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Revision 0

POST-CLOSURE CORRECTIVE ACTION GROUNDWATER MONITORING REPORT FOR THE 300 AREA PROCESS TRENCHES: JULY - DECEMBER 2018

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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Executive Summary

This is the second 2018 semiannual report on post-closure corrective action groundwater monitoring for the 300 Area Process Trenches. It fulfills the requirement of WAC 173-303-645(11)(g)[1] to report twice each year on the effectiveness of the corrective action program. This report covers the period from July through December 2018.

The final status groundwater monitoring plan for the 300 Area Process Trenches (hereinafter referred to as the groundwater monitoring plan) was incorporated into the Hanford Facility *Resource Conservation and Recovery Act of 1976*[2] (RCRA) Permit (WA7890008967, Modification 8C.2018.Q1[3]) on May 24, 2017, and supersedes WHC-SD-EN-AP-185[4]. Constituents monitored under the groundwater monitoring plan are *cis*-1,2-dichloroethene (*cis*-1,2-DCE), trichloroethene (TCE), and field parameters (pH, specific conductance, temperature, and turbidity). Water-level measurements are also collected. Sampling is conducted semiannually (two samples per year) at eight RCRA monitoring wells. The Hanford Facility RCRA Permit concentration limits for *cis*-1,2-DCE and TCE are 16 µg/L and 4 µg/L, respectively, consistent with the cleanup levels in the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*[5] (CERCLA) record of decision for the 300-FF-5 Operable Unit[6].

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[1] WAC 173-303-645, "Dangerous Waste Regulations," "Releases from Regulated Units," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-645.

[2] *Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq. Available at: https://www.gpo.gov/fdsys/pkg/STATUTE-90/pdf/STATUTE-90-Pg2795.pdf.

[3] WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Revision 8c, as amended, Washington State Department of Ecology. Available at: https://fortress.wa.gov/ecy/nwp/permitting/hdwp/rev/8c/index.html.

[4] WHC-SD-EN-AP-185, 1995, *Groundwater Monitoring Plan for the 300 Area Process Trenches*, Rev. 0, Westinghouse Hanford Company, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196020117.

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[5] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 U.S.C. 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: https://www.csu.edu/cerc/researchreports/documents/CERCLASummary1980.pdf.

[6] EPA, Ecology, and DOE, 2013, *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=0087180.

During the reporting period, *cis*-1,2-DCE remained above the 16 µg/L Hanford Facility RCRA Permit concentration limit in well 399-1-16B, one of the four deep RCRA monitoring wells. TCE remained below the 4 µg/L Hanford Facility RCRA Permit concentration limit in all eight (four shallow, four deep) of the RCRA monitoring wells.

A statistical evaluation was performed to compare the *cis*-1,2-DCE and TCE results to the Hanford Facility RCRA Permit concentration limits. The evaluation applies to results at individual point of compliance (downgradient) wells. The 95% upper confidence limit on the concentration mean is calculated for datasets with at least one result that exceeds the concentration limit. A nonstatistical analysis is used for datasets with all results less than the concentration limit. The only 95% upper confidence limit that exceeded the Hanford Facility RCRA Permit concentration limit in a downgradient well was for *cis*-1,2-DCE in well 399-1-16B.

Corrective action is being accomplished through the CERCLA remedial action for groundwater, as documented in the CERCLA record of decision for the 300-FF-5 Operable Unit[6], issued in November 2013. The remedy for *cis*-1,2-DCE and TCE in groundwater is monitored natural attenuation and institutional controls.

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Terms

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
cis-1,2-DCE	*cis*-1,2-dichloroethene
DOE	U.S. Department of Energy
EDA	Environmental Dashboard Application
EPA	U.S. Environmental Protection Agency
OU	operable unit
PHOENIX	Pacific Northwest National Laboratory Hanford Online Environmental Information Exchange
RCRA	*Resource Conservation and Recovery Act of 1976*
TCE	trichloroethene
UCL	upper confidence limit

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1 Introduction

This is the second semiannual report for 2018 regarding post-closure corrective action groundwater monitoring describing the effectiveness of corrective action at the 300 Area Process Trenches (316-5 waste site). This report fulfills the requirement of WAC 173-303-645(11)(g), "Dangerous Waste Regulations," "Releases from Regulated Units," to report twice each year on the effectiveness of the corrective action program. This report covers the period from July through December 2018.

