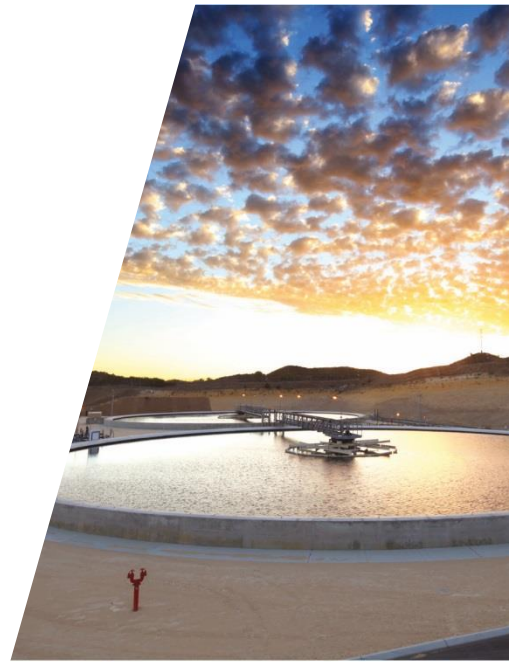




2018 Annual Monitoring Report

Highway 96 Site
White Bear Township, Minnesota

Highway 96 RP Group





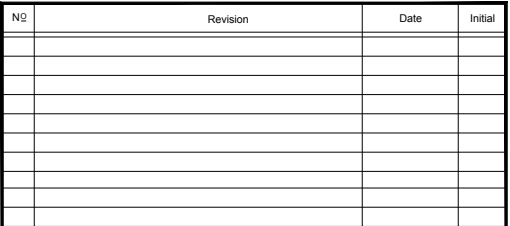
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Appendix A

Geologic Cross Sections

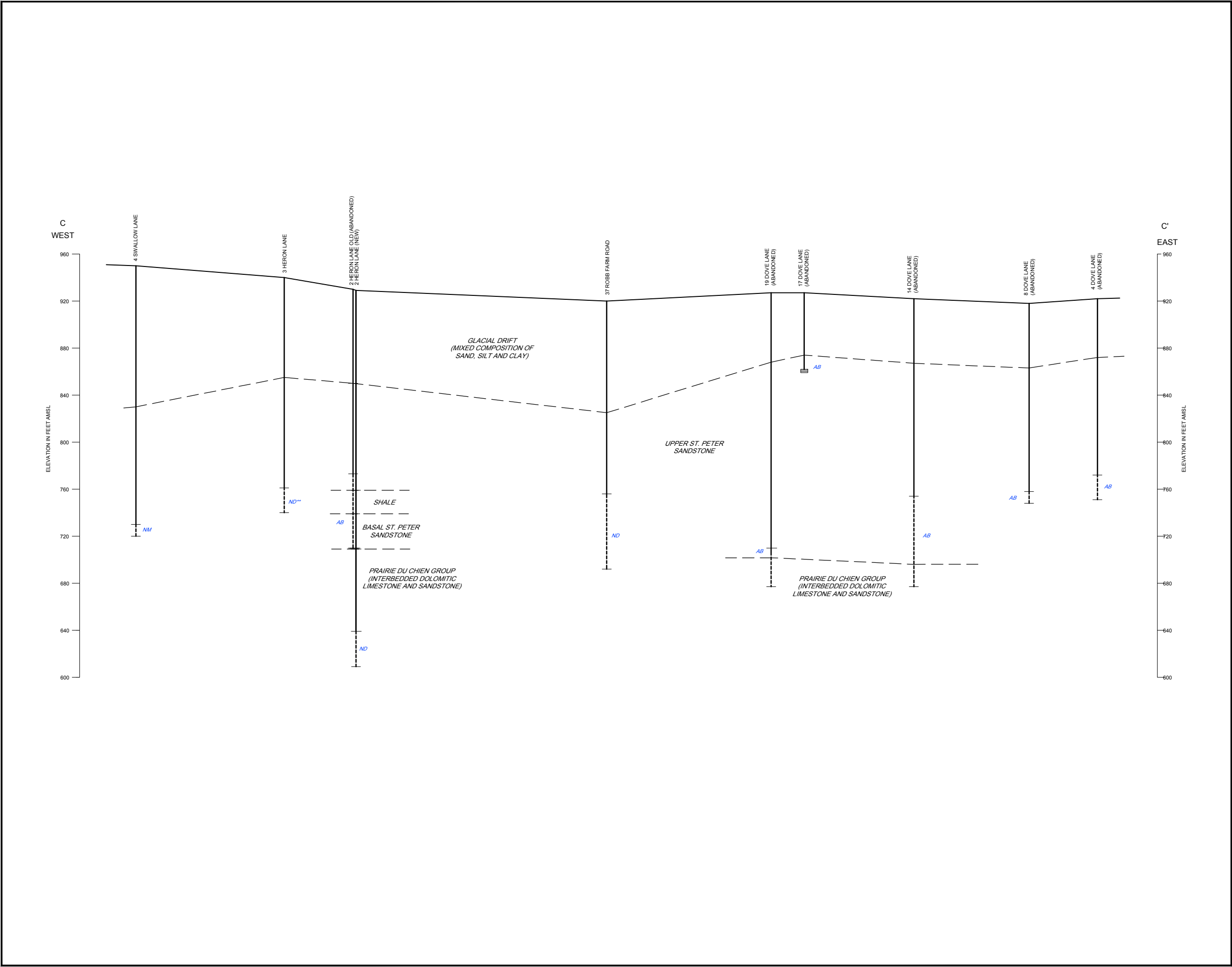


<i>ND</i>	NOT DETECTED
<i>NA</i>	NOT ACCESSIBLE
<i>NM</i>	NOT MONITORED (GEOGRAPHIC AREA 2)
<i>AB</i>	ABANDONED
<i>20</i>	VINYL CHLORIDE CONCENTRATION IN ug/L
---	ESTIMATED EW1B / EW2 CAPTURE AREA

Status	Date	Initial



Project Manager: S. ILLI	Reviewed By: S. ROSTE	Date: OCTOBER 2018	
Scale: 1"=200' HOR. 1"=40' VER.	Project N ^o : 02012-01	Report N ^o : 070	Drawing N ^o : A.2



NO	Revision	Date	Initial

MAXIMUM VINYL CHLORIDE RESULTS (2018)

ND NOT DETECTED

NM NOT MONITORED (GEOGRAPHIC AREA 2)

AB ABANDONED

**** SUPPLEMENTAL SAMPLING (NOT PART OF LONG-TERM MONITORING PROGRAM)

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved	

DRAWING STATUS		
Status	Date	Initial

HIGHWAY 96 SITE
GEOLOGIC CROSS SECTION C-C'

Source Reference:			
Project Manager:	Reviewed By:	Date:	
S. ILLI	S. ROSTE	OCTOBER 2018	
Scale:	Project N°:	Report N°:	Drawing N°:
1"=200' HOR. 1"=40' VER.	02012-01	070	A.3

