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03-WMD-0183

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Cleanup Section Manager  
Nuclear Waste Program  
State of Washington  
Department of Ecology  
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RECEIVED  
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EDMC

Dear Ms. Hedges:

RESULTS OF GROUNDWATER MONITORING FOR THE 183-H SOLAR EVAPORATION  
BASINS AND THE 300 AREA PROCESS TRENCHES, JULY THROUGH  
DECEMBER 2002

The Semi-annual reports for the subject Resource Conservation and Recovery Act sites where groundwater is monitored under Final Status/Corrective Action programs are attached for your information. These reports are submitted to fulfill the requirements of WAC 173-303-645(11)(g). If you have any questions, please contact me, or your staff may contact John Morse, Waste Management Division, on (509) 376-0057.

Sincerely,

Keith A. Klein  
Manager

WMD:JGM

Attachments

cc w/o attaches:

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# Results of Groundwater Monitoring for the 183-H Solar Evaporation Basins

Reporting Period: July - December 2002

Report Date: March 2003

M.J. Hartman

## INTRODUCTION

The 183-H solar evaporation basins were located in the 100 H Area of the Hanford Site, and have been demolished and backfilled. The basins are a treatment, storage, or disposal unit under the *Resource Conservation and Recovery Act of 1976* (RCRA) in the Hanford Facility RCRA Permit (Ecology 1994). Groundwater is monitored in accordance with Washington Administrative Code (WAC) 173-303-645(11), Corrective Action Program, and Part VI, Chapter 2 of the Hanford Facility RCRA Permit (Ecology 1994). The waste discharged to the basins originated in the 300 Area fuel fabrication facility and included solutions of chromic, hydrofluoric, nitric, and sulfuric acids that had been neutralized. The waste solutions contained various metallic and radioactive constituents (e.g., chromium, technetium-99, uranium). Between 1985 and 1996, remaining waste was removed, the facility was demolished, and the underlying contaminated soil was removed and replaced with clean fill.

This is one of a series of reports on corrective action monitoring at the 183-H basins. It addresses requirement of WAC 173-303-645(11)(g) to report twice each year on the effectiveness of the corrective action program. This report covers the period from July through December 2002.

The Washington State Department of Ecology issued the Hanford Facility RCRA Permit in 1994 (Ecology 1994). The 183-H basins were initially included in Part V of the Permit, which contains requirements specifically applicable to those treatment, storage, and disposal units that are undergoing closure. A final-status, compliance monitoring program was proposed in 1995 (Hartman and Chou, 1995) to comply with the groundwater monitoring requirements of WAC 173-303-645(10). The first sample set collected during the compliance monitoring program showed that downgradient concentrations of the contaminants of interest exceeded concentration limits defined in the monitoring plan. The regulations in WAC 173-303-645(11) require corrective action activities to reduce contaminant concentrations in groundwater. The postclosure plan (DOE-RL 1997a), which was incorporated into Part VI of the Hanford Facility RCRA Permit in February 1998, deferred further actions at the 183-H basins to the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) interim action for the 100-HR-3 Operable Unit. The postclosure plan also required monitoring to be conducted as described in the revised final status RCRA groundwater monitoring plan (Hartman 1997). That plan included four contaminants of interest for groundwater: chromium, nitrate, technetium-99, and uranium. Of these, only chromium is a listed dangerous waste

constituent subject to regulation under RCRA. However, all four constituents continue to be monitored because they are included by reference in the Hanford Facility RCRA Permit.

The objective of RCRA groundwater monitoring at the 183-H basins during the period of interim remediation is to track trends in chromium, nitrate, uranium, technetium-99, and fluoride. DOE, the regulators, and members of the public will determine methods for final remediation of 100-H Area groundwater some time in the future. At that time, the RCRA groundwater monitoring program will be revised to meet the requirements of final remedial measures.

### **INTERIM REMEDIAL MEASURE**

The interim remedial measure applies to the 100-HR-3 groundwater operable unit, which is under the authority of a CERCLA record of decision. Groundwater is pumped from five extraction wells, located west, north, and east of the 183-H Basins (Figure 1). The effluent is treated to remove chromium and injected back into the aquifer in upgradient wells. The objective of the interim remedial measure is to reduce the amount of chromium entering the Columbia River, where it is a potential hazard to the ecosystem.

Groundwater is sampled to monitor the effectiveness of the interim remedial measure and to monitor the entire 100-HR-3 Operable Unit (DOE-RL 1997b). This CERCLA monitoring is coordinated with RCRA monitoring.

The pump-and-treat system may be shut down when concentrations of hexavalent chromium are below 22  $\mu\text{g/L}$  in wells specified in the record of decision, and data indicate that the concentration will remain below that value. The system may also be shut down if the system proves ineffective or if a better treatment technique is found. The most recent operable unit report, covering calendar year 2001, concluded that chromium concentrations in groundwater were declining but are not consistently below 22  $\mu\text{g/L}$  in compliance wells (DOE-RL 2002).

### **RCRA GROUNDWATER MONITORING PROGRAM**

Four wells located in the 183-H chromium plume are monitored for corrective action program requirements during pump-and-treat activities (see Figure 1). Three of the wells are completed at the top of the uppermost aquifer (Hanford formation): wells 199-H4-7 and 199-H4-12A are extraction wells, and well 199-H4-3 is a monitoring well that has historically shown the highest levels of chromium, nitrate, technetium-99, and uranium from the 183-H basins. Well 199-H4-12C is located adjacent to 199-H4-12A and is completed deeper in the Ringold Formation. This well consistently has elevated concentrations of chromium without 183-H co-contaminants. The source of chromium in well 199-H4-12C is unknown.

Wells are sampled annually for RCRA, generally in November. This is typically a period when river stage is low and the samples reflect nearly pure groundwater instead of a

mixture of groundwater and river water held in bank storage. Therefore, contaminant concentrations in November are usually among the highest of the year.

Hartman and Chou (1995) listed the following concentration limits for the 183-H basins constituents of interest:

- Chromium: 122  $\mu\text{g/L}$ . This limit represented background concentrations and was based on data from upgradient wells 199-H3-2A and 199-H4-6, which were formerly monitored for RCRA.
- Nitrate: 45  $\text{mg/L}$  (as  $\text{NO}_3$ ). Based on final maximum contaminant level (56 FR, January 30, 1991).
- Uranium: 20  $\mu\text{g/L}$ . Based on EPA guidance in effect at the time the plan was written.
- Technetium-99: 900  $\text{pCi/L}$ . Interim drinking-water standard, based on national primary drinking water standards (40 CFR 141).

Hartman and Chou (1995) did not identify fluoride as a groundwater contaminant of interest, but it was detected in the vadose zone beneath the former basins and so it is monitored under RCRA (DOE-RL, 1997a).

During the period of compliance monitoring (1995-1996), contaminant concentrations from compliance wells were compared to the concentration limits listed above to determine whether corrective action was necessary as required under WAC 173-303-645. Because the CERCLA pump-and-treat system is not the final corrective action for the site, the current objective of RCRA monitoring is simply to track trends, not to determine the effectiveness of the corrective action (Hartman 1997). After completion of the interim remedial measure and future phases of corrective action, the RCRA monitoring program will be revised if necessary.