The final status groundwater monitoring plan for the 300 Area Process Trenches (hereinafter referred to as the groundwater monitoring plan) was incorporated into the Hanford Facility *Resource Conservation and Recovery Act of 1976* (RCRA) Permit (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Modification 8C.2018.Q1; hereinafter called the Hanford Facility RCRA Permit) on May 24, 2017. The groundwater monitoring plan, which is now included in the Hanford Facility RCRA Permit, supersedes WHC-SD-EN-AP-185, *Groundwater Monitoring Plan for the 300 Area Process Trenches*. Constituents monitored under the groundwater monitoring plan are *cis*-1,2-dichloroethene (*cis*-1,2-DCE), trichloroethene (TCE), and field parameters (pH, specific conductance, temperature, and turbidity). Sampling is conducted semiannually (two samples per year). This second semiannual report for 2018 includes *cis*-1,2-DCE and TCE results for samples collected in September 2018.

Environmental data used to generate this report are available from the U.S. Department of Energy (DOE) Environmental Dashboard Application (EDA) (https://ehs.hanford.gov/eda/) or the Pacific Northwest National Laboratory Hanford Online Environmental Information Exchange (PHOENIX) application (http://phoenix.pnnl.gov/). Ongoing data verification, technical review, and evaluation efforts by DOE contractors could result in differences between the data used for this publication and those available via the EDA or PHOENIX after publication of this report.

2 Site Description

The 300 Area Process Trenches are permitted as a RCRA treatment, storage, and disposal unit currently in post-closure corrective action monitoring. From 1975 through 1985, the trenches received liquid process waste discharges from fuel fabrication and research laboratories in the 300 Area, followed by continued discharge of clean effluent until December 1994. The site was remediated through removal of contaminated soil in the 1990s.

The 300 Area Process Trenches were closed under a modified closure/post-closure plan (DOE/RL-93-73, *300 Area Process Trenches Modified Closure/Postclosure Plan*) and remain in the groundwater corrective action program because groundwater contamination continues to exceed *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedial action objectives and Hanford Facility RCRA Permit concentration limits. Groundwater is monitored in accordance with WAC 173-303-645(11) and the Hanford Facility RCRA Permit, Part VI, "Unit Specific Conditions for Units in Post-Closure," "300 Area Process Trenches (PCU 1)," Chapter 3.0, "Groundwater Monitoring" (WA7890008967). The modified closure/post-closure plan (DOE/RL-93-73) and executive summary of the groundwater monitoring plan indicate the groundwater corrective action will be addressed as part of remediation for the CERCLA 300-FF-5 Operable Unit (OU).

Corrective action is being accomplished through the CERCLA remedial action for groundwater, as documented in the CERCLA record of decision for the 300-FF-5 OU (EPA et al., 2013, *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*) issued in November 2013. The remedy for *cis*-1,2-DCE and TCE in groundwater is monitored natural attenuation and institutional controls.

3 RCRA Groundwater Monitoring Program

Table 1 provides the Hanford Facility RCRA Permit concentration limits established for dangerous waste constituents *cis*-1,2-DCE and TCE at the 300 Area Process Trenches. RCRA corrective action monitoring for *cis*-1,2-DCE and TCE will continue to evaluate analytical results relative to Hanford Facility RCRA Permit concentration limits.

Table 1. Concentration Limits for the 300 Area Process Trenches

Dangerous Waste Constituents	Hanford Facility RCRA Permit Concentration Limit [a]	CERCLA Cleanup Level [b]
cis-1,2-DCE	16 µg/L (CERCLA Cleanup Level) [b]	16 µg/L (risk assessment for drinking water)
TCE	4 µg/L (CERCLA Cleanup Level) [b]	4 µg/L (risk assessment for drinking water)

Source: WAC 173-303-645(5), "Dangerous Waste Regulations," "Releases from Regulated Units."

a. WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Part VI, "Unit Specific Conditions for Units in Post-Closure," "300 Area Process Trenches (PCU 1)," Chapter 3.0, "Groundwater Monitoring," Modification 8C.2018.Q1.

