SGW-47971
Revision 0

Results of Groundwater Monitoring for the 183-H Solar Evaporation Basins and 300 Area Process Trenches, January-June 2010

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

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352

SGW-47971
Revision 0

Results of Groundwater Monitoring for the 183-H Solar Evaporation Basins and 300 Area Process Trenches, January-June 2010

Document Type: RPT Program/Project: S&GRP

D. C. Weekes
CH2M HILL Plateau Remediation Company

Date Published
November 2010

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

S E Bratton 11/17/2010
Release Approval Date

Results of Groundwater Monitoring for the 183-H Solar Evaporation Basins and 300 Area Process Trenches –

January—June 2010

Executive Summary

This is one of a series of reports on *Resource Conservation and Recovery Act of 1976*[1] monitoring at the 183-H Solar Evaporation Basins and the 300 Area Process Trenches. It fulfills the requirement of *Washington Administrative Code* (WAC) 173-303-645(11)[2] to report twice each year on the effectiveness of the corrective action program. This report covers the period from January through June 2010.

The concentrations of 183-H Solar Evaporation Basins contaminants remained below applicable concentration limits during the reporting period. The most recent exceedance of a concentration limit was May 2007.

The overall concentration of uranium in 300 Area Process Trenches wells remained above the 20 μg/L concentration limit in the three downgradient wells screened at the water table. Fluctuations of uranium concentration are caused by changes in river stage. The concentration of cis-1,2-dichloroethene remained above the 70 μg/L concentration limit in one deep well (399-1-16B). Concentrations are relatively steady at this well and are not affected by river stage. Trichloroethene concentrations were below detection limits in all wells during the reporting period.

[1] *Resource Conservation and Recovery Act of 1976*, Public Law 94-580, as amended, 90 Stat. 2795, 42 U.S.C. 6901, et seq.

[2] WAC 173-303-645, "Release from Regulated Units," *Washington Administrative Code*.

TABLE OF CONTENTS

FIGURES

TABLES

TERMS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DWS	drinking water standard
OU	operable unit
RCRA	*Resource Conservation and Recovery Act of 1976*
TCE	trichloroethene
WAC	*Washington Administrative Code*

1. Introduction

This is one of a series of reports on *Resource Conservation and Recovery Act of 1976* (RCRA) groundwater monitoring. It fulfills the requirement of *Washington Administrative Code* (WAC) 173-303-645(11), "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 2010. Chapter 2.0 presents information for the 183-H Solar Evaporation Basins, and Chapter 3.0 presents information for the 300 Area Process Trenches.

2. 183-H Solar Evaporation Basins

Formerly located in the 100-H Area of the Hanford Site, the 183-H Solar Evaporation Basins were four concrete basins used for waste treatment and disposal from 1973 to 1985. The waste discharged to the basins originated in the 300 Area Fuel Fabrication Facility and included solutions of neutralized chromic, hydrofluoric, nitric, and sulfuric acids. The waste solutions contained various metallic and radioactive constituents (e.g., chromium, technetium-99, and uranium). Between 1985 and 1996, the remaining waste was removed, the facility was demolished, and the underlying contaminated soil was removed and replaced with clean fill. The site is a post-closure unit in the Hanford Facility RCRA Permit (WA7890008967, *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*). Groundwater is monitored in accordance with WAC 173-303-645(11) and Part VI, Chapter 2 of the Hanford Facility RCRA Permit.

The regulations in WAC 173-303-645(11) require corrective action activities to reduce contaminant concentrations in groundwater. The post-closure plan (DOE/RL-97-48, *183-H Solar Evaporation Basins Postclosure Plan*), which was incorporated into Part VI of the Hanford Facility RCRA Permit in February 1998, deferred further actions at the basins (also known as waste site 116-H-6) to the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) interim action for the 100-HR-3 Groundwater Operable Unit (OU). The post-closure plan also requires monitoring to be conducted as described in the final status RCRA groundwater monitoring plan (PNNL-11573, *Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins*).

2.1 100-HR-3 CERCLA Interim Remedial Action

The interim remedial action applies to the 100-HR-3 Groundwater OU, which is under the authority of CERCLA (EPA 1996a, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington*). The objective of the interim remedial action is to reduce the amount of chromium entering the Columbia River, where it is a potential hazard to the ecosystem. To achieve this objective, a pump-and-treat system, which extracts groundwater, treats it to remove chromium, and then injects it back into the aquifer. Figure 1 illustrates the active extraction and injection wells. Details of the pump-and-treat system are specified in DOE/RL-96-84, *Remedial Design and Remedial Action Work Plan for the 100-HR-3 and 100-KR-4 Groundwater Operable Units' Interim Action*). The chromium concentration limit for treated groundwater to be discharged to injection wells that are not located upgradient of the extraction wells was changed to 20 µg/L from 22 µg/L in the August 2009 *Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision* (EPA 2009). The system may also be shut down if it proves ineffective or if a better treatment technique is found.

Groundwater is sampled to monitor the performance of the interim remedial action and to monitor the 100-HR-3 Groundwater OU (DOE/RL-96-90, *Interim Action Monitoring Plan for the 100-HR-3 and 100-KR-4 Operable Units*). Activities for CERCLA and RCRA monitoring are coordinated.