## CONTAMINANT TRENDS

This section discusses concentrations of chromium, fluoride, nitrate, technetium-99, and uranium in groundwater. The four wells in the RCRA network were sampled for the constituents of interest in November 2002. All of the wells also were sampled in July or August for chromium for the objectives of the 100-HR-3 operable unit. All available data are presented in Table 1 and pertinent results are discussed below.

Concentrations of groundwater contaminants during the reporting period continued along previously-established trends. Contaminant concentrations have decreased overall since 1998, but some increased slightly between November 2001 and November 2002.

## Chromium

Chromium data include two types of analyses: total chromium (analyzed with the inductively coupled plasma method) and hexavalent chromium. Total chromium measured in unfiltered samples may include the relatively insoluble, nontoxic trivalent chromium as well as the soluble, more toxic hexavalent form. Filtered samples represent dissolved chromium, which is hexavalent. Samples analyzed specifically for hexavalent chromium may be filtered or unfiltered. The type of chromium analysis for each result is shown in Table 1.

Dissolved chromium concentrations in the four RCRA monitoring wells are shown in Figure 2. Concentrations in well 199-H4-3, nearest the basins, were higher during the reporting period than in 2001, but remained below values measured in the 1990s. The maximum concentration in well 199-H4-3 during the reporting period was 73  $\mu\text{g/L}$ , which is below the concentration limit for 183-H (122  $\mu\text{g/L}$ ) and below the maximum contaminant level (100  $\mu\text{g/L}$ ).

Chromium concentrations in extraction well 199-H4-7 declined between 1997 and early 2001, and has increased gradually since then. The highest concentration during the reporting period was 44  $\mu\text{g/L}$  in November 2002. Similar trends are not evident for the other contaminants in this well.

Concentrations in extraction well 199-H4-12A decreased between February 2001 and early November 2002, but increased to 50  $\mu\text{g/L}$  later in November (see Table 1 and Figure 2). Well 199-H4-12C is located adjacent to 199-H4-12A and is completed deeper in the aquifer. Chromium concentrations have been fairly stable in this well since 2000 (~150  $\mu\text{g/L}$ ). The presence of elevated chromium in this well without similar levels of other 183-H contaminants may be related to corrosion of the well screen.

## Fluoride

Fluoride levels remained low (180 to 290  $\mu\text{g/L}$ ) in all four RCRA monitoring wells (Figure 3). Fluoride concentrations have not been elevated in 183-H groundwater monitoring wells since 1996.

## Nitrate

Nitrate concentrations continued within previously-established ranges in all four RCRA wells (Figure 4). The highest concentration was in well 199-H4-3, at 255  $\text{mg/L}$  in November 2002, exceeding the maximum contaminant level (45  $\text{mg/L}$ ). This was the highest level of nitrate in this well since November 1999.

## Technetium-99

Technetium-99 concentrations also continued within previously-established ranges (Figure 5). All values remained below the 900-pCi/L drinking water standard. The

highest value during the reporting period was 321 pCi/L in well 199-H4-3. A slight increase in technetium-99 concentration in well 199-H4-7 in May 2002, discussed in the last report, was not repeated in November 2002.

## Uranium

Uranium concentrations (Figure 6) showed trends very similar to nitrate and technetium-99. The highest concentration during the reporting period was 119 ug/L in well 199-H4-3, nearest the basins, in November 2002. This represented an increase from the previous two Novembers, and was the only result greater than the established concentration limit during the reporting period.

## CONCLUSIONS

The current objective of RCRA corrective action monitoring is simply to track trends, not to determine the effectiveness of the interim remedial action. After completion of the interim remedial measure and future phases of corrective action, the RCRA groundwater monitoring program will be revised if necessary.

Contaminant concentrations continued to fall within previously-established ranges in the four RCRA monitoring wells during the period July-December 2002. The four RCRA wells will be sampled for the constituents of interest in November 2003. The current RCRA monitoring plan (Hartman 1997) remains adequate for the objective of tracking trends during the period of the interim remedial action.

## REFERENCES

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- Ecology, 1994, *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, Permit No. WA7890008967, effective September 28, 1994, Washington State Department of Ecology, Olympia, Washington.

Hartman, M.J. and C.J. Chou, 1995, *Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins*, WHC-SD-EN-AP-180, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Hartman, M.J., 1997. *Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins*, PNNL-11573, Pacific Northwest National Laboratory, Richland, Washington.

Table 1. Groundwater Monitoring Data for 183-H Basins, July-December 2002.

Well	Sample Date	Specific conductance, uS/cm	Chromium, ug/L	Fluoride, ug/L	Nitrate, mg/L	Tc-99, pCi/L	Uranium, ug/L
199-H4-3	7/22/2002	746	64 <sup>(a)</sup>				
199-H4-3	11/4/2002	993	73 <sup>(a)</sup>	200	255D	321	119
199-H4-3	11/4/2002		74.5 <sup>(b)</sup>				
199-H4-3	11/4/2002		71.2 <sup>(c)</sup>				
199-H4-7	8/5/2002		43 <sup>(a)</sup>				
199-H4-7	8/5/2002		43 <sup>(b)</sup>				
199-H4-7	8/5/2002		42 <sup>(c)</sup>				
199-H4-7	11/4/2002	558	37.1 <sup>(c)</sup>	240	44.7D	14.8	4.09
199-H4-7	11/4/2002		37.5 <sup>(c)</sup>	290	49.6D	21.7	3.91
199-H4-7	11/19/2002		44 <sup>(a)</sup>		34.6G	25.9	1.35
199-H4-7	11/19/2002				41.3G		4.02
199-H4-12A	8/5/2002		19 <sup>(a)</sup>				
199-H4-12A	11/4/2002	323	26.7 <sup>(c)</sup>	180	26.6D	21.5	4.24
199-H4-12A	11/4/2002		26.2 <sup>(c)</sup>	180	25.7D	24.2	4.44
199-H4-12A	11/19/2002		51 <sup>(a)</sup>		56.8G	126	10.5
199-H4-12A	11/19/2002		50 <sup>(a)</sup>		54G	131	10.9
199-H4-12A	11/19/2002		50 <sup>(a)</sup>				
199-H4-12C	7/17/2002	271	148 <sup>(a)</sup>				
199-H4-12C	7/17/2002		147 <sup>(a)</sup>				
199-H4-12C	11/5/2002	271	154 <sup>(a)</sup>	230	5.31D	4.46U	1.27Q
199-H4-12C	11/5/2002		145 <sup>(c)</sup>				
199-H4-12C	11/5/2002		149 <sup>(b)</sup>				
199-H4-12C	11/5/2002		145 <sup>(c)</sup>				