b. EPA et al., 2013, *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*

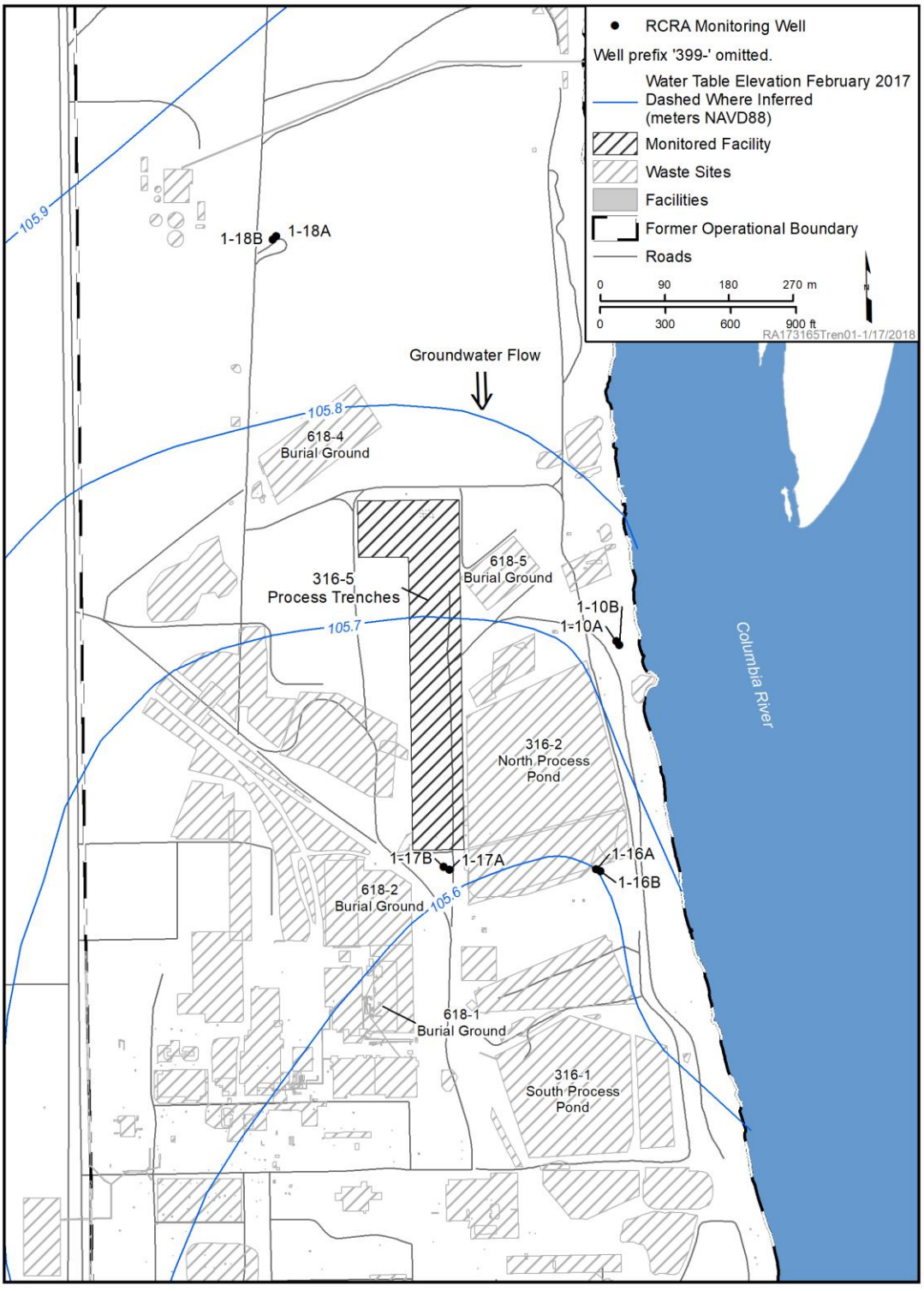
RCRA = *Resource Conservation and Recovery Act of 1976*

As specified in the groundwater monitoring plan, *cis*-1,2-DCE and TCE are sampled semiannually, with sample collection scheduled during low river stage (typically September to November) and high river stage (typically May through June). Semiannual monitoring consists of a single sample per sampling event (i.e., two samples per year). Field parameters (pH, specific conductance, temperature, and turbidity) and water-level measurements are collected each time a groundwater sample is obtained. During the 2018 second semiannual reporting period, the low river stage monitoring samples were collected in September 2018.