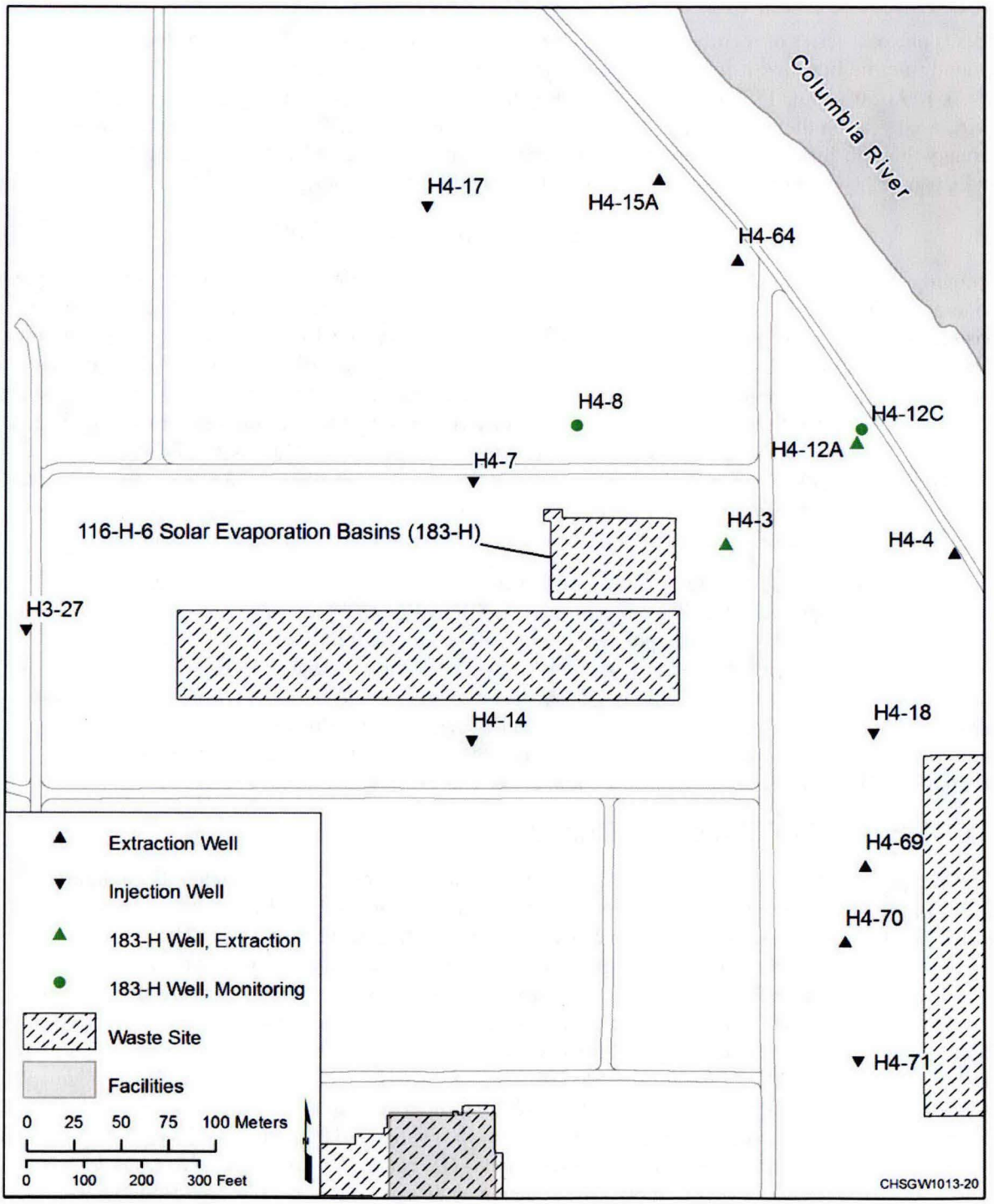

Figure 1. Monitoring Well Locations for 183-H (116-H-6) Basins

2.2 183-H Basins RCRA Groundwater Monitoring Program

For the duration of the groundwater extraction under the CERCLA interim remedial action, RCRA corrective action monitoring will continue to evaluate new analytical results relative to concentration limits stated in the Hanford Facility RCRA Permit (Table 1). Additionally, fluoride results will be evaluated relative to established trends and the drinking water standard (DWS) for fluoride[3] (Hanford Facility RCRA Permit, Part VI, Chapter 2).

Table 1. Concentration Limits for 183-H Solar Evaporation Basins.

Dangerous Waste Constituents	Concentration Limit
Chromium (total; filtered sample)	122 µg/L – local background when compliance monitoring plan written (1996); upgradient sources
Nitrate	45 mg/L – DWS (as NO_3)
Other 183-H Waste Indicators	**Concentration Limit**
Technetium-99	900 pCi/L – DWS
Uranium (total; chemical analysis)	20 µg/L – proposed DWS when monitoring plan written (1996)

DWS = drinking water standard

The RCRA groundwater monitoring network includes wells 199-H4-3, 199-H4-8, 199-H4-12A, and 199-H4-12C (Figure 1). The conditions in the Hanford Facility RCRA Permit, Part VI, Post-Closure Unit 2, provide for groundwater sample collection annually in these wells (generally in November). The wells were not scheduled for sampling during the reporting period; however, the wells were sampled for the 100-HR-3 interim action for the analytes in table 1 except for 199-H4-12C.

Wells 199-H4-3 and 199-H4-12A are extraction wells. Well 199-H4-8 has been part of the RCRA network since 2006; it replaced well 199-H4-7, which was converted to an injection well for the 100-HR-3 Pump-And-Treat System. Wells 199-H4-3, 199-H4-8, and 199-H4-12A are completed at the top of the unconfined aquifer. Well 199-H4-12C is located adjacent to well 199-H4-12A and is completed deeper in the Ringold Formation.

2.3 183-H Basins Contaminant Trends

This section discusses the concentrations of chromium, fluoride, nitrate, technetium-99, and uranium in the groundwater. Results of samples collected during the reporting period are presented in Table 2, and pertinent results are discussed in the following paragraphs.

During the reporting period, chromium[4] concentrations ranged from below detection limits to 20 µg/L (Table 2; Figures 2 and 3). Chromium concentrations have been below the 122 µg/L concentration limit in all four wells since 2003.

3 The RCRA Permit gives the value 1,400 µg/L as the U.S. Environmental Protection Agency maximum contaminant level (DWS) for fluoride. The actual limit is 4,000 µg/L.

4 Chromium results discussed here represent hexavalent chromium, which can be measured either by analyses specifically for the hexavalent species or from total chromium measured in filtered samples. Dissolved chromium in Hanford Site groundwater is nearly all hexavalent.

Because the well was not sampled no chromium concentrations were analyzed for in deep well 199-H4-12C. The levels in this well have declined from ~300 µg/L in the early 1990s, and were stable until the last year. Concentrations were increasing in the latter part of 2009. Since no other basins co-contaminants are elevated in well 199-H4-12C, it is likely the chromium in this well has another source.

Table 2. Groundwater Data for 183-H Basins, January through June 2010.

