Shelton Laundry and Cleaners Groundwater Monitoring Results, October 2018: Data Summary Report

Environmental Assessment Program
Publication Number: 20-03-012
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Abstract

This data summary report is one in a series describing results of long-term groundwater monitoring at the Shelton Laundry and Cleaners. Tetrachloroethene (PCE) contamination of shallow groundwater underlying Shelton Laundry and Cleaners was discovered in 1997. The contaminant source was assumed to be a 1993 solvent spill outside the dry cleaner's commercial building. Monitoring of four shallow wells in 1998 detected PCE in groundwater at concentrations as high as 280 µg/L in the well located nearest to the reported spill location (well 4W). The Washington State Model Toxics Control Act (MTCA) Method A cleanup level for PCE is 5 µg/L.

In 2002, the Washington State Department of Ecology (Ecology) began monitoring groundwater quality at the site. From 2002 to 2005, PCE was consistently detected in well 4W at concentrations ranging from 10 to 25 µg/L. Attempts to remediate the contamination were undertaken in June 2005, when a hydrogen release compound (HRC®) was injected into the groundwater around well 4W. The HRC injection appeared to have temporarily reduced PCE concentrations. However, after August 2006 concentrations gradually increased to pre-HRC injection levels.

This report describes the water quality results for groundwater samples collected in October 2018 from three shallow monitoring wells at Shelton Laundry. PCE was detected in well 4W at a concentration of 4.6 µg/L. Trichloroethene (TCE) and cis-1,2-Dichloroethene (cis-1,2-DCE) were also detected in well 4W at concentrations near the reporting limit of 1 µg/L. No contaminants of concern were found in the other two sampled wells.

Ecology will continue to monitor the site's groundwater until PCE concentrations in well 4W are consistently below the MTCA Method A cleanup level of 5 µg/L.

Publication Information

This report is available on the Department of Ecology's website at:
https://fortress.wa.gov/ecy/publications/SummaryPages/2003012.html.

Data for this project are available in Ecology's EIM Database. Study ID: PMART001.

The Activity Tracker Code for this study is 04-064.

Suggested Citation:
Marti, P., and J. Carnes. 2020. Shelton Laundry and Cleaners Groundwater Monitoring Results, October 2018: Data Summary Report. Publication 12-03-012. Washington State Department of Ecology, Olympia.
https://fortress.wa.gov/ecy/publications/SummaryPages/2003012.html.

Water Resource Inventory Area (WRIA) and 8-digit Hydrologic Unit Code (HUC) numbers for the study area: WRIA: 14; HUC number: 17110019.

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This report was prepared under the supervision of a licensed hydrogeologist. A signed and stamped copy of the report is available upon request.

Background

Shelton Laundry and Cleaners is an active laundromat located in downtown Shelton, Washington (Figure 1). In 1997, shallow groundwater beneath the site was found to be contaminated with tetrachloroethene (PCE) (Building Analytics, 1997). The contaminant source is assumed to be a 1993 solvent spill in the alley behind the dry cleaner's commercial building.

Investigations conducted at the site from 1997 through 2000 showed that PCE contamination was present in groundwater in the southeastern portion of the site beneath the alley. Groundwater samples collected from shallow (about 15 feet deep) monitoring wells showed PCE contamination was primarily detected in well 4W (the well located nearest to the reported spill location). During 1997-2000, PCE concentrations in this well decreased from 280 to 25 µg/L (GeoEngineers, 2000).

In 2002, Ecology conducted a follow-up study during which four deeper wells (about 45 to 60 feet deep) were installed to gain a better understanding of contaminant concentrations at greater depths. PCE was not detected in any of the deep wells. During continued monitoring from 2002-2005, Ecology detected PCE in well 4W at concentrations ranging from about 10 to 25 µg/L.

In June 2005, an effort was made to remediate the contamination. A hydrogen release compound (HRC®) was injected into the ground to stimulate biodegradation of the chlorinated compounds present in the soil and groundwater. The HRC was injected below the water table at depths of 5 to 20 feet below ground surface (bgs) at 16 locations between wells 4W and 7W (Figure 1) (Balaraju, 2005).