<sup>(a)</sup> Hexavalent chromium analysis

<sup>(b)</sup> Total chromium analysis, unfiltered sample

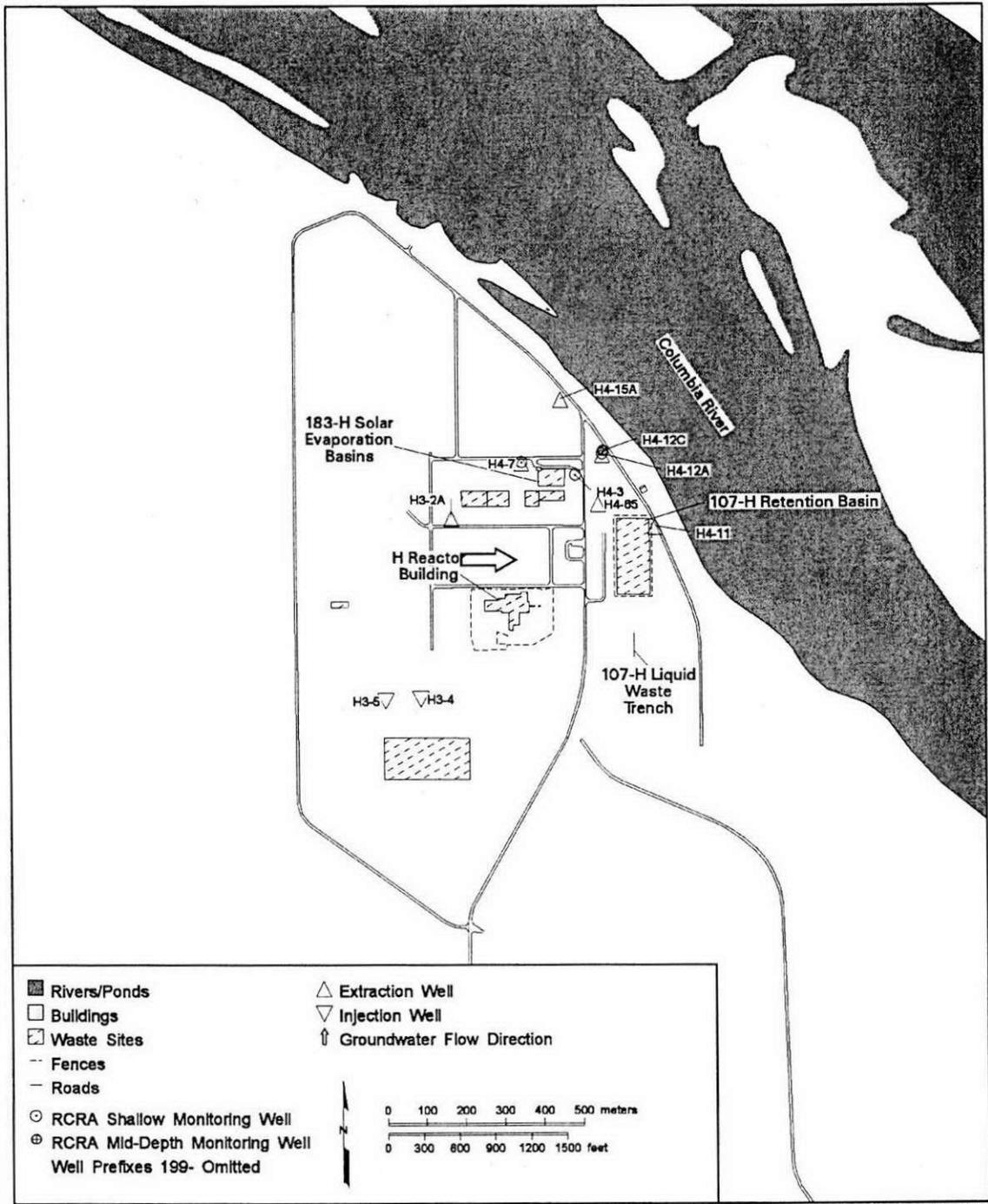
<sup>(c)</sup> Total chromium analysis, filtered sample

D= Sample diluted for analysis. Result corrected for dilution.

G= Data review was requested; check indicated the value is valid

Q= Result associated with out-of-range quality control sample

U= Below detection limit



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Figure 1. Monitoring Well Locations for 183-H Solar Evaporation Basins.

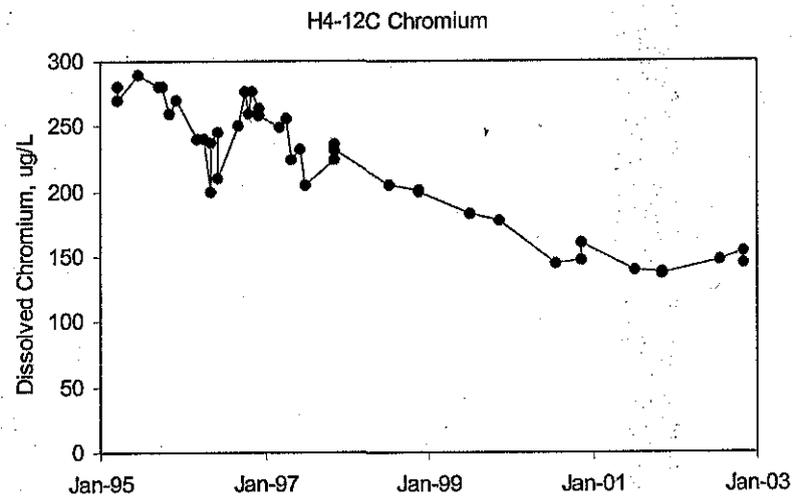
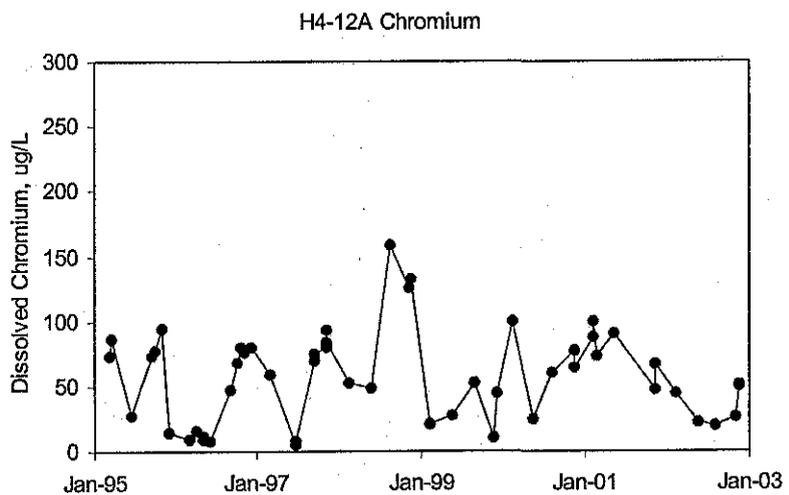
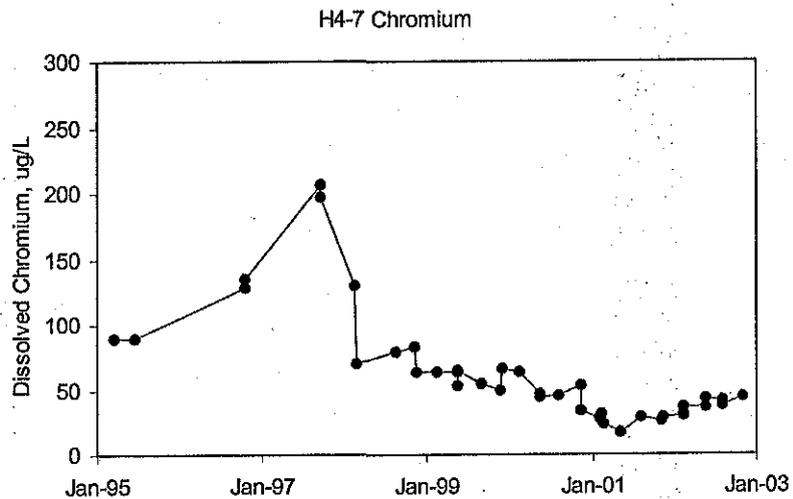
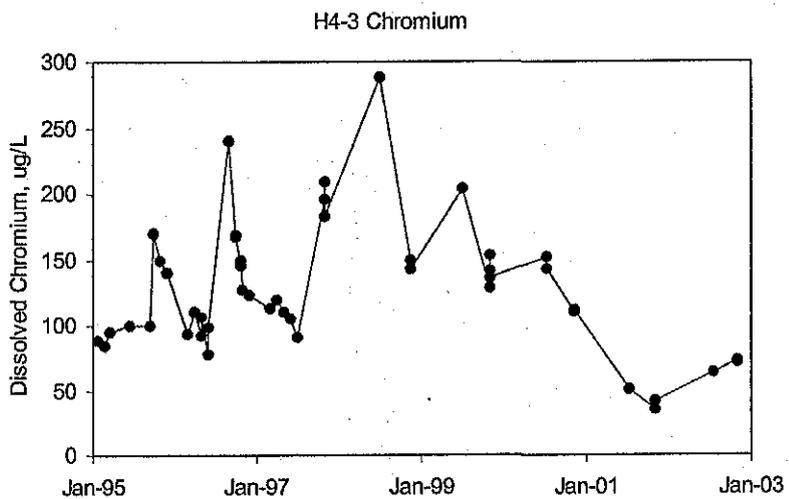