Well	Date	Sampling Purpose	Hexavalent Chromium (ug/L)		Chromium, total (ug/L)		Fluoride (ug/L)		Nitrate (mg/L)		Technetium-99 (pCi/L)		Uranium (ug/L)	
	Concentration Limit		*122*		*122*		*1400*		*45*		*900*		*20*	
199-H4-12A	3/2/2010	CERCLA	9		--		--		--		--		--	
199-H4-12A	4/5/2010	CERCLA	11		--		--		--		--		--	
199-H4-12A	5/3/2010	CERCLA	9		--		--		--		--		--	
199-H4-12A	5/20/2010	CERCLA	--		--		60	UD	20.2		-2.4	U	3.09	D
199-H4-12A	6/2/2010	CERCLA	20		--		--		--		--		--	
199-H4-3	1/11/2010	CERCLA	2	U	13	U	128	BD	29	D	19		12.2	D
199-H4-3	4/22/2010	CERCLA	2	U	14.7	D	60	UD	30.8	D	7.9		8.28	D
199-H4-3	5/20/2010	CERCLA	5.3		13	U	60	UD	35.1	D	9.6		6.68	D
199-H4-3	6/2/2010	CERCLA	8		--		--		--		--		--	
199-H4-8	1/11/2010	CERCLA	4.1	B	13	U	90.6	BD	24.57	D	-0.2	U	0.61	D
199-H4-8	5/16/2010	CERCLA	2.8		--		--		--		--		--	

* Concentration limits defined in the Hanford Facility RCRA Permit, Part VI, Post-Closure Unit 2

Analyses are from unfiltered samples unless otherwise noted. Shading indicates filtered samples.

B = less than contract-required detection limit but greater than method detection limit

