	2.86	2.60
299-W14-15	9	16	7.48	7.78	769	733	8,610	8,463	2.21	2.41
299-W14-16	12	4.8	7.91	7.76	641	602	7,590	8,370	1.78	2.57
299-W14-17	6	5.3	8.02	7.95	638	624	9,010	8,880	2.27	0.78

Table 5. WMA TX-TY Assessment Sampling Summary 2014 Compared to 2013

Well Name	Cr(VI) (µg/L)		pH		Specific Conductance (µS/cm)		Dissolved Oxygen (µg/L)		Turbidity (NTU)	
	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013
299-W14-18	35	9	7.54	7.60	971	824	9,808	6,980	14.94	58.54
299-W14-19	10	7	7.80	7.83	601	664	8,555	9,065	3.95	2.58
299-W15-44	8	6	7.92	7.88	478	490	8,580	8,695	0.87	2.48
299-W15-763	8	5	7.99	7.94	579	926	8,930	11,050	11.2	3.06
299-W15-765	22	31	7.55	7.77	668	587	9,687	8,915	11.71	3.81

NTU = nephelometric turbidity unit

5.7 SST WMA U (Interim Status, Assessment Monitoring)

Three wells were sampled as scheduled and results were loaded into HEIS. The next scheduled quarterly sampling is January.

Chromium concentrations in the wells ranged from 6.2 µg/L (299-W19-42) to 21.1 µg/L (299-W19-12).

Construction of Well 299-W18-260, drilled as a replacement for Well 299-W18-30 (dry), was completed during October. Depth discrete sample results collected during drilling indicate that nitrate concentrations are highest in the upper part of the aquifer, as expected (Figure 11). The maximum concentration was 57.1 mg/L from the uppermost sample depth (10 ft below the water table). The well will be added to the WMA U sampling schedule beginning April 2015.

