0068143 PNNL-15439

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

Reporting Period: January-June 2005

A Letter Report Prepared by
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Richland, Washington

October 2005

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

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This letter report has been prepared to provide the U.S. Department of Energy, U.S. Environmental Protection Agency, Washington State Department of Ecology, and Hanford Site contractors with updated groundwater monitoring information. It is not intended for general distribution beyond that audience.

INTRODUCTION

The 183-H solar evaporation basins (183-H basins) were located in the 100 H Area of the Hanford Site and have been demolished and backfilled under the *Resource Conservation and Recovery Act* (RCRA) in the Hanford Facility RCRA Permit (Ecology 2004). Post-closure actions remain for the 183-H basins. 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 2004). 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[1]). 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 fulfills a 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 January through June 2005.

The regulations in WAC 173-303-645(11) require corrective action activities to reduce contaminant concentrations in groundwater. The postclosure plan (DOE 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* (CERCLA) interim action for the 100-HR-3 Operable Unit. The post-closure plan also requires monitoring to be conducted as described in the 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.

INTERIM REMEDIAL MEASURE

The interim remedial action applies to the 100-HR-3 groundwater operable unit, which is under the authority of a CERCLA record of decision. Groundwater in the 100-H Area is pumped from extraction wells, treated to remove chromium, and injected back into the aquifer. The objective of

[1] Note that source, special nuclear and by-product materials, as defined in the *Atomic Energy Act* (AEA), are regulated at DOE facilities exclusively by DOE acting pursuant to its AEA authority. These materials are not subject to regulation by the State of Washington. All information contained herein and related to, or describing AEA-regulated materials and processes in any manner, may not be used to create conditions or other restrictions set forth in any permit, license, order, or any other enforceable instrument. DOE asserts that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear and by-product materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

the interim remedial measure is to reduce the amount of chromium entering the Columbia River, where it is a potential hazard to the ecosystem. Active extraction and injection wells for this reporting period are listed below:

Extraction Wells	Injection Wells
199-H4-4	199-H3-2A
199-H4-11	199-H4-18
199-H4-12A	199-H3-3
199-H4-15A	
199-H4-64	
199-H4-65	

Groundwater is sampled to monitor the performance of the interim remedial measure and to monitor the entire 100-HR-3 Operable Unit (DOE 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 µg/L in the extraction and compliance wells as specified in the Remedial Design Report and Remedial Action Work Plan (DOE 2003) and data indicate that the concentration will remain below that value. The system may also be shut down if it proves ineffective or if a better treatment technique is found. The most recent operable unit report, covering calendar year 2004, concluded that chromium concentrations in groundwater are not consistently below 22 µg/L in the extraction and compliance wells (DOE 2005). However, chromium concentrations are below the 100 ug/L drinking water standard at these wells and chromium levels in aquifer tubes along the Columbia River are near the aquatic standard.

RCRA GROUNDWATER MONITORING PROGRAM

Four wells located in the 183-H chromium plume are monitored for corrective action program requirements (Figure 1). Three of the wells are completed at the top of the uppermost aquifer (Hanford formation): well 199-H4-12A is an extraction well, well 199-H4-7 is a former extraction well, 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.

Wells are sampled annually for RCRA, generally in November. Late fall is typically a period when river stage is low and the samples reflect nearly undiluted 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.

CONTAMINANT TRENDS

This section discusses concentrations of chromium, nitrate, technetium-99, and uranium in groundwater. The wells were not sampled for RCRA during the reporting period. Two of the wells were sampled for the purposes of the CERCLA interim action. Available data are presented in Table 1 and pertinent results are discussed in the following paragraphs.

Chromium concentrations in the two wells sampled (199-H4-7 and 199-H4-12A) remained within expected ranges (Figure 2). The maximum concentration in former extraction well 199-H4-7 was 30 ug/L during the reporting period, and had declined to just 10 ug/L in late May 2005. Concentrations vary seasonally in extraction well 199-H4-12A, and ranged from 29 to 78 ug/L during the reporting period.

Only well 199-H4-7 was sampled for fluoride during the reporting period. Concentrations remained low (140 and 150 ug/L).

Nitrate concentrations continued in established ranges in the two wells sampled: 40.3 and 44.3 mg/L in well 199-H4-7 and 54 mg/L in 199-H4-12A.

Technetium-99 and uranium were analyzed in one sample from well 199-H4-12A and remained below drinking water standards, with technetium-99 at 120 pCi/L and uranium at 12.1 ug/L.

CONCLUSIONS

The current objective of RCRA corrective action monitoring is simply to track trends, not to determine the effectiveness of the interim remedial action. The current RCRA monitoring plan (Hartman 1997) remains adequate for the objective of tracking trends during the period of the interim remedial action.

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Atomic Energy Act of 1954. As amended, Ch. 1073, 68 Stat. 919, 42 USC 2011 et seq.