Appendix B

Historical Groundwater Elevations

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	TOC (ft. AMSL)	1/15/1999 (ft. AMSL)	2/26/1999 (ft. AMSL)	3/19/1999 (ft. AMSL)	4/8/1999 (ft. AMSL)	5/13/1999 (ft. AMSL)	6/9/1999 (ft. AMSL)	7/16/1999 (ft. AMSL)	8/13/1999 (ft. AMSL)	9/17/1999 (ft. AMSL)	10/1/1999 (ft. AMSL)	11/15/1999 (ft. AMSL)	12/3/1999 (ft. AMSL)	1/17/2000 (ft. AMSL)	2/22/2000 (ft. AMSL)
Perched Groundwater Unit															
LW1	938.86	926.43	928.30	928.24	932.28	934.24	931.74	929.56	928.35	929.23	928.34	926.84	926.83	926.82	926.82
LW2	945.66	929.33	929.15	929.42	DRY	931.39	932.00	931.57	931.00	930.89	930.78	929.91	929.77	929.04	928.79
LW3	944.82	928.37	928.47	928.57	930.56	934.16	933.67	931.98	930.74	931.28	930.80	929.29	929.02	928.19	927.84
MW1S	950.65	932.67	932.68	932.67	933.79	936.10	938.14	936.40	935.20	934.58	934.27	933.42	933.14	932.47	932.00
MW4U	939.65	DRY	DRY	DRY	DRY	DRY	DRY	910.19	910.62	910.47	910.49	910.14	910.09	DRY	DRY
MW6S	948.44	926.84	926.12	925.88	926.53	928.53	931.76	930.97	930.08	929.81	929.44	928.29	927.84	926.80	926.03
MW10S	935.94	922.40	924.66	928.95	930.30	931.22	929.02	930.02	928.26	930.01	928.60	929.60	928.86	922.40	919.26
MW11S	936.34	919.49	DRY	DRY	929.43	932.19	932.30	930.88	928.34	931.12	929.33	924.70	923.48	920.32	DRY
P1	941.70	934.22	934.73	935.73	937.29	939.89	937.38	936.15	935.43	935.34	935.11	934.62	934.44	933.90	933.56
P2	946.11	CAP FROZEN	926.39	926.29	927.29	926.70	926.68	926.44	926.50	926.49	926.42	926.41	926.41	NM	926.38
P3	947.11	927.35	927.30	927.29	927.30	927.51	927.42	927.42	927.45	927.45	927.40	927.37	927.36	927.30	927.28
P4	948.16	929.80	929.89	928.54	930.03	930.07	929.98	930.80	929.82	929.92	929.84	929.79	929.76	929.64	929.52
SUMP*	946.71	918.51	913.53	NM	913.08	915.24	914.98	913.80	913.50	913.60	913.44	913.55	913.47	913.90	913.49
Glacial Drift (Lower Sand) Aquifer															
EW1*	936.66	877.68	876.59	875.93	876.14	872.10	871.31	897.35	870.67	869.55	869.05	896.86	896.98	896.67	877.99
EW1A*	938.67	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	897.30	NM	NM	NM
EW1B*	939.99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW1D	951.02	894.56	897.13	896.74	897.23	897.32	897.88	898.06	897.25	897.25	897.21	897.61	897.79	897.51	897.35
MW4D	940.48	896.34	895.92	895.58	896.07	896.17	896.69	897.32	896.18	896.19	896.20	896.87	897.05	896.71	896.54
MW4S	940.33	899.08	898.49	897.92	898.19	898.16	898.81	899.82	899.42	899.35	899.45	900.15	900.44	899.92	899.68
MW6D	948.15	897.26	896.84	896.49	896.86	896.91	897.47	897.97	897.28	897.20	897.22	897.77	897.89	897.54	897.44
MW10D	935.94	901.77	901.03	900.37	900.69	901.10	902.43	903.02	902.95	902.92	903.05	903.24	903.44	902.43	902.23
MW11D	935.40	900.19	899.49	899.06	899.72	900.49	901.49	902.19	902.31	901.57	901.57	901.29	901.32	900.53	900.14
MW12D	940.52	899.78	899.08	898.68	898.90	899.20	900.09	900.77	900.29	900.14	900.05	900.08	900.03	899.54	899.17
MW13D	937.66	898.45	897.88	897.44	897.90	898.11	898.13	899.46	898.63	898.52	898.51	898.58	898.64	898.21	898.05
MW16D	940.70	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Upper St. Peter Sandstone Aquifer															
EW2*	938.67	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW7B	942.91	898.66	898.21	897.78	898.27	898.30	898.85	898.96	898.15	898.31	898.30	898.59	898.80	898.48	898.31
MW8B	940.91	896.22	895.81	895.47	895.99	896.04	896.59	897.20	896.05	896.08	896.07	896.76	896.89	896.64	896.24
MW10B	936.64	896.21	895.80	895.46	895.96	896.04	896.58	897.07	896.00	896.01	896.02	896.66	896.80	896.52	896.25
MW12B	939.89	896.19	895.74	895.42	895.90	895.97	896.53	895.92	895.89	895.92	895.91	896.47	896.64	896.34	896.12
MW13B	938.34	896.05	895.58	895.29	895.77	895.85	896.42	896.68	895.76	895.78	895.77	896.23	896.36	896.09	895.89
MW16B	940.71	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW17A	914.58	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW18A	925.39	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW19A	913.56	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW21A	909.03	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	TOC (ft. AMSL)	1/15/1999 (ft. AMSL)	2/26/1999 (ft. AMSL)	3/19/1999 (ft. AMSL)	4/8/1999 (ft. AMSL)	5/13/1999 (ft. AMSL)	6/9/1999 (ft. AMSL)	7/16/1999 (ft. AMSL)	8/13/1999 (ft. AMSL)	9/17/1999 (ft. AMSL)	10/1/1999 (ft. AMSL)	11/15/1999 (ft. AMSL)	12/3/1999 (ft. AMSL)	1/17/2000 (ft. AMSL)	2/22/2000 (ft. AMSL)
Basal St. Peter Sandstone Aquifer															
EW3	913.88	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW17B	914.50	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW18B	925.24	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW19B	913.33	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW20B	915.04	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
6 Blue Goose Road [#]	954.15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1 Lily Pond Road [#]	931.18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11 Lily Pond Road [#]	928.54	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11 Robb Farm Road [#]	942.63	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
38 East Oaks Road [^]	926.25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6 West Shore Road [^]	920.20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Prairie du Chien Aquifer															
MW17L	914.65	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW18L	925.44	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW19L	914.18	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	2/28/2000 (ft. AMSL)	3/29/2000 (ft. AMSL)	4/28/2000 (ft. AMSL)	5/26/2000 (ft. AMSL)	6/28/2000 (ft. AMSL)	7/26/2000 (ft. AMSL)	8/31/2000 (ft. AMSL)	9/21/2000 (ft. AMSL)	10/2/2000 (ft. AMSL)	11/17/2000 (ft. AMSL)	12/13/2000 (ft. AMSL)	1/9/2001 (ft. AMSL)	2/28/2001 (ft. AMSL)	3/16/2001 (ft. AMSL)	4/23/2001 (ft. AMSL)
Perched Groundwater Unit															
LW1	928.33	929.15	929.52	928.26	928.31	928.33	928.20	928.05	928.28	929.79	928.33	928.21	928.17	928.66	934.86
LW2	928.73	929.00	DRY	DRY	929.86	929.59	DRY	DRY	DRY	DRY	DRY	<929.42	DRY	<929.31	932.81
LW3	928.09	929.28	930.00	929.54	930.44	929.92	928.80	929.55	929.40	930.83	930.28	929.24	928.44	928.54	937.48
MW1S	932.11	932.40	932.30	932.30	932.40	932.16	931.74	931.86	931.72	932.08	932.04	931.59	931.15	931.09	931.33
MW4U	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	<909.32	<909.37	< 909.6	DRY
MW6S	926.20	926.06	926.12	926.21	927.68	928.00	927.45	927.34	927.21	926.86	926.83	926.44	925.79	925.53	929.51
MW10S	929.53	928.88	928.87	928.28	928.11	927.49	924.71	927.84	926.09	928.49	927.83	923.71	919.70	919.86	932.63
MW11S	918.51	922.29	921.89	920.23	923.74	923.11	919.62	925.41	923.70	923.55	921.19	918.91	<918.60	<918.6	932.68
P1	936.17	934.55	934.48	933.76	933.83	933.49	932.97	933.45	933.25	934.27	933.59	933.13	933.33	933.35	940.76
P2	926.38	926.37	926.38	926.33	926.51	NM	926.51	926.50	926.51	927.35	CAP FROZEN	926.56	CAP FROZEN	926.45	926.56
P3	927.31	927.49	927.45	927.36	927.38	927.39	927.48	927.48	927.46	930.14	929.66	929.38	929.01	928.97	931.66
P4	930.00	929.98	930.02	929.98	929.96	929.90	929.85	929.95	929.89	930.05	929.99	928.40	929.81	929.83	930.11
SUMP*	913.48	913.58	907.71	913.41	914.17	913.47	907.87	913.69	913.53	916.54	917.85	918.84	914.36	913.59	916.38
Glacial Drift (Lower Sand) Aquifer															
EW1*	877.01	867.76	867.94	881.52	882.21	883.24	884.50	894.15	894.51	884.80	884.20	883.80	884.13	883.78	883.95
EW1A*	NM	895.89	895.39	879.98	NM	NM	878.59	878.98	879.18	887.37	887.56	886.98	888.31	888.22	889.77
EW1B*	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW1D	897.10	896.89	896.70	896.10	896.01	895.62	895.25	895.26	895.26	895.10	895.21	895.14	895.34	895.04	896.39
MW4D	896.09	895.82	895.67	894.89	894.93	894.43	894.18	894.35	894.39	893.90	893.98	893.87	894.02	893.84	895.16
MW4S	899.20	898.46	898.19	897.43	897.28	896.81	896.39	896.25	896.40	895.93	896.01	895.91	896.01	895.73	896.63
MW6D	897.18	896.75	896.58	895.96	895.88	895.35	894.91	895.04	895.14	894.71	894.78	894.72	894.85	894.66	895.65
MW10D	901.41	894.97	900.71	900.10	900.42	900.02	899.79	899.86	900.12	899.19	899.25	899.04	898.86	898.57	899.54
MW11D	899.87	899.48	899.24	898.59	898.83	898.36	896.84	898.16	898.22	897.68	897.64	897.37	897.28	896.89	898.79
MW12D	899.12	898.57	898.40	898.04	897.91	897.60	897.19	897.14	897.20	896.68	896.76	896.67	896.51	896.32	897.22
MW13D	897.77	897.42	897.24	896.71	896.73	896.29	895.94	895.91	895.94	895.54	895.65	895.48	895.48	895.21	896.77
MW16D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Upper St. Peter Sandstone Aquifer															
EW2*	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW7B	898.12	897.89	897.76	897.21	897.09	896.76	896.39	896.30	896.33	896.16	896.29	896.24	896.40	896.10	897.34
MW8B	895.99	895.69	895.52	894.76	894.66	894.30	894.03	894.22	894.26	893.80	893.83	893.77	893.93	893.71	895.01
MW10B	895.96	901.63	895.50	894.76	894.83	894.27	894.00	894.23	894.18	893.78	893.86	893.78	893.92	893.72	895.08
MW12B	895.87	895.58	895.33	894.69	894.72	894.21	893.90	894.09	894.05	893.71	893.86	893.73	893.89	893.63	895.01
MW13B	895.66	895.42	895.18	894.58	894.54	894.05	893.73	893.90	893.84	893.59	893.68	893.62	893.73	893.52	894.93
MW16B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW17A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW18A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW19A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW21A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	2/28/2000 (ft. AMSL)	3/29/2000 (ft. AMSL)	4/28/2000 (ft. AMSL)	5/26/2000 (ft. AMSL)	6/28/2000 (ft. AMSL)	7/26/2000 (ft. AMSL)	8/31/2000 (ft. AMSL)	9/21/2000 (ft. AMSL)	10/2/2000 (ft. AMSL)	11/17/2000 (ft. AMSL)	12/13/2000 (ft. AMSL)	1/9/2001 (ft. AMSL)	2/28/2001 (ft. AMSL)	3/16/2001 (ft. AMSL)	4/23/2001 (ft. AMSL)
Basal St. Peter Sandstone Aquifer															
EW3	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW17B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW18B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW19B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW20B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
6 Blue Goose Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
1 Lily Pond Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11 Lily Pond Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11 Robb Farm Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
38 East Oaks Road [^]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6 West Shore Road [^]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Prairie du Chien Aquifer															
MW17L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW18L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW19L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	5/31/2001 (ft. AMSL)	8/3/2001 (ft. AMSL)	10/1/2001 (ft. AMSL)	2/7/2002 (ft. AMSL)	5/29/2002 (ft. AMSL)	8/8/2002 (ft. AMSL)	9/30/2002 (ft. AMSL)	1/6/2003 (ft. AMSL)	5/20/2003 (ft. AMSL)	9/18/2003 (ft. AMSL)	10/13/2003 (ft. AMSL)	10/18/2004 (ft. AMSL)	11/14/2005 (ft. AMSL)	10/16/2006 (ft. AMSL)	10/1/2007 (ft. AMSL)
Perched Groundwater Unit															
LW1	931.90	929.17	928.30	928.38	931.02	931.13	930.64	928.34	932.72	928.31	928.18	927.67	929.58	926.75	931.06
LW2	933.07	931.96	931.91	932.44	933.71	934.11	933.40	932.15	934.69	933.66	933.45	933.61	932.88	933.56	933.50
LW3	934.61	931.61	929.46	929.22	933.98	934.76	932.86	930.46	935.65	930.25	929.33	929.80	932.08	930.57	930.91
MW1S	938.72	935.66	933.36	932.05	937.84	939.37	935.46	933.59	938.26	933.23	932.40	932.74	932.97	931.85	931.03
MW4U	< 909.6	910.21	910.79	909.83	910.39	912.00	912.63	911.43	910.50	912.30	911.90	911.81	911.97	911.80	DRY
MW6S	933.62	932.57	931.05	928.07	930.01	930.06	928.62	927.03	931.48	928.96	928.62	928.90	930.05	930.11	930.99
MW10S	931.60	929.93	928.93	923.99	931.13	931.40	931.08	928.66	931.36	924.92	926.66	927.81	931.39	928.99	931.13
MW11S	932.04	930.53	923.91	918.77	932.18	932.72	932.43	928.35	932.60	925.64	923.50	924.39	931.86	928.15	931.49
P1	937.80	935.12	934.01	933.48	937.18	937.35	934.73	933.03	939.52	933.09	932.64	933.11	933.95	932.73	932.84
P2	926.78	926.75	926.72	926.54	926.72	926.70	926.62	926.55	926.20	927.56	926.52	926.56	926.53	928.02	927.04
P3	930.28	929.95	929.91	929.59	928.98	928.73	928.57	928.31	928.16	928.18	928.09	927.90	927.85	929.30	928.93
P4	DRY	DRY	DRY	DRY	DRY	930.78	930.64	930.57	930.32	930.64	930.59	930.64	930.65	930.65	930.65
SUMP*	918.96	920.97	921.86	914.84	916.27	913.96	913.61	915.61	919.49	921.30	920.14	917.31	921.92	926.35	923.60
Glacial Drift (Lower Sand) Aquifer															
EW1*	884.02	NM	887.18	884.26	880.00	877.62	887.66	897.35	897.42	895.95	896.11	895.60	891.88	894.36	891.64
EW1A*	890.18	888.91	889.19	894.92	880.39	880.66	877.35	875.58	870.07	859.92	858.50	860.91	857.22	856.97	865.22
EW1B*	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW1D	896.85	896.22	896.01	896.60	897.05	898.01	898.92	898.99	899.04	897.47	897.56	897.04	896.63	895.81	893.55
MW4D	895.71	895.00	894.78	895.46	895.72	896.80	897.89	897.96	898.02	896.46	896.96	896.06	895.58	894.64	892.30
MW4S	897.68	898.55	898.52	898.16	898.20	899.29	900.46	901.07	900.26	900.05	900.12	898.93	898.48	898.36	894.43
MW6D	896.43	896.35	896.08	896.39	896.63	897.63	898.54	898.92	898.72	897.52	897.71	897.02	896.67	896.02	893.38
MW10D	901.02	901.97	901.49	901.37	902.37	904.27	905.36	904.68	904.09	903.49	903.41	902.48	903.74	902.61	898.80
MW11D	900.03	900.25	899.39	898.93	900.53	902.09	903.27	902.90	902.84	901.49	901.30	900.66	901.56	900.50	896.83
MW12D	898.51	899.52	898.94	898.56	899.40	901.38	902.21	902.10	901.17	900.60	900.32	NO ACCESS	899.38	898.63	896.17
MW13D	898.04	898.41	897.92	897.84	899.16	900.72	901.27	900.70	901.09	899.59	899.55	NO ACCESS	898.88	897.69	895.26
MW16D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	896.38	895.49	893.10
Upper St. Peter Sandstone Aquifer															
EW2*	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NM	851.37	851.76
MW7B	897.80	897.29	897.08	897.60	898.05	898.98	899.83	899.89	899.67	898.49	898.54	898.06	897.67	896.90	894.65
MW8B	895.56	894.92	894.64	895.31	895.57	896.65	897.77	897.84	897.88	896.34	896.77	895.92	895.44	894.51	892.12
MW10B	895.60	894.93	894.64	895.28	895.62	896.71	897.77	897.86	897.93	896.33	896.77	895.94	895.49	894.51	892.21
MW12B	895.53	894.84	894.60	895.21	894.90	896.68	897.70	897.80	897.87	896.24	896.35	NO ACCESS	895.42	894.46	892.18
MW13B	895.48	894.76	894.51	895.09	895.55	896.66	897.61	897.67	897.76	896.10	896.22	NO ACCESS	895.32	894.37	892.13
MW16B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	895.84	894.94	892.59
MW17A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	893.22	892.13	890.11
MW18A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	885.63
MW19A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW21A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	5/31/2001 (ft. AMSL)	8/3/2001 (ft. AMSL)	10/1/2001 (ft. AMSL)	2/7/2002 (ft. AMSL)	5/29/2002 (ft. AMSL)	8/8/2002 (ft. AMSL)	9/30/2002 (ft. AMSL)	1/6/2003 (ft. AMSL)	5/20/2003 (ft. AMSL)	9/18/2003 (ft. AMSL)	10/13/2003 (ft. AMSL)	10/18/2004 (ft. AMSL)	11/14/2005 (ft. AMSL)	10/16/2006 (ft. AMSL)	10/1/2007 (ft. AMSL)
Basal St. Peter Sandstone Aquifer															
EW3	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	877.14
MW17B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	886.53	885.09	883.28
MW18B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	883.73
MW19B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	878.79	876.90
MW20B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	876.66
6 Blue Goose Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	890.85	886.20
1 Lily Pond Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	892.13	884.25
11 Lily Pond Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	885.73	884.20
11 Robb Farm Road [#]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	892.58	890.56
38 East Oaks Road [^]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6 West Shore Road [^]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Prairie du Chien Aquifer															
MW17L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	883.16	880.77	878.79
MW18L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	875.54
MW19L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	874.40	872.50

**Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota**

Location	10/6/2008 (ft. AMSL)	12/14/2009 (ft. AMSL)	10/11/2010 (ft. AMSL)	10/10/2011 (ft. AMSL)	10/1/2012 (ft. AMSL)	9/30/2013 (ft. AMSL)	10/6/2014 (ft. AMSL)	10/5/2015 (ft. AMSL)	10/3/2016 (ft. AMSL)	9/27/2017 (ft. AMSL)	10/8/2018 (ft. AMSL)
Perched Groundwater Unit											
LW1	927.01	DRY	929.75	928.26	927.95	928.06	932.20	931.10	932.79	929.53	933.35
LW2	932.58	932.64	931.86	932.62	931.61	931.91	933.44	938.22	934.60	933.60	935.02
LW3	928.33	929.96	930.85	930.79	928.40	928.86	933.21	937.37	934.59	932.06	934.68
MW1S	931.63	930.33	931.52	933.96	931.67	932.74	933.31	933.03	937.02	932.44	933.67
MW4U	909.88	DRY	909.86	913.36	910.24	911.11	914.40	913.81	916.57	915.03	914.99
MW6S	928.05	928.43	927.94	930.47	928.22	929.66	931.29	930.30	932.68	929.23	929.69
MW10S	DRY	927.69	929.74	928.71	919.89	920.18	930.74	931.47	932.70	930.98	931.83
MW11S	920.62	920.32	931.08	928.20	922.34	923.49	932.36	932.17	932.94	931.04	932.94
P1	932.05	932.36	932.45	933.39	931.67	932.29	933.59	933.33	935.97	932.52	934.94
P2	928.40	926.68	926.57	928.47	926.62	926.62	930.77	926.78	932.77	929.35	934.69
P3	929.21	929.06	928.66	929.58	928.75	928.42	930.35	929.59	930.05	928.85	938.82
P4	930.68	930.65	DRY	930.65	930.68	930.68	930.75	930.81	930.95	931.08	936.15
SUMP*	924.91	923.21	919.71	921.48	918.52	920.58	924.75	920.81	927.25	926.89	935.76
Glacial Drift (Lower Sand) Aquifer											
EW1*	892.16	891.96	891.26	894.96	891.26	893.84	896.94	897.05	899.05	899.23	899.02
EW1A*	861.67	871.43	891.79	895.28	892.74	894.22	897.31	897.31	899.39	899.42	899.03
EW1B*	NI	NI	888.44	894.88	889.43	891.04	893.42	892.51	887.65	890.44	884.90
MW1D	893.91	893.26	892.13	896.08	894.04	895.55	898.74	898.97	901.07	901.07	900.82
MW4D	892.45	892.17	891.93	895.06	892.91	894.39	897.53	897.71	899.99	899.92	899.59
MW4S	895.39	893.51	894.58	899.26	897.09	898.27	902.57	902.08	905.57	907.63	905.18
MW6D	893.72	893.15	893.23	896.68	894.62	895.95	898.94	899.10	901.25	901.48	900.93
MW10D	899.92	897.05	898.59	903.43	900.50	901.00	904.50	904.73	908.49	908.79	NM
MW11D	897.06	894.94	896.46	901.03	897.98	899.22	903.70	903.93	906.65	906.10	NM
MW12D	896.89	895.62	894.68	900.48	897.80	899.27	902.75	902.60	906.39	905.65	906.00
MW13D	895.88	894.35	894.10	898.87	896.35	898.28	901.56	901.27	904.07	903.28	899.79
MW16D	893.15	892.79	892.70	895.84	893.55	895.05	898.35	898.51	900.70	900.69	900.44
Upper St. Peter Sandstone Aquifer											
EW2*	830.76	844.88	838.11	829.96	855.39	892.30	895.08	895.02	898.46	898.76	898.76
MW7B	894.69	894.29	894.28	897.41	895.40	896.71	899.80	900.08	902.18	902.17	901.99
MW8B	892.26	892.01	891.74	892.87	892.72	894.24	897.38	897.53	899.66	899.81	899.43
MW10B	892.32	892.04	891.76	894.88	892.66	894.27	897.45	897.58	899.74	899.66	899.49
MW12B	892.28	891.95	891.71	894.82	892.68	894.20	897.41	897.57	899.71	899.64	899.47
MW13B	892.23	891.89	891.64	894.77	892.59	894.14	897.36	897.52	899.69	899.59	899.40
MW16B	892.72	892.42	892.16	895.24	893.08	894.61	897.85	898.00	900.13	900.06	900.11
MW17A	890.16	889.78	889.55	892.56	890.51	892.03	895.36	895.51	897.69	897.56	897.32
MW18A	885.88	885.39	885.21	888.49	886.64	887.96	891.15	891.31	893.46	893.81	893.14
MW19A	882.33	881.79	881.75	885.61	883.82	884.96	887.92	888.09	890.28	891.18	889.90
MW21A	882.51	882.01	881.96	885.80	884.01	885.20	887.90	888.27	890.44	891.32	890.07

Historical Summary of Groundwater Elevations
Highway 96 Site
White Bear Township, Minnesota

Location	10/6/2008 (ft. AMSL)	12/14/2009 (ft. AMSL)	10/11/2010 (ft. AMSL)	10/10/2011 (ft. AMSL)	10/1/2012 (ft. AMSL)	9/30/2013 (ft. AMSL)	10/6/2014 (ft. AMSL)	10/5/2015 (ft. AMSL)	10/3/2016 (ft. AMSL)	9/27/2017 (ft. AMSL)	10/8/2018 (ft. AMSL)
Basal St. Peter Sandstone Aquifer											
EW3	877.16	878.33	877.05	879.68	877.15	879.48	882.57	882.96	885.98	885.73	885.91
MW17B	883.10	884.25	882.56	884.78	881.67	884.21	888.54	887.99	891.03	890.21	891.34
MW18B	883.83	883.58	882.06	885.05	882.39	883.85	887.92	887.43	890.43	890.44	890.17
MW19B	876.92	877.91	876.65	879.43	876.90	878.67	882.43	882.68	885.71	885.47	885.65
MW20B	876.64	877.97	877.00	879.83	877.27	879.16	882.19	883.31	886.30	886.28	886.21
6 Blue Goose Road [#]	886.12	886.90	885.57	887.63	884.55	887.26	891.56	891.10	893.87	893.12	894.32
1 Lily Pond Road [#]	890.31	890.98	883.69	892.68	890.58	892.24	895.72	895.80	898.45	897.83	897.72
11 Lily Pond Road [#]	884.20	885.01	883.87	885.94	883.01	885.31	889.63	889.19	891.98	891.35	892.32
11 Robb Farm Road [#]	890.63	890.31	890.08	893.14	891.00	892.58	895.85	895.97	898.20	898.04	897.90
38 East Oaks Road [^]	879.73	881.04	879.20	881.82	878.73	880.77	885.36	885.26	888.15	888.07	887.79
6 West Shore Road [^]	880.62	881.12	880.01	882.80	880.18	881.85	886.03	883.46	888.60	888.42	888.67
Prairie du Chien Aquifer											
MW17L	879.27	881.31	878.52	880.70	876.63	879.25	885.18	883.38	886.99	885.37	888.17
MW18L	875.53	878.39	874.85	877.31	873.29	875.92	881.19	880.67	884.23	883.29	885.01
MW19L	872.28	875.15	872.64	875.26	871.40	873.65	878.47	878.51	882.13	880.29	882.57