U = below detection limit

D = sample diluted for analysis; result corrected for dilution

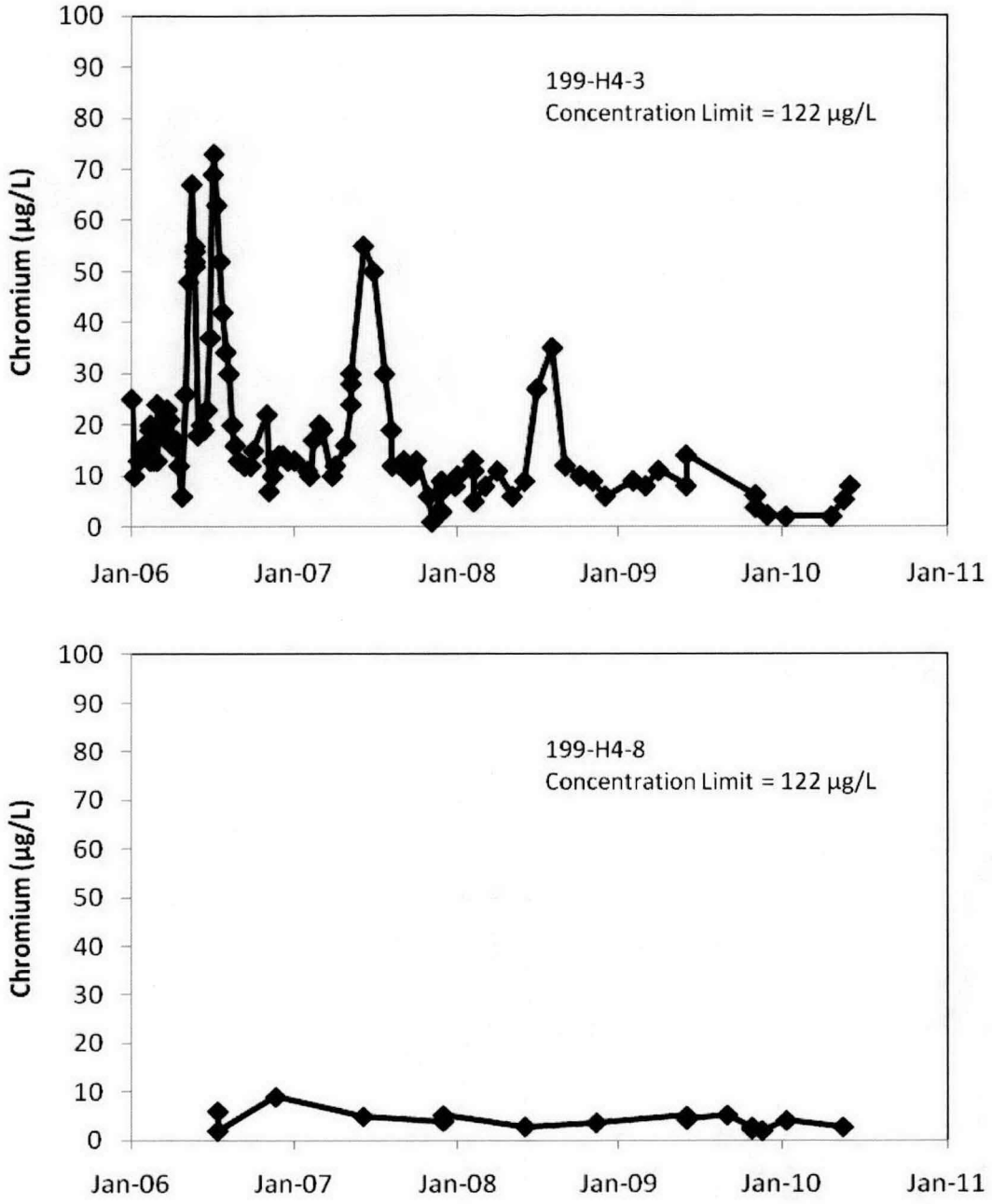

Figure 2. Chromium Concentrations in Wells 199-H4-3 and 199-H4-8

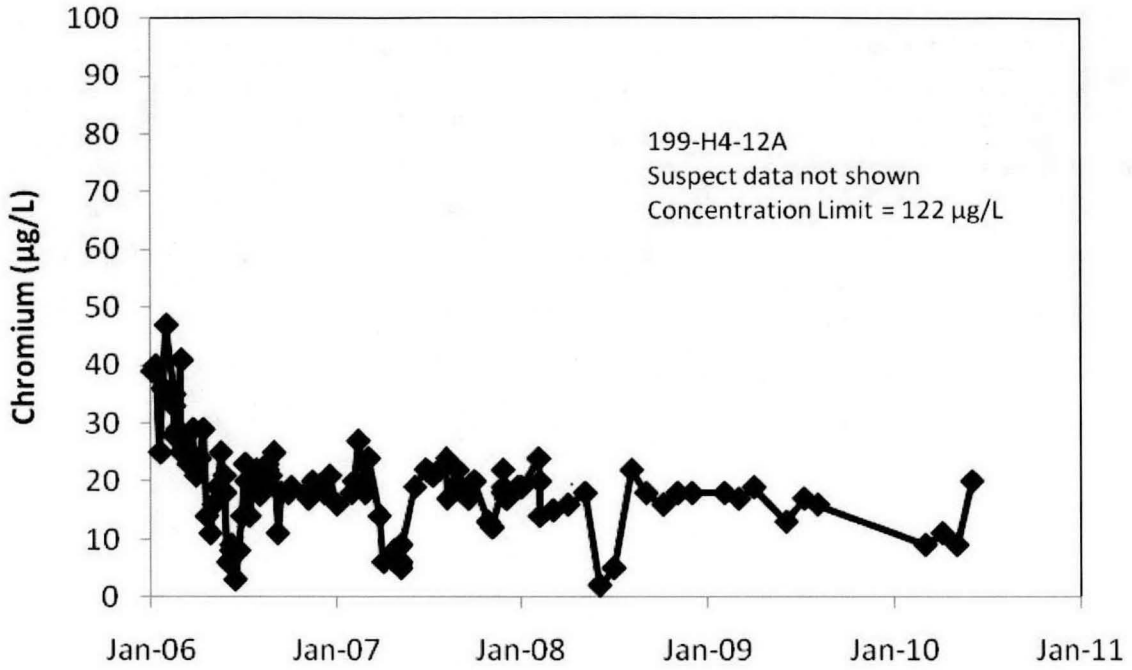

Figure 3. Chromium Concentrations in Well 199-H4-12A

Historically, 183-H contaminant concentrations in groundwater were highest during periods of low river stage (autumn). During 2006, 2007, 2008, and 2009, however, monitoring for CERCLA showed that chromium levels rose briefly in well 199-H4-3 in the spring/summer (Figure 2). This pattern was repeated in a subdued manner in June 2010, when the concentration was 8 µg/L. This extraction well is nearest to the former 183-H Solar Evaporation Basins and historically has the highest chromium concentrations in the 100-H Area.

In extraction well 199-H4-12A chromium levels were at or below 20 µg/L during the reporting period. Levels also remained low in well 199-H4-8.

Fluoride, nitrate, technetium-99, and uranium were analyzed in wells 199-H4-12A, 199-H4-3, and 199-H4-8 during the reporting period, and concentrations remained low.

2.4 183-H Basins Conclusions

The concentrations of 183-H Solar Evaporation Basins contaminants remained below applicable concentration limits during the reporting period. Table 3 summarizes the last exceedance of each concentration limit.

Table 3. Summary of 183-H Solar Evaporation Basins Concentration Limit Exceedances

Constituent	Date of most recent exceedance of concentration limit	Well exceeding
Chromium (hexavalent or filtered total)	July 2004	199-H4-12C
Fluoride	September 1996	199-H4-3
Nitrate	May 2007	199-H4-3
Technetium-99	November 1999	199-H4-3
Uranium	May 2007	199-H4-3

3. 300 Area Process Trenches

The Hanford Facility RCRA Permit classifies the 300 Area Process Trenches as a RCRA treatment, storage, and/or disposal unit. From 1975 to 1994, the trenches received effluent discharges of dangerous mixed waste from fuel fabrication and research laboratories in the 300 Area. The site was remediated in the 1990s. Groundwater monitoring at the 300 Area process trenches is conducted in accordance with WAC 173-303-645(11) and the Hanford Facility RCRA Permit, Part VI, Chapter 1. The closure plan (DOE/RL-93-73, *300 Area Process Trenches Modified Closure Plan and Part A, Form 3*), portions of which are incorporated in the Hanford Facility RCRA Permit, indicates that groundwater remediation is deferred to the CERCLA 300-FF-5 Groundwater OU. The CERCLA waste site designation is 316-5.

The objective of groundwater monitoring is to demonstrate the effectiveness of the corrective action program by confirming that the trends of the groundwater constituents of interest reflect natural attenuation, as expected by the CERCLA record of decision (EPA 1996b, *Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington*). The 300 Area Process Trenches were closed under a modified closure/postclosure plan (DOE/RL-93-73) and remain in the groundwater corrective action program because groundwater contamination continues to exceed groundwater quality criteria (federal DWSs, or in the case of uranium the proposed DWS at the time the plan was written).

The concentration limits established for the 300 Area Process Trenches are provided in Table 4. These limits were applied during compliance monitoring to determine whether corrective action was necessary as required in accordance with WAC 173-303-645(11).

Table 4. Concentration Limits for 300 Area Process Trenches.

Dangerous Waste Constituents	Concentration Limit
cis-1,2-Dichloroethene	70 µg/L – DWS
Trichloroethene (TCE)	5 µg/L – DWS
Other 300 Area Process Trenches Waste Constituent	**Concentration Limit**
Uranium (total; chemical analysis)	20 µg/L – proposed DWS when monitoring plan written (1996)

3.1 300 Area Process Trenches RCRA Groundwater Monitoring Program

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 4). Each of the well pairs has one shallow and one deep well. The shallow wells are screened at the water table, and the deep wells are screened at the bottom of the unconfined aquifer (above the lacustrine and over-bank deposits of the Ringold lower mud unit). One of the pairs is upgradient, and the other three pairs are downgradient. The constituents of interest are the volatile organic compounds cis-1,2-dichloroethene and trichloroethene (TCE), and the non-RCRA-regulated constituent uranium. Sampling frequency is semiannual, but during each semiannual sampling period the wells are sampled four times (monthly intervals). As a result, the wells are sampled during the months of December, January, February, March, and June, July, August, September. Groundwater samples are analyzed for the constituents of interest. Data from wells other than the 300 Area Process Trenches network (300-FF-5 Groundwater OU wells) 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.

