SGW-60197
Revision 0

Post-Closure Corrective Action Groundwater Monitoring Report for the 300 Area Process Trenches: January - June 2016

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;
Further Dissemination Unlimited

SGW-60197
Revision 0

Post-Closure Corrective Action Groundwater Monitoring Report for the 300 Area Process Trenches: January - June 2016

Date Published
November 2016

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
By Lana Perry at 1:06 pm, Nov 15, 2016

Release Approval | Date

Approved for Public Release;
Further Dissemination Unlimited

TRADEMARK DISCLAIMER

Reference herein to any specific commercial product, process, or service by tradename, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

Executive Summary

This is the first 2016 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.

Groundwater monitoring objectives of the *Resource Conservation and Recovery Act of 1976* (RCRA);[2] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA);[3] and *Atomic Energy Act of 1954* (AEA)[4] 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, these radionuclides are not subject to RCRA regulation. Consistent with the deferral of RCRA Sections 1004 and 1006 to the AEA, 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 corrective action reporting requirements, the inclusion of information on radionuclides in such context is for informational purposes only and may not be used to create conditions or other restrictions set forth in any *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*[5] (hereafter referred to as the Hanford Facility RCRA Permit). Uranium and other radionuclides included in this report serve only as "indicator parameters," which help to identify the presence of regulated dangerous wastes.

---

[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.epa.gov/rcra.

[3] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: http://epw.senate.gov/cercla.pdf.

[4] *Atomic Energy Act of 1954*, as amended, 42 USC 2011, Pub. L. 83-703, 68 Stat. 919. Available at: http://epw.senate.gov/atomic54.pdf.

[5] WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Revision 8c, as amended, Washington State Department of Ecology. Available at: http://www.ecy.wa.gov/programs/nwp/permitting/hdwp/rev/8c/.

This report covers the period from January through June 2016. Environmental data used to generate this report are available from the DOE Environmental Dashboard Application (EDA) (https://ehs.hanford.gov/eda/) or Pacific Northwest National Laboratory Online Environmental Information Exchange (PHOENIX) application (http://phoenix.pnnl.gov). Ongoing verification, technical review, and evaluation efforts may result in differences between the data used for this publication and those available via EDA or PHOENIX after publication of this report.

In one deep well (399-1-16B), *cis*-1,2-dichloroethene remained above the 70 µg/L Hanford Facility RCRA Permit concentration limit (drinking water standard [DWS]). Trichloroethene remained below the 5 µg/L Hanford Facility RCRA Permit concentration limit (DWS) in all of the wells.

Uranium concentrations continued to exceed the monitoring level set as the Hanford Facility RCRA Permit concentration limit (DWS of 30 µg/L) at downgradient well 399-1-16A screened near the water table. Uranium concentrations remained below the Hanford Facility RCRA Permit concentration limit in well 399-1-17A from January through June 2016. Well 399-1-17A is downgradient of the area selected for implementation of enhanced attenuation (EA), which is one component of the CERCLA 300-FF-5 Groundwater Operable Unit remedy (EPA et al., 2013, *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*[6]). The EA component of the groundwater remedy involves infiltrating and injecting phosphate solutions to the vadose zone, periodically rewetted zone, and top of the aquifer to sequester, or bind, residual mobile uranium to form insoluble minerals. Stage A (initial) infiltration and injection of phosphate was conducted in November 2015. The lower uranium concentrations in well 399-1-17A after November 2015 may reflect the impact of the Stage A phosphate application.

Uranium concentrations at well 399-1-16A vary inversely with water level, as is typical for wells located near the Columbia River. Uranium concentrations at well 399-1-17A vary positively with water level, as is typical for wells located farther inland from the Columbia River, near source areas. The increase in uranium concentrations in

[6] EPA, Ecology, and DOE, 2013, *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.

groundwater near source areas during high water levels is caused by mobilization of residual uranium contamination in the deep vadose zone resulting from the temporary elevation of the water table. The decrease in uranium concentrations near the shoreline during high water levels is caused by dilution from intrusion of river water into the aquifer. During seasonal low water table conditions, the highest concentrations in the plume are often observed near the river, where uranium introduced inland during the preceding period of high water table conditions has migrated downgradient to the shoreline, and intrusion of river water into the zone beneath the shoreline is lessened because of the lower river stage.

