A Department of Ecology Report

Lakewood Plaza Cleaners Groundwater Monitoring Results, June 2012: Data Summary Report

Abstract

This data summary report is one in a series describing results of long-term groundwater monitoring at the former Lakewood Plaza Cleaners site south of Tacoma. The Washington State Department of Ecology (Ecology) began collecting groundwater data at the site in the early 1990s as part of its responsibilities for operation and maintenance of the remedial actions. The goal was to evaluate the effectiveness of municipal supply wells H1 and H2 to contain and remove the contaminated groundwater.

This data summary describes volatile organic results from samples collected from project monitoring wells and a Lakewood Water District municipal well in June 2012.

Tetrachloroethene (PCE) concentrations still do not meet the Washington State Model Toxics Control Act (MTCA) cleanup level of 5 ug/L in monitoring wells MW-20B (140 ug/L) and MW-16A (98 ug/L). In addition, statistical trend analysis suggests that PCE concentrations in well MW-16A are increasing (USACE, 2012).

Samples collected from municipal well H1 prior to treatment continue to have PCE concentrations near the MTCA cleanup level.

PCE was also detected in well LPMW-2 in June (2.4 ug/L). This well is near the former septic system of Lakewood Plaza Cleaners which was identified as a source of the contamination.

The use of municipal wells H1 and H2 to treat contaminated groundwater associated with the Lakewood Plaza Cleaners site continues since the cleanup goals have not been achieved. Project data indicate that it will take much longer than the projected timeframe to meet the cleanup goals. The Environmental Protection Agency (EPA) has recommended that the treatment remedy be evaluated to determine if it is adequate to meet the cleanup goals. If these goals cannot be achieved, then EPA and Ecology need to determine what additional actions are needed to achieve the cleanup at this site.

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Background

In 1981, the U.S. Environmental Protection Agency (EPA) confirmed that the Lakewood Water District production wells H1 and H2 were contaminated with volatile organic compounds; tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE). Lakewood is south of Tacoma in Pierce County. The source of the contamination was identified as the former Lakewood Plaza Cleaners, a dry cleaning and laundry facility (EPA, 1983). Contamination had resulted from the dumping of PCE into on-site septic tanks and the disposal of sludge on the ground surface. The Lakewood Plaza Cleaners site was added to the National Priorities List (NPL) in 1982 under the site name of Lakewood/Ponders Corner. The site is currently occupied by Rainier Lighting and Electric Supply.

EPA began remedial activities at the site in 1983. They included the operation of wells H1 and H2, which are located approximately 800 feet southwest of the site's source area, to treat the contaminated groundwater with air-stripping. Cleanup activities also included the removal of contaminated soils and sludge from the source area and the treatment of a small portion of the contaminated septic field soils with vapor extraction. Soil remediation was completed in 1993. The soils unit of the site was removed from the NPL in 1996 (EPA, 1996). Treatment of the contaminated groundwater extracted by wells H1 and H2 continues since groundwater cleanup levels have not been achieved. Currently, wells H1 and H2 are operated on an alternate six month rotation with seasonal flow variations (lower in the winter, higher in the summer).

Although the Washington State Department of Ecology's (Ecology) responsibilities for operation and maintenance of the remedial actions did not begin until 1997, Ecology began semi-annual groundwater compliance monitoring at the site in 1991. The objective of the sampling was to collect groundwater quality data to evaluate the effectiveness of Lakewood water supply wells H1 and H2 to contain, remove, and treat the groundwater contaminated by Plaza Cleaners.

In accordance with EPA policy and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA § 121(42 U.S.C. Section 9621) and the National Contingency Plan (NCP), five-year reviews of the project are required as long as cleanup goals have not been achieved. Five 5-year reviews have been completed by EPA, in consultation with Ecology, in 1992, 1997, 2002, 2007 and 2012. The latest 5-year review concluded that the current remedy is not performing as expected from a long-term protectiveness perspective towards attaining the groundwater cleanup goals. The review acknowledged that the continuing migration of contaminants from lower permeable soils is the likely cause for ongoing impacts to groundwater. This represents one of the major physical barriers to attaining groundwater cleanup levels throughout the plume in a reasonable timeframe (USACE, 2012).

Therefore, remediation and monitoring of the groundwater is ongoing under a long-term response action. Project data indicate that it will take much longer than the projected timeframe to meet the cleanup goals. Because of this, EPA has recommended that the treatment remedy be evaluated to determine if it is adequate to meet the cleanup goals. If these

goals cannot be achieved, then EPA and Ecology need to determine what additional actions are needed to achieve the cleanup at this site.