During the January through June 2010 reporting period, most of the 300 Area Process Trenches network wells were sampled as scheduled in January, February, and June. Well 399-1-17A was not sampled in February as scheduled due to paperwork not being prepared. Some of the wells also were sampled in April and May for the 300-FF-5 Groundwater OU. Uranium data from that sampling event are included in the discussions of Section 3.2.

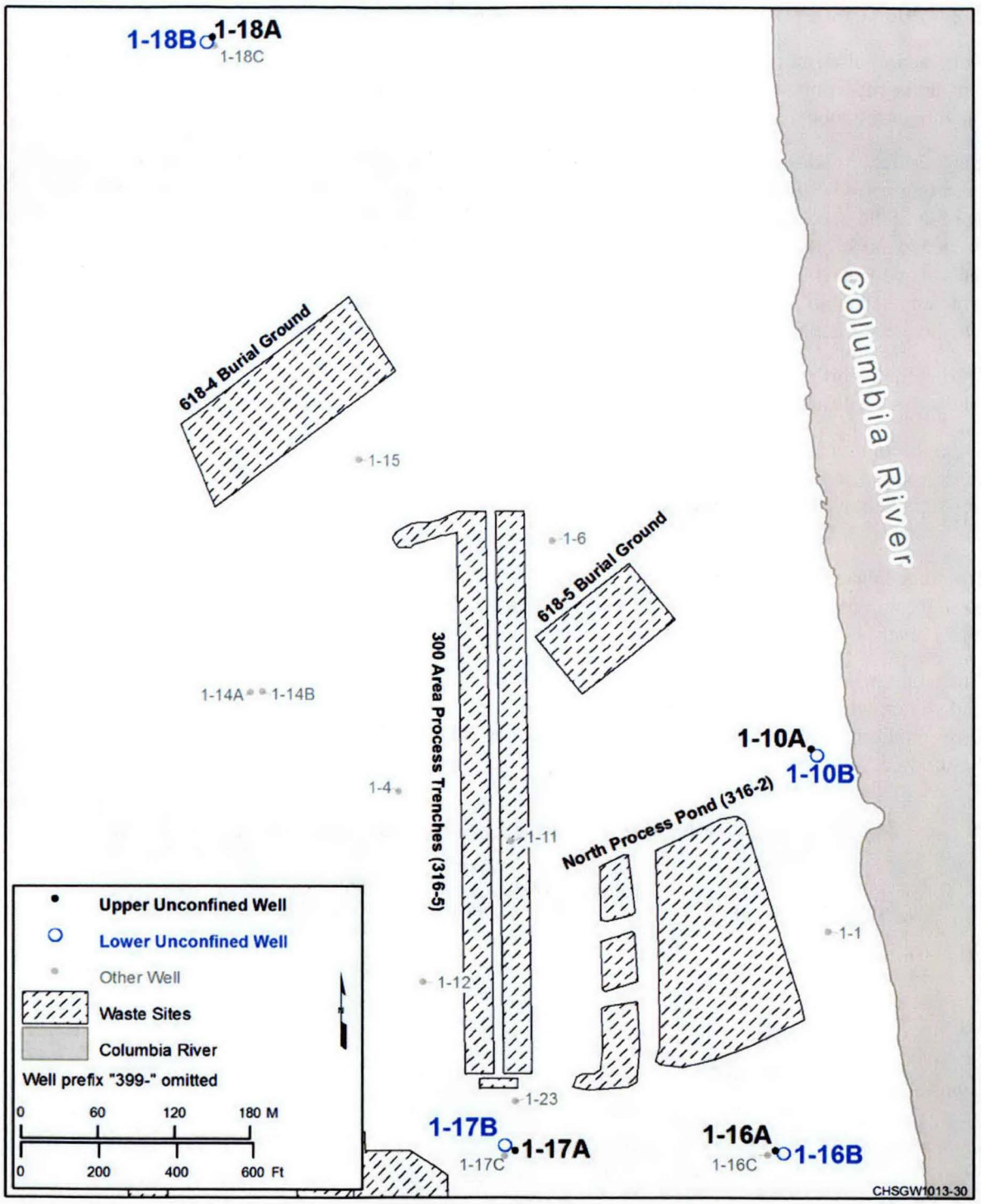

Figure 4. Monitoring Well Locations for the 300 Area Process Trenches (shown in large lettering)

3.2 300 Area Process Trenches Contaminant Trends

This section discusses concentrations of cis-1,2-dichloroethene, TCE, and uranium in the well network during the reporting period. Table 5 lists the analytical results for contaminants of interest in each well of the monitoring network.

Cis-1,2-dichloroethene was detected at three wells in the 300 Area Process Trenches network during the reporting period (399-1-17A, 399-1-16B, and 399-1-17B). The "B" wells are screened in the lower portion of the unconfined aquifer. Only well 399-1-16B had concentrations of cis-1,2-dichloroethene that exceeded the 70 µg/L concentration limit. The trend at well 399-1-16B (Figure 5) was relatively stable and ranged from 140 to 170 µg/L during the reporting period. Concentrations in well 399-1-17B ranged from undetected to 2.4 µg/L. Concentrations in well 399-1-17A ranged from undetected to 0.23 µg/L. The low result is flagged "J," indicating it is an estimate. The current method detection limit is 1 µg/L.

During the reporting period, TCE did not exceed the 5 µg/L concentration limit in any of the network wells. No wells had a detectable concentration. The current method detection limit is 1 µg/L.

A persistent uranium plume underlies a large portion of the 300 Area. Uranium concentrations continued to exceed the concentration limit (20 µg/L) at wells 399-1-10A, 399-1-16A, and 399-1-17A. These three downgradient wells are screened at the water table. The highest concentration reported in the network wells was 65.8 µg/L at well 399-1-16A in March 2010.

Uranium concentration trends at wells 399-1-10A and 399-1-16A (Figures 6 and 7, respectively), tend to be highest in the fall and winter when water levels are low, and decline in spring and early summer when water levels are high. This trend is typical for these wells, which are located near the Columbia River.