Corrective action is being accomplished through the CERCLA remedial action for groundwater, as documented in *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*,[6] issued in November 2013. The remedy for groundwater includes monitored natural attenuation, EA, and institutional controls.

This page intentionally left blank.

Contents

1 Introduction **1**

2 Site Description **1**

3 300-FF-5 Operable Unit CERCLA Remedial Action **2**

4 RCRA Groundwater Monitoring Program **2**

5 Contaminant Trends **3**

6 Conclusions **9**

7 References **9**

Figures

Figure 1. Monitoring Well Locations for the 300 Area Process Trenches 4

Figure 2. Concentrations of *cis*-1,2-Dichloroethene in Well 399-1-16B 7

Figure 3. Inversely Related Uranium Concentrations and Water Level in Well 399-1-16A 8

Figure 4. Positively Related Uranium Concentrations and Water Level in Well 399-1-17A 8

Tables

Table 1. WAC 173-303-645(5) Concentration Limits for the 300 Area Process Trenches 2

Table 2. Groundwater Data for 300 Area Process Trenches, January through June 2016 5

Terms

AEA	*Atomic Energy Act of 1954*
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DWS	drinking water standard
EA	enhanced attenuation
EDA	Environmental Dashboard Application
IC	institutional control
MDL	method detection limit
MNA	monitored natural attenuation
OU	operable unit
PHOENIX	Pacific Northwest National Laboratory Hanford Online Environmental Information Exchange
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	record of decision
VOC	volatile organic compound

1 Introduction

This is the first semiannual report for 2016 regarding post-closure corrective action groundwater monitoring describing the effectiveness of corrective actions at the 300 Area Process Trenches (waste site 316-5). 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 January through June 2016.

Groundwater monitoring objectives of the *Resource Conservation and Recovery Act of 1976* (RCRA); *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA); and *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, these radionuclides are not subject to RCRA regulation. Consistent with the deferral of RCRA Sections 1004 and 1006 to the AEA, 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 corrective action reporting requirements, the inclusion of information on radionuclides in such context is for informational purposes only and may not be used to create conditions or other restrictions set forth in any WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste* (hereafter referred to as the Hanford Facility RCRA Permit). Uranium and other radionuclides in this report serve only as "indicator parameters," which help to identify the presence of regulated dangerous wastes.

Environmental data used to generate this report are available from the DOE Environmental Dashboard Application (EDA) (https://ehs.hanford.gov/eda/) or the Pacific Northwest National Laboratory 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/or disposal unit that is currently in post-closure corrective action monitoring. From 1975 through 1985, the trenches received effluent discharges of dangerous mixed waste 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 Plan/Postclosure Plan*) and remain in the groundwater corrective action program because groundwater contamination continues to exceed CERCLA remedial action objectives and Hanford Facility RCRA Permit concentration limits. Groundwater monitoring is conducted in accordance with WAC 173-303-645(11) and the Hanford Facility RCRA Permit, Part VI, Post-Closure Unit 1. The closure plan (DOE/RL-93-73) indicates that groundwater corrective action will be addressed as part of remediation for the CERCLA 300-FF-5 Groundwater Operable Unit (OU).

3 300-FF-5 Operable Unit CERCLA Remedial Action

Until November 2013, the interim action for groundwater in the 300 Area was monitored natural attenuation (MNA) of uranium and volatile organic compounds (VOCs) in accordance with the CERCLA record of decision (ROD) (EPA et al., 1996, *Declaration of the Record of Decision for the USDOE Hanford 300 Area 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington*).

In November 2013, a ROD for final action was signed (EPA et al., 2013, *Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*). The selected remedy for groundwater in the 300 Area Industrial Complex includes MNA for trichloroethene and *cis*-1,2-dichloroethene, enhanced attenuation (EA) of uranium using sequestration by phosphate application, and institutional controls (ICs).

