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Revision 0

First Semiannual Report for 2012 Post-Closure Corrective Action Groundwater Monitoring at the 183-H Solar Evaporation Basins and 300 Area Process Trenches: January - June 2012

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

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F. H. Biebesheimer
CH2M HILL Plateau Remediation Company

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Executive Summary

This is the first 2012 semiannual report on post-closure corrective action groundwater monitoring for the 183-H Solar Evaporation Basins and 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 January through June 2012. Environmental data used to generate this report are available from the Environmental Dashboard Application (available at http://environet.hanford.gov/eda/). Ongoing validation, verification, and technical review efforts may result in differences between the data used for this publication and those available after publication of this report via the environmental data access tool.

183-H Solar Evaporations Basins Groundwater Monitoring

During the reporting period, hexavalent chromium concentrations in the unconfined aquifer remained below permit concentration limits. Fluoride and nitrate concentrations measured in Well 199-H4-12A also remained below the permit concentration limits.

Hexavalent chromium in 199-H4-12C results from historical releases, remaining above permit concentration limits and *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*[2] (CERCLA) remedial action objectives. With addition of 199-H4-12C to the pump-and-treat system, corrective action through the CERCLA interim action remains effective.

300 Area Process Trenches Groundwater Monitoring

Uranium concentrations continue to exceed the permit concentration limits in wells downgradient of the process trenches. The June 2011 sample result from Well 399-1-17A was unusually high, related to a period of extremely high groundwater. Uranium concentrations during this reporting period returned to expected levels, ranging from 78.3 to 100 µg/L. High water levels during 2012 might result in an increase in concentrations during the next reporting period.

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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] *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.

Cis-1,2-dichloroethene remained above the 70 µg/L permit concentration limit in one deep well (399-1-16B). Trichloroethene was measured slightly above the detection limit in deep Well 399-1-16B, and is not observed in the remaining wells. Corrective actions through the CERCLA interim action (attenuation and institutional controls) have been effective for trichloroethene, and moderately effective for uranium. The CERCLA remedial investigation/feasibility study for the 300-FF-5 Operable Unit (forthcoming) further evaluates the feasibility of remedies for these constituents.

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Terms

bgs	below ground surface
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DWS	drinking water standard
gpm	gallons per minute
OU	operable unit
RAO	remedial action objective
RCRA	*Resource Conservation and Recovery Act of 1976*
RI/FS	remedial investigation/feasibility study
RUM	Ringold Formation upper mud

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1 Introduction

This first 2012 semiannual report for post-closure corrective action groundwater monitoring describes the effectiveness of corrective action at the 183-H Solar Evaporation Basins (waste site 116-H-6) and the 300 Area Process Trenches. It 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 2012. Chapter 2 presents information for the 183-H Solar Evaporation Basins, and Chapter 3 presents information for the 300 Area Process Trenches.

Environmental data used to generate this report are available from the Environmental Dashboard Application (available at http://environet.hanford.gov/eda/). Ongoing validation, verification, and technical review efforts may result in differences between the data used for this publication and those available after publication of this report via the environmental data access tool.

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 underlying contaminated soil was removed and replaced with clean fill (Ecology, 1997). The site is a post-closure unit in the Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*). Groundwater is monitored in accordance with WAC 173-303-645(11) and Part III, Chapter 2 of the Hanford Facility RCRA Permit (WA7890008967).

During 1996, groundwater monitoring results for the dangerous waste constituent chromium exceeded groundwater concentration limits (DOE, 1996). A groundwater corrective action program was implemented in accordance with the requirements of WAC 173-303-645(11) on December 27th, 1996 (DOE, 1997). The post-closure plan (DOE/RL-97-48, *183-H Solar Evaporation Basins Postclosure Plan*) and corrective action program were incorporated into Part III of the Hanford Facility RCRA Permit (WA7890008967). The corrective action program included monitoring of groundwater contamination below the location of the Solar Evaporation Basins, and deferred groundwater remediation to the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) interim action for the 100-HR-3 Groundwater Operable Unit (OU). On July 2nd, 2012, DOE received a Notice of Noncompliance from the Department of Ecology for exceeding a permit concentration limit for nitrate during groundwater monitoring second half of 2011 (Ecology, 2012). In the DOE's response, it noted the permit concentration limit was not an instance of noncompliance since it occurred during the corrective action period, and that the measurement was consistent with previous periods following high river stage (DOE, 2012). As described in DOE's response, Ecology and DOE will hold a workshop in January 2013 to develop a framework for modernizing the groundwater monitoring network related to the 100-HR-3 remedial action.

2.1 100-HR-3 CERCLA Interim Remedial Action

The interim remedial action for groundwater contamination in the 100-HR-3 Groundwater OU is implemented under the authority of a CERCLA Interim Record of Decision (EPA 1996a, *Declaration of*

the Record of Decision for the USDOE Hanford 100 Area 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 has been implemented to extract groundwater, treat it to remove hexavalent chromium, and inject it back into the aquifer. Figure 1 illustrates the active extraction and injection wells during the reporting period. 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*).

Construction of the new 3028 Liters per minute (Lpm) (800 gallons per minute (gpm)) H pump-and-treat system was completed and started in September 2011. The new system replaced the aging 1136 Lpm (300 gpm) HR-3 pump-and-treat system. Together with the 2271 Lpm (600 gpm) D pump, the 100-HR-3 OU interim action has the expanded capacity to hydraulically contain and remediate hexavalent chromium contaminated groundwater throughout the OU.

A remedial investigation/feasibility study (RI/FS) is being conducted, and a Draft A RI/FS report is anticipated to be issued during 2012. As part of the RI/FS field activities, a new borehole (C7860) was installed through the former 183-H Solar Evaporation Basins (at the middle of sedimentation Basin 1) and completed as a temporary well (199-H4-84). The highest total chromium concentration measured in soil samples collected from the borehole was 13.9 mg/kg, which is less than background. The highest measured hexavalent chromium concentration was 1.07 mg/kg, which was collected at a depth of 11.3 m (37 ft) below ground surface (bgs). Groundwater samples collected from the borehole report a total chromium concentration of 4 µg/L, while hexavalent chromium concentrations were less than the detection limit. Subsequently, the borehole was completed as a temporary well. Groundwater samples collected in 2011 from the temporary well exhibited total chromium and hexavalent chromium concentrations of 28.6 µg/L and 25 µg/L, respectively. A sample was collected in July 2012, and will be reported in the next semiannual report, after results are returned from the laboratory.

Uranium results measured in soil samples were less than background. While Technetium-99 was not detected in the two sample intervals above 4.6 m (15.1 ft), it was detected a low concentrations throughout the remainder of the borehole. The highest activity measured was 0.544 pCi/g, occurring at the water table (12.1 m (39.8 ft) bgs). Groundwater sample results for Technetium-99 were at 53.4 pCi/L, well below the DWS of 900 pCi/L, in a sample collected from the temporary well in 2011.

Groundwater is sampled to monitor the performance of the interim action and 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. A revision of the Remedial Design/Remedial Action Work Plan and Interim Action Monitoring Program is underway to address the D and H systems.

