

# **POST-CLOSURE CORRECTIVE ACTION GROUNDWATER MONITORING REPORT FOR THE 300 AREA PROCESS TRENCHES: JULY - DECEMBER 2019**

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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## Executive Summary

This second 2019 semiannual report (for the July to December 2019 reporting period) covers post-closure corrective action groundwater monitoring for the 300 Area Process Trenches at the Hanford Site. It fulfills the requirement of WAC 173-303-645(11)(g)<sup>1</sup> to report twice each year on the effectiveness of the corrective action program.

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 *Resource Conservation and Recovery Act of 1976*<sup>2</sup> (RCRA) Permit (WA7890008967<sup>3</sup>) (hereinafter referred to as the Hanford RCRA Permit) on May 24, 2017. 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 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*<sup>4</sup> (CERCLA) Record of Decision for the 300-FF-5 Operable Unit.<sup>5</sup>

During the reporting period, *cis*-1,2-DCE remained above the 16 µg/L Hanford 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 RCRA Permit concentration limit in all four shallow and four deep RCRA monitoring wells.

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<sup>1</sup> 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>.

<sup>2</sup> *Resource Conservation and Recovery Act of 1976*, Pub. L. 94-580, 42 USC 6901 et seq. Available at: <https://www.gpo.gov/fdsys/pkg/STATUTE-90/pdf/STATUTE-90-Pg2795.pdf>.

<sup>3</sup> 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/>.

<sup>4</sup> *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, Pub. L. 107-377 as amended, 42 USC 9601 et seq., December 31, 2002. Available at: <https://www.csu.edu/cerc/researchreports/documents/CERCLASummary1980.pdf>.

<sup>5</sup> EPA 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, Region 10, and U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: <http://pdw.hanford.gov/document/0087180>.

A statistical evaluation was performed to compare the *cis*-1,2-DCE and TCE results to the Hanford RCRA Permit concentration limits. The evaluation applies to results at individual point of compliance (downgradient) wells. The 95% upper confidence limits on the *cis*-1,2-DCE and TCE concentration means are calculated for datasets with at least one result that exceeds the concentration limit. A nonstatistical or visual analysis is used for datasets with all results less than the concentration limit. The 95% upper confidence limit exceeded the Hanford RCRA Permit concentration limit only 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,<sup>5</sup> issued in November 2013. The remedy for *cis*-1,2-DCE and TCE in groundwater is monitored natural attenuation and institutional controls.

## Contents

<b>1</b>	<b>Introduction</b> .....	<b>1</b>
<b>2</b>	<b>Site Description</b> .....	<b>1</b>
<b>3</b>	<b>RCRA Groundwater Monitoring Program</b> .....	<b>2</b>
<b>4</b>	<b>Contaminant Data</b> .....	<b>5</b>
<b>5</b>	<b>Statistical Evaluation</b> .....	<b>7</b>
<b>6</b>	<b>Conclusions</b> .....	<b>8</b>
<b>7</b>	<b>References</b> .....	<b>8</b>

## Figures

Figure 1.	Monitoring Well Locations for the 300 Area Process Trenches .....	4
Figure 2.	Concentrations of <i>cis</i> -1,2-Dichloroethene in Well 399-1-16B.....	6

## Tables

Table 1.	Concentration Limits for the 300 Area Process Trenches.....	2
Table 2.	300 Area Process Trenches Groundwater Monitoring Network .....	5
Table 3.	300 Area Process Trenches RCRA Sampling Summary, July Through December 2019.....	5
Table 4.	Statistical Evaluation of 300 Area Process Trenches Dangerous Waste Constituents .....	7

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## Terms

CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
DOE	U.S. Department of Energy
EDA	Environmental Dashboard Application
PCU 1	Post-Closure Unit Group 1
PHOENIX	Pacific Northwest National Laboratory Hanford Online Environmental Information Exchange
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
UCL	upper confidence limit

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## 1 Introduction

This is the second semiannual report for 2019 regarding post-closure corrective action groundwater monitoring, which assesses the effectiveness of corrective action at the 300 Area Process Trenches (316-5 waste site). This report, which covers groundwater monitoring from July to December 2019, fulfills the WAC 173-303-645(11)(g), “Dangerous Waste Regulations,” “Releases from Regulated Units,” requirement to report twice each year on the effectiveness of the corrective action program.

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 *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*, as amended [hereinafter referred to as the Hanford RCRA Permit]) on May 24, 2017.<sup>1</sup> 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) at eight RCRA monitoring wells. This second semiannual report for 2019 includes *cis*-1,2-DCE, TCE, and field parameter results for samples collected in September 2019.

