Shelton Laundry and Cleaners Groundwater Monitoring Results, June 2020: Data Summary Report

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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 site in Shelton, WA. 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 micrograms per liter (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 June 2020 from three shallow and two deep monitoring wells at Shelton Laundry. PCE was detected in well 4W at an estimated concentration of 5.5 µg/L. Trichloroethene (TCE) was also detected in well 4W at a concentration near the reporting limit of 1 µg/L. Cis-1,2-Dichloroethene (cis-1,2-DCE) was not detected in well 4W. No contaminants of concern were found in the other four 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.

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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 and former dry cleaners located at 117 N 1st St. in downtown Shelton, Washington (Figure 1). In 1997, a consulting firm working for the neighboring Wells Fargo Bank identified tetrachloroethene (PCE) contamination in shallow groundwater beneath the Shelton Laundry and Cleaners site (Building Analytics, 1997).

The geology in the area surrounding Shelton Laundry and Cleaners is primarily composed of sand and gravel deposits. Recessional Outwash of the Vashon Stade underlies the entire downtown Shelton area. This unit consists of stratified, moderately to well-rounded, poorly to moderately sorted sand and gravel with relatively minor silt and clay in places (Schasse et al., 2003). Available well logs indicate that deposits beneath the site are composed of silty gravel to a depth of 8 ft. and interbedded sand and gravel from 8 ft. to a depth of at least 60 ft. Deeper production well logs near the site indicate that the recessional deposits can attain a thickness of more than 100 feet in the area of Oakland Bay.

The regional groundwater flow direction is to the south (Molenaar and Noble, 1970). In the area surrounding the Shelton Laundry and Cleaners site, the groundwater gradient measured in shallow wells is to the southeast and southwest (Figure 1). The gradient measured in deep wells is typically to the east-southeast. Water level data collected at paired wells during sampling events show that vertical gradients are small and overall appear to be upward (e.g. Marti, 2012, Table 1).

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. A 1993 solvent spill that occurred in the alley behind the dry cleaner's commercial building is the likely source of the contamination (GeoEngineers, 2000).

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; See Appendix, Tables A1 through A4).

In 2002, Ecology conducted a follow-up study during which four new wells completed deeper in the recessional outwash (about 45 to 60 feet deep) were installed to determine whether contaminants had migrated downward. PCE was not detected in any of the deep wells. During continued monitoring from 2002-2005, PCE in well 4W at concentrations ranging from about 10 to 25 µg/L. Two of the deep wells (MW-7, MW-8), and one shallow well (8W) were removed from the sampling schedule in 2003, and have not been sampled since.

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 (Balaraju, 2005).