The uranium concentration at well 399-1-17A (located farther from the river) tends to be lowest in the fall and winter, when water levels are low (Figure 8). The relationship of water levels and uranium concentration in the 300 Area is described in detail in PNNL-17034, *Uranium Contamination in the Subsurface Beneath the 300 Area, Hanford Site, Washington.*

Table 5. Groundwater Data for 300 Area Process Trenches, January through June 2010

Well	Date	Sampling Purpose	cis-1,2-Dichloroethene (µg/L)		Trichloroethene (µg/L)		Uranium (µg/L)	
Concentration Limit*			***70***		***5***		***20***	
399-1-10A	1/13/2010	RCRA	1	U	1	U	**36.3**	D
	2/16/2010	RCRA	1	UH	1	UH	**29.4**	D
	3/16/2010	RCRA	1	U	1	U	**32.8**	D
	4/7/2010	CERCLA	--		--		**31.7**	D
	5/27/2010	CERCLA	--		--		**28.5**	D
	6/4/2010	RCRA	0.087	U	0.21	U	**30.3**	D
399-1-10B	1/13/2010	RCRA	1	U	1	U	0.1	U
	2/16/2010	RCRA	1	UH	1	UH	0.1	U
	3/16/2010	RCRA	1	U	1	U	0.1	U
	6/4/2010	RCRA	1	U	1	U	0.1	UD

Table 5. Groundwater Data for 300 Area Process Trenches, January through June 2010

Well	Date	Sampling Purpose	cis-1,2-Dichloroethene (µg/L)		Trichloroethene (µg/L)		Uranium (µg/L)	
399-1-16A	1/13/2010	RCRA	1	U	1	U	**65.6**	D
	2/16/2010	RCRA	1	UH	1	UH	**61.6**	D
	3/16/2010	RCRA	1	U	1	U	**65.8**	D
	4/7/2010	CERCLA	--		--		**57.7**	D
	5/20/2010	CERCLA	--		--		**53.5**	D
	6/6/2010	RCRA	1	U	1	U	**44.5**	D
399-1-16B	1/13/2010	RCRA	**170**		1	U	12.3	D
	2/16/2010	RCRA	**140**	H	1	UH	8.69	D
	3/16/2010	RCRA	**150**		1	U	14.6	D
	6/6/2010	RCRA	**160**		1	U	13.8	D
399-1-17A	1/13/2010	RCRA	1	U	1	U	**56**	D
	1/13/2010	RCRA	1	U	1	U	--	
	3/16/2010	RCRA	1	U	1	U	**63.2**	D
	4/7/2010	RCRA	1	U	1	U	**57.7**	D
	5/20/2010	CERCLA	1	U	1	U	**53**	D
	5/20/2010	CERCLA	--		--		**51.9**	D
	6/4/2010	RCRA	0.23	J	0.21	U	**54.6**	D
399-1-17B	1/13/2010	RCRA	1	U	1	U	0.1	UD
	2/16/2010	RCRA	1	UH	1	U	0.1	UD
	3/16/2010	RCRA	1.5	J	1	U	0.1	UD
	6/4/2010	RCRA	4.8	J	1	U	0.1	UD
399-1-18A	1/13/2010	RCRA	1	U	1	U	6.03	D
	2/16/2010	RCRA	1	UH	1	UH	6.08	D
	3/16/2010	RCRA	1	U	1	U	6.62	D
	6/6/2010	RCRA	1	U	1	U	6.75	D
399-1-18B	1/13/2010	RCRA	1	U	1	U	0.1	UD
	2/16/2010	RCRA	1	UH	1	UH	0.1	UD
	3/16/2010	RCRA	1	U	1	U	0.1	UD
	6/6/2010	RCRA	1	U	1	U	0.05	U

* Concentration limits defined in the Hanford Facility RCRA Permit, Part VI, Post-Closure Unit 1.
Bold values exceed concentration limits

Table 5. Groundwater Data for 300 Area Process Trenches, January through June 2010

Well	Date	Sampling Purpose	cis-1,2-Dichloroethene (µg/L)	Trichloroethene (µg/L)	Uranium (µg/L)

J = value is an estimate (close to detection limit)

U = below detection limit

D = sample diluted for analysis; result corrected for dilution

G = record reviewed and determined to be correct or record modified to make correct