EA using the uranium sequestration component of the groundwater remedy involves infiltrating and injecting phosphate solutions to the vadose zone, periodically rewetted zone, and top of the aquifer to sequester, or bind, residual mobile uranium to form insoluble minerals. The target area for application of phosphate solutions is a 1 ha (3 ac) area near the former 300 Area Process Trenches. Uranium sequestration is being implemented using a staged approach. Stage A consists of performing infiltration and injection of phosphate solutions in one quadrant (approximately 0.3 ha [0.75 ac]) of the 1 ha (3 ac) EA area. Stage A infiltration and injection were conducted in November 2015. Stage A results will be used to refine the Stage B approach for the remaining three quadrants (0.9 ha [2.25 ac]).

4 RCRA Groundwater Monitoring Program

Table 1 provides the Hanford Facility RCRA Permit concentration limits established for the 300 Area Process Trenches. RCRA corrective action monitoring will continue to evaluate analytical results relative to Hanford Facility RCRA Permit concentration limits.

Table 1. WAC 173-303-645(5) Concentration Limits for the 300 Area Process Trenches

Dangerous Waste Constituents	RCRA Concentration Limit[a]	CERCLA Cleanup Level[b]
cis-1,2-Dichloroethene	70 µg/L (DWS)	16 µg/L (risk assessment for drinking water)
Trichloroethene	5 µg/L (DWS)	4 µg/L (risk assessment for drinking water)
Other 300 Area Process Trenches Waste Indicator[c]	**Concentration Limit**	**CERCLA Cleanup Level[b]**
Uranium (Total; Chemical Analysis)	30 µg/L (DWS)	30 µg/L (DWS)

Reference: WAC 173-303-645, "Dangerous Waste Regulations," "Releases from Regulated Units."

a. WHC-SD-EN-AP-185, *Groundwater Monitoring Plan for the 300 Area Process Trenches*.

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

c. Uranium is monitored as a waste indicator.

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

DWS = drinking water standard

RCRA = *Resource Conservation and Recovery Act of 1976*

The groundwater monitoring network for the 300 Area Process Trenches (WHC-SD-EN-AP-185, *Groundwater Monitoring Plan for the 300 Area Process Trenches*) includes 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. The wells are monitored for the constituents listed in Table 1. The sampling frequency is semiannual, but the wells are 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 are sampled in December, January, February, and March and in June, July, August, and September. During the January through June 2016 reporting period, the 300 Area Process Trenches post-closure monitoring wells were sampled in January, February, March, and June.

Data from RCRA monitoring at the 300 Area Process Trenches are used as supplementary information to construct larger scale water table and uranium concentration maps that extend beyond the area of the 300 Area Process Trenches network.

5 Contaminant Trends

This chapter discusses concentrations of *cis*-1,2-dichloroethene, trichloroethene, and uranium measured during the January through June 2016 reporting period. Table 2 lists the analytical results for contaminants measured in each well.

In the 300 Area Process Trenches network, *cis*-1,2-dichloroethene continued to be detected in two wells (399-1-16B and 399-1-17B) during the reporting period. Only well 399-1-16B had concentrations that exceeded the 70 µg/L Hanford Facility RCRA Permit concentration limit. Concentrations in well 399-1-16B were comparable to those of the previous reporting period, ranging from 152 to 228 µg/L (Figure 2). At well 399-1-17B, *cis*-1,2-dichloroethene was detected four times during this reporting period; the maximum detection of 2.5 µg/L was in March 2016. The method detection limit (MDL) varied from 0.09 µg/L to 0.3 µg/L.

During the reporting period, trichloroethene was detected only in wells 399-1-16A and 399-1-16B; concentrations did not exceed the 5 µg/L Hanford Facility RCRA Permit concentration limit. Estimated concentrations of trichloroethene in all four samples from well 399-1-16A ranged from 0.34 to 0.42 µg/L. Estimated concentrations in all four samples from well 399-1-16B ranged from 1.83 to 2.09 µg/L. The MDL ranged from 0.16 to 0.3 µg/L.