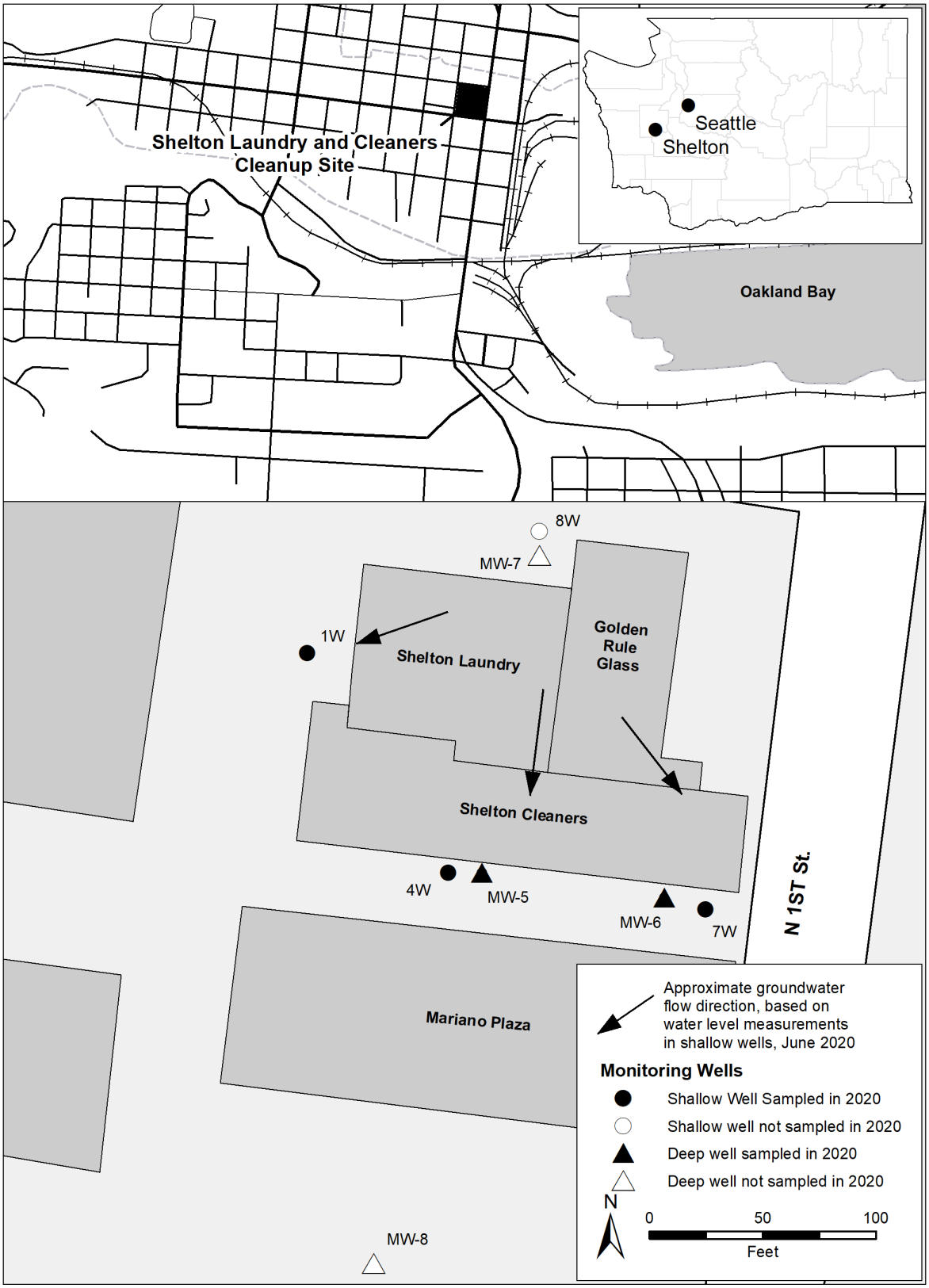

Figure 1. Shelton Laundry and Cleaners location and site details.

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 in the 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.

Methods and Results

In June 2020, Ecology collected groundwater samples from three shallow (<15 ft. deep) monitoring wells (1W, 4W, and 7W), and two deep (~45 ft. deep) monitoring wells (MW-5 and MW-6). All wells were sampled in accordance with Ecology's Standard Operating Procedure (SOP) EAP078 (Marti, 2020). Water levels were measured and recorded from all wells in succession to minimize any tidal influence.

Two pumping methods were used during this sampling:

- Mechanical bladder pump: The shallow wells (1W, 4W, and 7W) are completed with 1-inch PVC casing and were purged and sampled with a small-diameter mechanical bladder pump.
- Peristaltic pump: The deep wells (MW-5 and MW-6) are completed with 2-inch PVC casing and historically have been sampled with a stainless steel submersible pump.

In 2020, the deep wells were sampled with a peristaltic pump to match current environmental consulting industry standard methods.

To compare results from the two pumping methods, an additional sample was collected from 4W using a peristaltic pump. Due to time constraints, no additional purging was conducted on well 4W between the sample collected with the mechanical bladder pump and the sample collected with the peristaltic pump.

Ecology employed industry-standard low-flow sampling techniques for both pumping methods. Prior to sampling, groundwater in the wells was purged through a continuous flow cell at a rate of 0.5-liter/minute or less. Purging continued until field parameters (pH, temperature, specific conductance, dissolved oxygen, and oxidation-reduction potential) stabilized.

Table 1 presents well construction information and groundwater elevations recorded in June 2020. Table 2 presents stabilized field data measured in the five monitoring wells.

Samples were submitted for analysis of volatile organic compounds (VOCs) to determine PCE concentrations near well 4W. Analytical results for volatile organics of concern (PCE, TCE, and cis-1,2-DCE) are summarized in Table 3.

Table 1. Table 2. Well construction details and water levels collected at Shelton Laundry and cleaners, June 2020

Well ID	Land Surface Elevation [a] (feet)	Well Depth (feet bgs)	Screened Interval (feet bgs)	Groundwater Elevation [a] (feet)
1W	15.10	14.56	4 – 14	9.48
4W	14.67	13.77	3.5 – 13.5	9.58
7W	14.10	14.83	4.5 – 14.5	9.46
8W	14.04	14.8	4.5 – 14.5	9.69
MW-5	14.66	45.5	35 – 45	9.58
MW-6	14.25	45.3	35 – 45	9.51
MW-7	14.17	45.4	35 – 45	9.71
MW-8	15.32	60.5	50 – 60	--

bgs: Below ground surface.
[a] Vertical datum is NAVD29

Table 3. Field data for Shelton Laundry and Cleaners, June 2020

Well ID	pH (std. units)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)
1W	6.7	205	4.7	137
4W	6.8	202	4.3	62
7W	6.8	204	4.8	127
MW-5	6.8	201	4.7	142
MW-6	6.8	208	4.9	133

Table 4. Summary of analytical sample data for Shelton Laundry and Cleaners, June 2020