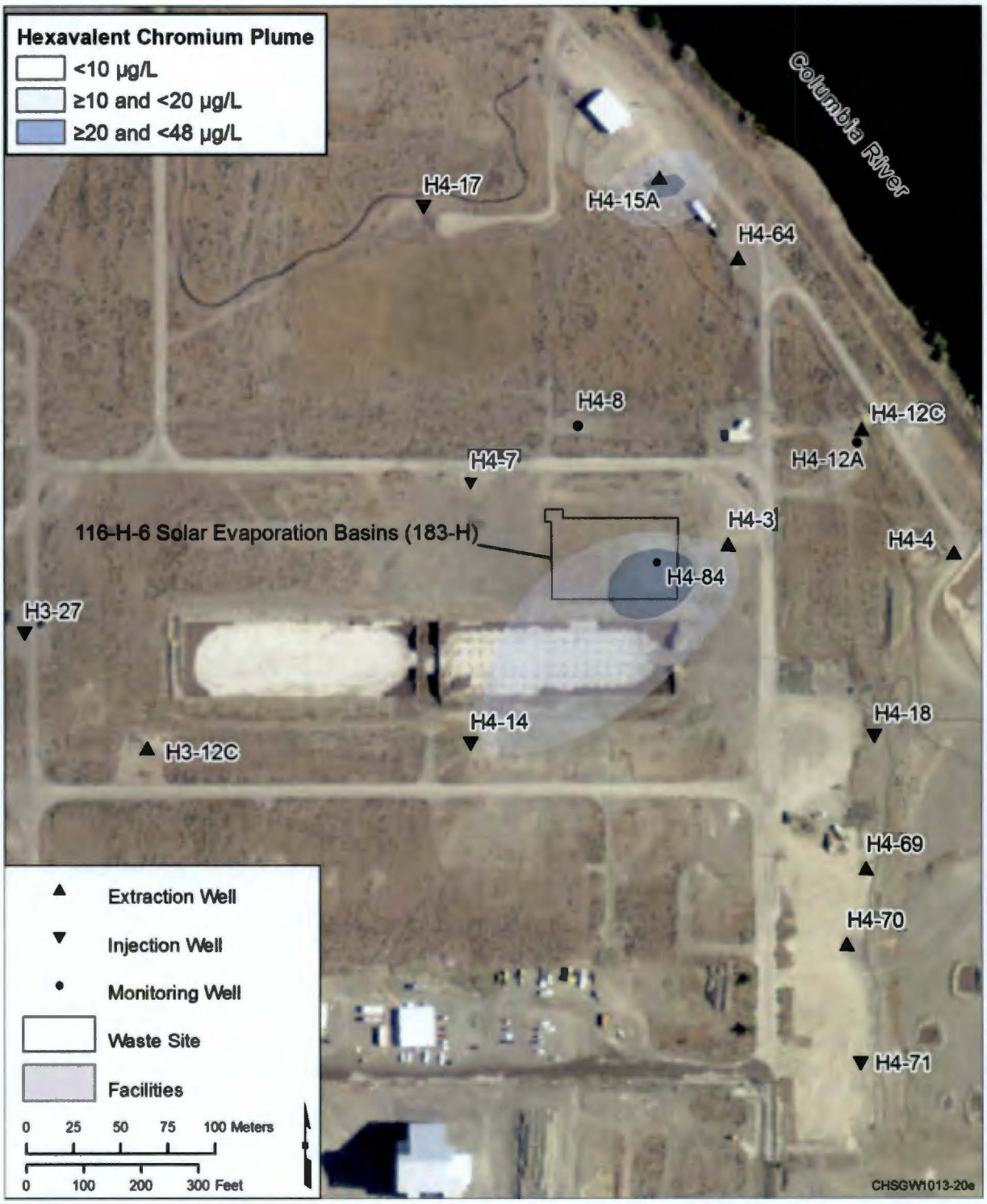


Figure 1. Monitoring Well Locations for 183-H (116-H-6) Basins

2.2 183-H Basins RCRA Groundwater Monitoring Program

During the CERCLA interim remedial action, RCRA corrective action monitoring will continue to evaluate analytical results relative to permit concentration limits (Table 1). Additionally, fluoride results will be evaluated relative to established trends and the drin□ing water standard (DWS) for fluoride[3] (Hanford Facility RCRA Permit □WA7890008967□, Part □I, Chapter 2).

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

Dangerous Waste Constituents	Concentration Limit
Chromium (total□ filtered sample)	122 □g□L – local bac□ground when compliance monitoring plan written (1996)□ upgradient sources
Nitrate[2]	45 mg□L – DWS[1] (as NO_3)
Other 183-H Waste Indicators	**Concentration Limit**
Technetium-99	900 pCi□L – DWS
Uranium (total□ chemical analysis)	20 □g□L – proposed DWS when monitoring plan written (1996)

[1] DWS □drin□ing water standard

[2] Nitrate exceeded the permit concentration limit in the previous reporting period as a result of a very high river stage during the summer of 2011. Refer to DOE, 2012 for addition discussion of this exceedence.

The RCRA groundwater monitoring networ□ 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 (WA7890008967), Part □I, Post-Closure Unit 2, provide for annual groundwater sample collection from these wells (typically in November). The wells were not scheduled for sampling of RCRA constituents during the reporting period. Well 199-H4-12C was sampled to measure hexavalent chromium concentrations to monitor the 100-HR-3 CERCLA interim action.

Well 199-H4-12C is an extraction well. Though still sampled, Well 199-H4-3 was removed from extraction service because of low production and impending waste site remediation activities. After the 100-H a□uifer test and rebound study (SGW-47776, *Aquifer Testing and Rebound Study in Support of the 100-H Deep Chromium Investigation*), Well 199-H4-12C was added to the extraction networ□, replacing Well 199-H4-12A. Well 199-H4-8 has been part of the RCRA networ□ since 2006□it replaced Well 199-H4-7, which was converted to an in□ection well for the 100-HR-3 Pump-And-Treat System. In order to support vadose □one remediation efforts, 199-H4-3 will be decommissioned and replaced by another well following approval of an appropriate permit modification by Department of Ecology.

Wells 199-H4-3, 199-H4-8, and 199-H4-12A are screened in the unconfined a□uifer. Well 199-H4-12C is located ad□acent to Well 199-H4-12A and is completed within the first water bearing unit of the deeper Ringold Formation upper mud (RUM).

[3] The RCRA Permit (WA7890008967) gives the value 1,400 □g/L as the U.S. Environmental Protection Agency maximum contaminant level (DWS) for fluoride. The actual limit is 4,000 □g/L.

2.3 183-H Basins Contaminant Trends

This section discusses the concentrations of chromium, fluoride, nitrate, technetium-99, and uranium in the groundwater. During the reporting period, two wells were scheduled for sampling (199-H4-12A and 199-H4-12C). Results from the sampling are presented in Table 2.

Table 2. Groundwater Data for 183-H Basins, January through June 2012

Well	Date	Hexavalent Chromium (µg/L)		Chromium, total (µg/L)	Fluoride (µg/L)		Nitrate (mg/L)		Technetium-99 (pCi/L)	Uranium (µg/L)
Permit Concentration Limit[a]		***122***		***122***	***1,400***		***45***		***900***	***20***
199-H4-12A	2/16/2012[b]	8.7		—	—		—		—	—
	5/23/2012[b]	2	U	—	130	BD	2.09	D	—	—
199-H4-12C	1/3/2012[b]	**133**		—	—		—		—	—
	2/6/2012[b]	**139**		—	—		—		—	—
	3/5/2012[b]	**130**		—	—		—		—	—
	4/2/2012[b]	**130**		—	—		—		—	—
	4/29/2012[b]	115		—	—		—		—	—
	5/17/2012[b]	**138**		—	—		—		—	—
	6/4/2012[b]	**125**		—	—		—		—	—
	6/11/2012[b]	**127**		—	—		—		—	—

Notes: Analyses are from unfiltered samples unless otherwise noted.

a. Concentration limits are defined in WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste* (Part VI, Post-Closure Unit 2).

b. These samples were collected to monitor performance of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* interim action. The RCRA monitoring network is scheduled annually, and is typically performed during the fall (low river stage) each year. No RCRA sampling was performed during this reporting period.

Italics indicates the Permit Concentration Limits

Bold emphasis added where the result exceeded the permit concentration limit.

Laboratory Qualifiers:

A = Potential issue with chain of custody
B = Analyte was found in the associated blank
D = dilution
H = potential issue with hold time
U = below detection limit

In the unconfined aquifer, hexavalent chromium concentrations in 199-H4-12A were reported at below detection limits and at 8.7 µg/L during the reporting period (Table 2; Figure 2). Hexavalent chromium concentrations have remained below the 122 µg/L permit concentration limit in all three wells in the unconfined aquifer since 2003.

Hexavalent chromium concentrations observed in 199-H4-12C are from historical releases at other sources, not releases from the 183-H Solar Evaporation Basin. This conclusion is discussed further in a previous semiannual report (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). The exceedance of the CE□CLA remedial action ob□ectives (□A□s) (20 µg/L) and permit concentrations (122 µg/L) in 199-H4-12C were addressed b□connecting Well 199-H4-12C to the pump-and-treat s□stem (Figure 3).