Data and associated annual monitoring reports for this project are available at Ecology's Environmental Information Management (EIM) website www.ecy.wa.gov/eim/index.htm. Search User Study ID, LAKEWOOD.

Groundwater Monitoring

Groundwater monitoring has been modified over the years to focus primarily on wells in the immediate vicinity of the former Plaza Cleaners. Currently there are 8 monitoring wells and the two production wells (H1 and H2) in the monitoring program (Figure 1). In June 2012 Ecology collected groundwater samples from two shallow and three deep wells (Table 1) to evaluate volatile organics in groundwater at the former Lakewood Plaza Cleaners site.

The two shallow wells are screened in the Steilacoom Gravel (LPMW-2) and the Vashon Till (MW-20B) and are located near the source area. The Steilacoom Gravel is composed of permeable sand and gravel of the recessional outwash deposits that generally contains areas of perched water above the Vashon Till and the regional water table. The Vashon Till, which separates the Steilacoom Gravel above and the Advance Outwash below, is a semi-confining silt and clay-rich layer that contains lenses of clean gravel. At least one gravel layer is present over a fairly large area, including Plaza Cleaners. This permeable interval appears to be hydraulically interconnected with the Steilacoom gravels (EPA, 1985b).

The three deep wells (MW-16A, MW-20A, and municipal well H1) are screened in the Advance Outwash deposits, the primary water-supply aquifer for the area. Although regional groundwater flow in the Advance Outwash is to the west-northwest toward Gravelly Lake, the pumping of production wells H1 and H2 creates a capture zone influencing groundwater flow directions in the area.

Monitoring wells MW-16A and MW-20A were purged and sampled using dedicated bladder pumps. Wells MW-20B and LPMW-2 were purged and sampled with a stainless-steel submersible pump. Ecology sampled all wells in accordance with Ecology's SOP EAP078 (Marti, 2011).

Results

Samples were submitted for analysis of volatile organic compounds (VOCs). Analytical results for volatile organics of concern are summarized in Table 1 and presented in Figure 1. PCE, TCE, and cis-DCE were the only volatile organics detected.

Quality control samples collected in the field consisted of a blind field duplicate collected from well MW-16A. The relative percent difference (RPD) for the June data ranged from 0% to 2%. The quality of the data for this progress report is good. The laboratory data quality control and quality assurance results indicate that the analytical performance was good and that the results are usable as qualified.

Table 1. Summary of Analytical Results (ug/L), June 2012.

Well	*Total Depth* (feet)[1]	*Tetra-Chloroethene* (PCE)	*Tri-Chloroethene* (TCE)	*Cis-1,2-Dichloroethene* (cis-1,2-DCE)	*Vinyl Chloride*
MTCA Cleanup Level		5 ug/L	5 ug/L	70 ug/L	0.2 ug/L
MW-16A	109	**98**	**1.3**	**2.4**	1 U
MW-16A (dup)	--	**100**	**1.3**	**2.4**	1 U
MW-20A	97.3	1 U	1 U	1 U	1 U
MW-20B	50.4	**140**	**3.3**	**5.7**	1 U
LPMW-2	29	**2.4**	1 U	1 U	1 U
H1	110	**5.2**	1 U	1 U	1 U

[1]: Measured from top of PVC casing.
MTCA: Model Toxics Control Act
Bold: Analyte detected.
U: Analyte was not detected at or above the reported value.

Chlorinated solvents continue to be detected in monitoring wells MW-20B, MW-16A, and LPMW-2 as well as in municipal well H1.

Monitoring wells MW-20B and MW-16A continue to have PCE concentrations that far exceed the MTCA cleanup level of 5 ug/L. While samples collected from municipal well H1 prior to treatment continue to have PCE concentrations near the MTCA cleanup level.

PCE concentrations in well LPMW-2 also continue to be detected near the cleanup level. This well is located near the former septic system of Plaza Cleaners which was identified as a source of the contamination

Vinyl chloride was not detected in any of the sampled wells. Although the reporting limit was 1 ug/L, the method detection limit for the June 2012 analysis was 0.22 ug/L. Vinyl chloride has not been detected in any of the samples collected by Ecology since 1991.

A summary of monitoring results since 1991 is presented in Table 2 and Figures 2 and 3 at the end of this report.

Conclusions

Concentrations of PCE in groundwater have decreased from their 1980s levels with the implementation of remedial activities, but still do not meet the project cleanup goal of 5 ug/L. Since Ecology began sampling in 1991, PCE concentrations have varied. Concentrations in well MW-20B fluctuate but continue to be far above the cleanup level (Figure 2). PCE concentrations in well MW-16A also continue to exceed the cleanup level (Figure 3). In addition, statistical trend analysis performed during the 2012 five-year review suggests that PCE concentrations in well MW-16A are increasing (USACE, 2012). The increasing trend in

well MW-16A may be attributed to a variety of factors but the continued migration of contaminants from the Vashon Till is the likely cause of continuing impacts to groundwater in the Advance Outwash. This supports the conceptual site model that contaminants migrate from the lower permeable till to the permeable outwash. Once in the outwash, the contaminants move in the capture zone towards pumping wells H1 and H2.