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Resource Conservation and Recovery Act. 1976. Public Law 94-580, as amended, 90 Stat. 2795, 42 USC 6901 et seq.

WAC 173-303-645. *Release from Regulated Units*. Washington Administrative Code, Olympia, Washington.

Table 1. Groundwater Data for 183-H Basins, January through June 2005.

Well	Sample Date	Chromium, ug/L	Fluoride, ug/L	Nitrate, mg/L	Tc-99, pCi/L	Uranium, ug/L
199-H4-12A	1/3/2005	41[a]				
199-H4-12A	2/7/2005	49[a]				
199-H4-12A	2/8/2005	49[a]				
199-H4-12A	2/8/2005	49[a]				
199-H4-12A	2/14/2005	51[a]				
199-H4-12A	2/28/2005	66[a]				
199-H4-12A	3/7/2005	62[a]				
199-H4-12A	3/21/2005	63[a]				
199-H4-12A	4/4/2005	78[a]				
199-H4-12A	4/11/2005	68[a]				
199-H4-12A	5/2/2005	59[a]				
199-H4-12A	5/10/2005	33[a]		54	120	12.1
199-H4-12A	5/10/2005	29[a]				
199-H4-12A	6/6/2005	60[a]				
199-H4-7	1/3/2005	16[a]				
199-H4-7	2/3/2005	11[b]	140	40.3 D		
199-H4-7	2/3/2005	10.4[c]				
199-H4-7	2/24/2005	30[a]				
199-H4-7	5/26/2005	14.4[b]	150	44.3 D		
199-H4-7	5/26/2005	10.1[c]				

(a) Hexavalent chromium
(b) Total chromium analysis, unfiltered sample
(c) Total chromium analysis, filtered sample