Results from the first year of monitoring following the HRC injection suggest that enhanced degradation was occurring. Concentrations of PCE, trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2-DCE) fluctuated through months following injection (See Appendix, Figures A1 through A3). The contaminant concentrations in well 4W were at their lowest in August 2006, 15 months after the HRC injection. After 2006, concentrations gradually increased to pre-injection levels. HRC typically has an effective longevity of about 12 to 18 months (Willett et al., 2004).

Ecology continues to monitor the site's groundwater because PCE concentrations in well 4W do not consistently meet (fall below) the Model Toxics Control Act (MTCA) Method A cleanup level of 5 µg/L.

The 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 Study ID, PMART001.

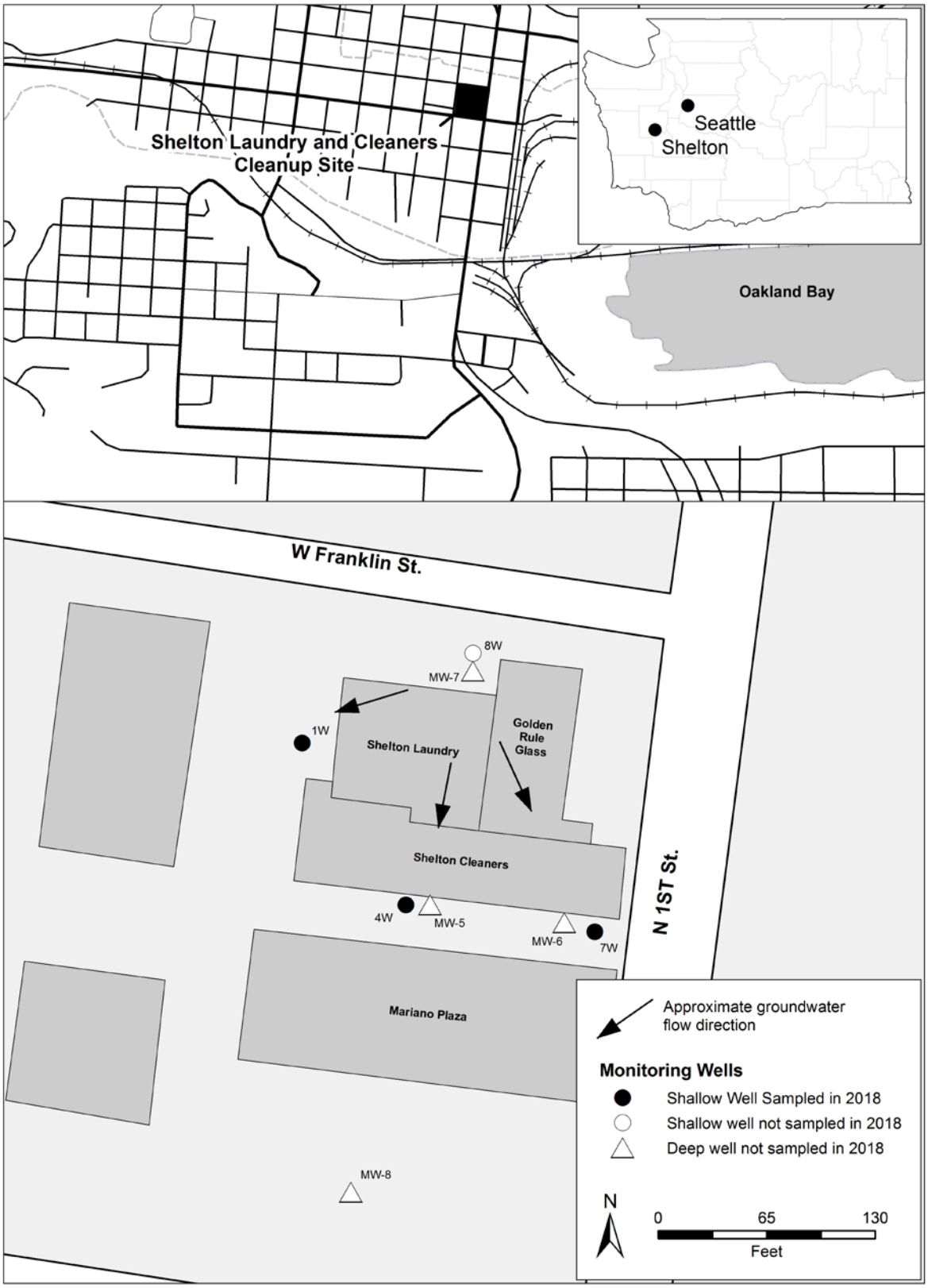

Figure 1. Shelton Laundry and Cleaners location and site details.