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 DOE contractor evaluation efforts could result in differences between the data used for this publication and those available via EDA or PHOENIX after the 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 (BHI-01164, *300 Area Process Trenches Verification Package*).

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 RCRA Permit concentration limits. Groundwater is monitored in accordance with WAC 173-303-645(11) and the Hanford 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 the executive summary of the groundwater monitoring plan indicate that the groundwater corrective action will be addressed as part of remediation for the CERCLA 300-FF-5 Operable Unit.

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<sup>1</sup> Minor formatting modifications were made to the groundwater monitoring plan on March 15, 2018, under Modification 8C.2018.Q1.

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 (EPA 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*) 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

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

**Table 1. Concentration Limits for the 300 Area Process Trenches**

Dangerous Waste Constituents	Hanford RCRA Permit Concentration Limit <sup>a</sup>	CERCLA Cleanup Level <sup>b</sup>
<i>cis</i> -1,2-DCE	16 µg/L (CERCLA cleanup level) <sup>b</sup>	16 µg/L (risk assessment for drinking water)
TCE	4 µg/L (CERCLA cleanup level) <sup>b</sup>	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 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*.

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

RCRA = *Resource Conservation and Recovery Act of 1976*

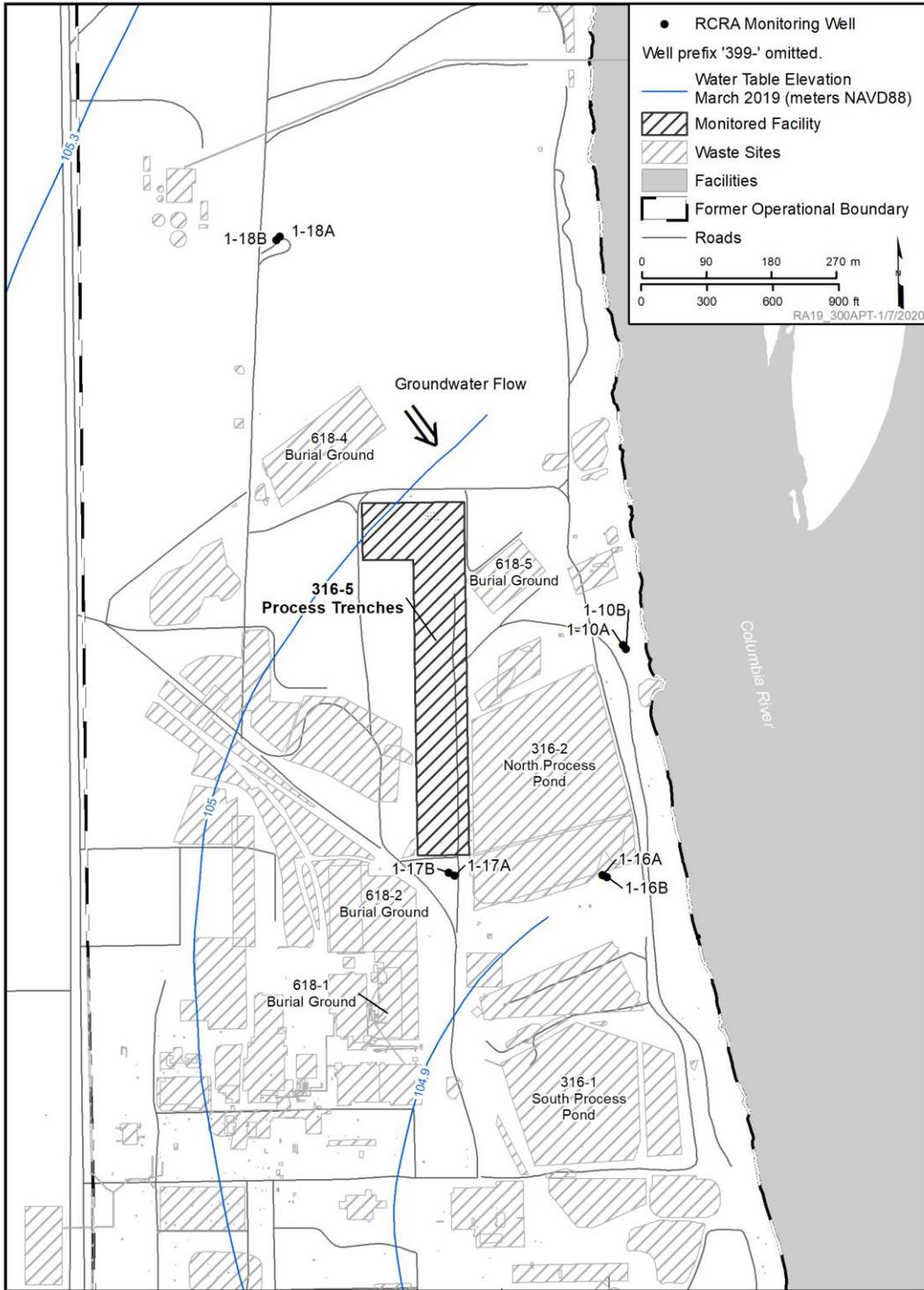
As specified in the groundwater monitoring plan, the RCRA monitoring wells are sampled semiannually for *cis*-1,2-DCE and TCE, with sample collection scheduled during low river stage (typically September to November) and high river stage (typically May through June). Semiannual monitoring consists of a single sample from each well during each sampling event (i.e., two samples from each well 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 2019 second semiannual reporting period, the samples were collected in September 2019 during low river stage.