Well ID	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
1W	1UJ	1UJ	1UJ
4W	**4.32**	**0.77J**	1UJ
4W (duplicate)	**<u>6.75</u>**	**1.14**	1UJ
7W	1UJ	1UJ	1UJ
MW-5	1U	1U	1U
MW-6	1U	1U	1U
Cleanup Levels	*5 [a]*	*5 [a]*	*70 [b]*

Bold: Analyte was detected in the sample.
<u>Underlined</u>: Values are greater than (did not meet) MTCA cleanup levels.
U: Analyte was not detected at or above the reported value.
UJ: Analyte was not detected at or above the reported estimate.
J: Analyte was positively identified. The associated numerical result is an estimate.
[a] Cleanup levels for PCE and TCE are based on MTCA Method A cleanup levels (WAC 173-340-720)
[b] The cleanup level for Cis-1,2-DCE is based on the Federal Maximum Contaminant Level (40 CFR Part 141.61)

Quality control samples collected in the field consisted of a blind field duplicate and matrix spike/matrix spike duplicate samples taken from well 4W. The relative percent differences (RPD) for PCE in the blind field duplicate samples was 43.9%, which exceeded the data quality objective (DQO) of 30%. Since the duplicate results from 4W fall within those obtained over the last 10 years, an average estimated PCE concentration of 5.5 µg/L will be used in the remainder of this report. 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.

The estimated average concentration of PCE detected in duplicate samples in well 4W was 5.5 µg/L, above the MTCA cleanup level of 5 µg/L. The TCE concentration in 4W was estimated at 0.77 µg/L, below the 1 µg/L reporting limit. Cis-1,2-DCE was not detected in well 4W.

The sample collected from 4W with a peristaltic pump had a PCE concentration of 13.6 µg/L and a TCE concentration of 2.12 µg/L. Cis-1,2-DCE was not detected.

Volatile organics of concern were not detected in any of the other wells sampled in June 2020. 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. Vinyl chloride, another degradation product of PCE, has never been detected at the site.

Summaries of monitoring results since 1998 are presented in the Appendix.

Discussion and Conclusions

Shallow groundwater contamination persists at the Shelton Laundry and Cleaners site in the area of well 4W. In June 2020, PCE was detected in this well at an estimated concentration of 5.5 µg/L, exceeding the MTCA cleanup level of 5 µg/L. Since 2013, the PCE concentration has ranged from 3.7 µg/L to 5.5 µg/L.

TCE, associated with the breakdown of PCE, was also detected in well 4W but at a concentration below the reporting limit of 1 µg/L. Cis-1,2-DCE was not detected in well 4W during this sampling event.

The elevated concentrations of PCE and TCE detected in the sample taken from well 4W using a peristaltic pump warrants further investigation. Due to time considerations during the 2020 sampling event, the sample collected using the peristaltic pump was taken immediately after the primary and duplicate samples collected with the mechanical bladder pump, with no additional purging. The process of stopping pumping, removing and replacing tubing, and re-starting pumping may have disturbed sediment at bottom of the well, increasing turbidity in the water column and ultimately leading to anomalously high results.

The remaining four wells sampled, shallow wells 1W and 7W and deep wells MW-5 and MW-6, continue to have no detectable levels of contamination.

Recommendations

Groundwater monitoring should continue in the three shallow wells (1W, 4W, 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.

In order to obtain a better comparison of results between mechanical bladder pump and peristaltic pump collection methods, 4W should again be sampled by both methods, with additional purging. Field parameters, including turbidity, should be monitored and recorded while purging.

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Appendix A.

Figures A1 through A3 show variations of PCE, TCE, and cis-1,2-DCE concentrations in monitoring well 4W during 2002 to 2020.

Tables A1 through A12 list historical results from groundwater sampling at the Shelton Laundry and Cleaners site.

- Tables A1 – A4 show results from three shallow monitoring wells (1W, 4W, 7W, 8W) collected by GeoEngineers from July 1998 to September 2000.
- Tables A5 – A7 show results from three shallow monitoring wells (1W, 4W, 7W) collected by Ecology from July 2002 through June 2020.
- Tables A8 and A9 show results from two deep monitoring wells (MW-5, MW-6) collected by Ecology from July 2002 through June 2020.
- Tables A10 – A12 show results from one shallow monitoring well (8W) and two deep monitoring wells (MW-7, MW-8) collected by Ecology from July 2002 through April 2003.