Results

In October 2018, Ecology collected groundwater samples from three shallow monitoring wells (1W, 4W, 7W). All wells were sampled in accordance with Ecology's Standard Operating Procedure (SOP) EAP078 (Marti, 2016). The two deep wells (MW-5, MW-6) were not sampled during this 2018 monitoring round.

Table 1 presents field data collected before sampling of the three shallow wells.

Samples were submitted for analysis of volatile organic compounds (VOCs) to determine PCE concentrations in the vicinity of well 4W. Analytical results for volatile organics of concern (PCE, TCE, and cis-1,2-DCE) are summarized in Table 2.

Quality control samples collected in the field consisted of a blind field duplicate collected from well 4W. The relative percent difference (RPD) for the PCE duplicate results was 2%. The PCE duplicate data meet the laboratory data quality objective (DQO) of 30% for this analysis. Results below the method reporting limit (cis-1,2-DCE) are automatically qualified as estimates. The laboratory data quality control and quality assurance results indicate that the analytical performance was good and that the results are usable as qualified.

PCE was detected in well 4W at a concentration of 4.6 µg/L, slightly below the MTCA cleanup level of 5 µg/L. TCE and cis-1,2-DCE were detected in well 4W at concentrations near the reporting limit of 1 µg/L.

In the remaining shallow wells (1W and 7W), volatile organics of concern were not detected. These contaminants have never been detected in well 1W since monitoring began in 1998. PCE was last detected in well 7W in February 2006 at a concentration of 0.53 µg/L. Volatile organics have never been detected in the deep wells (MW-5, MW-6) since the wells were installed in July 2002.

Summaries of monitoring results since 2002 are presented in the Appendix.

Table 1. Field data for Shelton Laundry and Cleaners, October 2018.

Well ID	Well Depth (feet)	Ground-water Elevation (feet)	pH (std. units)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)
1W	14.56	9.24	6.9	181	4.0	56
4W	13.77	9.35	6.9	179	3.6	53
7W	14.83	9.26	6.8	180	4.3	70

Table 2. Analytical sample data for Shelton Laundry and Cleaners, October 2018.

Well ID	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
1W	1 U	1 U	1 U
4W	**4.59**	**1.16**	**0.74 J**
4W (dup)	**4.68**	**1.15**	**0.74 J**
7W	1 U	1 U	1 U
MTCA Cleanup Level	*5*	*5*	*70*

Bold: Analyte was detected in the sample.
U: Analyte was not detected at or above the reported value.
J: Analyte was positively identified. The associated numerical result is an estimate.

Conclusions

Shallow groundwater contamination persists at the Shelton Laundry and Cleaners site in the area of well 4W. PCE continues to be detected in this well near the MTCA cleanup level of 5 µg/L.

TCE and cis-1,2-DCE, associated with the breakdown of PCE, were also detected in well 4W but at concentrations near the reporting limit of 1 µg/L, which is below their respective MTCA cleanup levels of 5 µg/L and 70 µg/L.

The remaining two shallow wells sampled continue to have no detectable levels of contamination.

Recommendations

Groundwater monitoring should continue in the three shallow wells (1W, 4W, and 7W) until PCE concentrations in well 4W are consistently below the MTCA Method A cleanup level of 5 µg/L. To capture seasonal variation in the PCE concentrations, monitoring should continue on an 18-month cycle.

Because contaminants have never been detected in deep wells MW-5 and MW-6, a sample frequency of every 36 months for these wells should continue to be sufficient.

References

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Willett, A., J. Tseng, R. Gillespie, and S. Koenigsberg, Ph.D., 2004. Hydrogen Release Compound (HRC®): A Review of Published Papers and Case Histories 1999-2003. Regenesis, San Clemente, CA. Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents. August 2004.