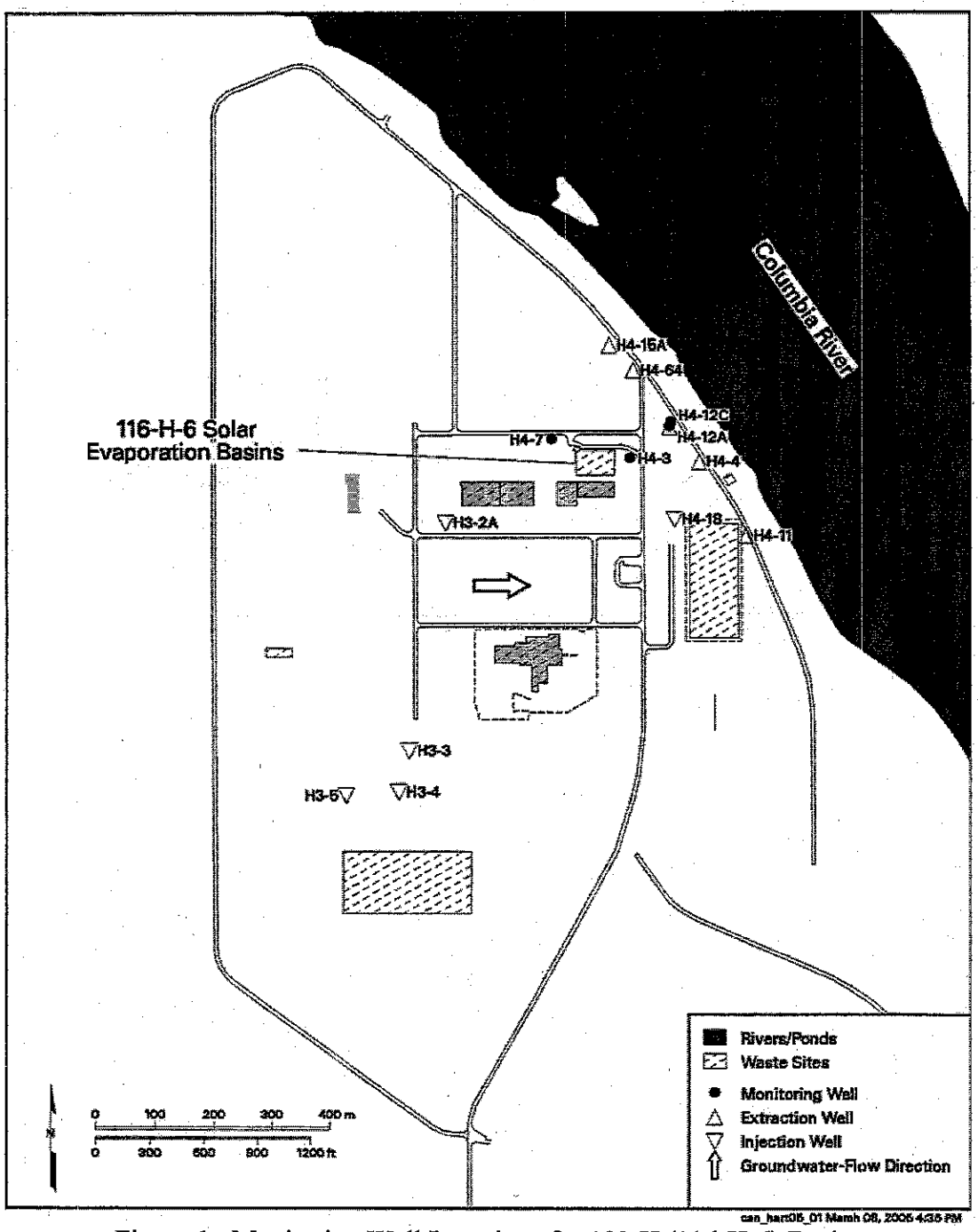

Figure 1. Monitoring Well Locations for 183-H (116-H-6) Basins

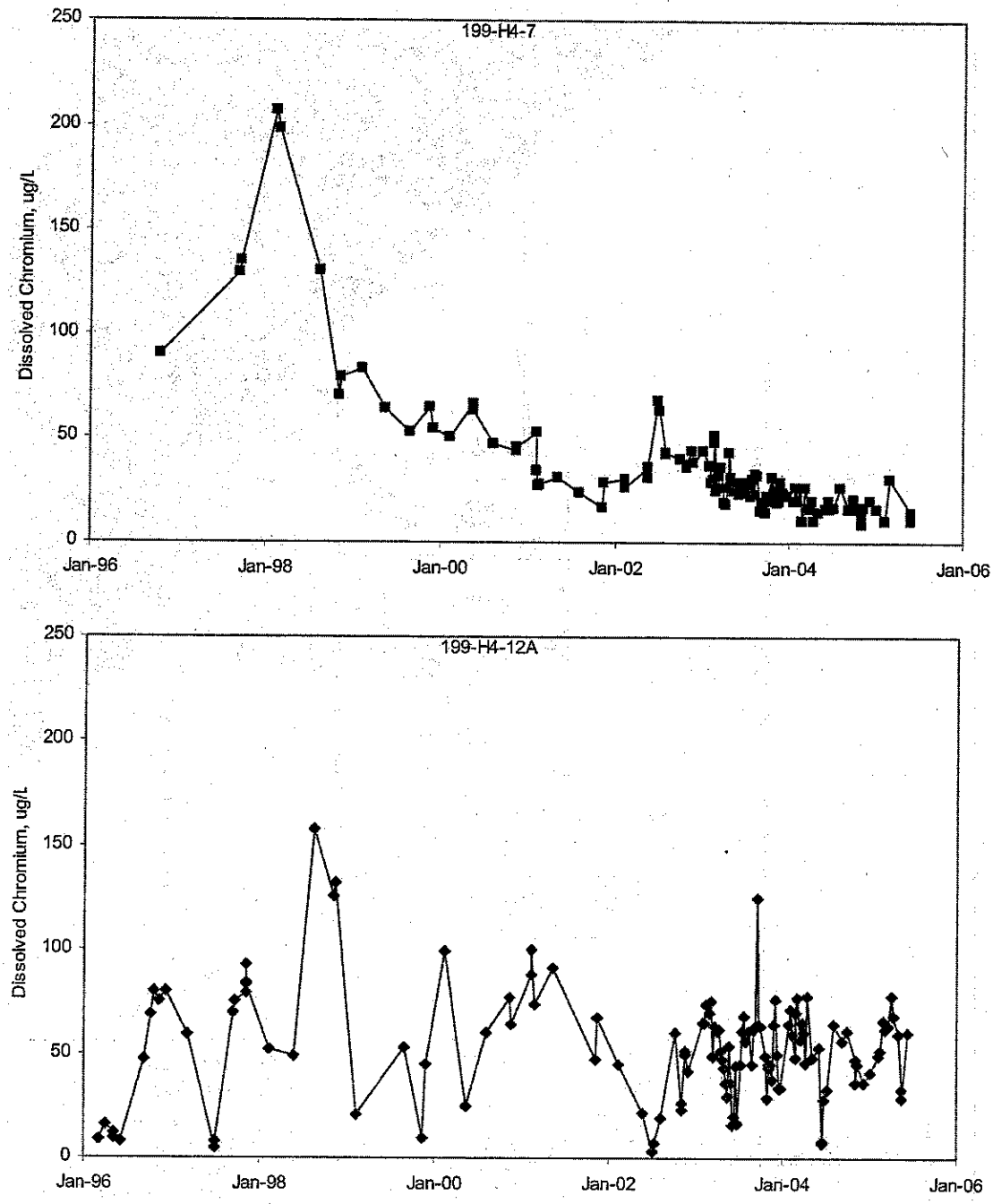

Figure 2. Dissolved Chromium in Wells Monitoring 183-H Basins