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Revision 0

Groundwater Quality Assessment Report for the Nonradioactive Dangerous Waste Landfill

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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1 Introduction and Background

Groundwater beneath the Nonradioactive Dangerous Waste Landfill (NRDWL) has been monitored under the *Resource, Conservation, and Recovery Act of 1976* in interim status under a groundwater indicator parameters evaluation program. This groundwater program is in accordance with WAC 173-303-400, "Interim Status Facility Standards" (and by reference, 40 CFR 265.92, "Sampling and Analysis"), as stated in PNNL-12227, *Groundwater Monitoring Plan for the Nonradioactive Dangerous Waste Landfill.*

Results for total organic carbon (TOC) for the August 2008 sampling event exceeded the 1,020 µg/L critical mean at two wells, 699-25-34A and 699-25-34B. Results for well 699-25-34A ranged from 1,400 to 1,800 µg/L. Results for well 699-25-34B ranged from 520 to 3,600 µg/L. Verification samples for TOC were collected from the two wells in October 2008. The sample from well 699-25-34B was split and sent to two laboratories. All quadruplicate replicate results for well 699-25-34A were nondetect (less than 200 µg/L). The quadruplicate replicates for well 699-25-34B ranged from 2,000 to 2,100 µg/L at one laboratory and ranged from 2,280 to 2,380 µg/L at the other laboratory. In December 2008, the sample split (quadruplicate aliquots) sent to the first laboratory was re-analyzed with results ranging from 1,900 to 2,000 µg/L. Because the verification sampling and re-analyses indicated that TOC has exceeded the 1,020 µg/L critical mean for TOC at NRDWL, the Department of Energy notified the Washington State Department of Ecology (09-AMCP-0058, "Notification of Exceedance of Critical Mean Values for an Indicator Parameter at Non-Radioactive Dangerous Waste Landfill and Low-Level Burial Grounds, Low-Level Waste Management Area 4").

The Soil and Groundwater Remediation Project prepared a groundwater quality assessment plan to evaluate the elevated TOC (SGW-40274, *Groundwater Quality Assessment Plan for the Non-Radioactive Dangerous Waste Landfill).* The assessment plan was written for "first determination," as allowed under 40 CFR 265.93(d)(5), "Preparation, Evaluation, and Response," to determine if dangerous waste from the facility has entered groundwater. The first determination assessment plan included three wells (699-25-34B, 699-25-34A, and 699-25-34D). Groundwater samples were analyzed for the organic compounds portion of 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Ground Water Monitoring List,"Appendix IX constituent list, and total petroleum hydrocarbon diesel, total petroleum hydrocarbon gasoline, oil and grease, coliform bacteria, dissolved oxygen, oxidation-reduction potential, TOC, inductively coupled plasma metals, anions, and chemical oxygen demand. The coliform bacteria, dissolved oxygen, oxidation-reduction potential, and chemical oxygen demand were added to address the potential for elevated TOC caused by sewage. The first determination assessment plan sampling was scheduled for March 2009, and samples were collected March 16 and 17, 2009.

2 Results of First Determination Sampling

Of the approximate 924 analytical results received from the March 2009 first determination, nine organic compounds were detected. Table 1 lists the detected organic compounds. Table 2 lists the associated field parameters. Table 3 contains results for coliform bacteria, dissolved oxygen, oxidation-reduction potential, and chemical oxygen demand.

Table 1. Organic Compounds Detected in the March 2009 First Determination Sampling at NRDWL

Well	Constituent	Analytical Method[a]	Concentration (µg/L)	Associated Laboratory Flag[b]
699-25-34A	1,1,1-Trichloroethane	8260 VOA GCMS	0.3	J
699-25-34B	1,1,1-Trichloroethane	8260 VOA GCMS	0.4	J
699-25-34D	1,1,1-Trichloroethane	8260 VOA GCMS	0.4	J
699-25-34D	1,1-Dichloroethane	8260 VOA GCMS	0.094	J
699-25-34A	bis(2-Ethylhexyl)phthalate	8270 SVOA GCMS	14	
699-25-34B	bis(2-Ethylhexyl)phthalate	8270 SVOA GCMS	3.2	J
699-25-34D	Carbon tetrachloride	8260 VOA GCMS	0.098	J
699-25-34A	Chloroform	8260 VOA GCMS	0.23	J
699-25-34B	Chloroform	8260 VOA GCMS	0.23	J
699-25-34D	Chloroform	8260 VOA GCMS	0.18	J
699-25-34A	Tetrachloroethene	8260 VOA GCMS	0.28	J
699-25-34B	Tetrachloroethene	8260 VOA GCMS	0.5	J
699-25-34D	Tetrachloroethene	8260 VOA GCMS	0.34	J
699-25-34A	Total Organic Carbon	9060 TOC	579	B
699-25-34B	Total Organic Carbon	9060 TOC	1,990	
699-25-34D	Total Organic Carbon	9060 TOC	568	B
699-25-34A	Trichloroethene	8260 VOA GCMS	0.4	J
699-25-34B	Trichloroethene	8260 VOA GCMS	0.51	J
699-25-34D	Trichloroethene	8260 VOA GCMS	0.5	J
699-25-34A	Trichloromonofluoro-methane	8260 VOA GCMS	0.29	J
699-25-34B	Trichloromonofluoro-methane	8260 VOA GCMS	0.51	J
699-25-34D	Trichloromonofluoro-methane	8260 VOA GCMS	0.5	J