Under the previous groundwater monitoring plan (WHC-SD-EN-AP-185, *Groundwater Monitoring Plan for the 300 Area Process Trenches*), the wells were sampled four times (at monthly intervals) during each semiannual sampling event to collect the required number of independent samples. As a result, the wells were sampled each year in December, January, February, and March; and in June, July, August, and September. Data collected from June 2016 through March 2017 under the previous groundwater monitoring plan are used in the statistical evaluation in Chapter 5.

The concentration limits identified 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 and DOE, 2013) (Table 1). Because of the previous exceedances of the concentration limits for *cis*-1,2-DCE and TCE and the ongoing remedial action, any concentration limit exceedances at the point of compliance during the remediation period do not require additional action (Section 3.2.2 of 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 with one shallow and one deep well. The shallow wells (well names ending in “A”) are screened in the Hanford formation near the water table. The deep wells (well names ending in “B”) are screened in the Ringold Formation 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 (Table 2).

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 statistically evaluated relative to the concentration limits in accordance with the groundwater monitoring plan in the Hanford RCRA Permit (Section 3.2.2 of WA7890008967, Part VI, “300 Area Process Trenches (PCU 1),” Chapter 3.0). The results of the statistical evaluation are provided in Chapter 5 of this report.



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

Source: Modified from Figure 7-8 in ECF-HANFORD-19-0114, *Preparation of the March 2019 Hanford Site Water Table Map*.

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

**Table 2. 300 Area Process Trenches Groundwater Monitoring Network**

Well Name	Location	Year Installed	WAC Compliant*	Sample Frequency
399-1-10A	Downgradient shallow	1986	Y	Semiannual
399-1-10B	Downgradient deep	1991	Y	Semiannual
399-1-16A	Downgradient shallow	1986	Y	Semiannual
399-1-16B	Downgradient deep	1987	Y	Semiannual
399-1-17A	Downgradient shallow	1986	Y	Semiannual
399-1-17B	Downgradient deep	1986	Y	Semiannual
399-1-18A	Upgradient shallow	1986	Y	Semiannual
399-1-18B	Upgradient deep	1987	Y	Semiannual

\*Constructed as a resource protection well in accordance with WAC 173-160, “Minimum Standards for Construction and Maintenance of Wells.”

WAC = Washington Administrative Code

## 4 Contaminant Data

Table 3 lists the results for dangerous waste constituents and field parameters in RCRA samples collected from the 300 Area Process Trenches well network during the July through December 2019 reporting period.

**Table 3. 300 Area Process Trenches RCRA Sampling Summary, July Through December 2019**

Well Name	RCRA Sample Date	Dangerous Waste Constituents				Field Parameters			
		<i>cis</i> -1,2-DCE (µg/L)		TCE (µg/L)		pH	Specific Conductance (µS/cm)	Temperature (°C)	Turbidity (NTU)
<b>Hanford RCRA Permit Concentration Limits</b>		<b>16</b>		<b>4</b>		—	—	—	—
399-1-10A	09/19/2019	0.30	U	0.30	U	7.8	482	17.4	0.4
399-1-10B	09/19/2019	0.30	U	0.50	U	7.7	312	15.7	1.7
399-1-16A	09/20/2019	0.23	U	0.31	U	7.5	497	17.1	0.4
399-1-16B	09/20/2019	<b>147</b>	D	1.41	J	8.0	311	16.3	0.8
399-1-17A	09/20/2019	0.30	U	0.30	U	7.6	513	18.9	0.4
399-1-17B	09/20/2019	0.69	J	0.50	U	7.6	342	18.8	0.6
399-1-18A	09/19/2019	0.15	U	0.16	U	8.1	486	17.1	1.7
399-1-18B	09/19/2019	0.30	U	0.30	U	7.7	371	17.3	0.7

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)”, Chapter 3.