The use of municipal wells H1 and H2 to remove and treat contaminated groundwater associated with the Lakewood Plaza Cleaners site continues since the cleanup goals have not been achieved. Project data indicates that it will take much longer than the initial projected timeframe to meet the cleanup goals.

Recommendations

EPA has recommended that if cleanup goals throughout the contaminant plume are not achieved in a reasonable timeframe, then the current remedial activities should be evaluated. The following recommendations were made in the 2012 five-year review (USACE, 2012):

- ***Determine the capture zone for wells H1 and H2 at the current pumping rates.*** Wells H1 and H2 are operated on an alternate six-month rotation with seasonal flow variations. Weak hydraulic control of groundwater in the Advance Outwash and Vashon Till aquifers may result since only one well operates at a time. Paired wells MW-20A and MW-20B appear to show vertical flow reversing seasonally. This may indicate a response to the changing pumping rates of productions wells H1 and H2. Previous studies in the 1980s (EPA, 1985b) showed that drawdown occurs in shallow monitoring wells drilled in the Steilacoom Gravel when wells H1 and H2 are pumping. However, this may have occurred when both production wells were pumping.

- ***Update characterization of groundwater flow directions and extent of the contaminant plume in the Steilacoom Gravel and Vashon Till.*** There is insufficient groundwater data to assess either of these issues since there is only one well in each unit in the current monitoring program. All other wells in these units have either been decommissioned or lost over the course of the project.

- ***Evaluate the restoration timeframe for the aquifer and alternatives to accelerate the restoration if necessary***. The estimated aquifer restoration timeframe has ranged from a minimum of 10 years to greater than 100 years. The initial shorter timeframe was apparently based on both production wells operating simultaneously and continuously. As of 2012, wells H1 and H2 have been used for 28 years to treat the contaminated groundwater. The variable pumping rates and continued leaching of PCE from the Vashon Till may be contributing to the increased length of time to achieve the cleanup goals. Additional treatment options for the source area (Steilacoom Gravel and Vashon Till) should be evaluated to determine if any could accelerate the restoration of the aquifer.