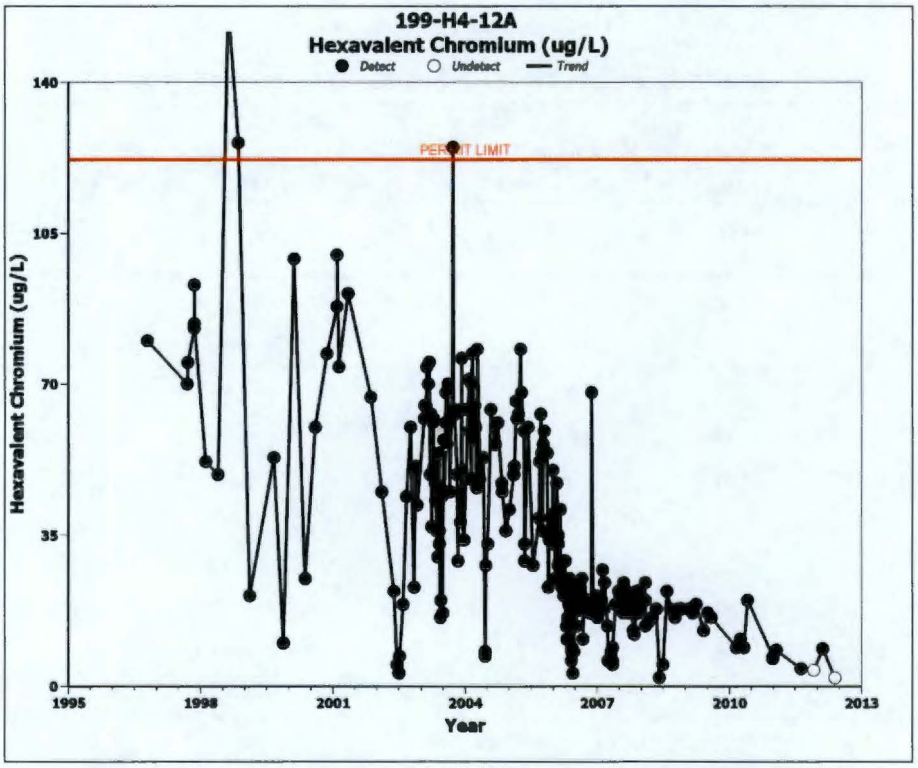
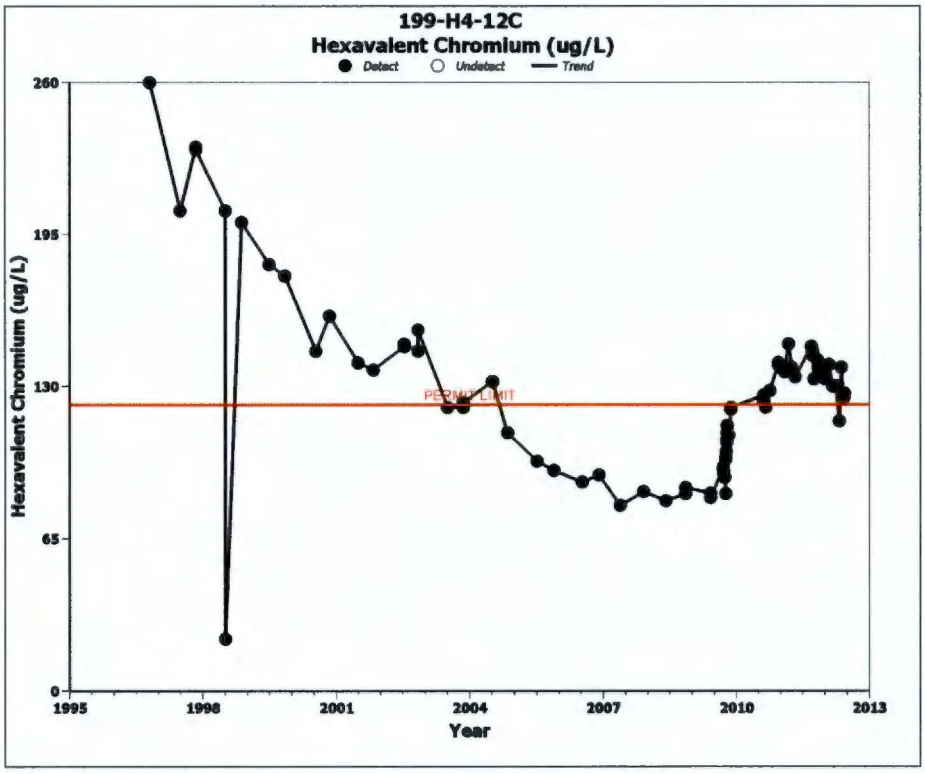


Figure 2. Hexavalent Chromium Concentrations in Well199-H4-12A



Note: Recent increasing concentrations coincide with the 2009 addition of the well to the pump-and-treat system.

Figure 3. Hexavalent Chromium Concentrations in Well199-H4-12C

The high concentrations measured in 199-H4-12C (125 to 139 µg/L) reflect contamination from the past releases entering □□□. Concentrations measured in this well declined from about 300 µg/L in the earl□ 1990s and were stable until 2009, when the well was connected to the H□-3 pump-and-treat s□stem. Since connection, hexavalent chromium concentrations have climbed as contaminated groundwater is pulled into the extraction well. □easured concentrations dropped slightl□below the permit concentration limits, 115 µg/L, in April 2012, but increased during the next sampling event.

Fluoride and nitrate were both monitored in Well 199-H4-12A during the reporting period. Anal□tical results were well below the respective permit limits. □n Figure 4 another area of nitrate contamination is present □ust west of the 100-H Area. As groundwater migration and extraction continues as part of the remediation, this area of nitrate contamination ma□eventuall□influence nitrate concentrations below the 183-H Solar Evaporation Basins (□□E/□L-2011-118, *Hanford Site Groundwater Monitoring For 2011*).