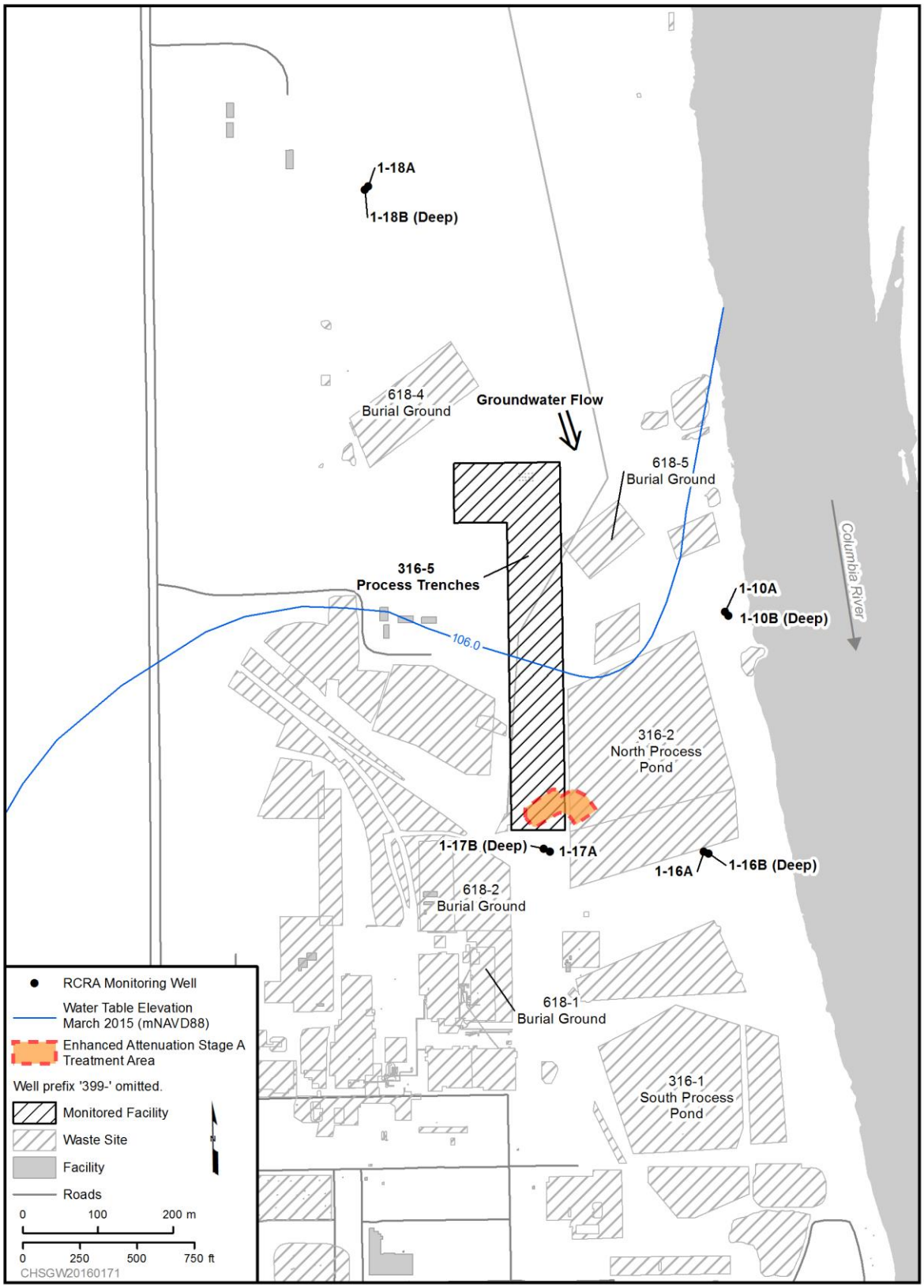

Figure 1. Monitoring Well Locations for the 300 Area Process Trenches

Table 2. Groundwater Data for 300 Area Process Trenches, January through June 2016