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Figures

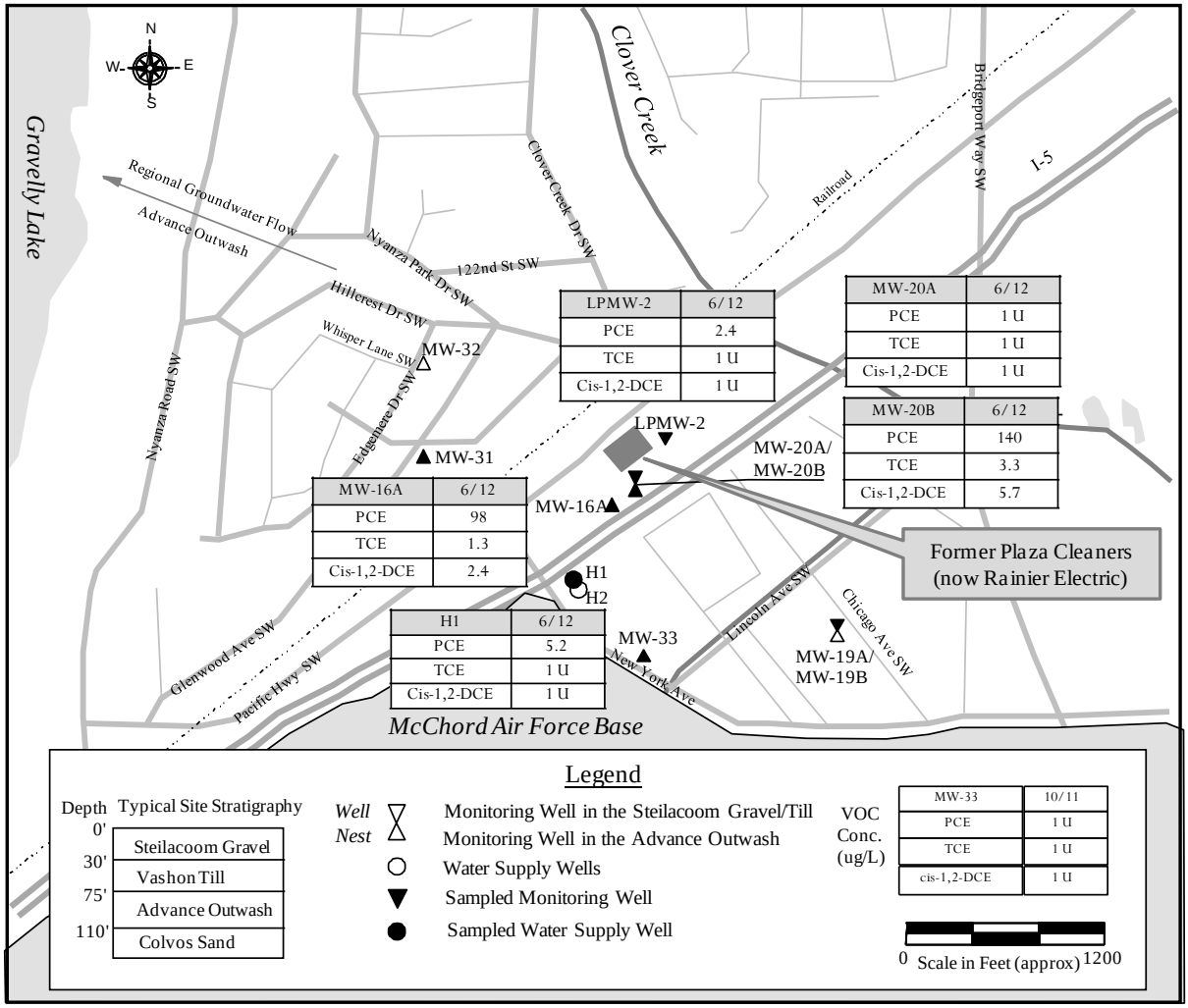

Figure 1. Lakewood Plaza Cleaners Sampling Locations and Results (ug/L), June 2012.

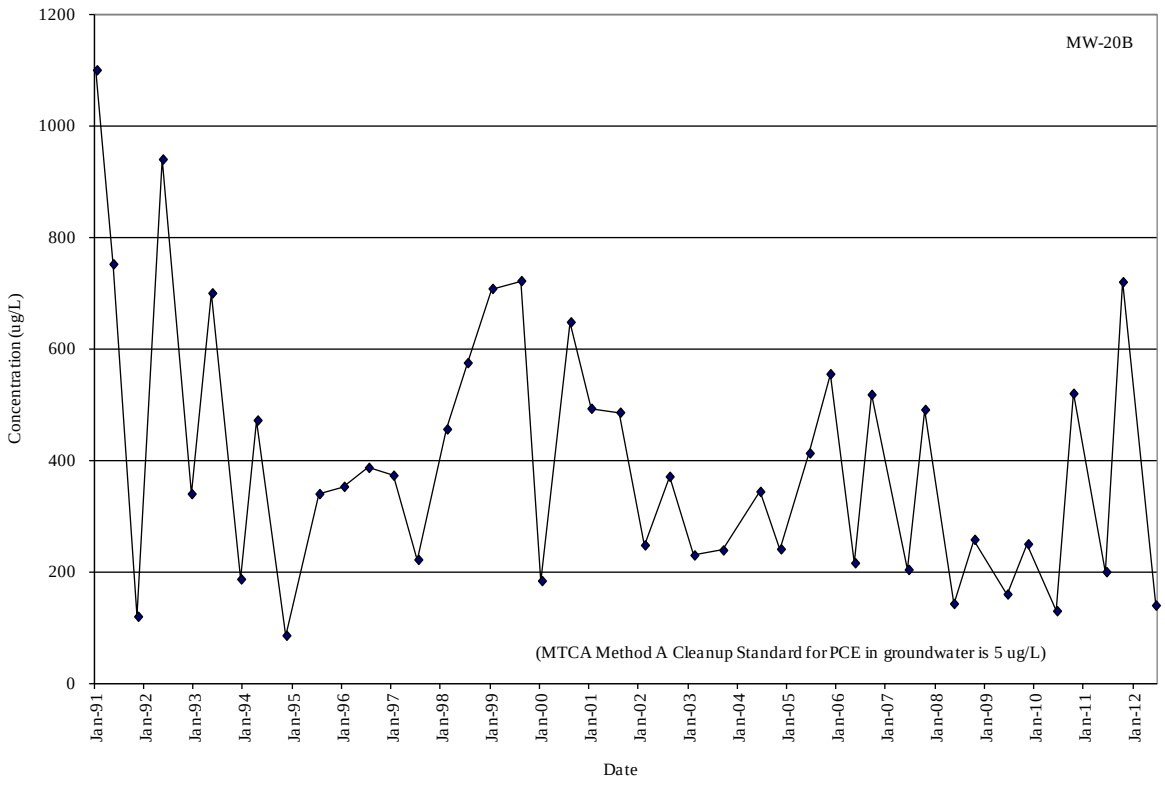

Figure 2. PCE Concentrations for Well MW-20B, January 1991 to June 2012.