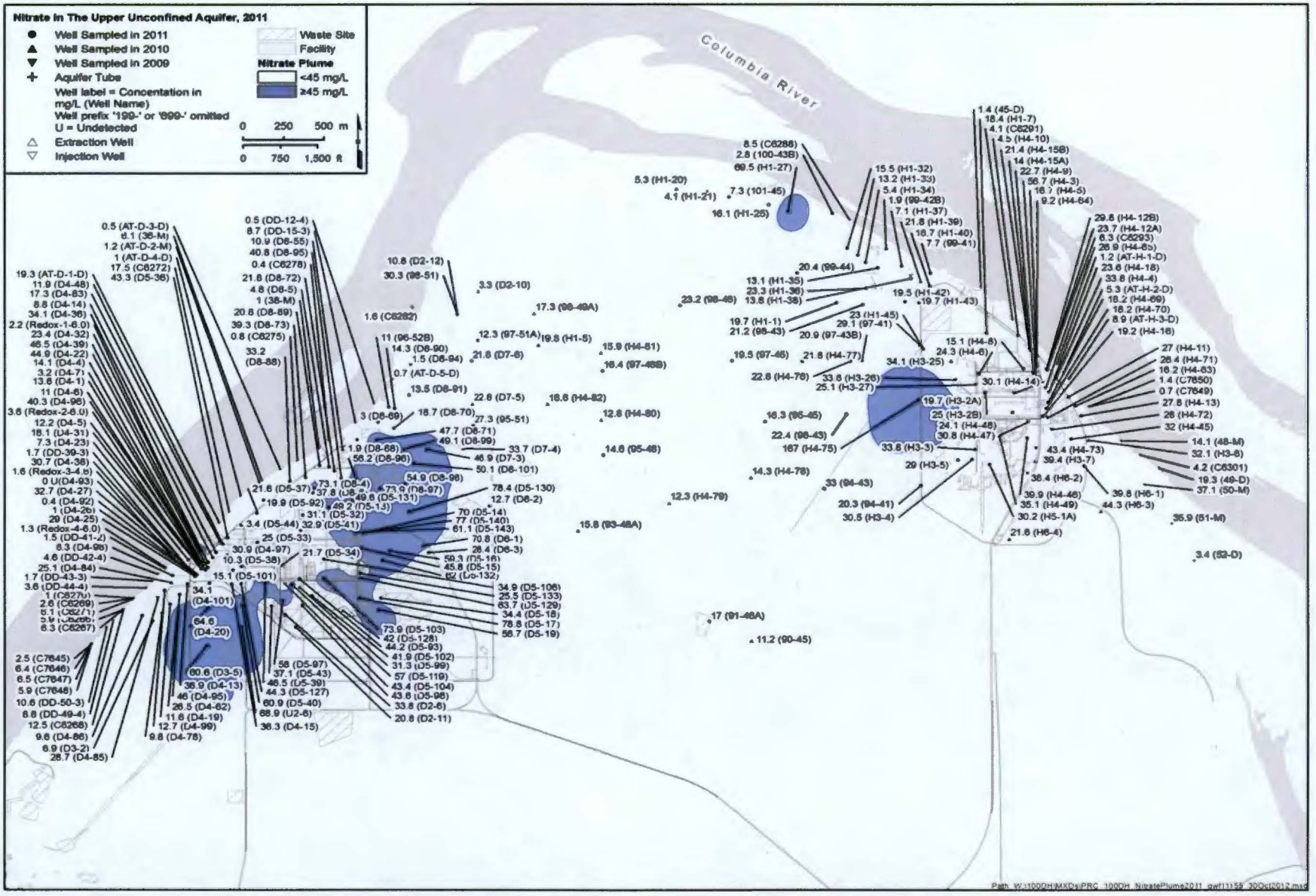


Figure 4. Nitrate Concentrations in the 100-HR-3 Operable Unit (DOE, 2012).

2.3.1 Contaminant Correlations

The waste discharged at the Solar Evaporation Basin consisted of spent acid etch solutions (nitric, sulfuric, hydrofluoric, and chromic acids), typically neutralized with sodium hydroxide. Metal constituents included copper, silicon, zirconium, aluminum, chromium, manganese, nickel, and uranium (primarily in the form of precipitates after neutralization).

A plot of the nitrate and uranium concentrations (Figure 5) indicates a strong linear correlation between nitrate and uranium at Well 199-H4-3. This correlation is consistent with the source being dominated by the neutralized nitric acid waste, as was present at 183-H Solar Evaporation Basins. The neutralized waste contained high concentrations of nitrate and copper from the nitric acid used in the copper stripping procedures.

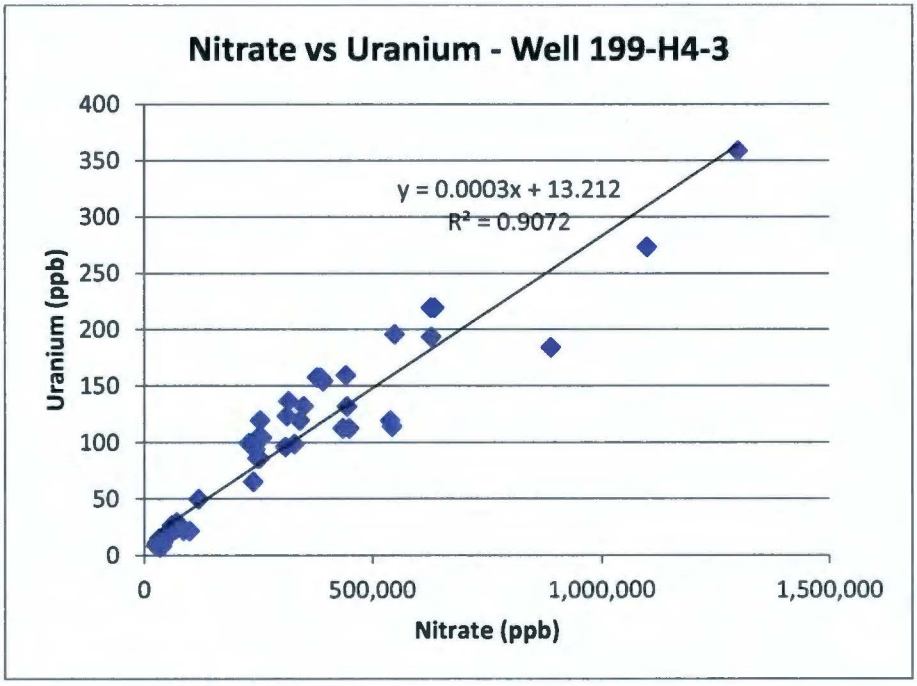


Figure 5. Nitrate versus Uranium at Well 199-H4-3

Chromium waste included hexavalent chromium, mostly from the chromic acid used in fuel fabrication. As shown in Figure , however, the correlation between hexavalent chromium and uranium is not as strong. This may be due to the presence of multiple sources of chromium contributing to the contamination.

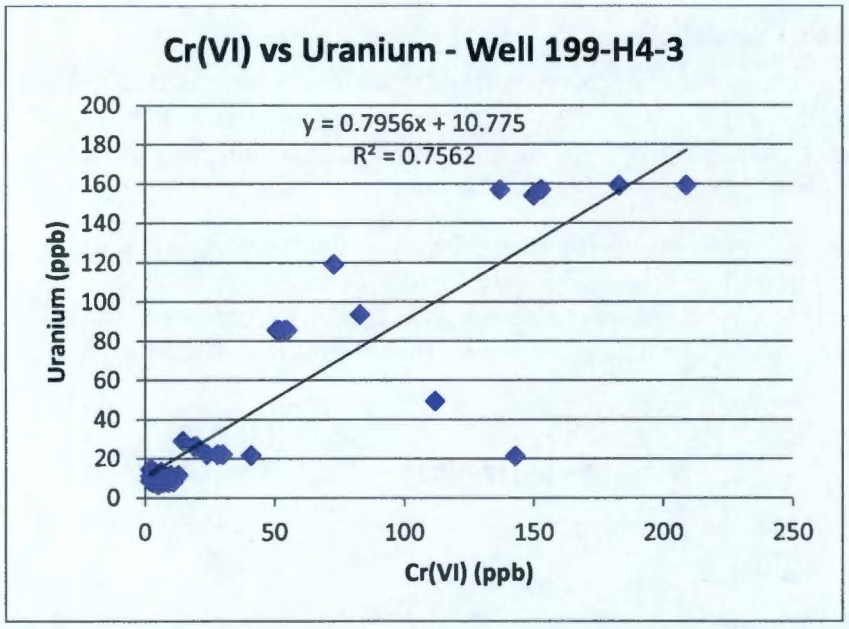


Figure 6. Hexavalent Chromium versus Uranium Concentrations at Well 199-H4-3

2.4 183-H Basins Conclusions

From anuar through une 2012, hexavalent chromium concentrations in the unconfined aquifer remained below permit concentration limits. Concentrations of hexavalent chromium in 199-H4-12C result from historical releases, and remain above permit concentration limits and CE CLA As. With addition of 199-H4-12C to the pump-and-treat s stem, corrective action through the CE CLA interim action remains effective. Fluoride and nitrate concentrations measured in Well 199-H4-12A remained below the permit concentration limits.

3 300 Area Process Trenches

The 300 Area rocess Trenches are permitted as a C A treatment, storage, and/or disposal unit in post-closure corrective action monitoring. 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- 45(1) and the Hanford Facilit C A ermit (WA78900089 7), art Chapter 1. The closure plan (E/ L-93-73, *300 Area Process Trenches Modified Closure Plan and Part A, Form 3*) indicates groundwater corrective action will be addressed as part of the remediation for the CE CLA 300-FF-5 Groundwater . The waste site designation is 31 5.

The ob ective of groundwater monitoring is to demonstrate the effectiveness of the corrective action program b confirming trends in the data for groundwater constituents reflect natural attenuation (as expected b the CE CLA record of decision E A 199 b, *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]*). The 300 Area rocess Trenches were closed under a modified closure/post closure plan (E/ L-93-73) and remain in the groundwater corrective action program because groundwater contamination continues to exceed CE CLA A s and Hanford Facilit C A ermit (WA78900089 7) concentration limits.