Under the previous groundwater monitoring plan (WHC-SD-EN-AP-185), the wells were sampled four times (at monthly intervals) during each semiannual sampling event in order to collect the required number of independent samples. As a result, the wells were sampled in December, January, February, and March, and in June, July, August, and September.

The concentration limits in the groundwater monitoring plan for *cis*-1,2-DCE and TCE are 16 µg/L and 4 µg/L, respectively, which are the cleanup levels identified in the CERCLA record of decision (EPA et al., 2013). Because of the previous exceedances of the concentration limit for *cis*-1,2-DCE and the ongoing remedial action, any concentration limit exceedances at the point of compliance during the remediation period do not require additional action (WA7890008967, Part VI, "300 Area Process Trenches [PCU 1]," Chapter 3.0).

The groundwater monitoring network for the 300 Area Process Trenches consists of four well pairs (Figure 1). Each well pair has one shallow and one deep well. The shallow wells (well numbers ending in "A") are screened near the water table, and the deep wells (well numbers ending in "B") are screened in the lower portion of the unconfined aquifer (above the lacustrine and overbank deposits of the Ringold Formation lower mud unit). One well pair is upgradient, and the other three pairs are downgradient of the process trenches.



Reference: NAVD88, *North American Vertical Datum of 1988*.

Figure 1. Monitoring Well Locations for the 300 Area Process Trenches

The point of compliance for the 300 Area Process Trenches is at downgradient monitoring wells 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, and 399-1-17B. Point of compliance wells are monitored to assess the progress of the corrective action (CERCLA remedial action). Concentrations of *cis*-1,2-DCE and TCE in these wells are evaluated relative to the concentration limits, in accordance with Section 3.3.2 of the groundwater monitoring plan in the Hanford Facility RCRA Permit. Results of the evaluation are provided in Chapter 5 of this report.

4 Contaminant Data

Table 2 lists the concentrations of dangerous waste constituents *cis*-1,2-DCE and TCE measured during the July through December 2018 reporting period.

Table 2. Groundwater Data for 300 Area Process Trenches, July through December 2018

Well	Date	Sampling Purpose	Dangerous Waste Constituents			
			***cis*-1,2-DCE (µg/L)**		**TCE (µg/L)**	
Hanford Facility RCRA Permit Concentration Limits*			***16***		***4***	
399-1-10A	09/05/2018	RCRA	0.10	U	0.25	U
399-1-10B	09/05/2018	RCRA	0.10	U	0.25	U
399-1-16A	09/06/2018	RCRA	0.10	U	0.25	U
399-1-16B	09/06/2018	RCRA	**140**	D	1.30	
399-1-17A	09/04/2018	RCRA	0.30	U	0.30	U
399-1-17A	09/04/2018	RCRA	0.30	U	0.30	U
399-1-17B	09/06/2018	RCRA	0.82	J	0.25	U
399-1-18A	09/05/2018	RCRA	0.15	UZTH	0.16	UZTH
399-1-18B	09/05/2018	RCRA	0.30	U	0.30	U

Reference: WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Part VI, "Unit Specific Conditions for Units in Post-Closure," "300 Area Process Trenches (PCU 1)."

**Italics* indicate Hanford Facility RCRA Permit (WA7890008967) concentration limits. The Hanford Facility RCRA Permit concentration limits for dangerous waste constituents were revised on May 24, 2017, with incorporation of the groundwater monitoring plan into the Hanford Facility RCRA Permit.

Bold emphasis is added where the result exceeded the Hanford Facility RCRA Permit concentration limit for dangerous waste constituents.

Dangerous waste constituent concentration limits are defined in WA7890008967, Part VI.

D = analyte reported at a secondary dilution factor

H = Laboratory holding time exceeded before the sample was analyzed.

J = estimated value

RCRA = *Resource Conservation and Recovery Act of 1976*

T = The matrix spike recovery is outside control limits. The associated sample data may be biased.