Figure 2. Dissolved Chromium in 183-H Monitoring Wells.





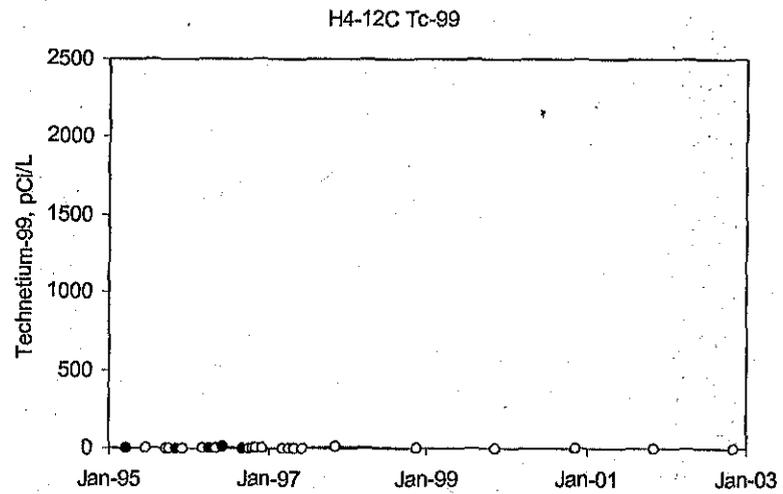
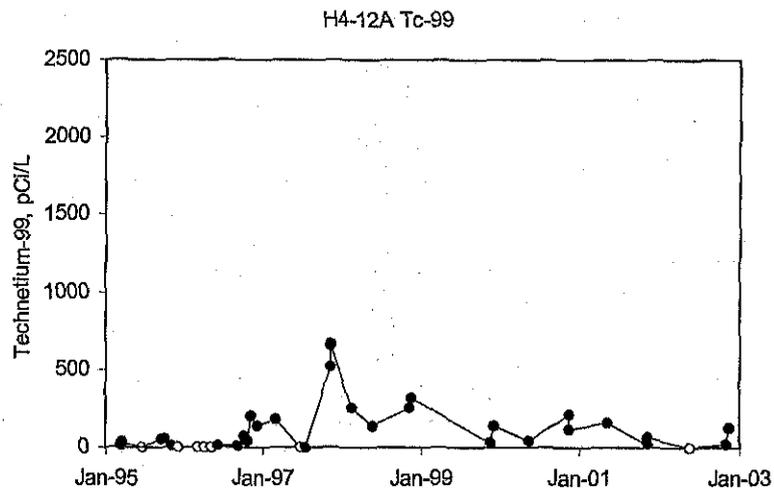
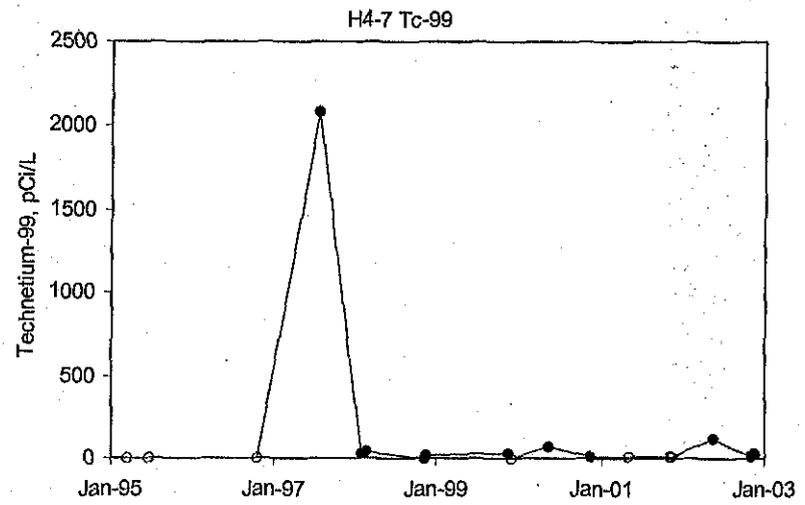
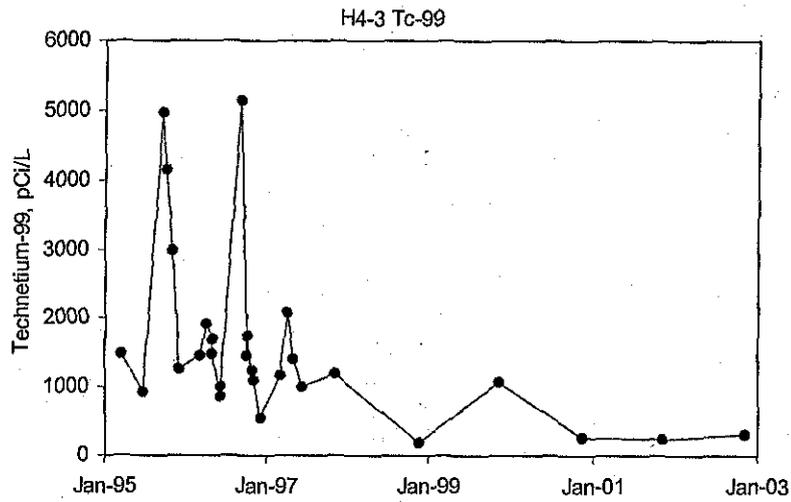


Figure 5. Technetium-99 in 183-H Monitoring Wells.