3.1 300 Area Process Trenches RCRA Groundwater Monitoring Program

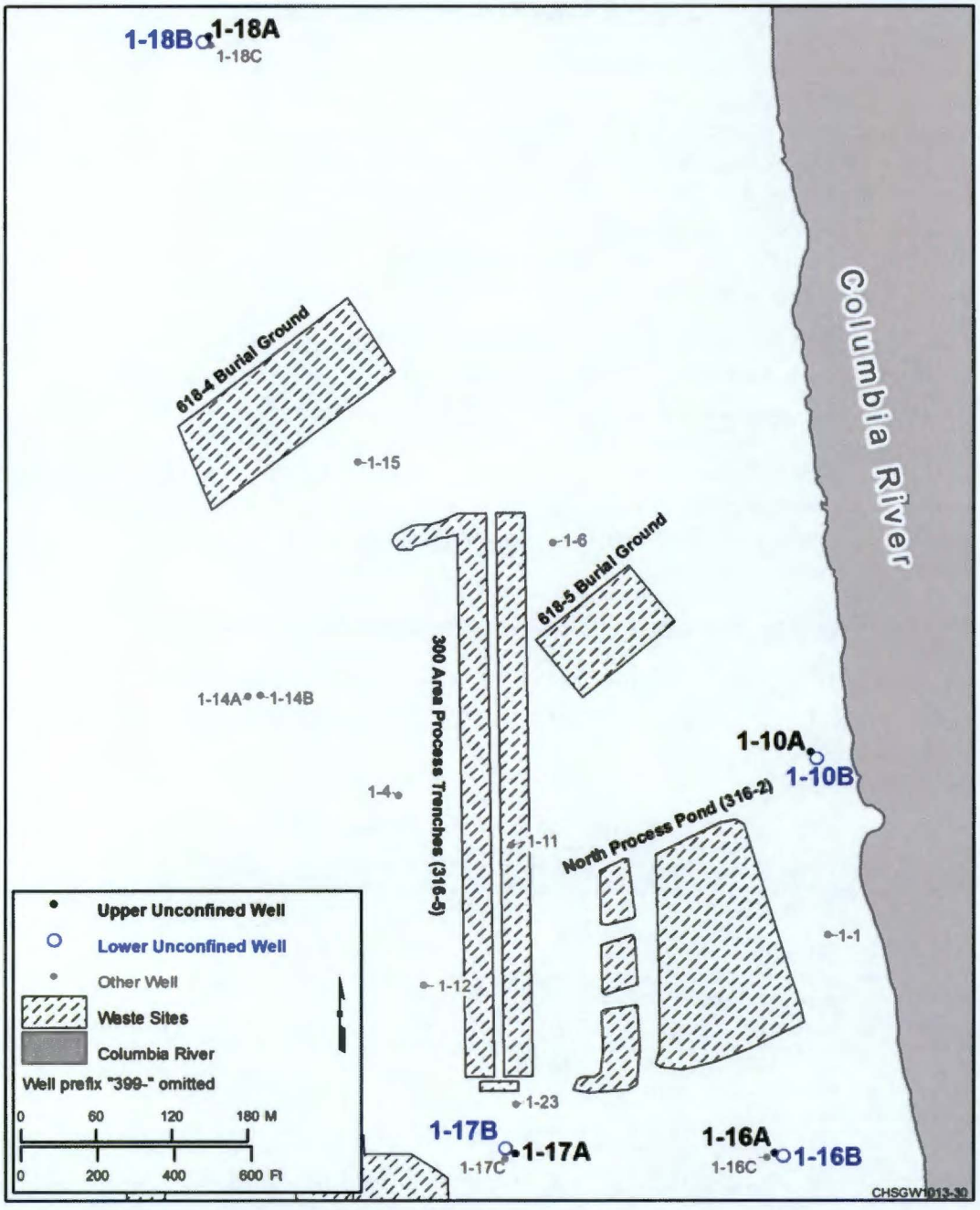
The permit concentration limits established for the 300 Area rocess Trenches are provided in Table 3. C A corrective action monitoring will continue to evaluate new anal tical results relative to permit concentration limits.

Table 3. Permit Concentration Limits for 300 Area Process Trenches

Dangerous Waste Constituents	Concentration Limit
cis-1,2- ichloroethene	70 µg/L – DWS
Trichloroethene	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)

DWS = drinking water standard

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 7). 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 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 in Table 4. The reporting period is semiannual, but wells are sampled four times (monthly intervals) in each reporting period in order to collect the required number of independent samples. As a result, the wells are sampled during the months of December, January, February, March, and June, July, August, September. Data from the 300-FF-5 Groundwater Operable Unit sampling 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.



Note: Well locations are shown in large lettering.

Figure 7. Monitoring Well Locations for the 300 Area Process Trenches

During the January through June 2012 reporting period, the 300 Area Process Trenches post-closure monitoring network wells were sampled during January, February, April, and June. Scheduled sampling for March was delayed for a stop work requiring clarification to the well access list and was successfully completed on April 2, 2012.

3.2 300 Area Process Trenches Contaminant Trends

This section discusses concentrations of cis-1,2-dichloroethene, trichloroethene, and uranium measured during the reporting period. Table 4 lists the analytical results for contaminants measured in each well.

Table 4. Groundwater Data for 300 Area Process Trenches, January through June 2012

Well	Date	Sampling Purpose	cis-1,2-Dichloroethene (µg/L)		Trichloroethene (µg/L)		Uranium (µg/L)	
Permit Concentration Limit*			***70***		***5***		***20***	
399-1-10A	1/25/2012	RCRA	1	U	1	U	**38**	D
	2/13/2012	RCRA	1	U	1	U	**34.7**	D
	4/2/2012	RCRA	1	U	1	U	18.9	D
	6/4/2012	RCRA	1	U	1	U	17.9	D
399-1-10[illegible]	1/25/2012	RCRA	1	U	1	U	0.1	UD
	2/13/2012	RCRA	1	U	1	U	0.1	UD
	4/2/2012	RCRA	1	U	1	U	0.05	U
	6/4/2012	RCRA	1	U	1	U	0.1	UD
399-1-16A	1/25/2012	RCRA	1	U	1	U	**90.1**	D
	2/13/2012	RCRA	1	U	1	U	**82.6**	
	4/2/2012	RCRA	1	U	1	U	**71.2**	D
	6/4/2012	RCRA	1	U	1	U	**27.2**	D
399-1-16[illegible]	1/25/2012	RCRA	**150**		1.6	J	10.3	D
	2/13/2012	RCRA(duplicate)	**140**		1.7	J	8.96	D
	2/13/2012	RCRA	**150**		1.6	J	8.56	D
	4/2/2012	RCRA	**150**		1	U	11.1	D
	6/4/2012	RCRA	**200**		2.2	J	11.2	D
399-1-17A	1/25/2012	RCRA	1	U	1	U	**89.6**	D
	2/13/2012	RCRA	1	U	1	U	**88.1**	D
	4/2/2012	RCRA	1	U	1	U	**78.3**	D
	6/4/2012	RCRA	1	U	1	U	**100**	D
399-1-17[illegible]	1/30/2012	RCRA	1	U	1	U	0.1	UD
	2/14/2012	RCRA	3.5	J	1	U	0.1	UD
	4/2/2012	RCRA	1	U	1	U	0.1	UD
	6/12/2012	RCRA	1	U	1	U	0.877	D

Table 4. Groundwater Data for 300 Area Process Trenches, January through June 2012

Well	Date	Sampling Purpose	cis-1,2-Dichloroethene (µg/L)		Trichloroethene (µg/L)		Uranium (µg/L)	
399-1-18A	1/25/2012	RCRA	1	U	1	U	6.49	
	1/25/2012	RCRA	1	U	1	U	5.81	D
	2/13/2012	RCRA	1	U	1	U	5.78	D
	4/2/2012	RCRA	1	U	1	U	6.7	D
	6/4/2012	RCRA	1	U	1	U	6.08	D
399-1-18	1/30/2012	RCRA	1	U	1	U	0.1	UD
	2/13/2012	RCRA	1	U	1	U	0.1	UD
	4/2/2012	RCRA	1	U	1	U	0.1	UD
	6/12/2012	RCRA	1	U	1	U	0.1	UD

Notes: Analyses are from unfiltered samples unless otherwise noted.

italic indicates Permit Concentration Limits

Bold emphasis added where the result exceeded the permit concentration limit.