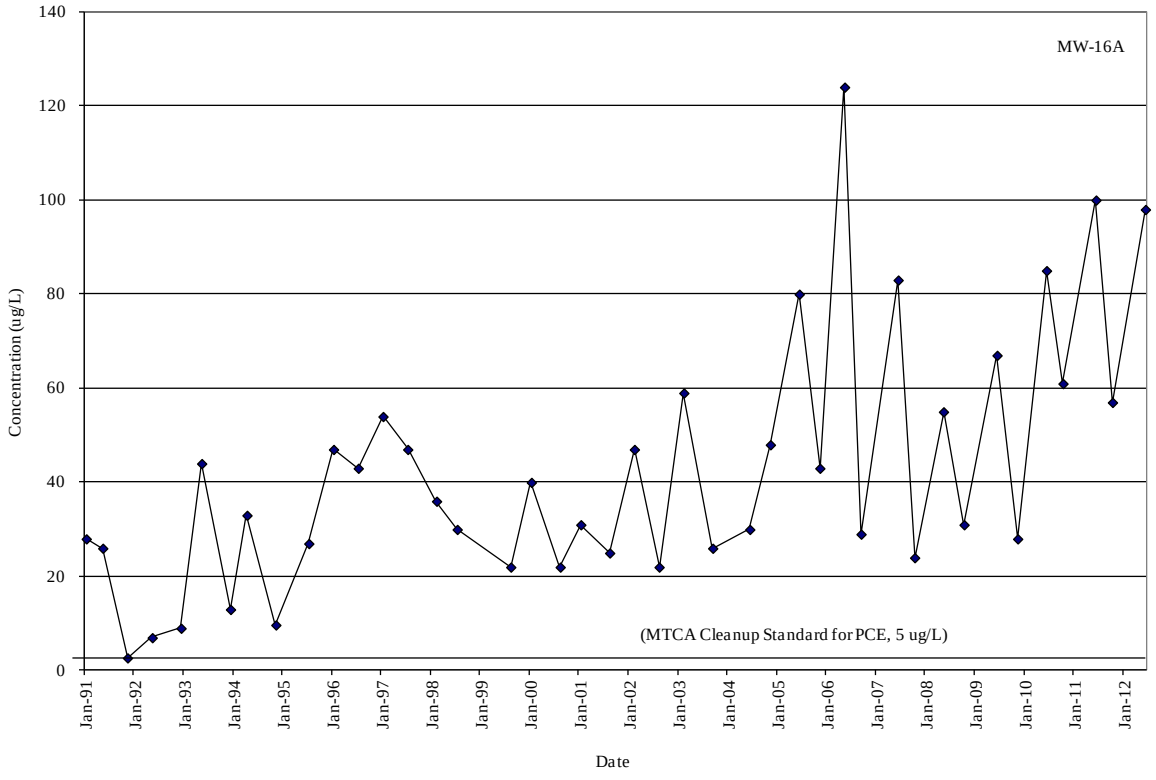

Figure 3. PCE Concentrations for Well MW-16A, January 1991 to June 2012.

Tables

Table 2. Summary of Sample Results (ug/L), January 1991 to June 2012.