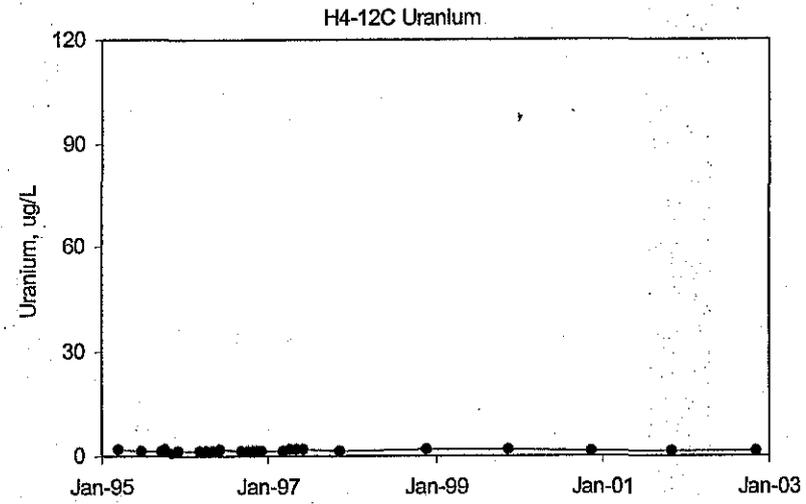
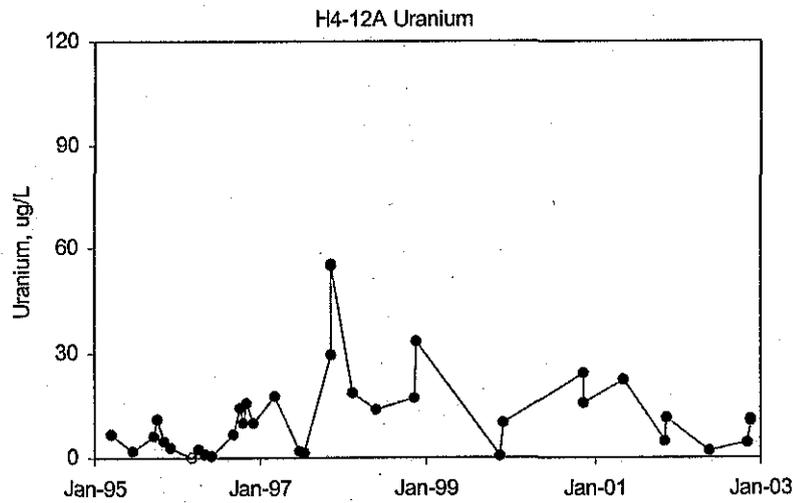
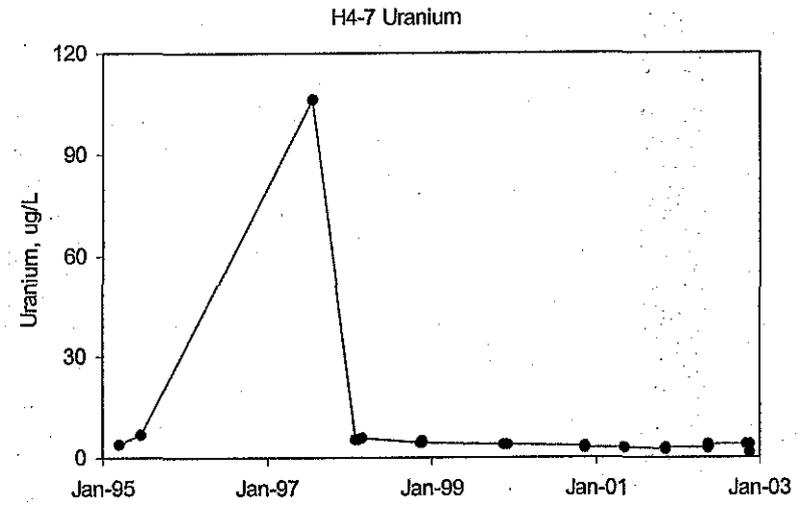
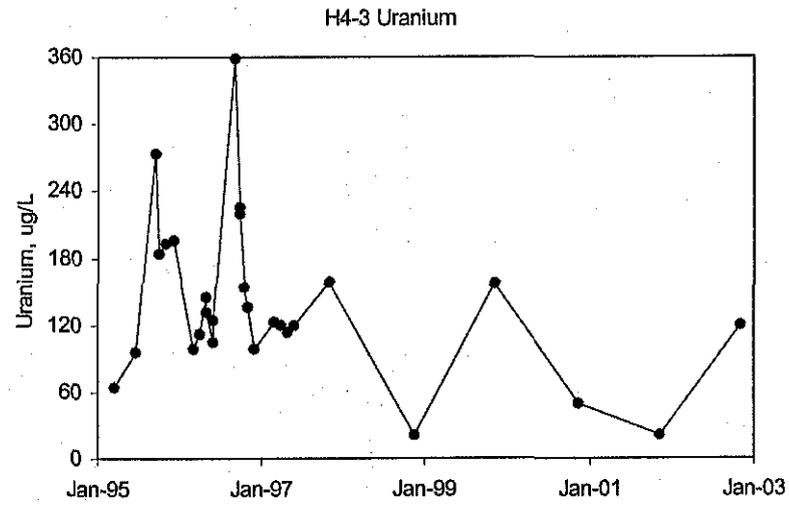


Figure 6. Uranium in 183-H Monitoring Wells.

## Results of Groundwater Monitoring for the 300 Area Process Trenches

Reporting Period: July through December 2002

Report Date: March, 2003

J.W. Lindberg

### INTRODUCTION

The 300 Area Process Trenches (316-5) are a *Resource Conservation and Recovery Act of 1976* (RCRA) treatment, storage, or disposal unit in the Hanford Facility RCRA Permit (Ecology 1994). From 1975 through 1994 they received effluent discharges of dangerous mixed waste from fuel fabrication laboratories in the 300 Area. The 300 Area Process Trenches (300 APT) groundwater monitoring is conducted in accordance with Washington Administrative Code (WAC) 173-303-645(11), Corrective Action Program, and Part VI, Chapter 1 of the Hanford Facility RCRA Permit (Ecology 1994). This is one of a series of semiannual groundwater-monitoring reports on the corrective action program at the 300 APT. It fulfills requirements of WAC 173-303-645(11)(g) to report on the effectiveness of the corrective action program. Results of monitoring have been reported previously in groundwater annual reports (e.g., Hartman et al. 2001; Hartman et al. 2002; Hartman et al. 2003). This report covers groundwater-monitoring data collected during the period from July through December 2002.

### BACKGROUND

The objective of groundwater monitoring during the corrective action period is to demonstrate the effectiveness of the corrective action program by examining the trend of the constituents of interest to confirm that they are attenuating naturally, as expected by the CERCLA record of decision for the 300-FF-5 Operable Unit (ROD 1996). In September 2001 a new groundwater-monitoring plan (Lindberg and Chou 2001) was implemented. Changes over the previous plan included an update on the discussion of hydrogeology and conceptual model, a change in the number of network wells from 8 to 11 (Figure 1), and a revision of the statistical approach to the control chart method that tracks the contamination trends better than the previous plan with reduced costs.

The 300 APT were closed under a modified closure/post-closure plan (DOE 1994) and continue to be in the groundwater corrective action program because groundwater contamination continues to exceed drinking water standards. Groundwater monitoring will continue for 30 years during the post-closure monitoring period. A new groundwater-monitoring plan (Lindberg and Chou 2001, hereafter called the current plan) was submitted to Ecology and was released for public comment in May 2002. This current groundwater-monitoring plan was in effect under a temporary authorization granted by Ecology on February 2002, and continued to June 2002. In June 2002 Ecology extended the temporary authorization to December 2002. Only two temporary authorizations are allowable. Since the Hanford Facility RCRA Permit modification was not finalized by December 2002, groundwater monitoring at the 300 APT must revert to the previous plan (Lindberg, et al. 1995) after that time. The previous plan was a compliance-monitoring plan and was not designed to effectively track the plumes of contaminants of concern

over time. It utilizes a network of fewer wells, but samples the well network eight times per year and is more expensive.