Notes:

ft. AMSL - Feet Above Mean Sea Level

NI - Not Installed

NM - Not Measured

TOC - Top of Casing

* - Historical/Current Pumping Well

- Converted Residential Monitoring Well

^ - Active Residential Well

Appendix C

Annual Monitoring Well Sampling Summary

**Monitoring Well Sampling Summary
October 2018
Highway 96 Site
White Bear Township, Minnesota**

Well	Sample No.	QA/QC	pH (--)	Temperature (°C)	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Observations	Analytical
EW1B	W-181010-SR-001	--	7.35	NM	NM	NM	NM	NM	NR	P1,P2,P4
EW2	W-181010-SR-002	--	7.27	NM	NM	NM	NM	NM	NR	P1,P2,P4
EW3	W-181009-SR-07	--	7.54	10.00	0.648	-187	0.31	13.1	Clear	P1,P3
LW1	W-181011-SR-29	FD (-30)	7.05	12.66	0.638	19	0.00	3.7	Clear	P1,P2
LW2	W-181011-SR-32	--	6.88	8.64	0.695	-97	1.35	72.3	Cloudy, Brown	P1,P2
LW3	W-181011-SR-31	--	7.02	11.74	1.41	-146	0.49	6.2	Clear	P1,P2
MW1D	W-181011-SR-37	--	7.54	9.64	0.648	-194	3.77	0.7	Clear	P1,P2
MW1S	W-181011-SR-36	MS/MSD	7.32	6.34	0.981	-123	0.00	14.7	NR	P1,P2
MW4D	W-181011-SR-39	--	7.41	8.05	1.51	-182	0.54	35.7	Clear	--
MW4S	W-181011-SR-38	--	NM	NM	NM	NM	NM	NM	NR	P1,P2
MW4U	W-181010-SR-34	--	7.16	9.83	1.23	-133	0.00	5	Clear	P1,P2
MW8B	W-181010-SR-33	--	7.96	9.59	0.713	-279	0.00	1.3	SI Cloudy, Brown	P1,P2
MW10B	W-181010-SR-35	--	7.31	10.08	0.643	-157	0.00	1.5	Cloudy, Gray	P1,P2
MW10D	NS	--	--	--	--	--	--	--	--	--
MW11D	NS	--	--	--	--	--	--	--	--	--
MW12B	W-181010-SR-26	--	7.33	10.93	0.569	-198	2.86	4.5	Clear	P1,P2
MW12D	W-181010-SR-25	--	7.09	10.73	0.866	-157	0.29	42.0	Clear	P1,P2
MW13B	W-181010-SR-24	--	7.51	10.80	0.596	-203	3.46	5.8	Clear	P1,P2
MW13D	W-181010-SR-21	FD (-22)	8.06	10.91	0.723	-220	0.57	9.2	Clear	P1,P2
MW16B	W-181010-SR-27	--	7.63	11.08	0.640	-195	3.14	7.4	Clear	P1,P2
MW16D	W-181010-SR-28	RB (-23)	7.31	11.27	0.808	-198	0.24	47.0	Clear	P1,P2
MW17A	W-181009-SR-15	--	8.27	10.03	0.880	-252	0.00	1.7	Clear	P1,P3
MW17B	W-181009-SR-17	--	8.12	10.56	0.646	-271	0.00	5.2	SI Cloudy, Brown	P1,P3
MW17L	W-181009-SR-16	--	7.43	9.82	0.562	-139	0.00	2.2	Cloudy, Gray	P1,P3
MW18A	W-181009-SR-09	RB (-06),FD (-10)	7.37	10.85	0.813	-206	3.34	6.3	Clear	P1,P3
MW18B	W-181009-SR-11	--	7.89	9.99	0.652	-226	0.26	156	SI Cloudy	P1,P3
MW18L	W-181010-SR-12	MS/MSD	7.02	10.77	0.551	-109	1.53	4.4	Clear	P1,P3
MW19A	W-181009-SR-03	--	7.62	10.11	0.783	-221	0.39	1.6	Clear	P1,P3
MW19B	W-181009-SR-04	--	7.60	10.09	0.598	-187	0.20	10.8	Clear	P1,P3
MW19L	W-181009-SR-01	FD (-02)	6.94	10.40	0.513	-112	0.13	2.4	Clear	P1,P3

Monitoring Well Sampling Summary
October 2018
Highway 96 Site
White Bear Township, Minnesota

Well	Sample No.	QA/QC	pH (--)	Temperature (°C)	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Observations	Analytical
MW20B	W-181009-SR-08	--	7.05	10.26	0.597	-150	3.71	1.4	Clear	P1,P3
MW21A	W-181009-SR-05	--	7.57	9.66	0.562	-196	3.35	2.1	Clear	P1,P3
SUMP	W-181011-SR-41	--	7.29	NM	NM	NM	NM	NM	NR	P1,P2
1 Lily Pond [#]	W-181009-SR-18	--	7.43	9.99	0.714	-211	0.00	1.0	Clear	P1,P3
11 Lily Pond [#]	W-181009-SR-13	--	7.16	10.44	0.596	-155	0.00	0.4	NR	P1,P3
11 Robb Farm [#]	W-181009-SR-14	--	7.35	10.41	0.605	-187	0.00	7.6	Cloudy, Dark	P1,P3
6 Blue Goose [#]	W-181010-SR-19	--	7.31	9.74	0.525	-183	0.00	2.8	SI Cloudy, Gray	P1,P3

Notes:

[#] - Converted residential monitoring well.

DO	- Dissolved Oxygen
FB	- Rinsate Blank
FD	- Field Duplicate
mg/L	- Milligrams per Liter
mS/cm	- Millisiemens per Centimeter
MS/MSD	- Matrix Spike/Matrix Spike Duplicate
mV	- Millivolts
NM	- Not Measured
NR	- Not Recorded
NS	- Not Sampled (Access/Equipment Issue)
NTU	- Nephelometric Turbidity Units
ORP	- Oxidation Reduction Potential
P1	- Chloride (Method 300.0A)
P2	- Volatile Organic Compounds (VOCs) (Method 8260C)
P3	- Low-Level VOCs (Method 524.2)
P4	- Total Suspended Solids (Method SM 2540D) and Chemical Oxygen Demand (Method 410.4)
QA/QC	- Quality Assurance/Quality Control Sample Type
RB	- Rinsate Blank

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name:	Highway 96
Ref. No.:	002012-01-022

Date: October 10, 2018
Personnel: Steven Roste

Monitoring Well Data:

Well No.:	EW1B
Measurement Point:	Top of Casing (TOC)
Well Depth (ft BTOC):	97 (pump set ~ 84 ft BTOC)

Screen Length (ft):	10 + tailpiece (2 ft)
Midscreen Depth (ft BTOC):	N/A (GRAB)
Well Diameter, D (in):	6
Water Level:	54.79 (pumping)

[illegible]

Notes:

GRAB SAMPLE

-Purged sample port for 2 minutes prior to sample.

* Measured 10/24/2018

Sample ID:	13:22	W-181010-SR-001
	VOCs (8260C), Chloride (300.0A), pH (Field), TSS (SM 2540D), and COD (410.4)	

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name:	Highway 96
Ref. No.:	002012-01-022

Date: October 10, 2018
 Personnel: Steven Roste

Monitoring Well Data:

Well No.:	EW2
Measurement Point:	Top of Casing (TOC)
Well Depth (ft BTOC):	140 (pump set ~ 89 ft BTOC)

Screen Length (ft):	10 + tailpiece (5 ft)
Midscreen Depth (ft BTOC):	N/A (GRAB)
Well Diameter, D (in):	6
Water Level:	39.61 (pumping)

[illegible]

Notes:

GRAB SAMPLE

-Purged sample port for 2 minutes prior to sample.

* Measured 10/24/2018

Sample ID:	13:27	W-181010-SR-002
	VOCs (8260C), Chloride (300.0A), pH (Field), TSS (SM 2540D), and COD (410.4)	

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: EW3
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 203.38

Screen Length (ft): 10.30
 Midscreen Depth (ft BTOC): 198.23
 Well Diameter, D (in): 6
 Static Water Level: 27.97

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
12:00	75	27.97	--	--	--	--	--	--	--	--
12:25	75	28.49	0.52	7.54	10.01	0.648	-186	0.68	19.5	Clear
12:30	75	28.52	0.55	7.54	10.00	0.648	-185	0.51	18.6	Clear
12:33	75	28.51	0.54	7.54	10.03	0.648	-186	0.43	16.6	Clear
12:36	75	28.51	0.54	7.54	10.03	0.648	-187	0.38	15.0	Clear
12:39	75	28.51	0.54	7.54	10.01	0.648	-187	0.35	14.2	Clear
12:42	75	28.51	0.54	7.54	10.00	0.648	-187	0.31	13.1	Clear
12:47	75	28.49	0.52	NR	NR	NR	NR	NR	14.0	Clear

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 12:51 W-181009-SR-07

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 11, 2018
 Personnel: Kai Kasprick
Steven Roste

Monitoring Well Data:

Well No.: LW-1
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 11.62

Screen Length (ft): 5.00
 Midscreen Depth (ft BTOC): 9.12
 Well Diameter, D (in): 2
 Static Water Level: 3.88

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
9:10	250	3.88	--	--	--	--	--	--	--	--
9:15	250	4.14	0.26	7.84	12.85	0.658	-73	0.00	31.9	Slightly Cloudy, Brown
9:25	250	4.25	0.37	7.18	12.75	0.625	-58	0.00	14.5	Slightly Cloudy, Brown
9:35	250	4.27	0.39	7.09	12.67	0.626	2	0.00	8.6	Slightly Cloudy, Brown
9:40	250	4.29	0.41	7.06	12.76	0.627	16	0.00	6.7	Slightly Cloudy, Brown
9:45	250	4.30	0.42	7.04	12.79	0.629	12	0.00	5.9	Slightly Cloudy, Brown
9:50	250	4.30	0.42	7.04	12.73	0.631	20	0.00	5.4	Slightly Cloudy, Brown
9:55	250	4.30	0.42	7.05	12.66	0.638	19	0.00	3.7	Slightly Cloudy, Brown

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Temperature destabilized due to ambient air temperature.
- Sample collected because all other parameters are stable.