The following symbols and qualifiers are used in the tables:

Underlined: Values are greater than (did not meet) 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.
--: Not sampled/measured
NA: Not applicable

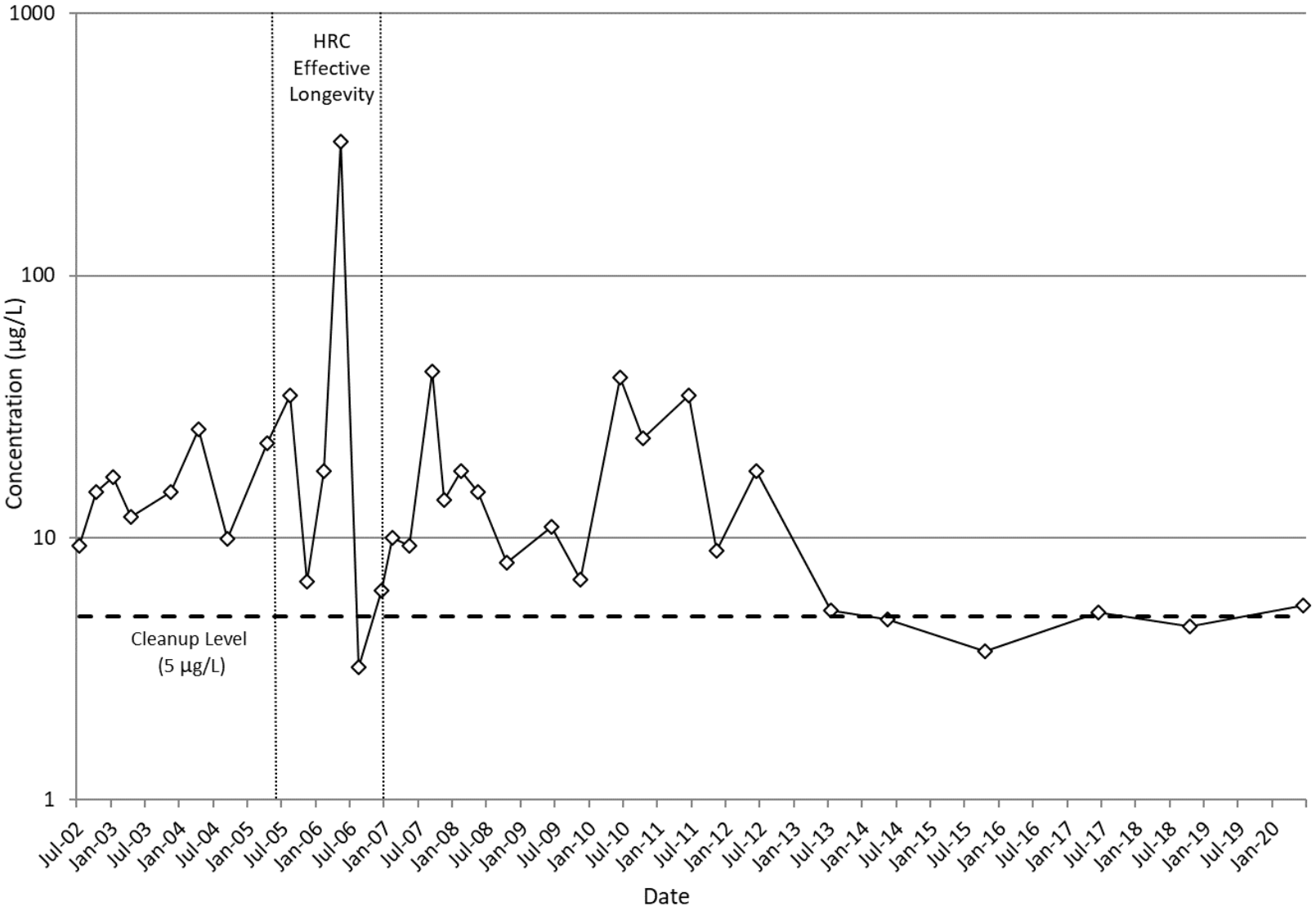

Figure A1. PCE concentrations (µg/L, log scale) in well 4W, 2002 – 2020.