Well	January 1991			May 1991			November 1991			May 1992			December 1992		
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**28**	**1 J**	**2.4 J**	**26**	**0.6 J**	**2**	**2.7 J**	1 U	**0.6 J**	**7**	1 U	**1**	**9 J**	**0.3 J**	**0.8 J**
MW-20A	1 U	1 U	1 U	**0.4 J**	1 U	1 U	**0.4 J**	1 U	1 U	**0.5 J**	1 U	1 U	**0.8 J**	1 UJ	1 UJ
MW-20B	**1100 D**	**18**	**33**	**752**	**16**	**30**	**120**	**2.6 J**	**6.7**	**940**	**13**	**32**	**340 J**	**14 J**	**20 J**
MW-21	**2.1 J**	1 U	**1 J**	**2**	1 U	**0.7 J**	**2.2 J**	1 U	**1.0 J**	**2**	1 U	**0.6 J**	**2**	**0.2 J**	**0.3 J**
MW-27	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 UJ
MW-28A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-31	**1 J**	1 U	**1.9 J**	**0.6 J**	1 U	**2**	**0.9 J**	1 U	**2.2 J**	**0.8 J**	1 U	**1**	**0.5 J**	1 UJ	**0.9 J**
MW-32	**1 J**	1 U	**1.1 J**	**1**	1 U	**2**	**0.6 J**	1 U	**0.6 J**	**0.7 J**	1 U	**1**	**0.7 J**	1 UJ	**0.5 J**
MW-41	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 UJ
MW-19A	--	--	--	--	--	--	1 U	**0.5 J**	1 U	--	--	--	1 UJ	1 UJ	1 UJ
MW-33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-40	1 U	1 U	1 U	--	--	--	1 U	1 U	1 U	--	--	--	1 UJ	1 UJ	1 UJ
H1/H2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Well	May 1993			December 1993			April 1994			November 1994			July 1995		
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**44**	10 U	**2 J**	**13**	**0.3 J**	**0.7 J**	**33**	**0.6**	**1.4**	**9.7**	**0.3 J**	**0.5 J**	**27**	**0.5 J**	**0.8 J**
MW-20A	10 U	10 U	10 U	**0.3 J**	1 U	1 U	**0.4**	0.2 U	0.2 U	**0.3 J**	1 U	1 U	**0.4 J**	1 U	1 U
MW-20B	**700 D**	**12**	**21**	**187**	50 U	**8.2 J**	**472**	**8.6 J**	**12.6**	**86**	50 U	**3 J**	**340 D**	**8.4**	**17**
MW-21	**1 J**	10 U	10 U	**1.6**	1 U	**0.4 J**	**1.5**	**0.2 J**	**0.3**	**1.8**	**0.2 J**	**0.3 J**	--	--	--
MW-27	10 U	10 U	10 U	1 U	1 U	1 U	0.2 U	0.2 U	0.2 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-28A	--	--	--	--	--	--	--	--	--	--	--	--	1 U	1 U	1 U
MW-31	10 U	10 U	10 U	**0.8 J**	1 U	**1.2 J**	**0.7**	0.2 U	**1.0**	**0.8 J**	1 U	**1**	**0.6 J**	1 U	**0.5 J**
MW-32	10 U	10 U	10 U	**0.7 J**	1 U	**0.6 J**	**0.7**	0.2 U	**0.6**	**0.6 J**	1 U	**0.5 J**	**0.7 J**	1 U	**0.5 J**
MW-41	10 U	10 U	10 U	1 U	1 U	1 U	0.2 U	0.2 U	0.2 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-19A	--	--	--	1 U	**0.4**	1 U	0.2 U	**0.5**	0.2 U	--	--	--	1 U	**0.4 J**	1 U
MW-33	--	--	--	--	--	--	--	--	--	--	--	--	1 U	1 U	1 U
MW-40	--	--	--	1 U	1 U	1 U	0.2 U	0.2 U	0.2 U	--	--	--	1 U	1 U	1 U
H1/H2	--	--	--	--	--	--	--	--	--	--	--	--	**9**	**0.3 J**	1 U

Table 2 (cont.). Summary of Sample Results (ug/L) from January 1991 to June 2012.

Well	January 1996			July 1996			January 1997			July 1997			February 1998		
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**47 E**	**0.8 J**	**1.5**	**43**	**0.7 J**	**1.9**	**54**	**1.1**	**3.1**	**47**	**0.7 J**	**2.5**	**36**	**0.7 J**	**2 J**
MW-20A	**0.2 J**	1 U	1 U	**0.4 J**	1 U	1 U	**0.4 J**	1 U	1 U	**0.3 J**	1 U	2 U	**0.4 J**	1 U	1 U
MW-20B	**353**	**7.2**	**15**	**387**	**7.6**	**15**	**373**	100 U	**6.4 J**	**222**	**4**	**6.4**	**456**	**7 J**	**12**
MW-21	--	--	--	Well Decommissioned											
MW-27	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U
MW-28A	1 U	1 U	1 U	Well Decommissioned											
MW-31	**0.6 J**	1 U	**0.7 J**	--	--	--	--	--	--	**0.9 J**	1 U	**0.9 J**	--	--	--
MW-32	**0.8 J**	1 U	**0.6 J**	--	--	--	--	--	--	--	--	--	--	--	--
MW-41	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--	--	--	--
MW-19A	--	--	--	--	--	--	--	--	--	1 U	**0.3 J**	2 U	--	--	--
MW-33	--	--	--	1 U	1 U	1 U	--	--	--	1 U	1 U	2 U	--	--	--
MW-40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H1/H2	**8.4**	**0.2 J**	**0.2 J**	**0.1 J**	1 U	1 U	**18**	**0.4 J**	**0.4 J**	**8.8**	**0.3 J**	**0.6 J**	**11**	**0.4 J**	**0.3 J**