U = below detection limit

Z = Indicates a result-specific comment is provided in the data report and/or case narrative.

In the 300 Area Process Trenches network, *cis*-1,2-DCE continued to be detected in two deep wells (399-1-16B and 399-1-17B) during the reporting period. Only well 399-1-16B had concentrations that exceeded the 16 µg/L Hanford Facility RCRA Permit concentration limit. The concentration in well 399-1-16B was 140 µg/L, which is within the range of concentrations observed during recent reporting periods (Figure 2). Concentrations in this well are not affected by river stage, as shown in SGW-52135, *First Semiannual Report for 2011 Post-Closure Corrective Action Groundwater Monitoring at the 183-H Solar Evaporation Basins and 300 Area Process Trenches: January – June 2011*. At well 399-1-17B, the estimated concentration of *cis*-1,2-DCE was 0.82 µg/L. The method detection limit varied from 0.1 µg/L to 0.3 µg/L.

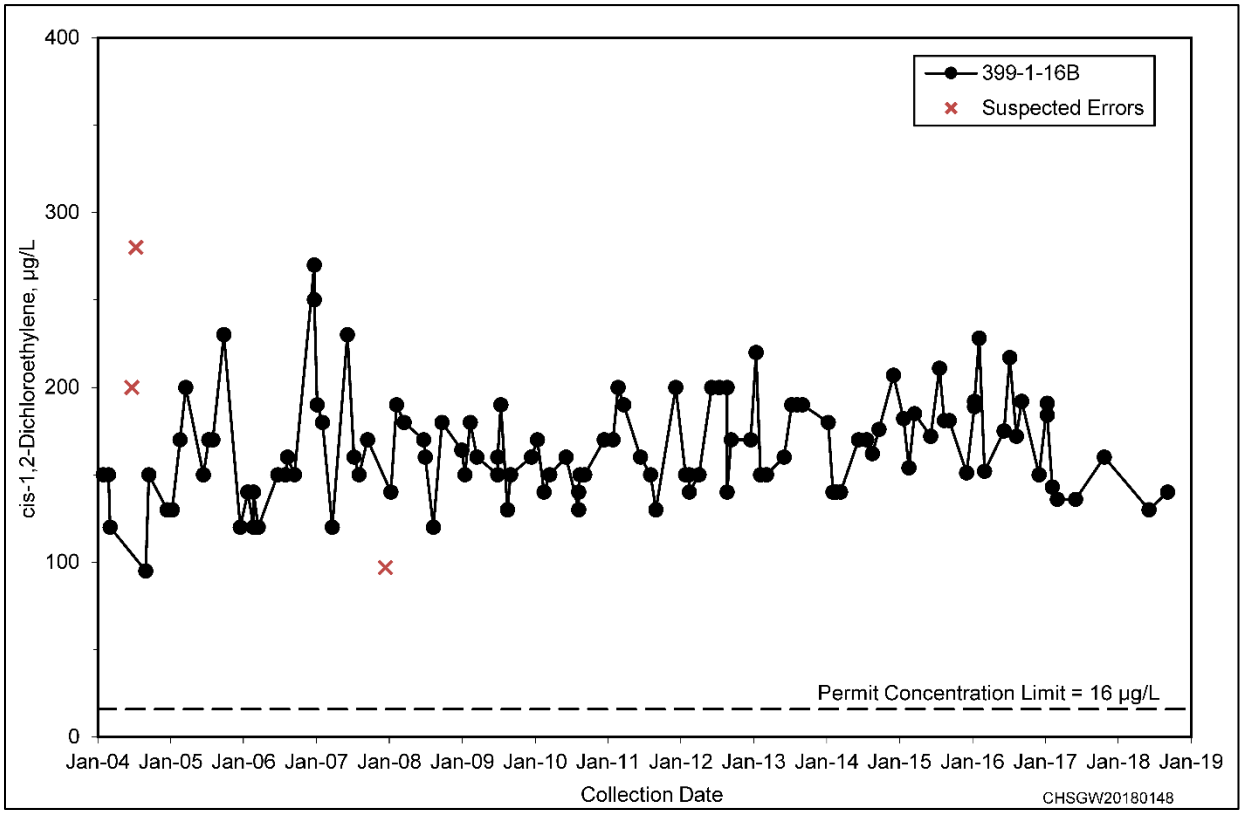


Figure 2. Concentrations of *cis*-1,2-Dichloroethene in Well 399-1-16B

During the reporting period, TCE was detected in well 399-1-16B. The concentration (1.30 µg/L) did not exceed the 4 µg/L Hanford Facility RCRA Permit concentration limit. The method detection limit ranged from 0.16 to 0.3 µg/L.