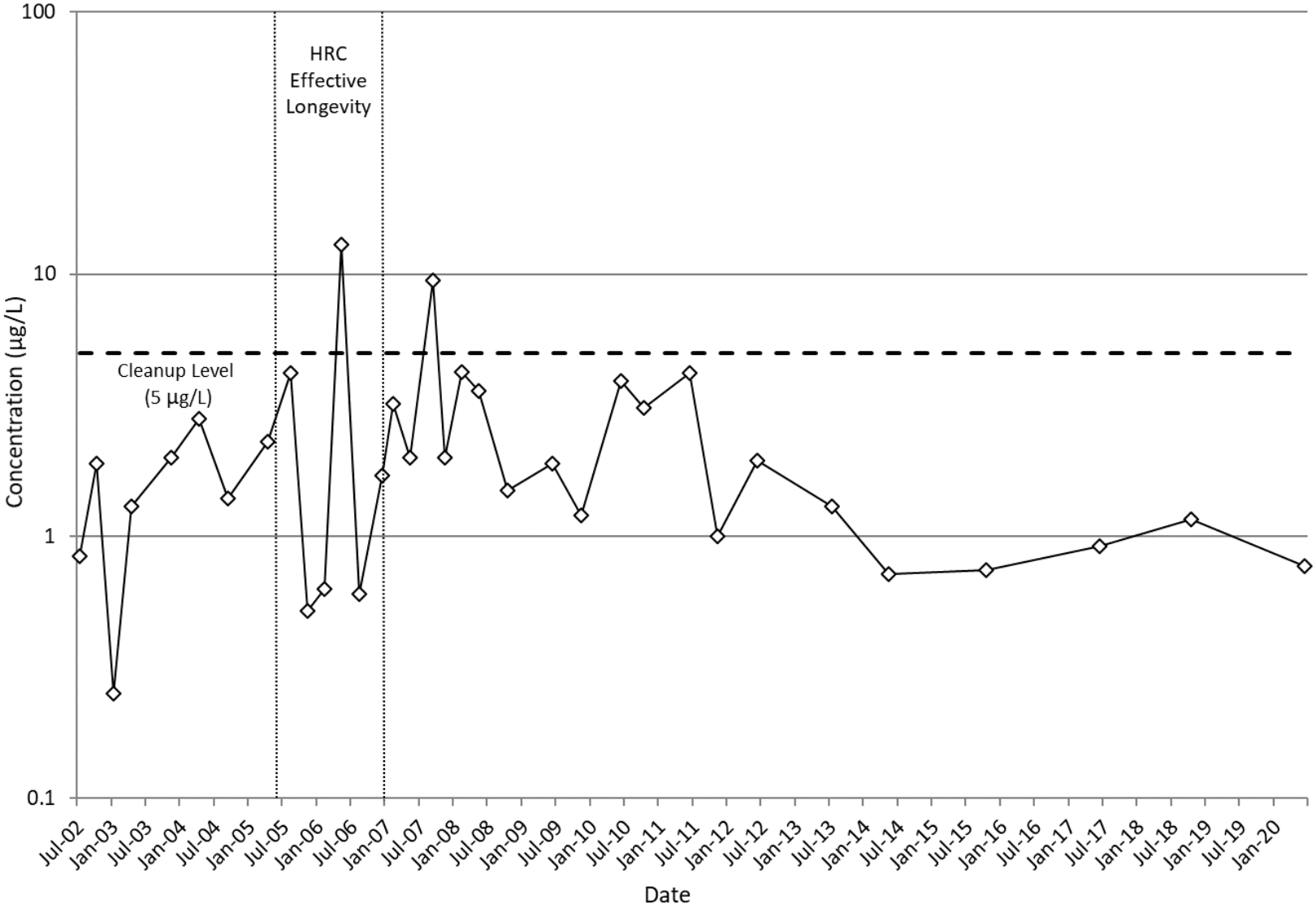

Figure A2. TCE concentrations (µg/L, log scale) in well 4W, 2002 – 2020.