Well	Date	Sampling Purpose	Dangerous Waste Constituents				Waste Indicator	
			cis-1,2-Dichloroethene (µg/L)		Trichloroethene (µg/L)		Uranium[b] (µg/L)	
Hanford Facility RCRA Permit Concentration Limits[a]			***70***		***5***		***30***	
399-1-10A	01/13/2016	RCRA	0.3	U	0.3	U	20.0	
	02/08/2016	RCRA	0.3	U	0.3	U	21.1	
	03/04/2016	RCRA	0.3	U	0.3	U	21.8	
	06/07/2016	RCRA	0.3	U	0.3	U	13.5	
399-1-10B	01/13/2016	RCRA	0.09	U	0.25	U	0.05	U
	02/08/2016	RCRA	0.09	U	0.25	U	0.23	U
	03/04/2016	RCRA	0.3	U	0.3	U	0.07	U
	06/07/2016	RCRA	0.1	U	0.25	U	0.03	U
399-1-16A	01/13/2016	RCRA	0.09	U	0.42	J	**57.2**	
	02/05/2016	RCRA	0.09	U	0.34	J	**54.0**	
	03/04/2016	RCRA	0.09	U	0.41	J	**52.6**	
	06/08/2016	RCRA	0.1	U	0.4	J	**33.0**	
399-1-16B	01/13/2016	RCRA	**189**	D	1.98	J	8.11	
	01/13/2016	RCRA	**192**	D	1.83	J	7.44	
	02/05/2016	RCRA	**228**	D	1.91	J	9.74	
	03/04/2016	RCRA	**152**	D	2.09	J	11.3	
	06/09/2016	RCRA	**175**	D	1.97	J	2.03	
399-1-17A	01/13/2016	RCRA	0.3	U	0.3	U	4.92	
	02/05/2016	RCRA	0.3	U	0.3	U	9.95	
	03/04/2016	RCRA	0.3	U	0.3	U	27.6	
	06/08/2016	RCRA	0.3	U	0.3	U	25.4	
	06/08/2016	RCRA	0.15	U	0.16	U	1.56	

Table 2. Groundwater Data for 300 Area Process Trenches, January through June 2016

Well	Date	Sampling Purpose	Dangerous Waste Constituents				Waste Indicator	
			***cis*-1,2-Dichloroethene (µg/L)**		**Trichloroethene (µg/L)**		**Uranium[b] (µg/L)**	
399-1-17B	01/13/2016	RCRA	1.7		0.25	U	0.05	U
	02/05/2016	RCRA	1.2		0.25	U	0.23	U
	03/04/2016	RCRA	2.5		0.25	U	0.23	U
	06/08/2016	RCRA	1.3		0.25	U	0.04	B
399-1-18A	01/13/2016	RCRA	0.09	U	0.25	U	5.9	
	02/05/2016	RCRA	0.09	U	0.25	U	5.8	
	03/04/2016	RCRA	0.09	U	0.25	U	7.33	
	06/07/2016	RCRA	0.1	U	0.25	U	6.2	
399-1-18B	01/13/2016	RCRA	0.3	U	0.3	U	0.07	U
	02/05/2016	RCRA	0.3	U	0.3	U	0.07	U
	03/04/2016	RCRA	0.3	U	0.3	U	0.07	U
	06/07/2016	RCRA	0.3	U	0.3	U	0.07	U

Notes: ***Italics*** indicate Hanford Facility RCRA Permit concentration limits; Hanford Facility RCRA Permit concentration limit updated for uranium following promulgation of the drinking water standard.

Bold emphasis is added where the result exceeded the Hanford Facility RCRA Permit concentration limit.

a. Concentration limits are defined in the Hanford Facility RCRA Permit, Part VI, Post-Closure Unit 1.

b. Uranium nondetects are listed as the minimum detectable activity.