The most significant difference between the old and current groundwater-monitoring plans is the change in statistical approach. The current statistical approach, undergoing a two-year demonstration, is a control chart method that uses a single observation (sample) during any monitoring event rather than four time-independent samples specified by the old plan. The method monitors each well in the network individually and yet maintains desired site-wide false-positive and false-negative rates. Also, each well showing an exceedance of one of the constituents of interest (currently 5 of the 11 network wells) is sampled quarterly to better follow the trends of contaminant concentration. The other wells in the network will continue to be sampled semiannually. Results of the two-year demonstration will be evaluated to determine future statistical methods.

## RCRA GROUNDWATER-MONITORING PROGRAM

The current groundwater-monitoring network for the 300 APT includes five well pairs plus one additional well (399-1-11) at the 300 APT that is screened in the upper portion of the unconfined aquifer (Figure 1). 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 local unconfined aquifer (above the lacustrine and overbank deposits of the Ringold Formation lower mud unit).

The wells are sampled for the constituents of interest, including total uranium (chemical), and the volatile organic compounds cis-1,2-dichloroethene, trichloroethene, and tetrachloroethene. The maximum contaminant levels (MCLs), as specified in Lindberg and Chou (2001) are shown in Table 1 along with the current method detection levels (MDLs).

Table 1. Maximum Contaminant Levels and Method Detection Levels of 300 APT Constituents of Interest

Constituents of Interest	MCL	MDL
Uranium	30 µg/L	<0.09 µg/L
Cis-1,2-dichloroethene	70 µg/L	0.06 µg/L
Trichloroethene	5 µg/L	0.16 µg/L
Tetrachloroethene	5 µg/L	0.17 µg/L

Uranium is not a listed dangerous waste constituent subject to regulation under RCRA. However, since it is included in the groundwater-monitoring plan, which is cited in the Hanford Facility RCRA Permit, it will continue to be monitored for in the 300 APT corrective action program.

The sampling schedule is based on the concentrations of the constituents of interest reported at each well. As mentioned in the Background Section, wells with constituents of interest exceeding MCLs are sampled quarterly. The rest are sampled semiannually. Table 2

lists the wells in the 300 APT network, their sampling frequency, and if sampled quarterly, the constituents of interest that exceed drinking water standards.

Table 2. Sampling Schedule for Wells in the 300 APT Network  
As Specified In The Groundwater-Monitoring Plan (PNNL-13645)

Well	Sampling Frequency	Constituents of Interest Exceeding MCLs
399-1-7	Quarterly	Uranium
399-1-8	Semiannually	
399-1-10A	Quarterly	Uranium
399-1-10B	Semiannually	
399-1-11	Quarterly	Uranium
399-1-16A	Quarterly	Uranium
399-1-16B	Quarterly	Cis-1,2-dichloroethene
399-1-17A	Quarterly	Uranium
399-1-17B	Semiannually	
399-1-21A	Semiannually	
399-1-21B	Semiannually	

## WATER TABLE AND GROUNDWATER -FLOW DIRECTIONS

The water table during the September and December 2002 sampling events was in its normal (low river stage) configuration where it sloped to the southeast in the vicinity of the 300 APT. The water table configuration was similar to that shown in the Figure 2.12-3 of PNNL-14187 (March 2002). Therefore, the flow direction was interpreted to be to the southeast as well during that time.

## GROUNDWATER CONTAMINANT TRENDS

This section discusses concentrations of uranium and cis-1,2-dichloroethene (cis-DCE) in groundwater downgradient of the 300 APT during the reporting period. Trichloroethene and tetrachloroethene are not discussed because none of the wells in the network had reported concentrations at or above the MCLs. Since March 1997 the reported concentrations of trichloroethene have been slowly declining or holding steady at low concentrations, and tetrachloroethene is no longer detected in 300 APT network wells. Appendix A contains all reported results for constituents of interest in 300 APT network wells during the current reporting period.

During the current reporting period, the network wells were sampled twice, once in September 2002 and again in December 2002. Only six of the 11 wells were sampling during the September sampling event because the other five wells are on a semiannual sampling schedule

The distribution of uranium concentration in the 300 Area during the previous quarter (June 2002) is shown in Figure 2 so that it can be compared to December 2002 (Figure 3) during

the reporting period. In June 2002, the 300 Area was influenced by a high Columbia River stage during the "Spring" runoff. Under the reversed gradient, river water entered the riverbank, mixed with groundwater, and concentrations of uranium decreased in the areas where mixing occurred. The peak concentrations in June 2002, as a result, were further inland from the river near the uranium sources of the 316-5 Process Trenches and probably the 307 Trenches (near the 324 Bldg). By December 2002, the water table had resumed its normal configuration, and the areas of higher concentration of uranium in had moved downgradient with the groundwater to positions along the riverbank (Figure 3).

The effect of high river stage in June 2002 on the uranium plume and recovery to the normal groundwater flow pattern can also be shown by examining the uranium trend plots of a well near the river shoreline versus one further away. Well 399-1-16A was within the zone of groundwater-river water mixing during June 2002. Figure 4 shows there was a substantial decrease in uranium concentration at well 399-1-16A in the June 2002 sample (down to 16 ug/L), and then shows that the September and December results were higher than concentrations just prior to June 2002. Well 399-1-21A was beyond the zone of groundwater-river water mixing during June 2002. As a result, it not only showed no decrease in uranium concentration in the June 2002 sample, but the concentration actually increased from 12 to 35 ug/L (Figure 5). The increase in uranium at this well during and subsequent to June 2002 is most likely due to an increased amount of uranium desorption and mobilization from the lower vadose zone (then temporarily converted to aquifer) when the water table rose during the high river stage (June 2002). This effect is discussed in detail in the last semiannual report on groundwater monitoring at the 316-5 Process Trenches (January - June 2002 report).

Cis-DCE (MCL 70 ug/L) was detected at three wells in the 300 APT well network during the current reporting period. Those three wells were 399-1-16A, 399-1-16B, and 399-1-17B. Well 399-1-16A is screened at the water table, but the other two are screened at the bottom of the unconfined aquifer. The concentrations at wells 399-1-16A and 399-1-17B were detected at 0.3 ug/L and 0.8 ug/L (respectively) but are only estimates because the results were less than the practical quantitation limit but greater than method detection limit. The concentration at 399-1-16B was as high as 150 ug/L (September 26, 2002) during the reporting period, which is consistent with historical trends in this well (Figure 6). The concentrations do not appear to be directly affected by river stage as would be expected in wells screened at the water table. The overall trend in well 399-1-16B is highly variable, ranging from 100 to 190, but has remained in this range since 1997. The concentration of cis-DCE remains steady for one of two potential reasons. The first is that the groundwater flow rate at the bottom of the unconfined aquifer is very low such that the contamination has not had sufficient time to move downgradient. The other potential reason is that there is a continuing supply of dissolved cis-DCE from a pool of immiscible cis-DCE (DNAPL) located near well 399-1-16B.