Sample ID: 9:57 W-181011-SR-29
9:59 W-181011-SR-30 (FD)
 VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 11, 2018
 Personnel: Kai Kasprick
Melissa Hackenmueller

Monitoring Well Data:

Well No.: LW-2
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 18.63

Screen Length (ft): 5.00
 Midscreen Depth (ft BTOC): 16.13
 Well Diameter, D (in): 2
 Static Water Level: 7.91

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:20	50	7.91	--	--	--	--	--	--	--	--
10:25	50	9.31	1.40	NR	NR	NR	NR	NR	NR	Cloudy, Brown
10:45	50	10.94	3.03	NR	NR	NR	NR	NR	NR	Cloudy, Brown
10:51	50	11.04	3.13	7.02	8.63	0.697	-77	2.16	91.7	Cloudy, Brown
10:56	50	11.15	3.24	6.93	8.59	0.690	-88	1.57	79.2	Cloudy, Brown
11:01	50	11.20	3.29	6.90	8.62	0.694	-94	1.45	76.9	Cloudy, Brown
11:06	50	11.21	3.30	6.88	8.64	0.695	-97	1.35	72.3	Cloudy, Brown

Notes:

-Drawdown > 0.3 ft. Cannot operate pump any slower.

Sample ID: 11:07 W-181011-SR-32

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 11, 2018
 Personnel: Kai Kasprick
Melissa Hackenmueller

Monitoring Well Data:

Well No.: LW-3
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 21.02

Screen Length (ft): 5.00
 Midscreen Depth (ft BTOC): 18.52
 Well Diameter, D (in): 2
 Static Water Level: 9.00

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
9:23	200	9.00	--	--	--	--	--	--	--	--
9:32	200	9.21	0.21	7.02	12.06	1.43	-141	0.88	11.2	Some Black Sediment
9:37	200	9.21	0.21	7.04	12.12	1.43	-149	0.72	7.2	Trace Black Sediment
9:40	200	9.20	0.20	7.05	12.14	1.41	-151	0.66	9.6	Clear
9:43	200	9.20	0.20	7.05	12.06	1.41	-152	0.61	6.8	Clear
9:46	150	9.17	0.17	7.04	12.13	1.41	-151	0.56	6.7	Clear
9:49	150	9.17	0.17	7.04	12.04	1.41	-150	0.55	6.0	Clear
9:52	150	9.17	0.17	7.03	11.91	1.41	-149	0.53	6.5	Clear
9:59	150	9.17	0.17	7.02	11.74	1.41	-149	0.49	6.2	Clear

Notes:

- Temperature destabilized due to change in flow and ambient air temperature.
- Sample collected because all other parameters are stable.

Sample ID: 10:05 W-181011-SR-31

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 11, 2018
 Personnel: Kai Kasprick
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-1D
 Measurement Point: Top of Casing
 Well Depth (ft BTOC): 106.61

Screen Length (ft): 10
 Midscreen Depth (ft BTOC): 101.61
 Well Diameter, D (in): 2
 Static Water Level: 50.18

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:40	500	50.18	--	--	--	--	--	--	--	--
11:51	500	50.32	0.14	7.65	9.51	0.594	-223	12.45	14.8	Clear
12:00	500	50.38	0.20	7.71	9.64	0.612	-214	6.01	6.5	Clear
12:03	500	50.41	0.23	7.57	9.79	0.625	-206	5.74	4.7	Clear
12:06	500	50.41	0.23	7.47	9.63	0.643	-192	4.61	2.2	Clear
12:11	500	50.40	0.22	7.49	9.59	0.646	-190	4.22	1.5	Clear
12:14	500	50.44	0.26	7.40	9.70	0.647	-187	4.10	1.1	Clear
12:17	500	50.38	0.20	7.56	9.59	0.648	-196	4.03	0.9	Clear
12:20	500	50.41	0.23	7.47	9.55	0.648	-189	3.77	0.7	Clear
12:23	500 *	50.39	0.21	7.54	9.64	0.648	-194	NR	0.7	Clear

Notes:

* Flow rate was reduced to 250 mL/min prior to sampling.

Sample ID: 12:24 W-181011-SR-37

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING**Project Data:**

Project Name: Highway 96
Ref. No.: 002012-01-050

Date: October 11, 2018
Personnel: Kai Kasprick
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW1S
Measurement Point: Top of Casing
Well Depth (ft BTOC): 25.4

Screen Length (ft): 10
Midscreen Depth (ft BTOC): 20.4
Well Diameter, D (in): 2
Static Water Level: 16.38

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:40	NR	16.72	--	--	--	--	--	--	--	--
11:22	Min	19.82	3.10	6.19	6.54	0.997	105	4.10	16.7	NR
11:32	Min	19.05	2.33	7.21	6.41	0.986	-129	0.00	16.9	NR
11:42	Min	18.49	1.77	7.31	6.37	0.978	-126	0.00	15.3	NR
11:47	Min	18.35	1.63	7.32	6.35	0.982	-125	0.00	13.5	NR
11:52	Min	18.27	1.55	7.32	6.34	0.951	-123	0.00	14.7	NR

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 11:58 W-181011-SR-36 (MS/MSD)

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 11, 2018
 Personnel: Kai Kasprick
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-4D
 Measurement Point: Top of Casing
 Well Depth (ft BTOC): 90.23

Screen Length (ft): 10
 Midscreen Depth (ft BTOC): 85.23
 Well Diameter, D (in): 2
 Static Water Level: 39.44

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
13:20	50	39.44	--	--	--	--	--	--	--	--
13:35	50	45.95	6.51	7.39	8.18	0.757	-147	1.11	26.6	Clear
13:45	0	44.55	5.11	7.25	7.57	0.000	-127	11.64	97.2	Clear
13:55	50	45.91	6.47	7.35	8.11	1.480	-163	0.52	35.1	Clear
14:00	0	46.72	7.28	6.85	NR	0.000	NR	NR	NR	Clear
14:15	50	48.72	9.28	7.35	7.86	1.500	-159	0.98	37.6	Clear
14:20	50	50.58	11.14	7.45	7.97	1.510	-176	0.37	40.2	Clear
14:25	50	51.33	11.89	7.42	7.98	1.510	-178	1.11	36.3	Clear
14:30	50	52.70	13.26	7.41	8.05	1.510	-182	0.54	35.7	Clear

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- DO not stabilized after 1 hour of purging.
- Sample collected because all other parameters are stable.

Sample ID: 14:33 W-181011-SR-39

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name:	Highway 96
Ref. No.:	002012-01-050

Date: October 10, 2018
 Personnel: Steven Roste
 Kai Kasprick

Monitoring Well Data:

Well No.:	MW-4S
Measurement Point:	Top of Casing
Well Depth (ft BTOC):	47.88

Screen Length (ft):	10
Midscreen Depth (ft BTOC):	42.88
Well Diameter, D (in):	2
Static Water Level:	33.73

Time (hh:mm)	Flow Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level (ft)		pH	Temperature (°C)	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Observations
3 - 5	≤ 500		≤ 0.3		± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	

[illegible]

Notes:

- Well pumped dry after ~1.0 gallon. Allowed to recharge overnight.
- Sample collected 10/11/18

Sample ID:	14:15	W-181011-SR-38
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VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Steven Roste
Kai Kasprick

Monitoring Well Data:

Well No.: MW-4U
 Measurement Point: Top of Casing
 Well Depth (ft BTOC): 27.56

Screen Length (ft): 5
 Midscreen Depth (ft BTOC): 25.06
 Well Diameter, D (in): 2
 Static Water Level: 24.35

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:10	500	24.35	--	--	--	--	--	--	--	--
11:13	500	25.33	0.98	7.56	9.94	1.220	-140	0.00	4.8	Clear
11:16	0	NR	NR	NR	NR	NR	NR	NR	NR	NR
11:19	200	25.19	0.84	7.24	9.87	1.230	-135	0.00	9.2	Clear
11:22	200	25.28	0.93	7.19	9.82	1.230	-134	0.00	7.1	Clear
11:25	200	25.37	1.02	7.16	9.83	1.230	-133	0.00	5.0	Clear

Notes:

-Drawdown > 0.3 ft. Cannot operate pump any slower.

Sample ID: 11:27 W-181010-SR-34

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Steven Roste
Kai Kasprick

Monitoring Well Data:

Well No.: MW-8B
 Measurement Point: Top of Casing
 Well Depth (ft BTOC): 134.61

Screen Length (ft): 10
 Midscreen Depth (ft BTOC): 129.61
 Well Diameter, D (in): 4
 Static Water Level: 41.09

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:50	500	41.09	--	--	--	--	--	--	--	--
10:54	500	41.29	0.20	7.95	9.31	0.710	-273	0.00	2.1	Slightly Cloudy, Brown
10:58	500	41.29	0.20	7.96	9.40	0.712	-277	0.00	1.8	Slightly Cloudy, Brown
11:02	500	41.29	0.20	7.95	9.49	0.712	-275	0.00	1.4	Slightly Cloudy, Brown
11:06	500	41.29	0.20	7.95	9.55	0.712	-276	0.00	1.4	Slightly Cloudy, Brown
11:10	500 *	41.29	0.20	7.96	9.59	0.713	-279	0.00	1.3	Slightly Cloudy, Brown

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 11:10 W-181010-SR-33

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kai Kasprick
Steven Roste

Monitoring Well Data:

Well No.: MW-10B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 182.94

Screen Length (ft): 10 + tailpiece (5 ft)
 Midscreen Depth (ft BTOC): 177.94
 Well Diameter, D (in): 5
 Static Water Level: 36.84

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
13:05	500	36.84	--	--	--	--	--	--	--	--
13:10	500	36.90	0.06	7.34	9.97	0.644	-151	0.00	1.6	Cloudy, Gray
13:15	500	36.90	0.06	7.32	10.04	0.644	-155	0.00	1.5	Cloudy, Gray
13:20	500	36.87	0.03	7.31	10.09	0.644	-157	0.00	1.6	Cloudy, Gray
13:25	500 *	36.85	0.01	7.31	10.08	0.643	-157	0.00	1.5	Cloudy, Gray

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 13:27 W-181010-SR-35

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name:	Highway 96
Ref. No.:	002012-01-050

Date: _____
Personnel: _____

Monitoring Well Data:

Well No.:	MW-10D
Measurement Point:	Top of Casing
Well Depth (ft BTOC):	62

Screen Length (ft):	5
Midscreen Depth (ft BTOC):	60
Well Diameter, D (in):	2
Static Water Level:	

Time (hh:mm)	Flow Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level (ft)		pH	Temperature (°C)	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Observations
3 - 5	≤ 500		≤ 0.3		± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	

[illegible]

Notes:

-Not Sampled (obstruction in well)

Sample ID:

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name:	Highway 96
Ref. No.:	002012-01-050