B = analyte detected at a value less than the contract required detection limit but greater than or equal to the method detection limit

D = analyte reported at a secondary dilution factor

J = estimated value

RCRA = *Resource Conservation and Recovery Act of 1976*

U = below detection limit

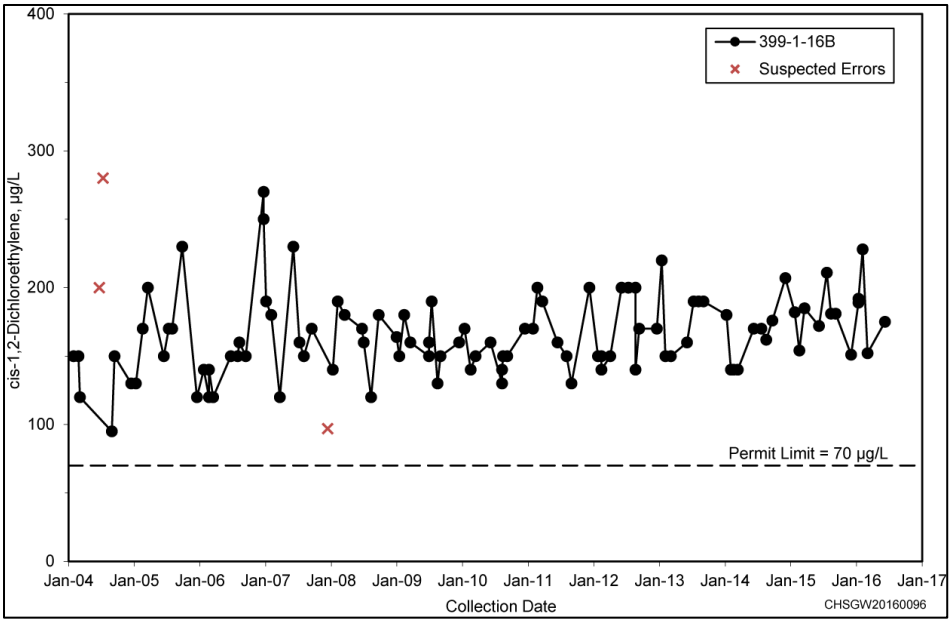

Figure 2. Concentrations of *cis*-1,2-Dichloroethene in Well 399-1-16B

A persistent uranium plume underlies the 300 Area Industrial Complex. Concentrations of waste indicator uranium continued to exceed the Hanford Facility RCRA Permit concentration limit (30 µg/L) in all samples from downgradient water table well 399-1-16A (Figure 3). Concentrations of waste indicator uranium exceeded the Hanford Facility RCRA Permit concentration limit in samples from downgradient water table well 399-1-17A before December 2015 (SGW-59635, *Post-Closure Corrective Action Groundwater Monitoring Report for the 300 Area Process Trenches: July – December 2015*). In December 2015, the uranium concentration decreased below the Hanford Facility RCRA Permit concentration limit and remained below 30 µg/L in January through June 2016 (Figure 4). Well 399-1-17A is downgradient of the area selected for implementation of the 300-FF-5 OU EA remedy (Figure 1). Lower uranium concentrations in December 2015 and January through June 2016 for well 399-1-17A (Table 2) may reflect the impact of the Stage A phosphate application in November 2015. The increasing concentrations in March and June 2016 may be a result of the rising water level mobilizing residual uranium. The concentration in June, when a seasonal high concentration would be expected, was in the same concentration range as the previous seasonal low concentrations (Figure 4). Longer-term groundwater monitoring is needed to confirm these trends.

Uranium concentrations at well 399-1-16A (Figure 3) tend to be highest in the fall and winter when water levels are low and lowest in the spring and early summer when water levels are high. This inverse relationship between uranium concentration and water level is typical for wells that are located near the Columbia River. Uranium concentrations at well 399-1-17A (Figure 4) tend to be lowest in the fall and winter and highest in the spring and early summer. The positive relationship between uranium concentration and water level is typical for wells that are located farther inland from the Columbia River near source areas.