## CONCLUSIONS

Concentrations of uranium and cis-DCE exceeded applicable concentration limits during the reporting period. Five wells exceeded the MCL for uranium during the reporting period, and the results continued the previous steady to downward trend. However, the previous high-river stage during the June 2002 sampling event disrupted the trends. Wells close to the river had

decreased concentrations of uranium due to mixing of groundwater with river water and increased adsorption of uranium. Wells further away from the river had increased levels of uranium due to an additional source of uranium from (what was formerly) the lower vadose zone. The only well showing a significant concentration of cis-DCE (well 399-1-16B) is screened at the base of the unconfined aquifer. The concentration of cis-DCE in this well appears to be holding steady as it has since 1997, and the concentration does not appear to fluctuate with changing river stage.

The Five-Year Review of the Hanford Site 300 Area National Priority List (U.S. EPA, 2001) indicated that, in general, the 300 Area cleanups are proceeding in a protective and effective manner. The EPA still considers the cleanup goals and remedy selection decisions in the record of decision (ROD 1996) appropriate at the present time. The results and conclusions of this semiannual report of groundwater contamination beneath the 300 APT are in general agreement with the conclusions of the EPA in the Five-Year Review.

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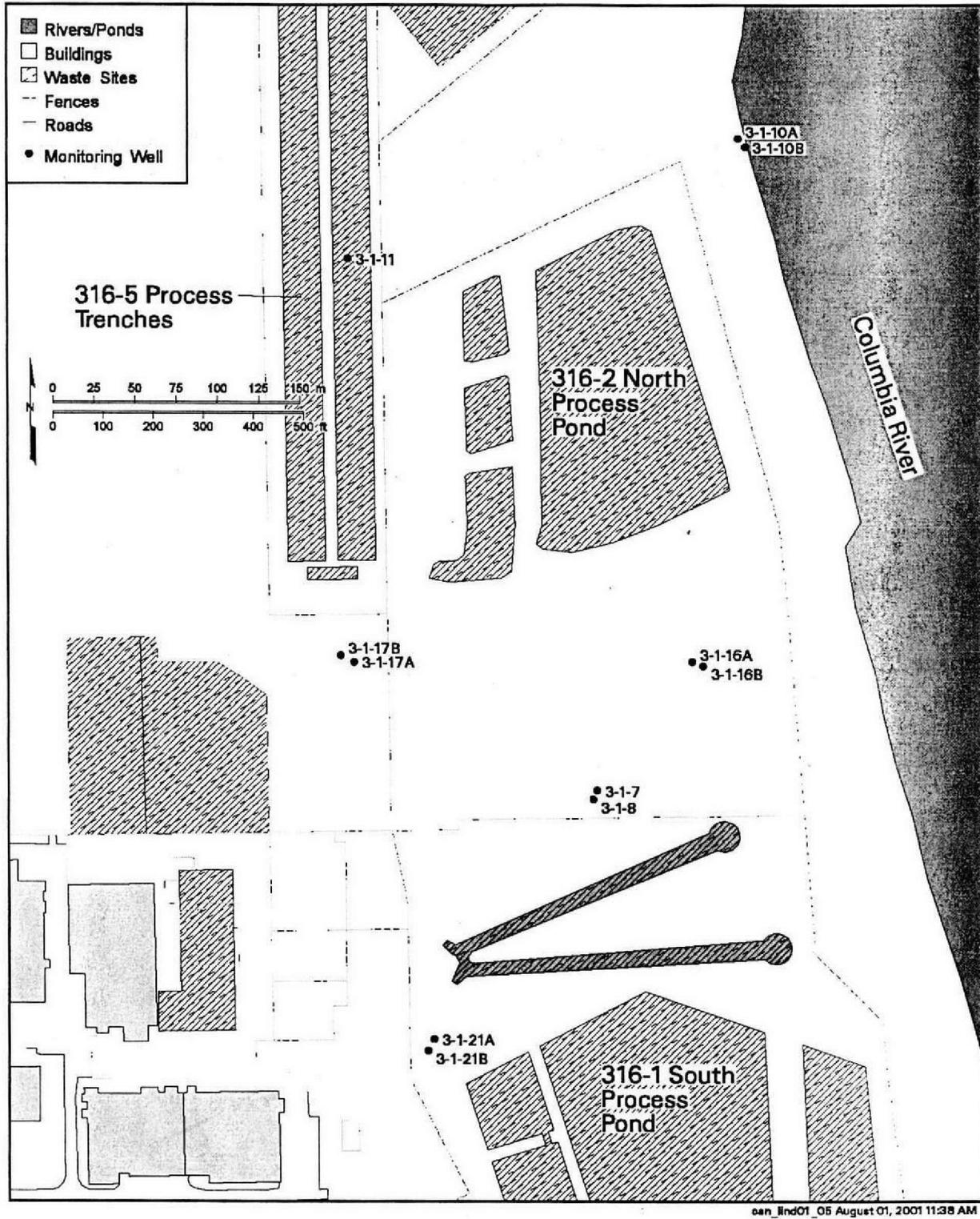


Figure 1. Locations of Wells in the 300 Area Process Trenches Monitoring Network (from PNNL-13645).