Date: _____
 Personnel: _____

Monitoring Well Data:

Well No.:	MW-11D
Measurement Point:	Top of Casing (TOC)
Well Depth (ft BTOC):	63

Screen Length (ft):	5
Midscreen Depth (ft BTOC):	60
Well Diameter, D (in):	2
Static Water Level:	

Time (hh:mm)	Flow Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level (ft)	pH	Temperature (°C)	Conductivity (mS/cm)	Water Quality Parameters			Observations
							ORP (mV)	DO (mg/L)	Turbidity (NTU)	
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	

[illegible]

Notes:

-Not Sampled (inaccessible - deep water in wetland)

Sample ID:

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkins
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-12B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 165.69

Screen Length (ft): 20
 Midscreen Depth (ft BTOC): 155.69
 Well Diameter, D (in): 4
 Static Water Level: 40.01

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:32	250	40.01	--	--	--	--	--	--	--	--
11:49	250	40.29	0.28	7.17	10.86	0.570	-186	0.75	10.8	Clear
11:52	250	40.23	0.22	7.15	10.88	0.570	-190	0.96	9.2	Clear
11:56	250	40.23	0.22	7.19	10.89	0.570	-194	1.35	7.7	Clear
12:02	250	40.23	0.22	7.25	10.90	0.570	-199	2.24	6.2	Clear
12:05	250	40.23	0.22	7.27	10.92	0.570	-200	NR	5.4	Clear
12:08	250	40.23	0.22	7.30	10.91	0.570	-200	2.91	5.2	Clear
12:11	250	NR		7.32	10.92	0.569	-200	2.88	5.2	Clear
12:14	250	NR		7.33	10.93	0.569	-198	2.86	4.5	Clear

Notes:

Sample ID: 12:15 W-181010-SR-26

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkins
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-12D
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 92.92

Screen Length (ft): 20
 Midscreen Depth (ft BTOC): 82.92
 Well Diameter, D (in): 2
 Static Water Level: 34.69

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:15	75	34.69	--	--	--	--	--	--	--	--
11:37	50	37.38	2.69	7.09	10.70	0.872	-152	0.71	60.0	Clear
11:43	50	36.89	2.20	7.08	10.70	0.870	-154	0.42	49.8	Clear
11:46	50	36.91	2.22	7.08	10.75	0.868	-155	0.38	46.4	Clear
11:50	50	36.54	1.85	7.08	10.69	0.867	-156	0.33	43.5	Clear
11:54	50	36.64	1.95	7.08	10.76	0.867	-157	0.33	41.6	Clear
11:57	50	36.63	1.94	7.09	10.73	0.866	-157	0.29	42.0	Clear

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 12:00 W-181010-SR-25

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkins
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-13B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 148.24

Screen Length (ft): 20
 Midscreen Depth (ft BTOC): 138.24
 Well Diameter, D (in): 4
 Static Water Level: 38.59

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:18	150	38.59	--	--	--	--	--	--	--	--
10:29	150	38.67	0.08	7.31	10.57	0.602	-183	14.30	52.3	Clear
10:34	200	38.70	0.11	7.34	10.65	0.600	-188	5.58	48.6	Clear
10:39	200	38.70	0.11	7.39	10.80	0.599	-193	4.90	48.4	Clear
10:43	200	38.70	0.11	7.41	10.78	0.598	-195	4.28	44.5	Clear
10:50	500	38.75	0.16	7.48	10.83	0.595	-202	3.97	35.2	Clear
10:53	500	38.75	0.16	7.52	10.79	0.595	-203	3.85	30.0	Clear
10:56	500	38.75	0.16	7.52	10.79	0.595	-203	3.72	23.0	Clear
10:59	500	38.75	0.16	7.51	10.80	0.596	-203	3.62	16.6	Clear
11:02	500	NR		7.51	10.79	0.596	-203	3.51	13.8	Clear
11:05	500	NR		7.51	10.80	0.596	-203	3.46	12.0	Clear
11:09	500	NR		NR	NR	NR	NR	NR	10.3	Clear
11:12	500	NR		NR	NR	NR	NR	NR	8.4	Clear
11:15	500	NR		NR	NR	NR	NR	NR	6.4	Clear
11:18	500	NR		NR	NR	NR	NR	NR	5.8	Clear

Notes:

- Turbidity > 5 NTU after 1 hour of purging.
- Sample collected because all other parameters are stable.

Sample ID: 11:19 W-181010-SR-24

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkins
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-13D
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 84.86

Screen Length (ft): 20
 Midscreen Depth (ft BTOC): 74.86
 Well Diameter, D (in): 2
 Static Water Level: 34.18

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:20	50	32.05	--	--	--	--	--	--	--	--
10:33	50	38.64	6.59	8.08	10.77	0.726	-227	0.92	8.9	Clear
10:36	50	38.91	6.86	8.08	10.88	0.726	-227	0.75	8.8	Clear
10:40	50	38.80	6.75	8.08	10.85	0.726	-224	0.67	8.6	Clear
10:47	50	38.74	6.69	8.06	10.91	0.723	-220	0.57	9.2	Clear

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 10:50 W-181010-SR-21
10:52 W-181010-SR-22 (FD)
 VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkins
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-16B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 162.61

Screen Length (ft): 10
 Midscreen Depth (ft BTOC): 157.61
 Well Diameter, D (in): 2
 Static Water Level: 40.51

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
13:08	200	40.51	--	--	--	--	--	--	--	--
13:35	200	40.85	0.34	7.40	10.94	0.640	-184	3.36	26.7	Clear
13:38	100	40.67	0.16	7.74	10.98	0.641	-201	3.36	20.5	Clear
13:43	100	40.67	0.16	7.60	11.06	0.640	-194	3.23	17.0	Clear
13:48	100	40.69	0.18	7.58	11.05	0.640	-192	3.12	12.7	Clear
13:53	150	40.74	0.23	7.55	11.05	0.640	-191	3.01	14.7	Clear
13:57	150	40.74	0.23	7.51	10.99	0.640	-190	3.09	11.7	Clear
14:00	150	40.72	0.21	7.54	11.02	0.640	-190	3.08	11.0	Clear
14:03	150	40.70	0.19	7.59	11.05	0.640	-194	3.07	10.0	Clear
14:06	150	40.70	0.19	7.59	11.07	0.641	-193	NR	7.9	Clear
14:11	150	40.69	0.18	7.60	11.07	0.641	-193	3.29	7.5	Clear
14:14	150	40.68	0.17	7.63	11.08	0.640	-195	3.14	7.4	Clear

Notes:

- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 14:17 W-181010-SR-27

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkins
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-16D
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 82.50

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 77.50
 Well Diameter, D (in): 2
 Static Water Level: 40.26

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
13:30	50	41.10	--	--	--	--	--	--	--	--
13:40	50	45.41	4.31	7.28	11.12	0.835	-201	0.43	49.5	Clear, Some Sediment
13:45	50	46.61	5.51	7.31	11.06	0.828	-204	0.37	37.8	Clear
13:49	50	46.83	5.73	7.33	11.20	0.820	-206	0.31	37.4	Clear
13:55	50	47.11	6.01	7.34	11.21	0.813	-205	0.31	42.2	Clear
13:58	50	47.16	6.06	7.32	11.25	0.809	-202	0.29	47.9	Clear
14:01	50	47.01	5.91	7.31	11.27	0.808	-198	0.24	42.7	Clear
14:08	50	47.28	6.18	NR	NR	NR	NR	NR	51.2	Clear
14:12	50	47.14	6.04	NR	NR	NR	NR	NR	47.8	Clear
14:20	50	47.50	6.40	NR	NR	NR	NR	NR	43.4	NR
14:29	50	NR		NR	NR	NR	NR	NR	23.9	NR
14:33	50	NR		NR	NR	NR	NR	NR	47.0	NR

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

12:02 W-181010-SR-23 (RB)
 Sample ID: 14:35 W-181010-SR-28

VOCs (8260C) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Steven Roste
Kai Kasprick

Monitoring Well Data:

Well No.: MW-17A
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 106.98

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 101.98
 Well Diameter, D (in): 2
 Static Water Level: 17.26

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:38	500	17.26	--	--	--	--	--	--	--	--
11:44	500	17.41	0.15	9.52	10.13	0.829	-279	5.26	3.0	Clear
11:47	500	17.45	0.19	9.01	10.09	0.853	-263	3.39	1.4	Clear
11:50	500	17.45	0.19	8.78	10.03	0.870	-259	5.04	1.1	Clear
11:53	500	17.45	0.19	8.59	10.03	0.875	-255	3.56	1.0	Clear
11:56	500	17.45	0.19	8.49	10.02	0.877	-256	1.48	1.1	Clear
11:59	500	17.42	0.16	8.37	10.00	0.878	-254	0.47	1.3	Clear
12:02	500	17.40	0.14	8.30	10.01	0.879	-254	0.00	1.5	Clear
12:05	500 *	17.40	0.14	8.27	10.03	0.880	-252	0.00	1.7	Clear

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 12:07 W-181009-SR-15

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Steven Roste
Kai Kasprick

Monitoring Well Data:

Well No.: MW-17B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 191.90

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 186.90
 Well Diameter, D (in): 2
 Static Water Level: 21.46

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
12:30	500	21.46	--	--	--	--	--	--	--	--
12:35	500	25.30	3.84	8.06	10.05	0.475	-41	0.00	7.1	Slightly Cloudy, Brown
12:40	500	24.92	3.46	8.67	10.28	0.572	-246	0.00	15.8	Slightly Cloudy, Brown
12:45	500	24.88	3.42	8.35	10.43	0.611	-274	0.00	9.5	Slightly Cloudy, Brown
12:50	500	24.88	3.42	8.20	10.52	0.638	-273	0.00	5.1	Slightly Cloudy, Brown
12:55	500	24.88	3.42	8.16	10.53	0.645	-271	0.00	5.0	Slightly Cloudy, Brown
13:00	500 *	24.88	3.42	8.12	10.56	0.646	-271	0.00	5.2	Slightly Cloudy, Brown

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 13:00 W-181009-SR-17

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Steven Roste
Kai Kasprick

Monitoring Well Data:

Well No.: MW-17L
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 291.95

Screen Length (ft): 40.00
 Midscreen Depth (ft BTOC): 271.95
 Well Diameter, D (in): 4
 Static Water Level: 27.50

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:43	500	27.50	--	--	--	--	--	--	--	--
11:48	500	27.55	0.05	9.33	9.76	0.253	-35	0.00	2.4	Cloudy, Dark Gray
11:52	500	27.57	0.07	8.85	9.75	0.359	-225	0.00	2.4	Cloudy, Dark Gray
11:56	500	27.57	0.07	7.72	9.79	0.513	-192	0.00	2.3	Cloudy, Dark Gray
12:00	500	27.54	0.04	7.47	9.81	0.549	-158	0.00	2.4	Cloudy, Dark Gray
12:04	500	27.54	0.04	7.43	9.82	0.558	-146	0.00	2.3	Cloudy, Dark Gray
12:08	500	27.53	0.03	7.43	9.82	0.561	-139	0.00	2.3	Cloudy, Dark Gray
12:12	500 *	27.51	0.01	7.43	9.82	0.562	-139	0.00	2.2	Cloudy, Dark Gray