a. Analytical Methods (method numbers are from SW-846, *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods*)

SVOA GCMS = semivolatile organic analysis gas chromatograph mass spectrometer

VOA GCMS = volatile organic analysis gas chromatograph mass spectrometer

b. Laboratory Flags

J = Estimated value; constituent detected at a level less than the required detection limit or practical quantitation limit and greater than or equal to the minimum detection limit.

B = The analyte was detected in both the associated quality control blank and the sample.

Table 2. Field Parameters Associated with the March 2009 First Determination Sampling

Field Parameter	Well 699-25-34A	Well 699-25-34B	Well 699-25-34D
pH	7.37	7.18	7.16
Specific Conductance (µS/cm)	638	630	567
Temperature (°C)	18.8	19.4	19.0
Turbidity (NTUs)	0.39	0.1	0.89

Table 3. Results for Coliform Bacteria, Dissolved Oxygen, Oxidation-Reduction Potential, and Chemical Oxygen Demand Associated with the March 2009 First Determination Sampling

Parameter	Well 699-25-34A	Well 699-25-34B	Well 699-25-34D
Coliform Bacteria (col./100 mL)	1 U*	1 U	1 U
Dissolved Oxygen (µg/L)	11,380	7,240	7,570
Oxidation-Reduction Potential (mV)	401	415.6	356.5
Chemical Oxygen Demand (µg/L)	10,000 U	10,000 U	10,000 U

*U = Not detected, result was less than the method detection limit.

Eight volatile or semivolatile organic compounds were tentatively identified in the first determination sampling (Table 1). Of those, one occurrence of bis(2-ethylhexyl)phthalate did not have an associated laboratory qualifier. Bis(2-ethylhexyl)phthalate is a plasticizer that is a common laboratory contaminant. Detection of this semivolatile compound is not likely attributable to actual contamination in the groundwater from the NRDWL. All of the remaining identified compounds have the "J" qualifier with the results indicating they are estimated values, and the constituents were detected at levels less than the required detection limits or practical quantitation limits and greater than or equal to the minimum detection limits.

Data verification on these samples discovered no major issues affecting data quality. However, two of the three results for TOC had the "B" qualifier indicating that TOC was detected in both the associated quality control blank and the sample. The highest of the three results (1,990 µg/L at well 699-25-34B) did not have the "B" qualifier.

Table 2 lists the field parameters associated with the first determination samples. The field parameters also give an indication that the samples were representative of groundwater. All the field parameters are within the historical range for groundwater at NRDWL.

Table 3 lists results for parameters that could have indicated the presence of sewage. Sewage was discharged to trenches at the nearby Solid Waste Landfill. Historically, wells at NRDWL and Solid Waste Landfill have had sporadically elevated coliform bacteria. However, coliform bacteria were not detected in the first determination samples. Dissolved oxygen, oxidation-reduction potential, and chemical oxygen demand are three other parameters that may indicate the presence of sewage byproducts. However, results

for these parameters are typical of wells in the area (such as NRDWL upgradient wells) that are likely to be uncontaminated with sewage.

3 Conclusion

No identified dangerous waste constituent is responsible for the elevated total organic carbon in well 699-25-34B. It is possible that the elevated TOC resulted from sewage disposed at the nearby Solid Waste Landfill, but the parameters tested (Table 3) do not support that conclusion.

It is concluded that the NRDWL has not contaminated the unconfined aquifer with dangerous waste constituents, and the monitoring regime at NRDWL will revert to an interim status indicator parameters evaluation program.

4 References

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