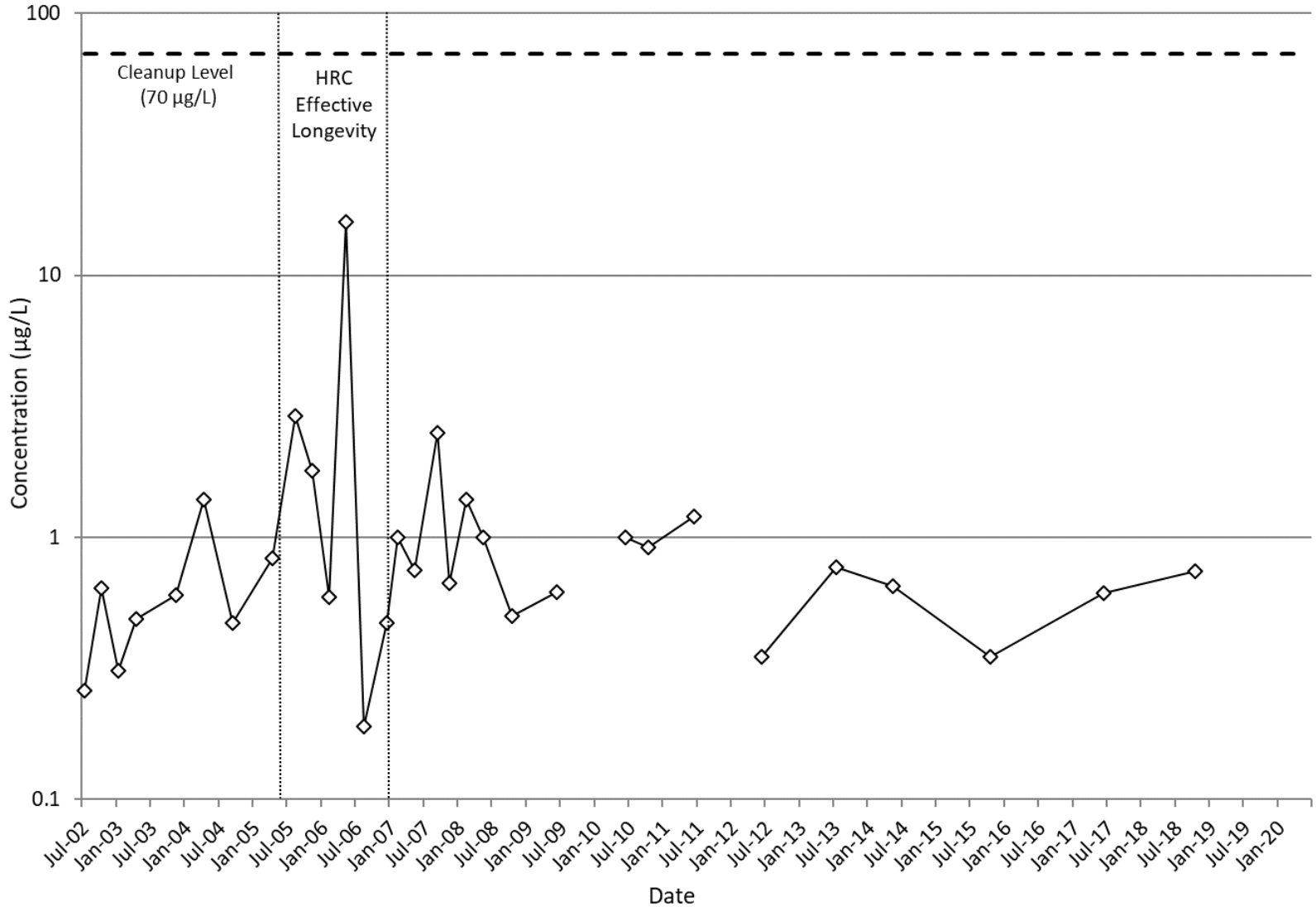

Figure A3. Cis-1,2-DCE concentrations (µg/L, log scale) in well 4W, 2002 – 2020

Table A1. Historical sample results collected by GeoEngineers from shallow monitoring well 1W, July 1998 to July 1999.

Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/1998	<1.0	<1.0	--
11/1998	<1.0	<1.0	--
7/1999	<1.0	<1.0	--

Table A2. Historical sample results collected by GeoEngineers from shallow monitoring well 4W, July 1998 to September 2000.

Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/1998	**280**	**4.7**	**33**
11/1998	**130**	<1.0	<1.0
7/1999	**39**	<1.0	<1.0
9/2000	**25**	<1.0	<1.0

Table A3. Historical sample results collected by GeoEngineers from shallow monitoring well 7W, July 1998 to September 2000.

Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/1998	**4.3**	<1.0	**6.4**
11/1998	**3**	<1.0	<1.0
7/1999	<1.0	<1.0	<1.0
9/2000	**1.2**	<1.0	<1.0

Table A4. Historical sample results collected by GeoEngineers from shallow monitoring well 8W, July 1998 to September 2000.

Date	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/1998	<1.0	<1.0	--
11/1998	<1.0	<1.0	--
7/1999	<1.0	<1.0	--
9/2000	--	--	--

Table A5. Historical sample results and water levels collected by Ecology from shallow monitoring well 1W, July 2002 to June 2020.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	5.78	1 U	1 U	1 U
10/2002	6.08	1 U	2 U	1 U
1/2003	5.19	1 U	1 U	1 U
4/2003	5.25	1 U	1 U	1 U
11/2003	5.64	--	--	--
4/2004	5.36	--	--	--
9/2004	5.89	--	--	--
4/2005	5.23	--	--	--
8/2005	5.86	1 U	1 U	1 U
11/2005	5.23	1 U	1 U	1 U
2/2006	4.00	1 U	1 U	1 U
5/2006	5.46	1 U	1 U	1 U
8/2006	5.89	1 U	1 U	1 U
12/2006	5.15	1 U	1 U	1 U
2/2007	4.79	1 U	1 U	1 U
5/2007	5.25	1 U	1 U	1 U
9/2007	7.45	2 U	2 U	1 U
11/2007	6.89	2 U	1 U	1 U
2/2008	4.95	1 U	1 U	2 U
5/2008	5.44	2 U	1 U	1 U
10/2008	5.81	1 U	1 U	1 U
6/2009	5.5	1 U	1 U	1 U
11/2009	4.05	1 U	1 U	1 U
6/2010	--	1 U	1 U	1 U
10/2010	5.49	1 U	1 U	1 U
6/2011	5.18	2 U	1 U	1 U
11/2011	5.66	1 U	1 U	1 U
6/2012	5.18	1 U	1 U	1 U
7/2013	5.93	1 U	1 U	1 U
5/2014	5.42	1 U	1 U	1 U
10/2015	5.41	1 U	1 U	1 U
6/2017	5.38	1 U	1 U	1 U
10/2018	5.86	1 U	1 U	1 U
6/2020	5.62	1 UJ	1 UJ	1 UJ
Project Cleanup Level	*NA*	*5*	*5*	*70*