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 12:12 W-181009-SR-16

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
Ref. No.: 002012-01-050

Date: October 9, 2018
Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW18A
Measurement Point: Top of Casing (TOC)
Well Depth (ft BTOC): 115.89

Screen Length (ft): 10.00
Midscreen Depth (ft BTOC): 110.89
Well Diameter, D (in): 2
Static Water Level: 32.25

Time (hh:mm)	Flow Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level (ft)	pH	Temperature (°C)	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Observations
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
14:36	125	32.25	--	--	--	--	--	--	--	--
14:45	125	32.38	0.13	7.60	10.69	0.814	-225	3.30	21.0	Clear
14:48	125	32.46	0.21	7.48	10.76	0.813	-221	3.45	8.4	Clear
14:52	125	32.51	0.26	7.39	10.82	0.813	-212	3.33	6.9	Clear
14:56	100	32.45	0.20	7.37	10.84	0.813	-209	3.35	5.7	Clear
15:00	100	32.48	0.23	7.37	10.85	0.813	-206	3.34	6.3	Clear

Notes:

- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

12:13 W-181009-SR-06 (RB)
Sample ID: 15:04 W-181009-SR-09
15:06 W-181009-SR-10 (FD)
VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW18B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 196.04

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 191.04
 Well Diameter, D (in): 2
 Static Water Level: 35.07

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
14:33	75	35.07	--	--	--	--	--	--	--	--
14:43	75	36.36	1.29	7.83	10.07	0.654	-227	0.57	123	Slightly Cloudy
14:46	75	36.32	1.25	7.91	10.14	0.660	-230	0.46	135	Slightly Cloudy
14:55	75	36.21	1.14	7.83	10.01	0.664	-202	0.48	224	Slightly Cloudy
14:58	75	36.18	1.11	7.86	9.98	0.644	-211	0.38	200	Slightly Cloudy
15:03	75	36.21	1.14	7.90	9.96	0.650	-225	0.29	173	Slightly Cloudy
15:06	75	36.22	1.15	7.91	9.94	0.652	-226	0.28	162	Slightly Cloudy
15:09	75	36.19	1.12	7.89	9.99	0.652	-226	0.26	156	Slightly Cloudy

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 15:12 W-181009-SR-11

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW18L
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 281.14

Screen Length (ft): 18.00
 Midscreen Depth (ft BTOC): 272.14
 Well Diameter, D (in): 4
 Static Water Level: 40.43

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
9:00	500	40.43	--	--	--	--	--	--	--	--
9:10	500	40.05	-0.38	7.17	10.75	0.512	-154	6.21	7.2	Clear
9:14	500	40.05	-0.38	6.99	10.82	0.549	-121	2.62	3.0	Clear
9:18	500	40.05	-0.38	6.98	10.79	0.551	-114	2.00	6.2	Clear
9:21	500	40.05	-0.38	7.00	10.77	0.551	-111	1.72	4.8	Clear
9:24	500 *	40.05	-0.38	7.02	10.77	0.551	-109	1.53	4.4	Clear

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 9:32 W-181010-SR-12 (MS/MSD)

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-19A
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 131.96

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 126.96
 Well Diameter, D (in): 2
 Static Water Level: 23.66

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
9:22	500	23.66	--	--	--	--	--	--	--	--
9:42	500	25.03	1.37	7.73	10.15	0.783	-214	0.84	1.5	Clear
9:47	500	24.83	1.17	7.63	10.04	0.784	-219	0.60	1.1	Clear
9:50	500	24.82	1.16	7.62	10.02	0.784	-220	0.57	1.1	Clear
9:53	500	24.84	1.18	7.61	9.98	0.785	-221	0.49	0.9	Clear
9:57	500	24.49	0.83	7.63	9.98	0.784	-223	0.55	1.7	Clear
10:00	150	24.13	0.47	7.63	10.03	0.784	-223	0.48	1.8	Clear
10:03	150	23.98	0.32	7.63	10.09	0.784	-222	0.44	1.9	Clear
10:06	150	24.00	0.34	7.62	10.11	0.783	-222	0.39	1.8	Clear
10:09	150	23.95	0.29	7.62	10.11	0.783	-221	NR	1.6	Clear

Notes:

Sample ID: 10:10 W-181009-SR-03

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-19B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 201.33

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 196.33
 Well Diameter, D (in): 2
 Static Water Level: 27.68

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:36	125	27.68	--	--	--	--	--	--	--	--
10:51	125	28.20	0.52	10.85	10.03	NR	-168	0.32	15.2	Clear
10:54	125	28.20	0.52	10.82	10.06	0.228	-170	0.29	14.0	Clear
10:57	125	28.21	0.53	10.77	10.05	0.228	-169	0.27	13.9	Clear
11:00	125	28.21	0.53	10.71	10.04	0.228	-169	0.26	15.3	Clear
11:03	125	28.21	0.53	10.62	10.05	0.231	-166	0.24	14.8	Clear
11:06	125	28.21	0.53	10.47	10.06	0.235	-163	0.23	14.1	Clear
11:09	125	28.20	0.52	10.22	10.06	0.259	-153	0.21	13.1	Clear
11:12	125	28.20	0.52	9.21	10.04	0.455	-243	NR	10.2	Clear
11:15	125	28.20	0.52	8.32	10.07	0.547	-217	0.23	9.1	Clear
11:19	125	28.20	0.52	7.85	10.08	0.589	-195	0.22	9.2	Clear
11:22	125	28.22	0.54	7.68	10.09	0.601	-188	0.21	9.4	Clear
11:25	125	28.21	0.53	7.62	10.08	0.602	-187	0.21	10.2	Clear
11:28	125	28.22	0.54	7.60	10.09	0.598	-187	0.20	10.8	Clear

Notes:

- Drawdown > 0.3 ft. Cannot operate pump any slower.
- Turbidity is > 5 NTU. Cannot operate pump any slower.
- Sample collected because all other parameters are stable.

Sample ID: 11:30 W-181009-SR-04

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-19L
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 269.28

Screen Length (ft): 12.00
 Midscreen Depth (ft BTOC): 263.28
 Well Diameter, D (in): 4
 Static Water Level: 31.61

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
9:37	500	31.61	--	--	--	--	--	--	--	--
9:45	500	31.61	0.00	7.29	10.64	0.506	-167	4.01	8.0	Clear
9:48	500	31.61	0.00	6.89	10.46	0.512	-145	3.11	4.7	Clear
9:51	500	31.61	0.00	6.86	10.41	0.513	-139	2.47	4.1	Clear
9:56	500	31.64	0.03	7.01	10.16	0.514	-137	1.48	3.7	Clear
9:59	500	31.64	0.03	7.09	10.34	0.514	-135	1.04	3.8	Clear
10:02	500	31.62	0.01	7.15	10.30	0.517	-132	0.65	2.9	Clear
10:05	200	31.62	0.01	7.18	10.40	0.516	-130	0.29	2.8	Clear
10:08	200	31.62	0.01	7.01	10.46	0.516	-119	0.14	2.5	Clear
10:12	200	31.63	0.02	6.94	10.49	0.516	-113	NR	2.4	Clear
10:15	200	31.63	0.02	6.94	10.40	0.513	-112	0.13	2.4	Clear

Notes:

Sample ID: 10:16 W-181009-SR-01
10:18 W-181009-SR-02 (FD)
VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW20B
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 202.84

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 197.84
 Well Diameter, D (in): 2
 Static Water Level: 28.83

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
13:05	75	28.83	--	--	--	--	--	--	--	--
13:21	75	31.39	2.56	6.96	10.17	0.599	-142	5.54	1.4	Clear
13:24	75	31.43	2.60	6.97	10.20	0.598	-144	4.97	1.1	Clear
13:28	75	31.42	2.59	6.99	10.23	0.598	-146	4.44	1.2	Clear
13:31	75	31.44	2.61	7.01	10.25	0.597	-147	4.15	1.1	Clear
13:34	75	31.44	2.61	7.03	10.25	0.597	-149	3.90	0.8	Clear
13:37	75	31.44	2.61	7.05	10.26	0.597	-150	3.71	1.4	Clear

Notes:

-Drawdown > 0.3 ft. Cannot operate pump any slower.

Sample ID: 13:38 W-181009-SR-08

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Kiel Jenkin
Melissa Hackenmueller

Monitoring Well Data:

Well No.: MW-21A
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 132.13

Screen Length (ft): 10.00
 Midscreen Depth (ft BTOC): 127.13
 Well Diameter, D (in): 2
 Static Water Level: 18.96

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
11:25	100	18.96	--	--	--	--	--	--	--	--
11:49	100	19.20	0.24	7.55	9.62	0.561	-195	14.18	4.4	Clear
11:54	100	19.15	0.19	7.57	9.65	0.560	-196	5.10	1.8	Clear
11:57	100	19.15	0.19	7.67	9.66	0.560	-199	4.38	4.0	Clear
12:00	100	19.17	0.21	7.58	9.65	0.561	-195	3.99	3.4	Clear
12:03	100	19.20	0.24	7.53	9.66	0.561	-193	3.61	1.5	Clear
12:06	100	19.24	0.28	7.55	9.66	0.561	-194	3.43	1.0	Clear
12:09	100	19.24	0.28	7.57	9.66	0.562	-196	3.35	2.1	Clear

Notes:

Sample ID: 12:11 W-181009-SR-05

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name:	Highway 96
Ref. No.:	002012-01-050

Date: October 11, 2018
 Personnel: Kai Kasprick
Melissa Hackenmueller

Monitoring Well Data:

Well No.:	SUMP
Measurement Point:	Top of Casing (TOC)
Well Depth (ft BTOC):	42.71

Screen Length (ft):	9.00
Midscreen Depth (ft BTOC):	N/A (GRAB)
Well Diameter, D (in):	8
Static Water Level:	NR

[illegible]

Notes:

GRAB SAMPLE

-Purged sample port for 2 minutes prior to sample.