Laboratory Qualifiers:

D = reported value is after dilution

F = filtered sample

J = estimated value

U = below the detection limit

Q = associated quality control sample was out of limits

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

Cis-1,2-dichloroethene was observed in two wells in the 300 Area Process Trenches network during the reporting period (399-1-16B, and 399-1-17B), consistent with the previous reporting period. The "B" wells are screened in the lower portion of the unconfined aquifer. Well 399-1-16B had concentrations of cis-1,2-dichloroethene that exceed the 70 µg/L permit concentration limit. Concentrations in Well 399-1-16B were stable and consistent with the previous reporting period, ranging from 140 to 200 µg/L (Figure 8). Figure 9 depicts concentrations in Well 399-1-17B, which ranged from below the detection limit to 3.5 µg/L. This maximum observation is flagged "J" by the laboratory, indicating it is an estimated value. The current method detection limit is 1 µg/L.

Trichloroethene did not exceed the 5 µg/L permit concentration limit (Figure 10) in the sampled wells, but was detected in Well 399-1-16B. Concentrations in Well 399-1-16B ranged from below the detection limit to 2.2 µg/L. Each of the detected values were flagged "J" by the laboratory, indicating an estimated value near the current method detection limit of 1 µg/L. This is consistent with past results, which have been at, or near, the detection limit since mid-2007 and consistently below the permit limit since late 1999.

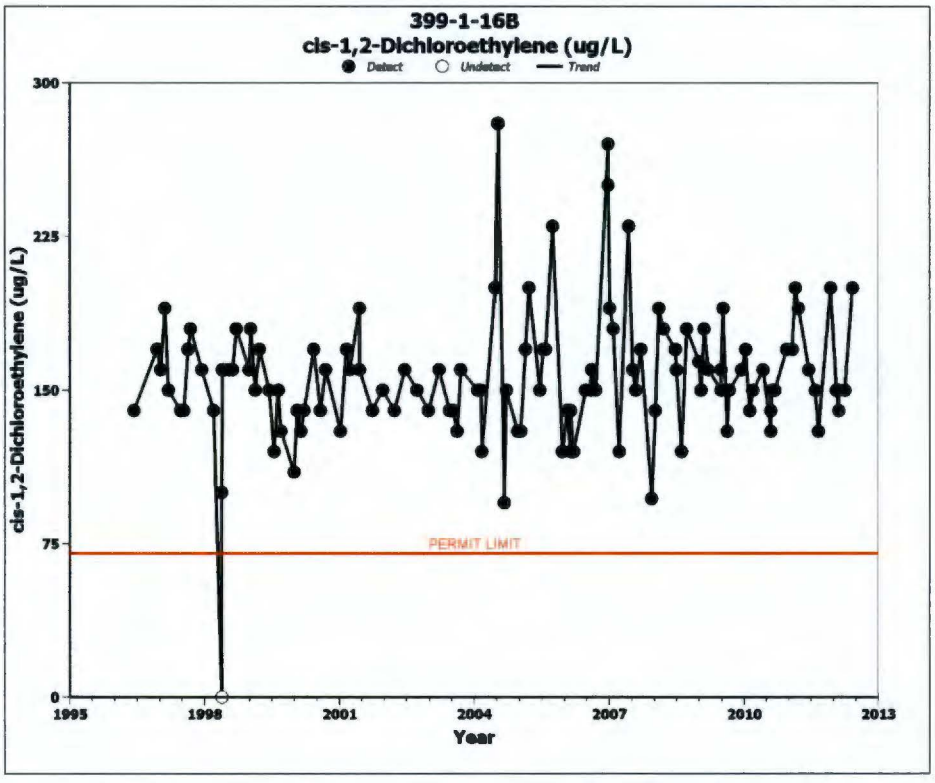


Figure 8. Cis-1,2-Dichloroethene Concentrations in Well 399-1-16B

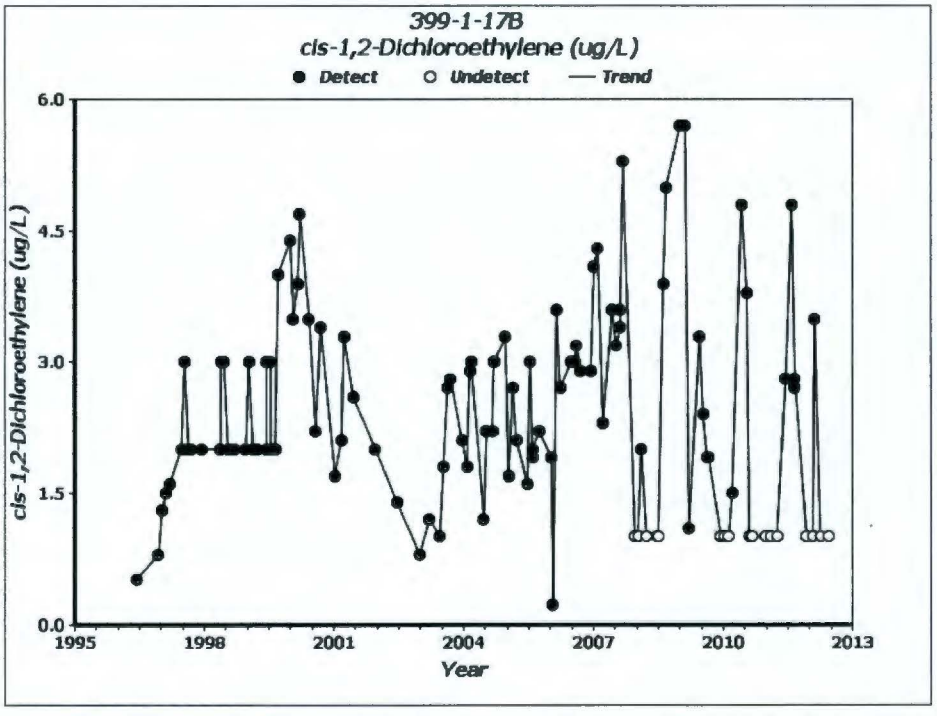


Figure 9. Cis-1,2-Dichloroethene Concentrations in Well 399-1-17B

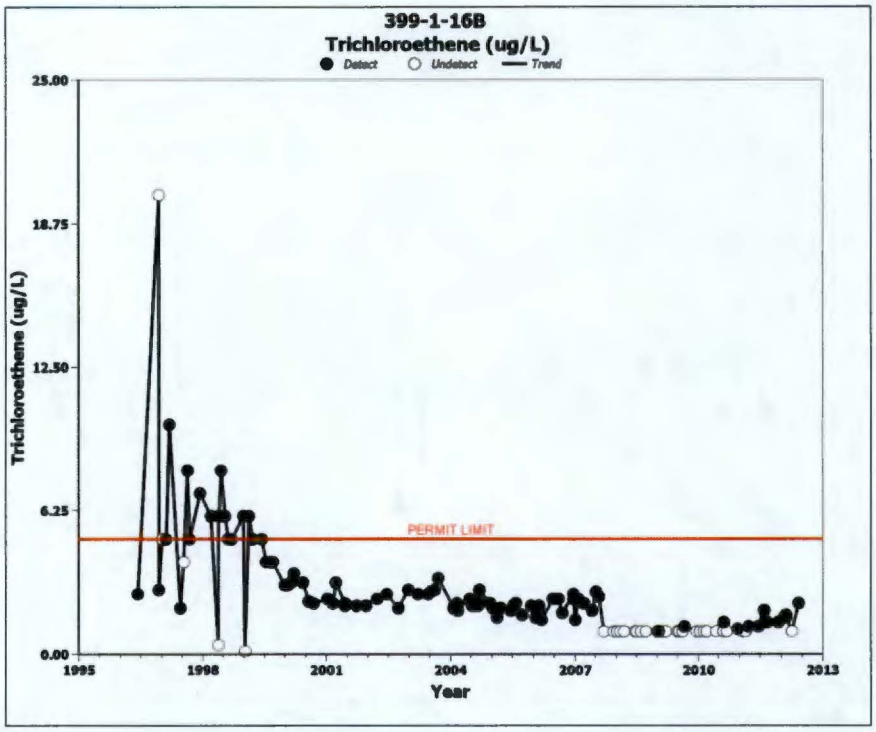


Figure 10. Trichloroethene Concentrations in Well 399-1-16B

A persistent uranium plume underlies a large portion of the 300 Area. Uranium concentrations continued to exceed the permit 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. Uranium concentrations at Wells 399-1-10A and 399-1-16A (Figures 11 and 12, respectively), show an increase following an increase in water level. This is typical for these wells, which are located near the Columbia River.