Appendix

Figures A1 through A3 show variations of PCE, TCE, and cis-1,2-DCE in monitoring well 4W during 2002 to 2018.

Tables A1 through A3 list historical results from groundwater sampling at the Shelton Laundry and Cleaners site.

- Table A1 shows results from three shallow monitoring wells (1W, 4W, 7W) from July 2002 through October 2018.
- Table A2 shows results from two deep monitoring wells (MW-5, MW-6) from July 2002 through October 2018.
- Table A3 shows results from one shallow monitoring well (8W) and two deep monitoring wells (MW-7, MW-8) from July 2002 through April 2003.

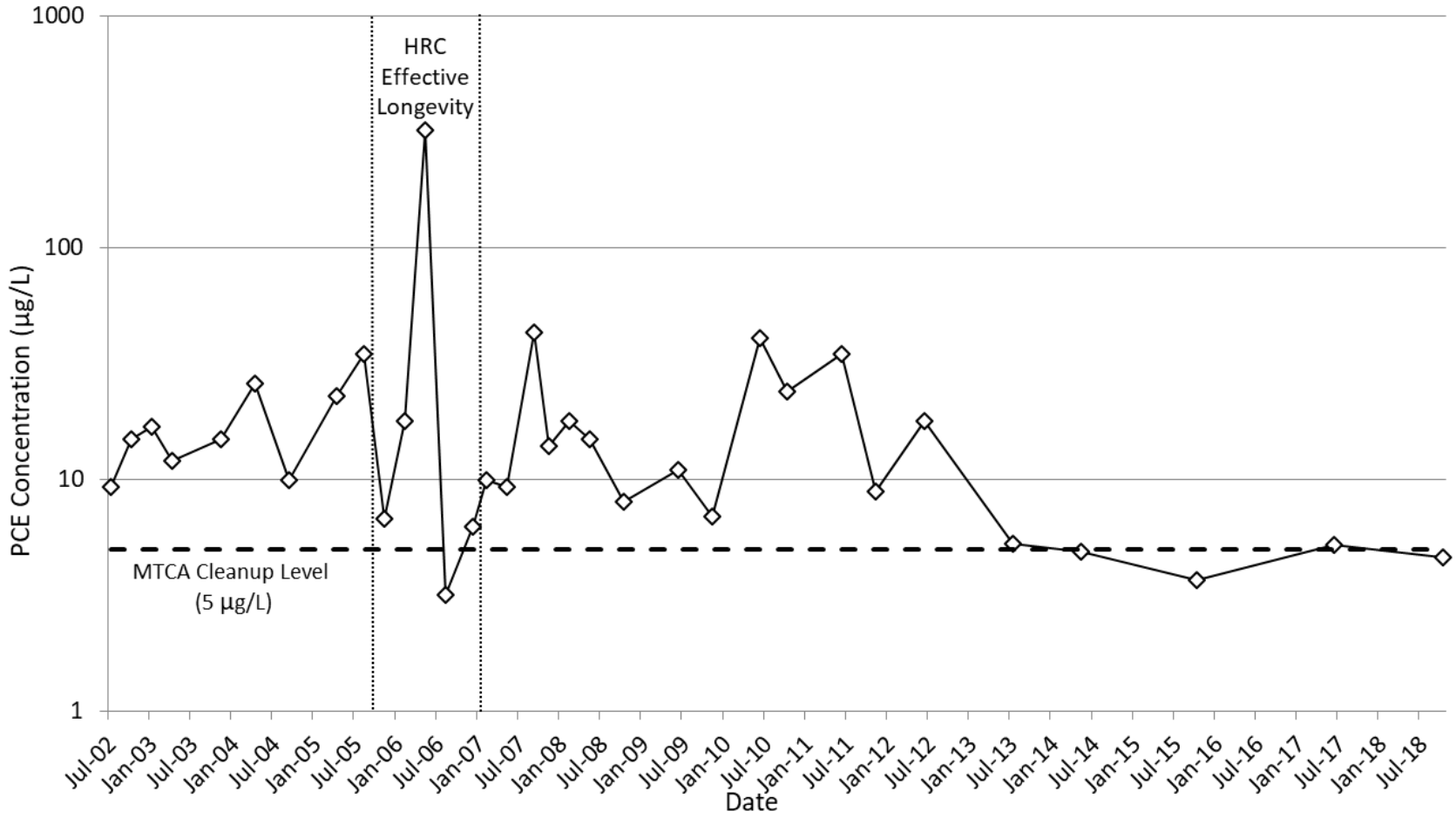

Figure A1. PCE concentrations in well 4W, 2002 - 2018.