Table A6. Historical sample results and water levels collected by Ecology from shallow monitoring well 4W, July 2002 to June 2020.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	5.25	**9.3**	**0.84 J**	**0.26 J**
10/2002	5.84	**15**	**1.9 J**	**0.64 J**
1/2003	4.66	**17**	**0.25 J**	**0.31 J**
4/2003	4.75	**12**	**1.3**	**0.49 J**
11/2003	5.13	**15**	**2**	**0.6 J**
4/2004	4.84	**26 J[a]**	**2.8 J[a]**	**1.4**
9/2004	5.37	**9.9**	**1.4**	**0.47 J**
4/2005	4.72	**23**	**2.3**	**0.83 J**
8/2005	5.28	**35 J[a]**	**4.2 J[a]**	**2.9 J[a]**
11/2005	--	**6.8**	**0.52 J**	**1.8**
2/2006	3.39	**18 J[a]**	**0.63 J**	**0.59 J**
5/2006	4.94	**324**	**13**	**16**
8/2006	5.34	**3.2 J**	**0.6 J**	**0.19 J**
12/2006	4.44	**6.3**	**1.7**	**0.47 J**
2/2007	4.29	**10**	**3.2**	**1**
5/2007	4.75	**9.3**	**2**	**0.75 J**
9/2007	7.01	**43**	**9.5**	**2.5**
11/2007	6.38	**14**	**2**	**0.67 J**
2/2008	4.45	**18**	**4.3 J[a]**	**1.4 J**
5/2008	4.91	**15 J**	**3.6**	**1**
10/2008	5.26	**8**	**1.5**	**0.5 J**
6/2009	4.99	**11**	**1.9**	**0.62 J**
11/2009	3.55	**6.9 J**	**1.2**	1 U
6/2010	--	**41 J[a]**	**3.9 J[a]**	**1**
10/2010	4.96	**24**	**3.1**	**0.92 J**
6/2011	4.66	**35 J**	**4.2 J**	**1.2**
11/2011	5.12	**8.9 J**	**1 J**	1 U
6/2012	4.66	**18 J[a]**	**1.95 J[a]**	**0.35 J**
7/2013	5.41	**5.3**	**1.3**	**0.77 J**
5/2014	4.93	**4.9**	**0.72 J**	**0.65 J**
10/2015	5.38	**3.7 J**	**0.74 J**	**0.35 J**
6/2017	4.84	**5.2**	**0.92 J**	**0.61 J**
10/2018	5.32	**4.6**	**1.2**	**0.74 J**
6/2020	5.09	**5.5 J[a]**	**0.96 J[a]**	1 UJ
Project Cleanup Level	*NA*	*5*	*5*	*70*

[a] Average concentration of duplicate samples when RPD > 30%.

Table A7. Historical sample results and water levels collected by Ecology from shallow monitoring well 7W, July 2002 to June 2020.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	5.21	1 U	1 U	1 U
10/2002	5.08	**0.19 J**	2 U	1 U
1/2003	4.25	1 U	1 U	1 U
4/2003	4.32	1 U	1 U	1 U
11/2003	4.69	1 U	1 U	1 U
4/2004	4.39	**1.7**	1 U	1 U
9/2004	4.92	**0.47 J**	**0.26 J**	1 U
4/2005	4.28	**0.15 J**	1 U	1 U
8/2005	4.80	**0.38 J**	1 U	1 U
11/2005	--	1 U	1 U	1 U
2/2006	2.96	**0.53 J**	1 U	1 U
5/2006	4.51	1 U	1 U	1 U
8/2006	4.9	1 UJ	1 U	1 U
12/2006	4.01	1 U	1 U	1 U
2/2007	3.84	1 U	1 U	1 U
5/2007	4.30	1 U	1 U	1 U
9/2007	6.65	2 U	2 U	1 U
11/2007	6.01	2 U	1 U	1 U
2/2008	4.00	1 U	1 U	2 U
5/2008	4.45	2 U	1 U	1 U
10/2008	4.8	1 U	1 U	1 U
6/2009	4.53	1 U	1 U	1 U
11/2009	3.13	1 U	1 U	1 U
6/2010	4.30	1 U	1 U	1 U
10/2010	4.51	1 U	1 U	1 U
6/2011	4.24	2 U	1 U	1 U
11/2011	4.21	1 U	1 U	1 U
6/2012	4.67	1 U	1 U	1 U
7/2013	4.21	1 U	1 U	1 U
5/2014	4.96	1 U	1 U	1 U
10/2015	4.49	1 U	1 U	1 U
6/2017	5.00	1 U	1 U	1 U
10/2018	4.38	1 U	1 U	1 U
6/2020	4.84	1 UJ	1 UJ	1 UJ
Project Cleanup Level	*NA*	*5*	*5*	*70*