During the reporting period, TCE was detected in one well (399-1-16B), but the estimated concentration (1.41 µg/L) did not exceed the 4 µg/L Hanford RCRA Permit concentration limit. The method detection limit ranged from 0.16 to 0.5 µg/L.

## 5 Statistical Evaluation

In accordance with the groundwater monitoring plan (Section 3.2.2 of WA7890008967, Part VI, “300 Area Process Trenches (PCU 1),” Chapter 3.0), a statistical evaluation was performed to compare the dangerous waste constituent results to the Hanford RCRA Permit concentration limits. The evaluation applies to results at individual point of compliance (downgradient) wells. The 95% upper confidence limits (UCLs) on the mean concentrations for *cis*-1,2-DCE and TCE are calculated for datasets with at least one result that exceeds the concentration limit. A nonstatistical or visual 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-300FF5-20-0001, *Calculation of Upper Confidence Limits for RCRA Monitoring at the 300 Area Process Trenches to Support the July – December 2019 Semiannual Report*. The data from the last 14 monitoring events were used for the calculation: the last eight events under the previous groundwater monitoring plan (June 2016 through March 2017) (WHC-SD-EN-AP-185) and the first six events under the current plan (June 2017 through September 2019) (Section 3.2.2 of WA7890008967, Part VI, “300 Area Process Trenches (PCU 1),” Chapter 3.0). Once eight semiannual samples have been collected under the current groundwater monitoring plan, sample results collected under the previous groundwater monitoring plan no longer will be included in datasets. The 95% UCL for a dangerous waste constituent exceeded the Hanford RCRA Permit concentration limit only for *cis*-1,2-DCE in well 399-1-16B (Table 4).

**Table 4. Statistical Evaluation of 300 Area Process Trenches Dangerous Waste Constituents**

Downgradient Well	2019 Semiannual Period	<i>cis</i> -1,2-DCE (Hanford RCRA Permit Concentration Limit = 16 µg/L)	TCE (Hanford RCRA Permit Concentration Limit = 4 µg/L)
		95% UCL (µg/L)	
399-1-10A	July–December	N/A <sup>b</sup>	N/A <sup>b</sup>
399-1-10B	July–December	N/A <sup>b</sup>	N/A <sup>b</sup>
399-1-16A	July–December	N/A <sup>b</sup>	N/A <sup>b</sup>
399-1-16B	July–December	173.1	N/A <sup>b</sup>
399-1-17A	July–December	N/A <sup>b</sup>	N/A <sup>b</sup>
399-1-17B	July–December	N/A <sup>b</sup>	N/A <sup>b</sup>

Source: ECF-300FF5-20-0001, *Calculation of Upper Confidence Limits for RCRA Monitoring at the 300 Area Process Trenches to Support the July – December 2019 Semiannual Report*.

a. The 95% UCL calculation was performed using data collected during the last 14 sample events in June 2016 through September 2019.

b. None of the results exceeded the concentration limit.

RCRA = Resource Conservation and Recovery Act of 1976

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 Hanford RCRA Permit concentration limit. Each result for TCE in the datasets for all six downgradient wells was less than the 4 µg/L Hanford RCRA Permit concentration limit. For these datasets, a nonstatistical analysis of the data is appropriate. Time-series plots for all wells and constituents are included in ECF-300FF5-20-0001.

## 6 Conclusions

In September 2019, the concentration of *cis*-1,2-DCE remained above the Hanford RCRA Permit concentration limit (16 µg/L) in well 399-1-16B, one of four deep RCRA monitoring wells. The 95% UCL for *cis*-1,2-DCE at well 399-1-16B also remained above the Hanford RCRA Permit concentration limit based on the last 14 sample results. Concentrations of *cis*-1,2-DCE remained below the Hanford RCRA Permit concentration limit in the other three deep and four shallow RCRA wells monitoring the 300 Area Process Trenches.

TCE concentrations remained below the Hanford RCRA Permit concentration limit (4 µg/L) during the reporting period in all eight RCRA monitoring wells at 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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