Well	July 1998			January 1999			August 1999			January 2000			August 2000		
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**30**	1 U	**1.5 J**	--	--	--	**22**	**0.4 J**	**1.1**	**40**	**0.7 J**	**1.9**	**22**	**0.3 J**	**0.7**
MW-20A	**0.6 J**	1 U	1 U	1 U	2 U	1 U	**0.8 J**	2 U	1 U	**0.2 J**	2 U	1 U	**0.1 J**	2 U	1 U
MW-20B	**575 D**	**10**	**23**	**708**	**5.2**	**12**	**722**	**8.4 J**	**16 J**	**184**	**6**	**13**	**648**	200 U	100 U
MW-27	**0.05 J**	1 U	1 U	1 U	2 U	1 U	1 U	2 U	1 U	1 U	2 U	1 U	1 U	2 U	1 U
MW-31	--	--	--	--	--	--	**0.9 J**	2 U	**0.4 J**	--	--	--	--	--	--
MW-32	--	--	--	--	--	--	--	--	--	--	--	--	**0.8 J**	2 U	1 U
MW-41	--	--	--	--	--	--	--	--	--	--	--	--	1 U	2 U	1 U
MW-19A	--	--	--	--	--	--	1 U	**0.4 J**	1 U	--	--	--	--	--	--
MW-33	1 U	1 U	1 U	--	--	--	1 U	2 U	1 U	--	--	--	1 U	2 U	1 U
MW-40	--	--	--	--	--	--	--	--	--	--	--	--	1 U	2 U	1 U
H1/H2	**10**	1 U	**0.1 J**	**1.5**	1 U	1 U	**5.2**	**0.2 J**	1 U	**10**	1 U	1 U	**8.7**	**0.03 J**	1 U

Table 2 (cont.). Summary of Sample Results (ug/L) from January 1991 to June 2012.

Well	January 2001			August 2001			February 2002			August 2002			February 2003		
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**31**	**0.4 J**	**1**	**25**	**0.3 J**	**0.7 J**	**47**	**0.8 J**	**2.3**	**22**	**0.3 J**	**0.8 J**	**59 J**	**0.2 J**	**2.4**
MW-20A	**0.2 J**	1 U	1 U	1 U	2 U	1 U	--	--	--	--	--	--	1 U	1 U	1 U
MW-20B	**493**	**6.6 J**	**12**	**486**	**8.2**	**18**	**248**	200 U	100 U	**371**	**8.5**	**16**	**230**	100 U	100 U
MW-27	1 U	1 U	1 U	1 U	2 U	1 U	1 U	2 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
MW-31	--	--	--	**0.4 J**	2 U	**0.3 J**	--	--	--	--	--	--	--	--	--
MW-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-19A	--	--	--	1 U	**0.3 J**	1 U	--	--	--	--	--	--	--	--	--
MW-33	--	--	--	1 U	2 U	1 U	--	--	--	1 U	1 U	1 U	--	--	--
MW-40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H1/H2	**11**	**0.2 J**	1 U	**6.8**	**0.2 J**	1 U	**12**	**0.2 J**	**0.2 J**	**6.1**	1 U	1 U	**1.3**	1 U	1 U

Well	September 2003			June 2004			November 2004			June 2005			November 2005		
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**26**	**0.3 J**	**0.5 J**	**30**	**0.4 J**	**0.8 J**	**48**	1 U	**1.4**	**80**	**1.3**	**2.8**	**43**	**0.7 J**	**1.0 J**
MW-20A	**0.1 J**	1 U	1 U	**0.2 J**	1 U	1 U	**0.3 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-20B	**239**	**5.4 J**	**12**	**344**	**6.5 J**	**15**	**241**	**6.7**	**13**	**413**	**6.6**	**12**	**555**	**6.4**	**11**
MW-27	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-31	**0.5 J**	1 U	**0.1 NJ**	--	--	--	--	--	--	**0.5 J**	1 U	1 U	--	--	--
MW-32	--	--	--	--	--	--	--	--	--	**1.4**	1 U	1 U	--	--	--
MW-41	--	--	--	--	--	--	--	--	--	1 U	1 U	1 U	--	--	--
MW-19A	1 U	**0.4 NJ**	1 U	--	--	--	--	--	--	1 U	**0.6 J**	1 U	--	--	--
MW-33	1 U	1 U	1 U	--	--	--	--	--	--	1 U	1 U	1 U	--	--	--
MW-40	--	--	--	--	--	--	--	--	--	1 U	1 U	1 U	--	--	--
H1/H2	**6.4**	**0.2 NJ**	1 U	**7.9**	**0.2 J**	**0.1 J**	**2.6**	1 U	1 U	**14**	**0.3 J**	1 U	**6.4**	1 U	1 U

Table 2 (cont.). Summary of Sample Results (ug/L) from January 1991 to June 2012.