### 300 Area Uranium, December 2002

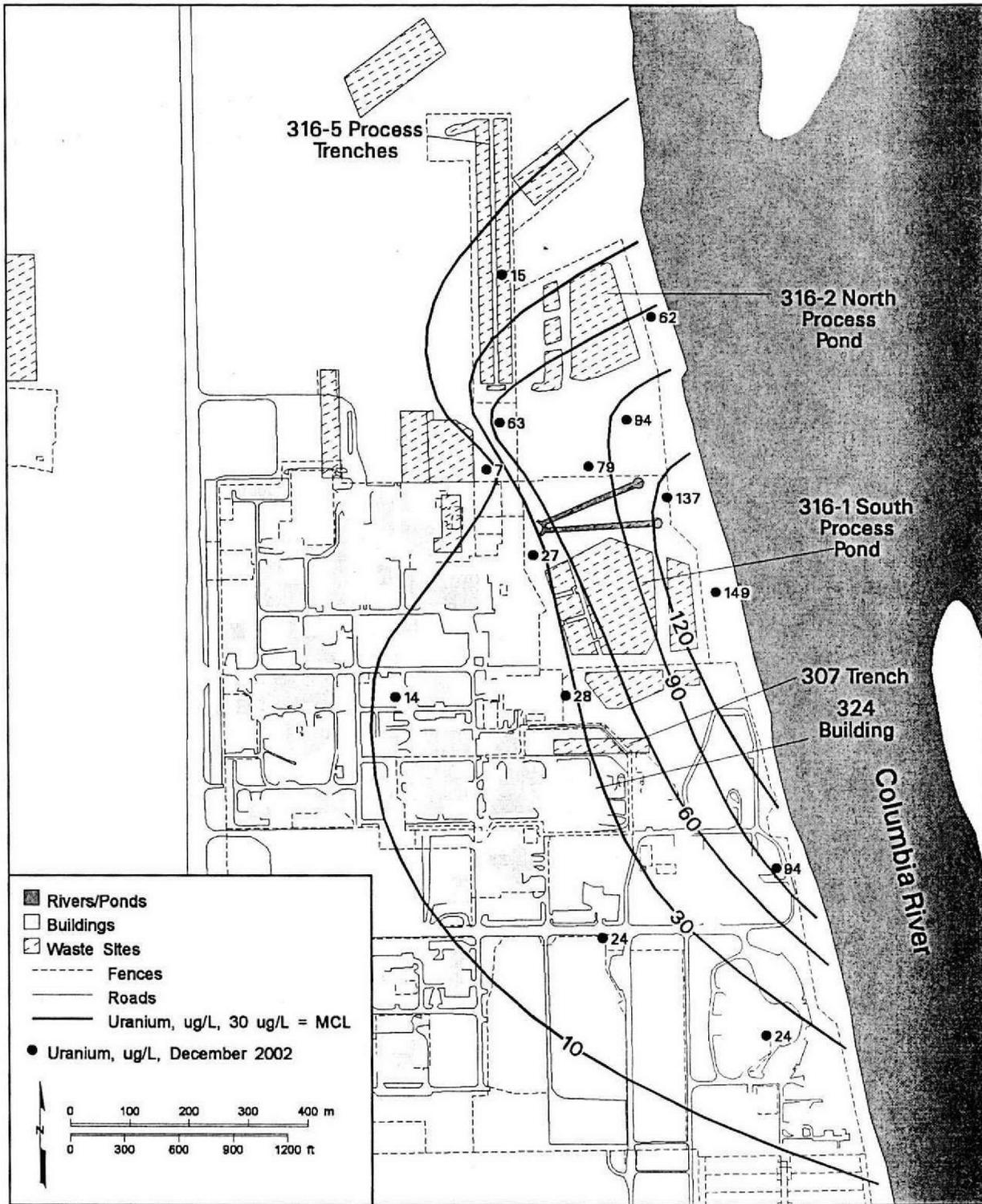


Figure 3. Uranium in December 2002.

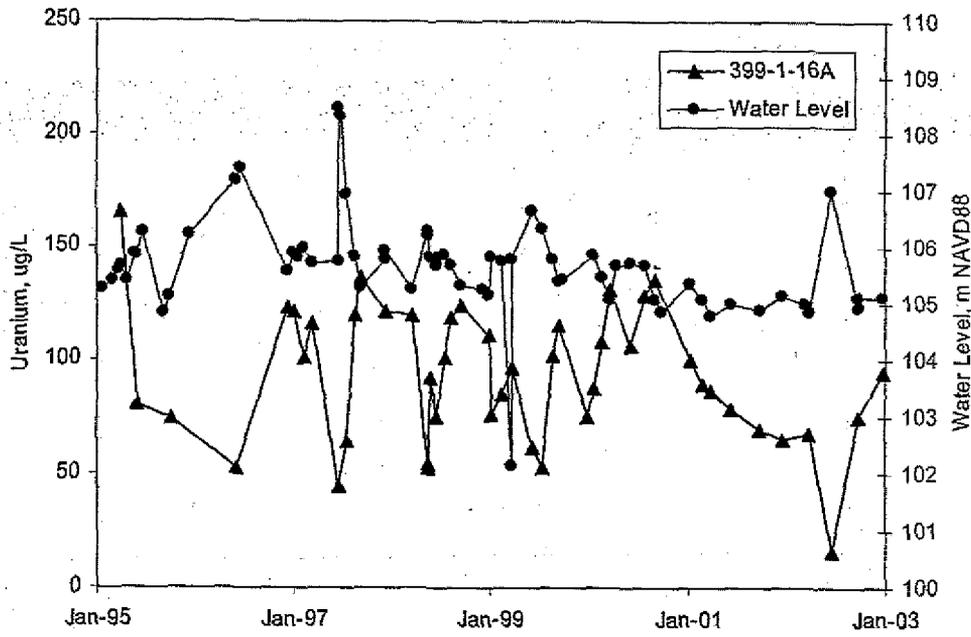


Figure 4 – Uranium concentration at well 399-1-16A.

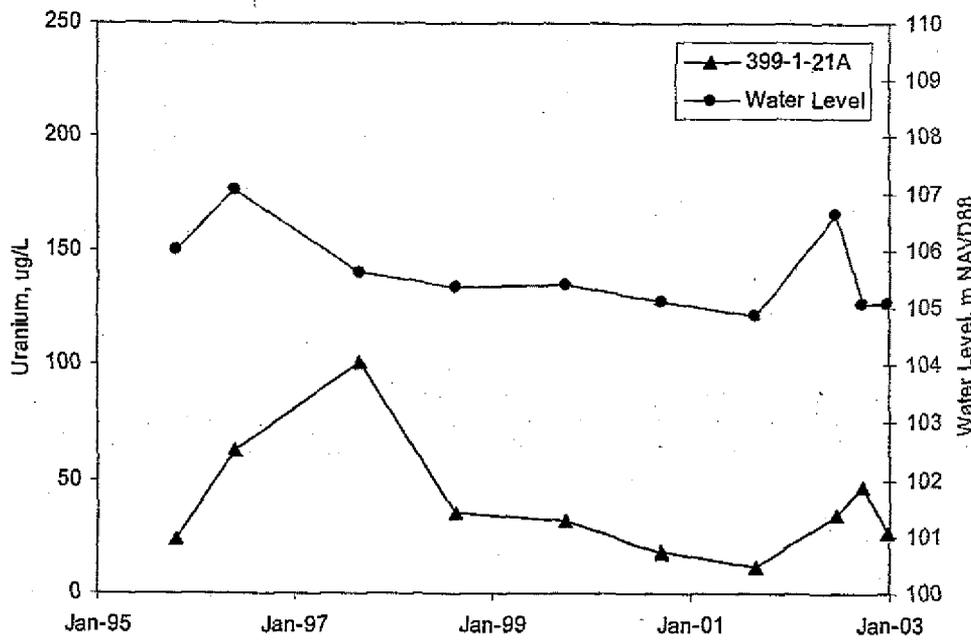


Figure 5 – Uranium concentration at well 399-1-21A.

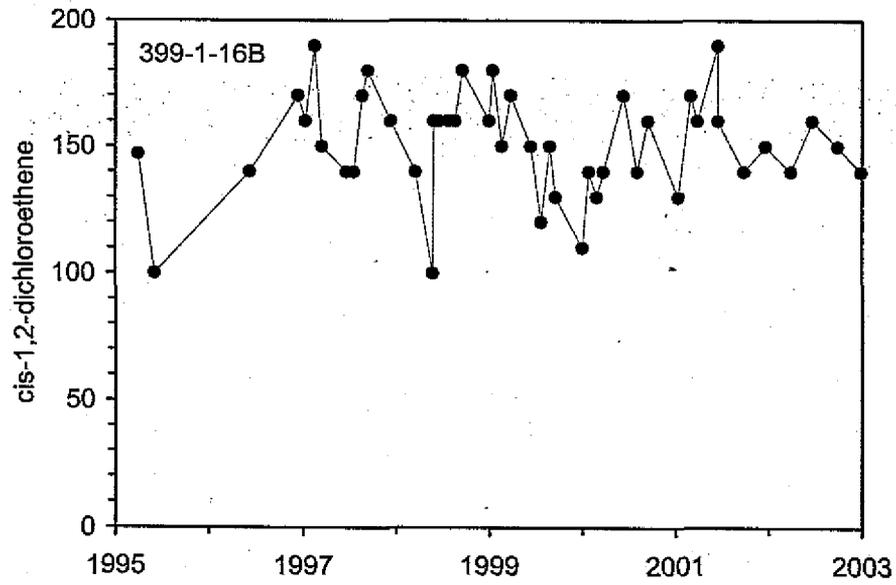


Figure 6 – Cis-1,2-dichloroethene at well 399-1-16B.