H = laboratory holding time exceeded before sample was analyzed

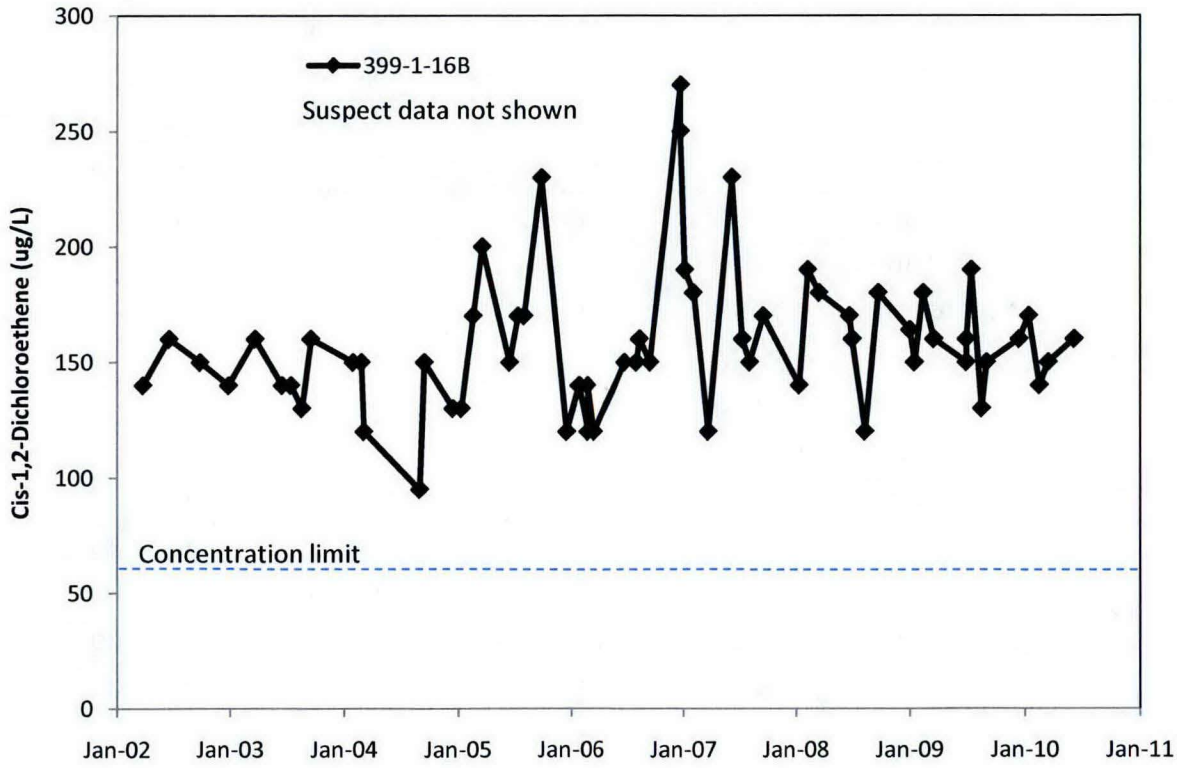

Figure 5. Cis-1,2-Dichloroethene Concentrations in Well 399-1-16B

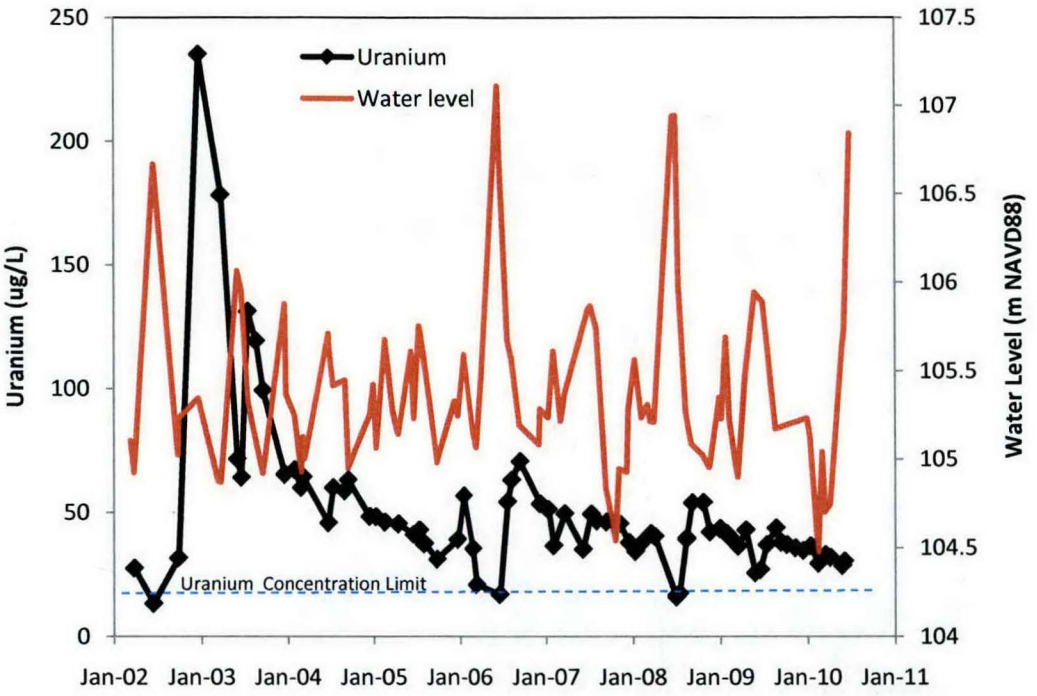

Figure 6. Uranium Concentrations and Water-Level Elevations in Well 399-1-10A

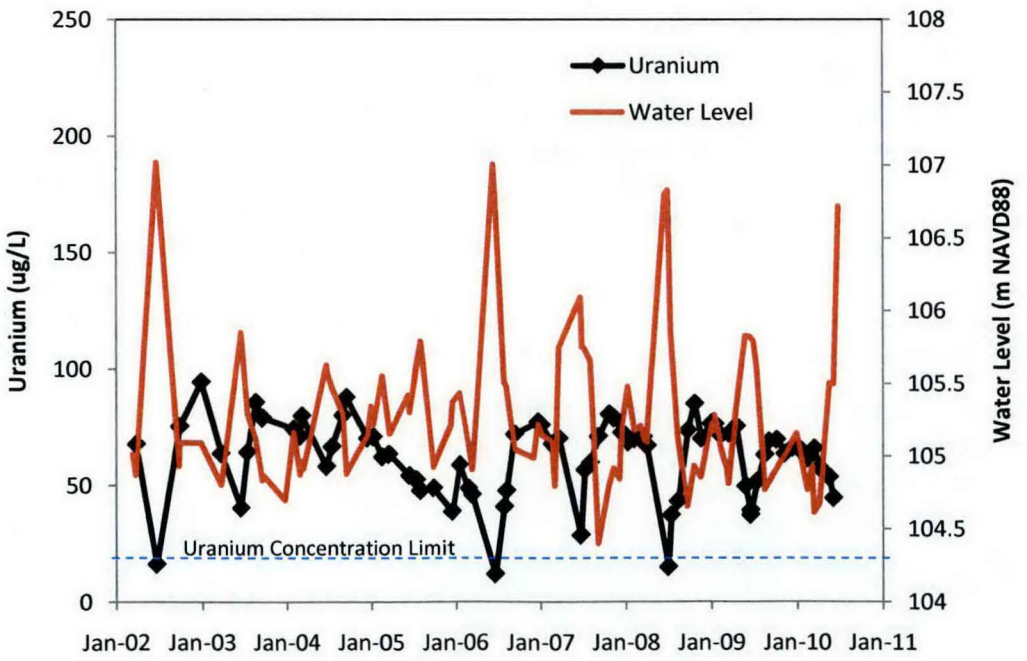

Figure 7. Uranium Concentrations and Water-Level Elevations in Well 399-1-16A

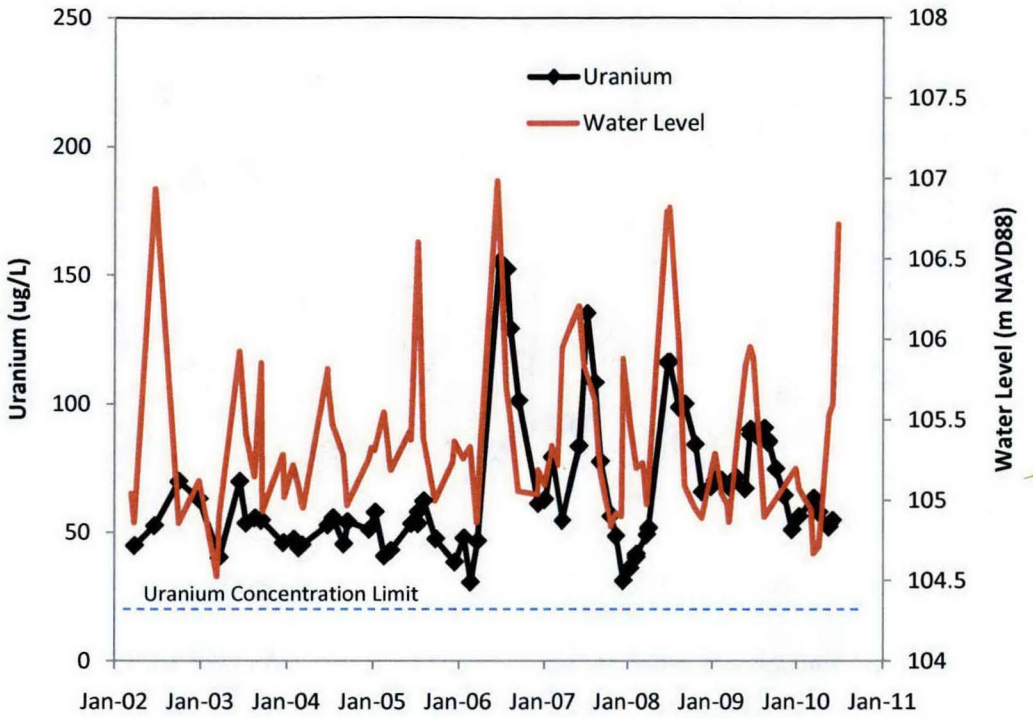

Figure 8. Uranium Concentrations and Water-Level Elevations in Well 399-1-17A

3.3 300 Area Process Trenches Conclusions

Concentrations of cis-1,2-dichloroethene and uranium have not naturally attenuated as expected under the CERCLA record of decision. The concentration of cis-1,2-dichloroethene continued at levels above the concentration limit (70 µg/L) in one well (399-1-16B) and is not affected by river stage. Three wells downgradient of the 300 Area Process Trenches and screened at the water table continued to have uranium concentrations that exceeded the 20 µg/L concentration limit. The overall trends at these wells for the last few years are relatively stable, although uranium concentrations occasionally increase or decrease temporarily. These variations are caused by seasonal water table and river-level fluctuations that, in turn, alter groundwater chemistry and affect uranium adsorption in the aquifer.

The TCE concentrations remained below the concentration limit (5 µg/L) during the reporting period. However, monitoring of this volatile organic will continue because it remains a constituent of interest in the groundwater monitoring plan.

4. References

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq. http://www.epa.gov/oecaagct/lcla.html#Hazardous%20Substance%20Responses

DOE/RL-93-73, 1995, *300 Area Process Trenches Modified Closure Plan and Part A, Form 3*, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington. http://www5.hanford.gov/arpir/?content=detail&AKey=D196000405

DOE/RL-96-84, 2003, *Remedial Design and Remedial Action Work Plan for the 100-HR-3 and 100-KR-4 Groundwater Operable Units' Interim Action*, Rev. 0-A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. http://www5.hanford.gov/arpir/?content=detail&AKey=D1348764

DOE/RL-96-90, 1997, *Interim Action Monitoring Plan for the 100-HR-3 and 100-KR-4 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. http://www5.hanford.gov/arpir/?content=detail&AKey=D197194770