Well Number	May 2006			September 2006			June 2007			October 2007			May 2008		
	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**124**	**1.8**	**4.6**	**29**	**0.3 J**	**0.48 J**	**83**	**1.2**	**2.5**	**24**	1 U	**0.64 J**	**55**	**1.2**	**2.8**
MW-20A	1 U	1 U	1 U	1 U	1 U	1 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U
MW-20B	**216**	**4.2**	**6.6**	**518**	**5.6**	**11**	**204**	**4.4**	**7.8**	**491**	**7.5**	**15**	**143**	**5.5**	**12**
MW-27	1 U	1 U	1 U	1 U	1 U	1 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U
MW-31	--	--	--	--	--	--	**1.6 J**	2 U	2 U	--	--	--	--	--	--
MW-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-19A	--	--	--	--	--	--	2 U	**1.2 J**	2 U	--	--	--	--	--	--
MW-33	1 U	1 U	1 U	--	--	--	2 U	2 U	2 U	--	--	--	1 U	1 U	1 U
MW-40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LPMW-2	**9.9**	1 U	1 U	--	--	--	**4.8**	1 U	1 U	--	--	--	**2.5**	1 U	1 U
LPMW-3	1 U	1 U	1 U	--	--	--	2 U	1 U	1 U	--	--	--	--	--	--
H1/H2	**7.3**	**0.2 J**	1 U	**4.8**	1 U	1 U	**5.2**	2 U	2 U	**3.8**	1 U	1 U	**9.6**	1 U	1 U

Well Number	October 2008			June 2009			November 2009			June 2010			October 2010		
	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE
MW-16A	**31**	**0.45 J**	**0.6 J**	**67**	**0.94 J**	**2.2**	**28**	**0.52 J**	**0.83 J**	**85**	**1.3**	**1.6**	**61**	**0.86 J**	**1.2**
MW-20A	1 U	1 U	1 U	1 U	1 U	1 U	**0.64 J**	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
MW-20B	**258**	**4.5**	**9**	**160**	**4.1**	**7.4**	**250**	**4.7**	**9.6**	**130**	**3.7**	**6.3**	**520**	**5.8**	**10**
MW-27	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	--	--
MW-31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-32	--	--	--	--	--	--	--	--	--	**1.8**	1 U	1 U	--	--	--
MW-41	--	--	--	--	--	--	--	--	--	1 U	1 U	1 U	--	--	--
MW-19A	--	--	--	1 U	1 U	1 U	--	--	--	--	--	--	--	--	--
MW-33	--	--	--	1 U	1 U	1 U	--	--	--	1 U	1 U	1 U	--	--	--
MW-40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LPMW-2	--	--	--	**4.1**	1 U	1 U	**11**	1 U	1 U	**4.4**	1 U	1 U	**5**	1 U	1 U
H1/H2	**5.1**	1 U	1 U	**6.8**	1 U	1 U	--	--	--	**4.3**	1 U	1 U	--	--	--

Table 2 (cont.). Summary of Sample Results (ug/L) from January 1991 to June 2012.

Well	June 2011			October 2011			June 2012				
Number	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE	PCE	TCE	cis-1,2-DCE		
MW-16A	**100**	**1.4**	**1.6**	**57**	**0.75 J**	**1**	**98**	**1.3**	**2.4**		
MW-20A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U		
MW-20B	**200**	**3.5**	**5.6**	**720**	**4.8**	**7.9**	**140**	**3.3**	**5.7**		
MW-27	1 U	1 U	1 U	1 U	1 U	1 U	--	--	--		
MW-31	--	--	--	**0.65 J**	1 U	1 U	--	--	--		
MW-32	--	--	--	--	--	--	--	--	--		
MW-41	--	--	--	--	--	--	--	--	--		
MW-19A	--	--	--	1 U	**0.42 J**	1 U	--	--	--		
MW-33	--	--	--	1 U	1 U	1 U	--	--	--		
MW-40	--	--	--	1 U	1 U	1 U	--	--	--		
LPMW-2	**3.2**	1 U	1 U	--	--	--	**2.4**	1 U	1 U		
H1/H2	**5.9**	1 U	1 U	**1.4**	1 U	1 U	**5.2**	1 U	1 U		

U: The analyte was not detected at or above the reported result.
J: The analyte was positively identified. The associated numerical result is an estimate.
UJ: The analyte was not detected at or above the reported estimated result.
D: Analysis performed at secondary dilution.
E: The concentration of the associated value exceeds the known calibration range.
-- Not tested
Bold: The analyte was positively identified.