5 Statistical Evaluation

In accordance with Section 3.3.2 of the groundwater monitoring plan, a statistical evaluation was performed to compare the dangerous waste constituent results to the Hanford Facility RCRA Permit concentration limits. The evaluation applies to results at individual point of compliance downgradient wells. The 95% upper confidence limit (UCL) on the mean concentration is calculated for datasets with at least one result that exceeds the concentration limit. A nonstatistical analysis is used for datasets with all results less than the concentration limit. The 95% UCL was calculated using EPA, 2015, ProUCL, Version 5.1.

The 95% UCL statistical evaluation is documented in ECF-300FF5-18-0076, *Calculation of Upper Confidence Limits for RCRA Monitoring at the 300 Area Process Trenches to Support the July – December 2018 RCRA Semiannual Report*, which is provided as Appendix A of this report. The data for the last 12 monitoring events were used for the calculation: the last 8 events monitored under the previous plan (June 2016 through March 2017) and the first 4 events monitored under the groundwater monitoring plan (June 2017 through September 2018). The only 95% UCL for a dangerous waste constituent that exceeded the Hanford Facility RCRA Permit concentration limit in a downgradient well was for *cis*-1,2-DCE in well 399-1-16B (Table 3).

Table 3. Statistical Evaluation of 300 Area Process Trenches Dangerous Waste Constituents

Downgradient Well	2018 Semiannual Period	*cis*-1,2 DCE (µg/L)		TCE (µg/L)	
		95% UCL	Concentration Limit	95% UCL	Concentration Limit
399-1-10A	July-December	Not applicable*	16	Not applicable*	4
399-1-10B					
399-1-16A					
399-1-16B		175.7			
399-1-17A		Not applicable*			
399-1-17B					

Source: ECF-300FF5-18-0076, *Calculation of Upper Confidence Limits for RCRA Monitoring at the 300 Area Process Trenches to Support the July – December 2018 RCRA Semiannual Report* (Appendix A of this report).

*No results exceeded the concentration limit.

UCL = upper confidence limit

Each result for *cis*-1,2-DCE in the datasets for the other five downgradient wells was less than the 16 µg/L concentration limit. Each result for TCE in the datasets for all six downgradient wells was less than the 4 µg/L concentration limit. For these datasets, a nonstatistical analysis of the data is appropriate. Time-series plots for all wells and constituents are shown in ECF-300FF5-18-0076 (Appendix A of this report).

6 Conclusions

The September 2018 concentration of *cis*-1,2-DCE remained above the Hanford Facility RCRA Permit concentration limit (16 µg/L) in well 399-1-16B, which is screened near the bottom of the unconfined aquifer. The 95% UCL for *cis*-1,2-DCE at well 399-1-16B also remained above the Hanford Facility RCRA Permit concentration limit based on the last 12 sample results. Concentrations of *cis*-1,2-DCE remained below the Hanford Facility RCRA Permit concentration limit in the other seven RCRA wells monitoring the 300 Area Process Trenches.

Trichloroethene concentrations remained below the Hanford Facility RCRA Permit concentration limit (4 µg/L) during the reporting period in all eight RCRA wells monitoring the 300 Area Process Trenches. However, monitoring of this constituent will continue in compliance with the groundwater monitoring plan (WA7890008967, Part VI, "300 Area Process Trenches [PCU 1]," Chapter 3.0).

7 References

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Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. Available at: https://www.gpo.gov/fdsys/pkg/STATUTE-90/pdf/STATUTE-90-Pg2795.pdf.

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Appendix A

ECF-300FF5-18-0076, *Calculation of Upper Confidence Limits for RCRA Monitoring at the 300 Area Process Trenches to Support the July – December 2018 RCRA Semiannual Report*

Available at:

https://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0063917H

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