Table A8. Historical sample results and water levels collected by Ecology from deep monitoring well MW-5, July 2002 to June 2020.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	5.21	1 U	1 U	1 U
10/2002	5.52	1 U	2 U	1 U
1/2003	4.66	1 U	1 U	1 U
4/2003	4.75	1 U	1 U	1 U
11/2003	5.13	1 U	1 U	1 U
4/2004	4.83	1 UJ	1 U	1 U
9/2004	5.38	1 U	1 U	1 U
4/2005	4.71	1 U	1 U	1 U
8/2005	5.27	1 U	1 U	1 U
11/2005	4.70	1 U	1 U	1 U
2/2006	3.24	1 U	1 U	1 U
5/2006	4.94	1 U	1 U	1 U
8/2006	5.34	1 UJ	1 U	1 U
12/2006	4.44	1 U	1 U	1 U
2/2007	4.27	1 U	1 U	1 U
5/2007	4.76	1 U	1 U	1 U
9/2007	7.00	2 U	2 U	1 U
11/2007	6.34	2 U	1 U	1 U
2/2008	4.45	1 U	1 U	2 U
5/2008	4.89	2 U	1 U	1 U
10/2008	5.28	1 U	1 U	1 U
6/2009	4.98	1 U	1 U	1 U
11/2009	3.55	1 U	1 U	1 U
6/2010	4.64	1 U	1 U	1 U
10/2010	4.94	1 U	1 U	1 U
6/2011	4.65	2 U	1 U	1 U
11/2011	5.11	1 U	1 U	1 U
6/2012	4.65	--	--	--
7/2013	5.38	1 U	1 U	1 U
5/2014	4.91	--	--	--
10/2015	5.35	1 U	1 U	1 U
6/2017	4.84	1 U	1 U	1 U
10/2018	5.30	--	--	--
6/2020	5.08	1 U	1 U	1 U
Project Cleanup Level	*NA*	*5*	*5*	*70*

Table A9. Historical sample results and water levels collected by Ecology from deep monitoring well MW-6, July 2002 to June 2020.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	4.90	1 U	1 U	1 U
10/2002	5.15	1 U	2 U	1 U
1/2003	4.34	1 U	1 U	1 U
4/2003	4.39	1 U	1 U	1 U
11/2003	4.77	1 U	1 U	1 U
4/2004	4.49	1 UJ	1 U	1 UJ
9/2004	5.02	1 U	1 U	1 U
4/2005	4.37	1 U	1 U	1 U
8/2005	4.88	1 U	1 U	1 U
11/2005	4.32	1 U	1 U	1 U
2/2006	3.04	1 U	1 U	1 U
5/2006	4.59	1 U	1 U	1 U
8/2006	4.99	1 UJ	1 U	1 U
12/2006	4.12	1 U	1 U	1 U
2/2007	3.93	1 U	1 U	1 U
5/2007	4.38	1 U	1 U	1 U
9/2007	6.71	2 U	2 U	1 U
11/2007	6.15	2 U	1 U	1 U
2/2008	4.08	1 U	1 U	2 U
5/2008	4.55	2 U	1 U	1 U
10/2008	4.90	1 U	1 U	1 U
6/2009	4.64	1 U	1 U	1 U
11/2009	3.20	1 U	1 U	1 U
6/2010	4.30	1 U	1 U	1 U
10/2010	4.59	1 U	1 U	1 U
6/2011	4.30	2 U	1 U	1 U
11/2011	4.75	1 U	1 U	1 U
6/2012	4.30	--	--	--
7/2013	5.04	1 U	1 U	1 U
5/2014	4.59	--	--	--
10/2015	5.00	1 U	1 U	1 U
6/2017	4.49	1 U	1 U	1 U
10/2018	4.94	--	--	--
6/2020	4.74	1 U	1 U	1 U
Project Cleanup Level	*NA*	*5*	*5*	*70*

Table A10. Historical sample results and water levels collected by Ecology from shallow monitoring well 8W, July 2002 to April 2003.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	4.51	1 U	1 U	1 U
10/2002	4.81	1 U	2 U	1 U
1/2003	3.93	1 U	1 U	1 U
4/2003	4.97	1 U	1 U	1 U
Project Cleanup Level	*NA*	*5*	*5*	*70*

Table A11. Historical sample results and water levels collected by Ecology from deep monitoring well MW-7, July 2002 to April 2003.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	4.61	1 U	1 U	1 U
10/2002	4.87	1 U	2 U	1 U
1/2003	4.06	1 U	1 U	1 U
4/2003	4.15	1 U	1 U	1 U
Project Cleanup Level	*NA*	*5*	*5*	*70*

Table A12. Historical sample results and water levels collected by Ecology from deep monitoring well MW-8, July 2002 to April 2003.

Date	Water Level (feet bgs)	PCE (µg/L)	TCE (µg/L)	Cis-1,2-DCE (µg/L)
7/2002	5.90	1 U	1 U	1 U
10/2002	6.51	1 U	2 U	1 U
1/2003	5.30	1 U	1 U	1 U
4/2003	5.41	1 U	1 U	1 U
Project Cleanup Level	*NA*	*5*	*5*	*70*