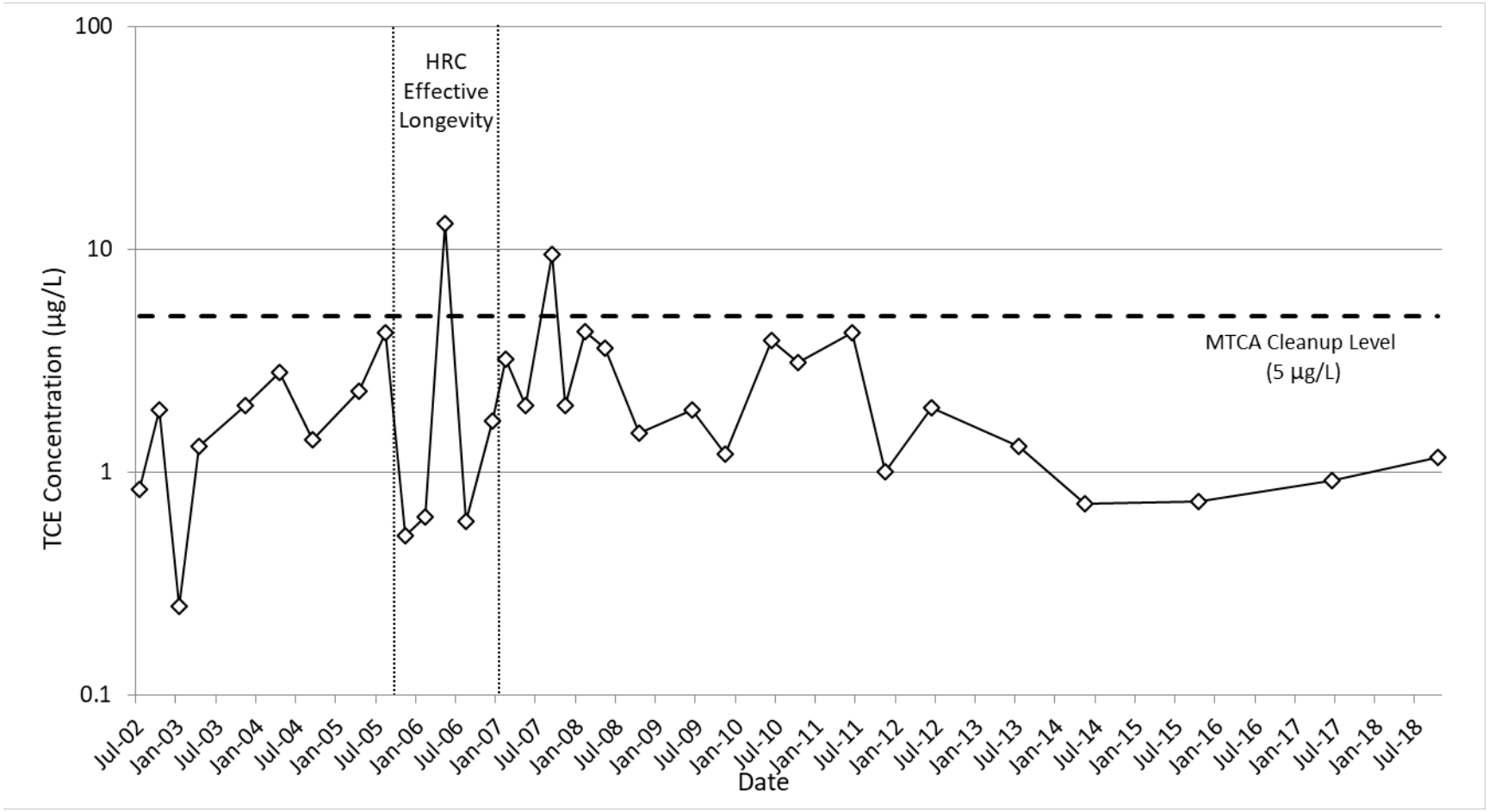

Figure A2. TCE concentrations in well 4W, 2002 - 2018.