Concentrations in Well 399-1-17A, which is located farther inland, typically has higher concentrations in the spring and summer when water levels are high. While there appears to be some delay in the uranium concentrations responding to an increase in water levels (Figure 13), the peaks correspond more closely at Well 399-1-17A as compared to Well 399-1-16B or 399-1-10A. The relationship of water levels and uranium concentration in the 300 Area is described in detail in P□□L-17034, *Uranium Contamination in the Subsurface Beneath the 300 Area, Hanford Site, Washington*. The positive correlation between water table elevation and uranium concentration suggests that at or near these locations, uranium remains in the lower portion of the vadose □one and is available to be remobili□ed during periods of high water table conditions. Based on this correlation, uranium concentrations are expected to increase in the upcoming sampling rounds due to the extremely high river stage that occurred during the summer of 2012.

Typical characteristics of the plume during seasonal high water table conditions include (1) lowered concentrations along portions of the Columbia River shoreline, and (2) increased concentrations farther inland near source areas. The reduction in concentrations near the shoreline is caused by dilution from intrusion of river water into the aquifer. The increase in concentrations near source areas is caused by mobili□ation of residual contamination resulting from temporary elevation of the water table. 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 □one beneath the shoreline is lessened because of the lower river stage (□ection 3.3 of P□□L-17034).