DOE/RL-97-48, 1997, *183-H Solar Evaporation Basins Postclosure Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. http://www5.hanford.gov/arpir/?content=detail&AKey=D197226569

EPA, 1996a, *Declaration of Record of Decision for the USDOE Hanford 100 Area 100-HR-3 and 100-KR-4 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. http://www2.hanford.gov/arpir/?content=detail&AKey=D196097243

EPA, 1996b, *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. http://www2.hanford.gov/arpir/?content=detail&AKey=D196245781

EPA, 2009, *Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision, Hanford Site, Benton County, Washington, August 2009*, U.S. Environmental Protection Agency and U.S. Department of Energy, Richland, Washington. http://www2.hanford.gov/arpir/?content=detail&AKey=0096029

NAVD88, 1988, *North American Vertical Datum of 1988*, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland.

PNNL-11573, 1997, *Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins*, Rev. 0, Pacific Northwest National Laboratory, Richland, Washington. http://www2.hanford.gov/arpir/?content=detail&AKey=D1659822

PNNL-17034, 2008, *Uranium Contamination in the Subsurface Beneath the 300 Area, Hanford Site, Washington*, Rev. 0, Pacific Northwest National Laboratory, Richland, Washington. http://www.osti.gov/bridge/product.biblio.jsp?osti_id=925719

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. http://www.epa.gov/epawaste/inforesources/online/index.htm

WA7890008967, 2007, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*, as amended, Washington State Department of Ecology, Richland, Washington. http://www2.hanford.gov/arpir/?content=detail&AKey=DA06295340

WAC 173-303-645, "Release from Regulated Units," *Washington Administrative Code*. 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. 0A, Westinghouse Hanford Company, Richland, Washington. http://www5.hanford.gov/arpir/?content=detail&AKey=D196020117

Distribution

Onsite

3	U.S. Department of Energy, Richland Operations Office		
	DOE Public Reading Room	(2)	H2-53
	R. D. Hildebrand		A6-38
7	CHPRC		
	R. L. Fleshman		R3-50
	M. J. Hartman		R3-50
	G. J. LeBaron		S2-42
	S. P. Luttrell		R3-50
	G. A. Aljure		H8-45
	L. C. Swanson		R3-50
	D. C. Weekes		R3-50
	J. A. Winterhalder		R3-60
3	Pacific Northwest National Laboratory		
	Hanford Technical Library (2)		P8-55
	R.E. Peterson		K6-75
1	Lockheed Martin Information Technology		
	Document Processing Center		H6-08