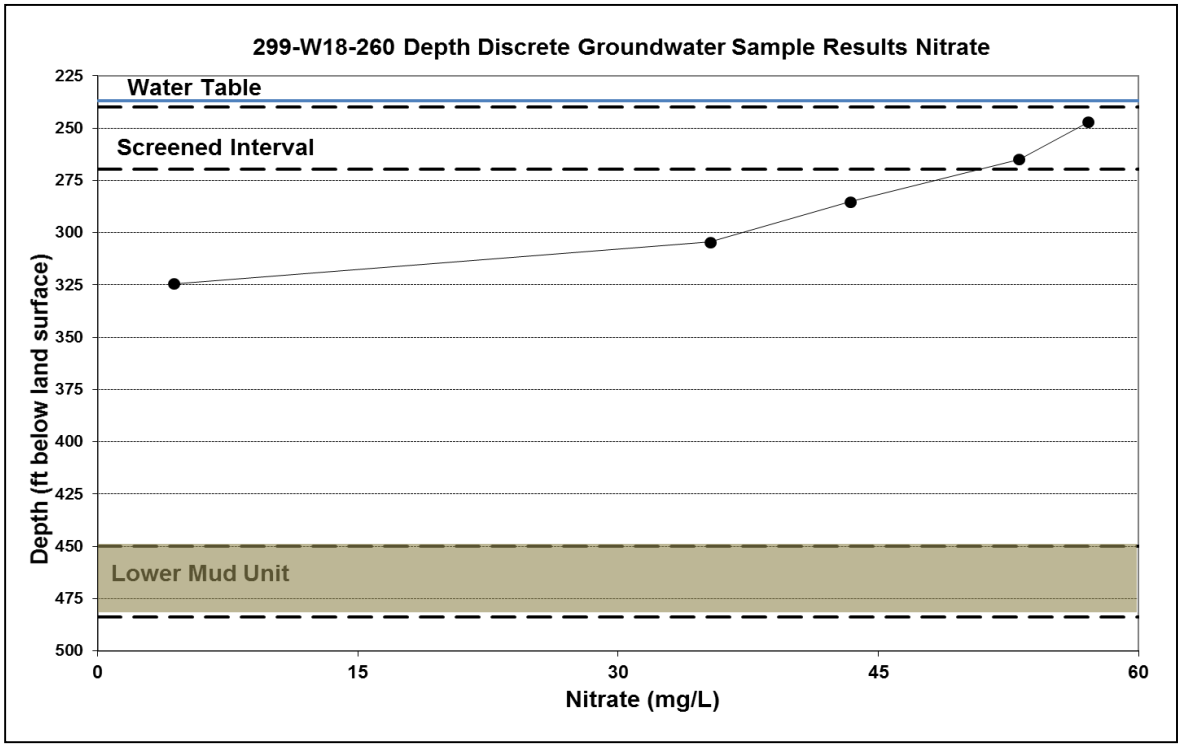

Figure 11. Depth Discrete Groundwater Results for Nitrate in Well 299-W18-260

6 Active Waste Management Areas

Permitted WMAs are monitored to determine whether dangerous waste or dangerous waste constituents from the waste sites have entered the groundwater. Summary status and monitoring highlights of results by exception are provided for each area for the quarterly reporting period.

6.1 Integrated Disposal Facility (Final Status, Detection Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is January 2015.

6.2 Liquid Effluent Retention Facility (Final Status, Detection Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is January 2015.

6.3 LLWMA-1 (Interim Status, Indicator Evaluation Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is January 2015.

6.4 LLWMA-2 (Interim Status, Indicator Evaluation Monitoring)

Eight of the nine wells were sampled in October as scheduled and results were loaded during the quarter. Sampling of Well 299-E27-10 was delayed until December due to development of a statement of work (SOW) for characterization of elevated TOC, and was approved December 18, 2014. On December 19 both the RCRA semiannual detection monitoring and TOC Characterization sampling were completed at Well 299-E27-10. None of the indicator parameter sample results exceeded the derived critical mean values. The next scheduled semiannual sampling event is April 2015.

Other analytical results loaded into HEIS during the quarter included: alkalinity, anions, cations, phenols, and trace metals used to evaluate groundwater quality. All the phenol groundwater quality parameter results were less than detection. Chloride, sodium, and sulfate, which are other groundwater quality parameters, (Table 6), had the highest concentrations in Wells 299-E27-9 and 299-E34-9, indicating these wells are being affected by migrating contaminant plumes. The elevated concentrations at Well 299-E27-9 appear to be associated with the elevated specific conductance previously detected at Well 299-E34-7. However, further characterization of this plume has not been associated with dangerous wastes or dangerous waste constituents as mentioned below. Likewise, the elevated concentrations at Well 299-E34-9 have been linked to the migration of plumes emanating from the BY Cribs as stated further in *Hanford Site Groundwater Monitoring Report for 2013,* (DOE/RL-2014-32). The other groundwater quality parameters, iron and manganese, are generally below detection levels for filtered samples. The unfiltered iron samples are generally just above detection limits and indicated minor well screen corrosion, which has been verified by television surveys in certain wells. Chromium and nickel are also elevated as a result of the well screen corrosion.

Previous characterization of elevated TOC and specific conductance in this area occurred during the years of 2000 to 2005 at Well 299-E34-7. The characterization included semiannual sample collection and analyses for 40 CFR 264 Appendix IX constituents. Additional analyses included: coliform bacteria, total petroleum hydrocarbons for diesel and gasoline, and oil and grease. In PNNL-15670 (*Hanford site Groundwater Monitoring for Fiscal Year 2005*) the results of the previous analyses concluded: "*no organic constituents were detected consistently and those detected were at low levels, often associated with blank contamination that appears to be false-positive results*." PNNL-15670 also stated, "*constituents causing the increased specific conductance in well 299-E34-7 are impacting wells farther southwest, wells 299-E27-10 and well 299-E27-9*." The new characterization approach of the TOC at Well 299-E27-10 is directed at concentrating the TOC and utilizing two additional analytical methods. The analytical methods include: 1) direct gas chromatography-mass spectrometer [GC-MS] injection to identify peaks that could represent the concentrated organic matter (used previously); 2) liquid

chromatography-MS/MS for evaluating concentrated organic material (new method); and, 3) direct electro-spray MS infusion of concentrated organic material (new method).

Table 6. Groundwater Quality Parameter Results

Parameter	Range of October 2014 Values
Chloride	18,900 to 22,400 µg/L
Sodium	21,800 to 26,000 µg/L
Sulfate	84,400 to 95,700 µg/L

6.5 LLWMA-3 (Interim Status, Indicator Evaluation Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is March 2015.

6.6 LLWMA-4 (Interim Status, Indicator Evaluation Monitoring)

No sampling scheduled during the quarter. The next scheduled sampling event is March 2015.

7 References

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