The increase in uranium concentrations near source areas during high water levels is caused by mobilization of residual contamination in the vadose zone resulting from the temporary elevation of the water table. The decrease in uranium concentrations near the shoreline during high water levels is caused by dilution from intrusion of river water into the aquifer.

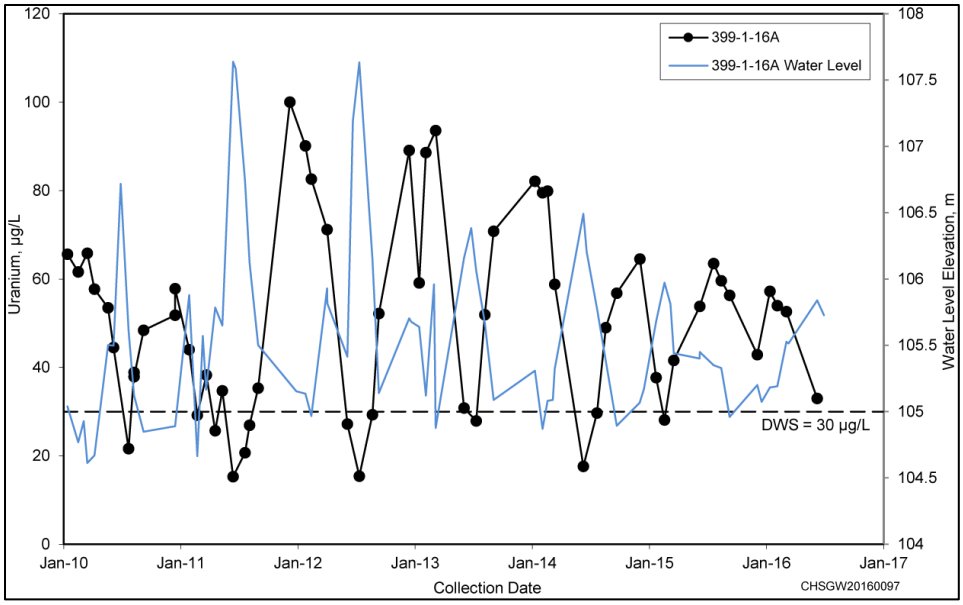

Figure 3. Inversely Related Uranium Concentrations and Water Level in Well 399-1-16A

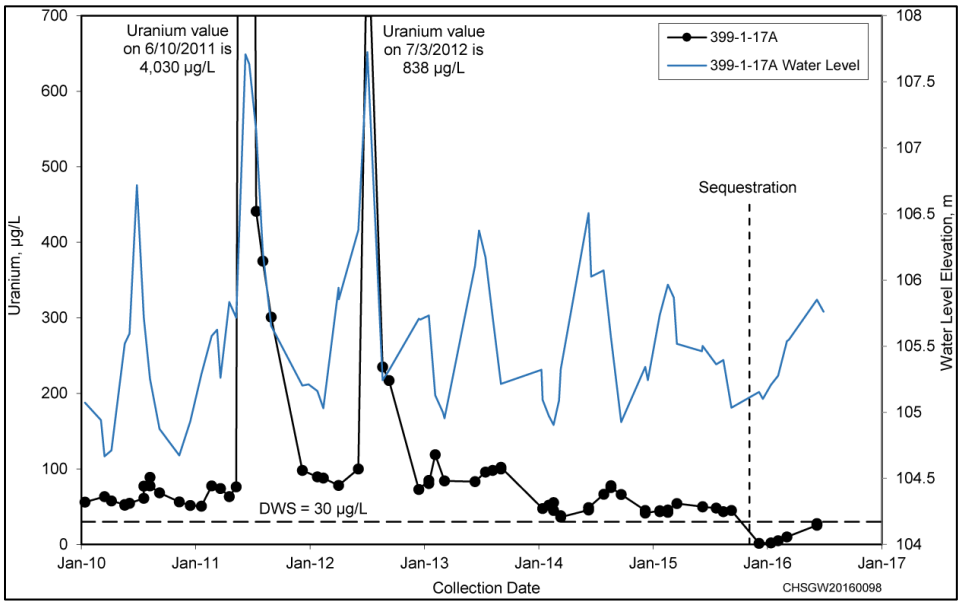

Figure 4. Positively Related Uranium Concentrations and Water Level in Well 399-1-17A