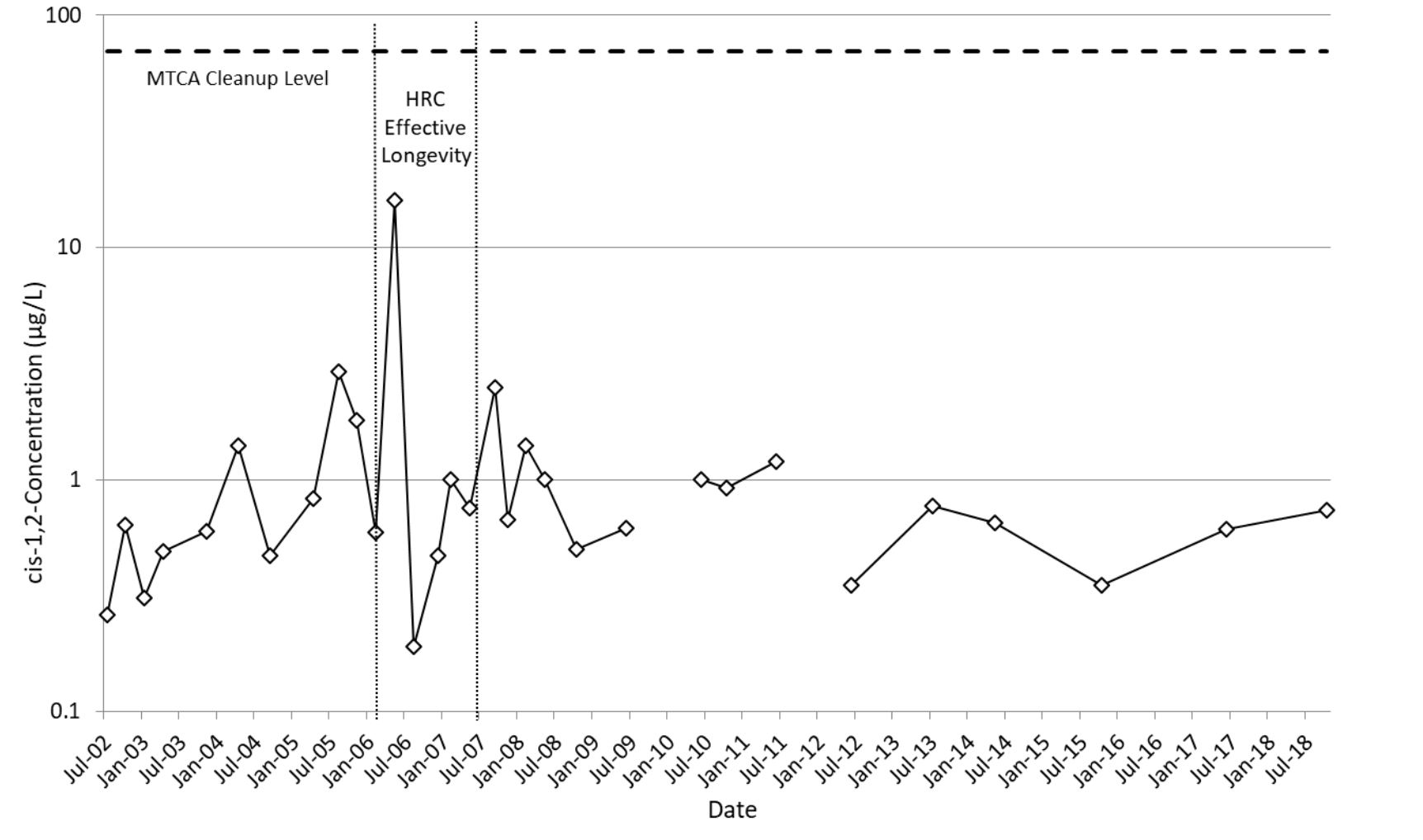

Figure A3. cis-1,2-DCE concentrations in well 4W, 2002 - 2018.