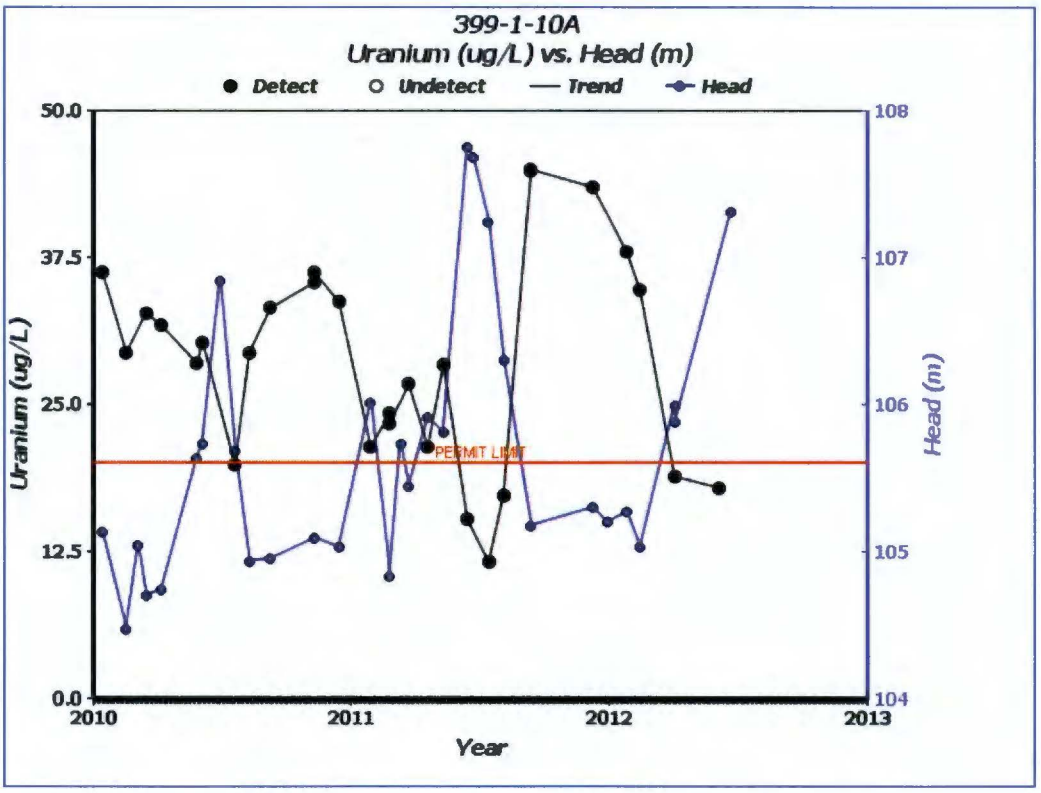


Figure 11. Uranium Concentrations and Water Level in Well 399-1-10A

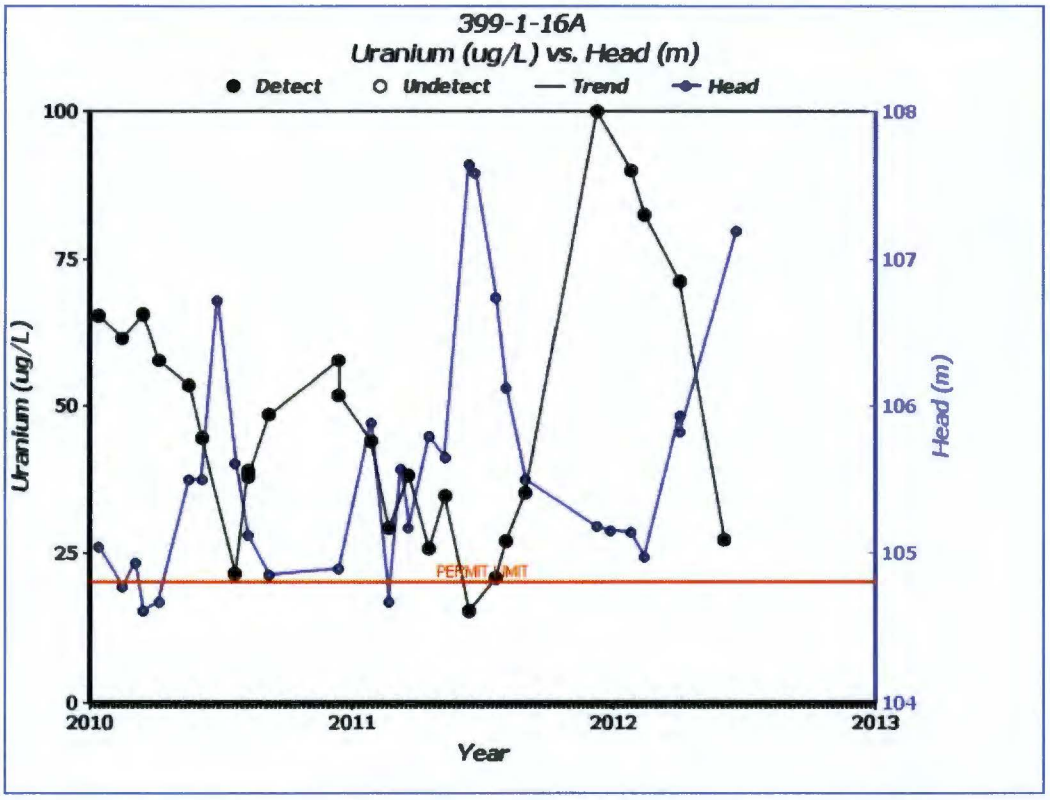


Figure 12. Uranium Concentrations and Water Level in Well 399-1-16A

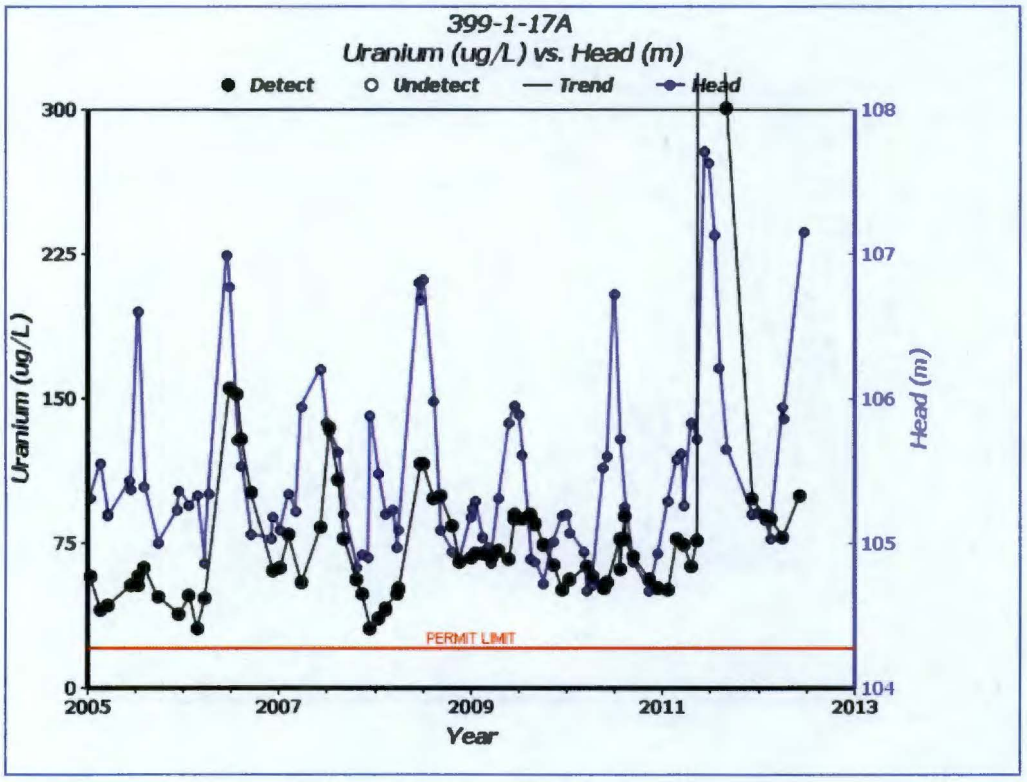


Figure 13. Uranium Concentrations and Water Level in Well 399-1-17A

3.3 300 Area Process Trenches Conclusions

Concentrations of cis-1,2-dichloroethene and uranium have not attenuated as quickly 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 (399-1-10A, 399-1-16A, and 399-1-17A) continued to have uranium concentrations that exceeded the 20 µg/L permit concentration limit. Normally, 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. This trend continued in Wells 399-1-10A and 399-1-16A.

Unusually high uranium concentrations were reported in late 2011 in Well 399-1-17A. Normally, an increase is expected during this timeframe because of the change in river stage, but the magnitude of the increase in June 2011 was not consistent with the seasonal fluctuations. Contaminants within the periodically rewetted zone are readily available to the groundwater as the water table rises and falls during the year. A very high river stage occurred in May/June of 2011 resulting in an unusually high water table at the waste site. This allowed for uranium trapped in the usually dry soil to be released to the water column and causing the high concentrations found in June at Well 399-1-17A.

The values reported during July and August from 399-1-17A had returned to expected levels. Uranium concentrations from Well 399-1-17A ranged from 78.3 to 100 µg/L during the sample period, which is representative of seasonal concentrations.

Trichloroethene concentrations remained below the concentration limit (5 µg/L) during the reporting period. However, monitoring of this volatile organic will continue in compliance with the groundwater monitoring plan.

Corrective actions through the CERCLA interim action (attenuation and institutional controls) have been effective for trichloroethene, and moderately effective for uranium. The CERCLA RI/F for the 300-FF-5 U further evaluates the feasibility of remedies for these constituents.

4 References

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U□C 9601, et seq. Available at: http://www.epa.gov/oecaagct/lcla.html□Ha□ardous□20□ubstance□20Responses.

D□E/RL-93-73, 1995, *300 Area Process Trenches Modified Closure Plan and Part A, Form 3*, Rev. 4, U.□ Department of Energy, Richland □perations □ffice, Richland, Washington. Available at: http://www5.hanford.gov/arpir/□content=detail□A□ey=D196000405.

D□E/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.□ Department of Energy, Richland □perations □ffice, Richland, Washington. Available at: http://www5.hanford.gov/arpir/□content=detail□A□ey=D1348764.

D□E, 1996, *Exceedence of Concentration Limits in groundwater at 183-H Solar Evaporation Basins*, Letter from Department of Energy to Washington Department of Ecology, Dated □eptember 27, 1996. Available at: http://www5.hanford.gov/arpir/□content=findpage□A□ey=D197142672.

D□E, 1997, *Establishment of a Corrective Action Program for Groundwater at 183-H Solar Evaporation Basins*, Letter from Department of Energy to Washington Department of Ecology, Dated December 27, 1996.

D□E/RL-96-90, 1997, *Interim Action Monitoring Plan for the 100-HR-3 and 100-KR-4 Operable Units*, Rev. 0, U.□ Department of Energy, Richland □perations □ffice, Richland, Washington. Available at: http://www5.hanford.gov/arpir/□content=detail□A□ey=D197194770.

D□E/RL-97-48, 1997, *183-H Solar Evaporation Basins Postclosure Plan*, Rev. 0, U.□ Department of Energy, Richland □perations □ffice, Richland, Washington. Available at: http://www5.hanford.gov/arpir/□content=detail□A□ey=D197226569.

D□E, 2012, Response To □otification □f □on Compliance □f The Hanford Facility Resource Conservation And Recovery Act Permit Part VI Post Closure Unit 2 183-H □olar Evaporation Basins Dangerous Waste Portion Revision 8C ID □o WA7890008967 Dated July 2 2012 And Response To Hanford Facility Resource Conservation And Recovery Act Permit Part Vi Post Closure Unit 2 183-H □olar Evaporation Basins Dangerous Waste Portion Revision 8C ID □o WA 7890008967, U.□ Department of Energy, Richland □perations □ffice, Richland, Washington. Available at: http://www5.hanford.gov/arpir/□content=findpage□A□ey=0091903.

D□E/RL-2011-118, 2012, *Hanford Site Groundwater Monitoring For 2011*, Rev. 0, U.□ Department of Energy, Richland □perations □ffice, Richland, Washington. Available at: http://www.hanford.gov/c.cfm/sgrp/□WRep11/html/start11.htm.

Ecology, 1997, *Acceptance of "Closure Certification for the 183-H Solar Evaporation Basins (T-1-4), "96-EAP-246"*, Department of Ecology, Richland, Washington.

Ecology, 2012, *Notification of Non-Compliance of the Hanford Facility Resource Conservation and Recovery Act Permit, Part VI Post Closure Unit 2, 183-H Solar Evaporation Basins Dangerous Waste Portion, Revision 8C, ID No. WA 7890008967*, Department of Ecology, Richland, Washington, Available at: http://www5.hanford.gov/arpir/□content=findpage□A□ey=1207100016.

Environmental Dashboard Application, 2012, U.□. Department of Energy, Available at: http://environet.hanford.gov/EDA.□

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.□ Environmental Protection Agency, Washington □tate Department of Ecology, and U.□ Department of Energy, □lympia, Washington. Available at: http://www2.hanford.gov/arpir/□content=detail□A□ey=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.□ Environmental Protection Agency, Washington □tate Department of Ecology, and U.□ Department of Energy, □lympia, Washington. Available at: http://www2.hanford.gov/arpir/□content=detail□A□ey=D196245781.

P□□L-17034, 2008, *Uranium Contamination in the Subsurface Beneath the 300 Area, Hanford Site, Washington*, Rev. 0, Pacific □orthwest □ational Laboratory, Richland, Washington. Available at: http://www.osti.gov/bridge/product.biblio.□sp□osti□id=925719.

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

□□W-47776, 2010, *Aquifer Testing and Rebound Study in Support of the 100-H Deep Chromium Investigation*, Rev. 0, CH2□ Hill Plateau Remediation Company, Richland, Washington.

□□W-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*, Rev. 0, CH2□ Hill Plateau Remediation Company, Richland, Washington.

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 □tate Department of Ecology, Richland, Washington. Available at: http://www2.hanford.gov/arpir/□content=detail□A□ey=DA06295340.

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

WHC-□D-E□-AP-185, 1995, *Groundwater Monitoring Plan for the 300 Area Process Trenches*, Rev. 0A, Westinghouse Hanford Company, Richland, Washington. Available at: http://www5.hanford.gov/arpir/□content=detail□A□ey=D196020117.

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