During seasonally low water table conditions, the highest concentrations in the plume are often observed near the river, where uranium introduced inland during the preceding period of high water table conditions has migrated downgradient to the shoreline, and intrusion of river water into the zone beneath the shoreline is lessened because of the lower river stage. Uranium concentrations in the 300 Area are described in detail in PNNL-17034, *Uranium Contamination in the Subsurface Beneath the 300 Area, Hanford Site, Washington*; PNNL-22048, *Updated Conceptual Model for the 300 Area Uranium Groundwater Plume*; and DOE/RL-2010-99, *Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units*.

6 Conclusions

The concentration of *cis*-1,2-dichloroethene remained above the Hanford Facility RCRA Permit concentration limit (70 µg/L) in well 399-1-16B, which is screened near the bottom of the unconfined aquifer. 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*.

Trichloroethene concentrations remained below the Hanford Facility RCRA Permit concentration limit (5 µg/L) during the reporting period. However, monitoring of this VOC will continue in compliance with the groundwater monitoring plan (WHC-SD-EN-AP-185).

Concentrations of waste indicator uranium remained above the monitoring level specified as the Hanford Facility RCRA Permit concentration limit (30 µg/L) in well 399-1-16A, downgradient of the 300 Area Process Trenches and screened near the top of the unconfined aquifer. Uranium concentrations in well 399-1-16A vary inversely with seasonal fluctuations in the water table elevation. Uranium concentrations in well 399-1-17A vary positively with seasonal fluctuations in the water table elevation, which are caused by seasonal fluctuations in the river elevation. The lower uranium concentration in well 399-1-17A (December 2015 and January through June 2016) may reflect the impact of the Stage A phosphate application in November 2015 for the EA component of the CERCLA 300-FF-5 OU remedy.

RCRA corrective actions are being accomplished through the CERCLA remedial action for groundwater (MNA, EA, and ICs), as identified in the 300-FF-5 OU ROD (EPA et al., 2013).

7 References

Atomic Energy Act of 1954, as amended, 42 USC 2011, Pub. L. 83-703, 68 Stat. 919. Available at: http://epw.senate.gov/atomic54.pdf.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: http://epw.senate.gov/cercla.pdf.

DOE/RL-93-73, 1997, *300 Area Process Trenches Modified Closure/Postclosure Plan*, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1309100642.

DOE/RL-2010-99, 2013, *Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088359.
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088307.
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088306.
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088305.

EPA, Ecology, and DOE, 1996, *Declaration of the Record of Decision for the USDOE Hanford 300 Area, 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington*, 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/index.cfm/viewDoc?accession=D196245781.

EPA, Ecology, and DOE, 2013, *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.

NAVD88, 1988, *North American Vertical Datum of 1988*, as revised, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland. Available at: http://www.ngs.noaa.gov/.

PNNL-17034, 2008, *Uranium Contamination in the Subsurface Beneath the 300 Area, Hanford Site, Washington*, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-17034.pdf.

PNNL-22048, 2012, *Updated Conceptual Model for the 300 Area Uranium Groundwater Plume*, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22048.pdf.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. Available at: https://www.epa.gov/rcra.

SGW-52135, 2012, *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*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093013.

SGW-59635, 2016, *Post-Closure Corrective Action Groundwater Monitoring Report for the 300 Area Process Trenches: July – December 2015*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076946H.

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: http://www.ecy.wa.gov/programs/nwp/permitting/hdwp/rev/8c/index.html.

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

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.

Modified by:

WHC-SD-EN-AP-185, 1996, *Groundwater Monitoring Plan for the 300 Area Process Trenches*, Rev. 0A, Westinghouse Hanford Company, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196135178.