Table A1. Historical sample results (µg/L) from shallow monitoring wells 1W, 4W, and 7W, July 2002 to October 2018.

Date	1W PCE	1W TCE	1W Cis-1,2-DCE	4W PCE	4W TCE	4W Cis-1,2-DCE	7W PCE	7W TCE	7W Cis-1,2-DCE
7/2002	1 U	1 U	1 U	**9.3**	**0.84 J**	**0.26 J**	1 U	1 U	1 U
10/2002	1 U	2 U	1 U	**15**	**1.9 J**	**0.64 J**	**0.19 J**	2 U	1 U
1/2003	1 U	1 U	1 U	**17**	**0.25 J**	**0.31 J**	1 U	1 U	1 U
4/2003	1 U	1 U	1 U	**12**	**1.3**	**0.49 J**	1 U	1 U	1 U
11/2003	--	--	--	**15**	**2**	**0.6 J**	1 U	1 U	1 U
4/2004	--	--	--	**26 J[a]**	**2.8 J[a]**	**1.4**	**1.7**	1 U	1 U
9/2004	--	--	--	**9.9**	**1.4**	**0.47 J**	**0.47 J**	**0.26 J**	1 U
4/2005	--	--	--	**23**	**2.3**	**0.83 J**	**0.15 J**	1 U	1 U
8/2005	1 U	1 U	1 U	**35 J[a]**	**4.2 J[a]**	**2.9 J[a]**	**0.38 J**	1 U	1 U
11/2005	1 U	1 U	1 U	**6.8**	**0.52 J**	**1.8**	1 U	1 U	1 U
2/2006	1 U	1 U	1 U	**18 J[a]**	**0.63 J**	**0.59 J**	**0.53 J**	1 U	1 U
5/2006	1 U	1 U	1 U	**324**	**13**	**16**	1 U	1 U	1 U
8/2006	1 U	1 U	1 U	**3.2 J**	**0.6 J**	**0.19 J**	1 UJ	1 U	1 U
12/2006	1 U	1 U	1 U	**6.3**	**1.7**	**0.47 J**	1 U	1 U	1 U
2/2007	1 U	1 U	1 U	**10**	**3.2**	**1**	1 U	1 U	1 U
5/2007	1 U	1 U	1 U	**9.3**	**2**	**0.75 J**	1 U	1 U	1 U
9/2007	2 U	2 U	1 U	**43**	**9.5**	**2.5**	2 U	2 U	1 U
11/2007	2 U	1 U	1 U	**14**	**2**	**0.67 J**	2 U	1 U	1 U
2/2008	1 U	1 U	2 U	**18**	**4.3 J[a]**	**1.4 J**	1 U	1 U	2 U
5/2008	2 U	1 U	1 U	**15 J**	**3.6**	**1**	2 U	1 U	1 U
10/2008	1 U	1 U	1 U	**8**	**1.5**	**0.5 J**	1 U	1 U	1 U
6/2009	1 U	1 U	1 U	**11**	**1.9**	**0.62 J**	1 U	1 U	1 U
11/2009	1 U	1 U	1 U	**6.9 J**	**1.2**	1 U	1 U	1 U	1 U
6/2010	1 U	1 U	1 U	**41 J[a]**	**3.9 J[a]**	**1**	1 U	1 U	1 U
10/2010	1 U	1 U	1 U	**24**	**3.1**	**0.92 J**	1 U	1 U	1 U
6/2011	2 U	1 U	1 U	**35 J**	**4.2 J**	**1.2**	2 U	1 U	1 U
11/2011	1 U	1 U	1 U	**8.9 J**	**1 J**	1 U	1 U	1 U	1 U
6/2012	1 U	1 U	1 U	**18 J[a]**	**1.95 J[a]**	**0.35 J**	1 U	1 U	1 U
7/2013	1 U	1 U	1 U	**5.3**	**1.3**	**0.77 J**	1 U	1 U	1 U
5/2014	1 U	1 U	1 U	**4.9**	**0.72 J**	**0.65 J**	1 U	1 U	1 U
10/2015	1 U	1 U	1 U	**3.7 J**	**0.74 J**	**0.35 J**	1 U	1 U	1 U
6/2017	1 U	1 U	1 U	**5.2**	**0.92 J**	**0.61 J**	1 U	1 U	1 U
10/2018	1 U	1 U	1 U	**4.6**	**1.2**	**0.74 J**	1 U	1 U	1 U
MTCA CL	5	5	70	5	5	70	5	5	70

Underlined: Values are greater than (did not meet) MTCA cleanup levels.
Bold: Analyte was detected in the sample.
U: Analyte was not detected at or above the reported value.
J: Analyte was positively identified, and the associated numerical result is an estimate.
UJ: Analyte was not detected at or above the reported estimated result.
[a] Average concentration of duplicate samples when RPD > 30%.

Table A2. Historical sample results (µg/L) from deep monitoring wells MW-5 and MW-6, July 2002 to October 2018.

Date	MW-5 PCE	MW-5 TCE	MW-5 Cis-1,2-DCE	MW-6 PCE	MW-6 TCE	MW-6 Cis-1,2-DCE
7/2002	1 U	1 U	1 U	1 U	1 U	1 U
10/2002	1 U	2 U	1 U	1 U	2 U	1 U
1/2003	1 U	1 U	1 U	1 U	1 U	1 U
4/2003	1 U	1 U	1 U	1 U	1 U	1 U
11/2003	1 U	1 U	1 U	1 U	1 U	1 U
4/2004	1 UJ	1 U	1 U	1 UJ	1 U	1 UJ
9/2004	1 U	1 U	1 U	1 U	1 U	1 U
4/2005	1 U	1 U	1 U	1 U	1 U	1 U
8/2005	1 U	1 U	1 U	1 U	1 U	1 U
11/2005	1 U	1 U	1 U	1 U	1 U	1 U
2/2006	1 U	1 U	1 U	1 U	1 U	1 U
5/2006	1 U	1 U	1 U	1 U	1 U	1 U
8/2006	1 UJ	1 U	1 U	1 UJ	1 U	1 U
12/2006	1 U	1 U	1 U	1 U	1 U	1 U
2/2007	1 U	1 U	1 U	1 U	1 U	1 U
5/2007	1 U	1 U	1 U	1 U	1 U	1 U
9/2007	2 U	2 U	1 U	2 U	2 U	1 U
11/2007	2 U	1 U	1 U	2 U	1 U	1 U
2/2008	1 U	1 U	2 U	1 U	1 U	2 U
5/2008	2 U	1 U	1 U	2 U	1 U	1 U
10/2008	1 U	1 U	1 U	1 U	1 U	1 U
6/2009	1 U	1 U	1 U	1 U	1 U	1 U
11/2009	1 U	1 U	1 U	1 U	1 U	1 U
6/2010	1 U	1 U	1 U	1 U	1 U	1 U
10/2010	1 U	1 U	1 U	1 U	1 U	1 U
6/2011	2 U	1 U	1 U	2 U	1 U	1 U
11/2011	1 U	1 U	1 U	1 U	1 U	1 U
6/2012	--	--	--	--	--	--
7/2013	1 U	1 U	1 U	1 U	1 U	1 U
5/2014	--	--	--	--	--	--
10/2015	1 U	1 U	1 U	1 U	1 U	1 U
6/2017	1 U	1 U	1 U	1 U	1 U	1 U
10/2018	--	--	--	--	--	--
MTCA CL	5	5	70	5	5	70

U: Analyte was not detected at or above the reported value.
UJ: Analyte was not detected at or above the reported estimated result.

Table A3. Historical sample results (µg/L) from shallow monitoring well 8W and deep monitoring wells MW-7 and MW-8, July 2002 to April 2003.

Date	8W PCE	8W TCE	8W Cis-1,2-DCE	MW-7 PCE	MW-7 TCE	MW-7 Cis-1,2-DCE	MW-8 PCE	MW-8 TCE	MW-8 Cis-1,2-DCE
7/2002	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
10/2002	1 U	2 U	1 U	1 U	2 U	1 U	1 U	2 U	1 U
1/2003	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4/2003	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
MTCA CL	5	5	70	5	5	70	5	5	70

U: Analyte was not detected at or above the reported value.