Sample ID:	15:08	W-181011-SR-41
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VOCs (8260C), Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Steven Roste
Kai Kasprick

Residential Well Data:

Well No.: 1 Lily Pond Road
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 221.18

Screen Length (ft): 50.00
 Midscreen Depth (ft BTOC): 196.18
 Well Diameter, D (in): 5
 Static Water Level: 33.30

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
14:35	500	33.30	--	--	--	--	--	--	--	--
14:40	500	33.30	0.00	7.45	9.82	0.714	-217	0.00	1.2	Clear
14:45	500	33.25	-0.05	7.44	9.99	0.714	-213	0.00	1.0	Clear
14:50	500 *	33.20	-0.10	7.43	9.99	0.714	-211	0.00	1.0	Clear

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 14:50 W-181009-SR-18

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Steven Roste
Kai Kasprick

Residential Well Data:

Well No.: 11 Lily Pond Road
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 210.54

Screen Length (ft): 35.00
 Midscreen Depth (ft BTOC): 193.04
 Well Diameter, D (in): 4
 Static Water Level: 36.22

<i>Time</i> <i>(hh:mm)</i>	<i>Flow</i> <i>Rate</i> <i>(mL/min)</i>	<i>Depth to</i> <i>Water</i> <i>(ft)</i>	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> <i>(ft)</i>	<i>pH</i>	<i>Temperature</i> <i>(°C)</i>	<i>Conductivity</i> <i>(mS/cm)</i>	<i>ORP</i> <i>(mV)</i>	<i>DO</i> <i>(mg/L)</i>	<i>Turbidity</i> <i>(NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:00	500	36.22	--	--	--	--	--	--	--	--
10:04	500	36.34	0.12	7.23	10.45	0.612	-150	0.00	2.2	Clear
10:08	500	36.44	0.22	7.20	10.42	0.602	-153	0.00	0.9	Clear
10:12	500	36.54	0.32	7.18	10.40	0.600	-154	0.00	0.6	Clear
10:16	500 *	36.60	0.38	7.16	10.44	0.596	-155	0.00	0.4	Clear

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 10:16 W-181009-SR-13

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 9, 2018
 Personnel: Steven Roste
Kai Kasprick

Monitoring Well Data:

Well No.: 11 Robb Farm Road
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 233.63

Screen Length (ft): 48.00
 Midscreen Depth (ft BTOC): 209.63
 Well Diameter, D (in): 4
 Static Water Level: 44.73

<i>Time (hh:mm)</i>	<i>Flow Rate (mL/min)</i>	<i>Depth to Water (ft)</i>	<i>Drawdown from Initial Water Level (ft)</i>	<i>pH</i>	<i>Temperature (°C)</i>	<i>Conductivity (mS/cm)</i>	<i>ORP (mV)</i>	<i>DO (mg/L)</i>	<i>Turbidity (NTU)</i>	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
10:50	500	44.73	--	--	--	--	--	--	--	--
10:54	500	44.75	0.02	7.41	10.12	0.585	-198	0.00	5.4	Cloudy, Dark
10:58	500	44.76	0.03	7.36	10.31	0.597	-190	0.00	7.8	Cloudy, Dark
11:02	500*	44.77	0.04	7.35	10.41	0.605	-187	0.00	7.6	Cloudy, Dark

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 11:02 W-181009-SR-14

VOCs (524.2) and Chloride (300.0A)

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: Highway 96
 Ref. No.: 002012-01-050

Date: October 10, 2018
 Personnel: Kai Kasprick
Steven Roste

Monitoring Well Data:

Well No.: 6 Blue Goose Road
 Measurement Point: Top of Casing (TOC)
 Well Depth (ft BTOC): 232.15

Screen Length (ft): 36.00
 Midscreen Depth (ft BTOC): 214.15
 Well Diameter, D (in): 4
 Static Water Level: 59.40

<i>Time</i> (hh:mm)	<i>Flow</i> <i>Rate</i> (mL/min)	<i>Depth to</i> <i>Water</i> (ft)	<i>Drawdown</i> <i>from Initial</i> <i>Water Level</i> (ft)	<i>pH</i>	<i>Temperature</i> (°C)	<i>Conductivity</i> (mS/cm)	<i>ORP</i> (mV)	<i>DO</i> (mg/L)	<i>Turbidity</i> (NTU)	<i>Observations</i>
3 - 5	≤ 500		≤ 0.3	± 0.1	± 0.1	± 5%	± 20	± 0.5	≤ 5; ± 10%	
9:26	500	59.40	--	--	--	--	--	--	--	--
9:30	500	59.63	0.23	9.42	10.88	0.244	1	0.00	3.5	Slightly Cloudy, Gray
9:34	500	59.63	0.23	9.04	9.97	0.286	-257	0.00	4.2	Slightly Cloudy, Gray
9:38	500	59.63	0.23	8.74	9.85	0.344	-306	0.00	3.3	Slightly Cloudy, Gray
9:42	500	59.63	0.23	8.18	9.82	0.408	-258	0.00	3.1	Slightly Cloudy, Gray
9:46	500	59.63	0.23	7.71	9.83	0.459	-211	0.00	3.0	Slightly Cloudy, Gray
9:50	500	59.63	0.23	7.49	9.85	0.486	-198	0.00	2.9	Slightly Cloudy, Gray
9:54	500	59.63	0.23	7.41	9.75	0.500	-191	0.00	2.8	Slightly Cloudy, Gray
9:58	500	59.63	0.23	7.35	9.72	0.515	-186	0.00	2.8	Slightly Cloudy, Gray
10:02	500 *	59.63	0.23	7.31	9.74	0.525	-183	0.00	2.8	Slightly Cloudy, Gray

Notes:

* Flow rate was reduced to < 250 mL/min prior to sampling.

Sample ID: 10:02 W-181010-SR-19

VOCs (524.2) and Chloride (300.0A)

Appendix D

Documentation of Site Cleanup Levels

Appendix D.1

Amended Table 1 of 1993 MDD

AMENDED TABLE 1		October 10, 1994	
HIGHWAY 96 DUMP		GROUNDWATER CLEANUP LEVELS	
		HRL(2)	MCL(3)
		ug/l	ug/l
MATRIX/COMPOUND	CARC. (1)		LEVEL
			ug/l
METALS			
Barium		2000	2000
Beryllium	c	0.08	0.08
Cadmium		4	4
Chromium VI		100	100
Chromium III		20000	20000
Copper		1000	1300
Manganese		100	100
Mercury		2	2
Thallium		0.6	0.6
Zinc		2000	5000
VOLATILE ORGANICS			
Acetone		700	700
Benzene	c	10	5
Bromodichloromethane	c	6	100
Bromoform	c	40	100
Bromomethane		10	10
Carbon Tetrachloride	c	3	5
Chlorobenzene		100	100
Chloroform	c	60	100
Dibromochloromethane		10	10
Dichlorodifluoromethane		1000	1000
1,1-Dichloroethane		70	70
1,2-Dichloroethane	c	4	5
1,1-Dichloroethene		6	7
1,2-Dichloroethene, trans		100	100
1,2-Dichloroethene, cis		70	70
1,2-Dichloropropane	c	5	5
1,3-Dichloropropene (cis-, trans-, mix)	c	2	2
Ethylbenzene		700	700
Ethyl Ether		1000	1000
Isopropylbenzene (cumene)		300	300
Methyl Ethyl Ketone (MEK, 2-butanone)		4000	4000
Methyl Isobutyl Ketone (MIBK)		300	300
Methylene Chloride (Dichloromethane)	c	50	5
1,1,1,2-Tetrachloroethane	c	70	70
1,1,2,2-Tetrachloroethane	c	2	2
1,1,2,2-Tetrachloroethene	c	7	5
Toluene		1000	1000
1,2,4-Trichlorobenzene			70
1,1,1-Trichloroethane		600	200
1,1,2-Trichloroethane		3	5
1,1,2-Trichloroethene (TCE)	c	30	5
Trichlorofluoromethane		2,000	2000
1,1,2-Trichloro-1,2,2-trifluoroethane		200000	200,000
Vinyl Chloride	c	0.2	2*
Xylenes (total)		10000	10000
SEMI-VOLATILE ORGANICS			
PAHs (total carcinogenic) (6)	c	0.03	0.03
NOTES:			
* - The clean-up level for vinyl chloride was adjusted for Site specific reasons. It is not MCL based.			
(1) Carcinogenicity - A "c" denotes a potential carcinogen.			
(2) HRL - Health Risk Limit established by the MN Department of Health.			
(3) MCL - Federal Maximum Contaminant Level			

Appendix D.2

Excerpts from 2008 MDD Amendment

MINNESOTA DECISION DOCUMENT AMENDMENT

1.0 INTRODUCTION

1.1 Statement of Purpose

This Minnesota Decision Document (MDD) Amendment to the 1993 MDD presents the selected remedial action and cleanup levels for the Highway 96 Dump Superfund site (Highway 96 Site), and summarizes the facts and determinations made by the Minnesota Pollution Control Agency (MPCA) in approving the selected response actions. In 1993, MPCA issued a MDD, which identified selected remedies for three operable units associated with the Site:

- Operable Unit 1 – Source Control
- Operable Unit 2 – Ground Water Remediation
- Operable Unit 3 - Residential Drinking Water (east of Gilfillan Lake)

Since 1993, Reynolds Metals Company and Whirlpool Corporation, the RPs, have implemented the selected remedies for Operable Units 1, 2 and 3 pursuant to the MDD and under the direction of the MPCA.

The MDD Amendment selects a remedy for the following additional Operable Unit associated with the Site:

- Operable Unit 4 – Residential Drinking Water (west of Gilfillan Lake)

The MPCA established Operable Unit 4 based on residential well monitoring conducted since 2004, which detected low level (i.e., less than or equal to the health-based standard) vinyl chloride contamination in four wells west of Gilfillan Lake. This new Operable Unit includes approximately eighty-two (82) homes west of the lake with wells that could potentially be impacted by vinyl chloride contamination from the Highway 96 Dump Site.

The remedial actions and obligations of the RPs identified in the 1993 MDD for Operable Units 1, 2, and 3 will continue to be implemented, and will not be altered by the establishment of Operable Unit 4 or the MDD Amendment.

This MDD Amendment:

- Summarizes historical Site investigation, and remedial action activities conducted by the RPs in accordance with the 1993 MDD;
- Summarizes current groundwater conditions associated with Operable Unit 4 and potential changes at the Site;
- Discusses the risks to human health and the environment that may be present at the Site;
- Outlines the remedial action alternatives evaluated in the July 2007 Feasibility Study (FS) Report; and
- Identifies the MPCA's selected remedial action plan for Operable Unit 4 and explains why the MPCA selected this remedy.

On October 2, 2006, the MPCA approved a revised two-year residential well monitoring plan. On October 16, 2006, the MPCA approved an investigation plan and a geophysical logging plan for residential wells for the area west of Gilfillan Lake. The MPCA also approved a geophysical survey work plan for the area underlying Gilfillan Lake on February 1, 2007.

On June 8, 2007, the MPCA requested that the RPs prepare and submit to the MPCA a FS addressing two potential scenarios for Operable Unit 4:

(1) remedial action alternatives where the concentrations of vinyl chloride and other Site-related VOCs in water samples from residential wells west of Gilfillan Lake remain at or below the MDH HRLs; and

(2) remedial action alternatives where the concentrations of vinyl chloride and/or other Site-related VOCs in water samples from residential wells west of Gilfillan Lake (singly, or through additivity) exceed the MDH HRLs and a well advisory is issued by the Minnesota Department of Health.

On September 25, 2007, after receiving comments on the FS from the City of North Oaks, the MPCA requested the RPs modify the FS. The RPs responded on October 25, 2007 with responses to the MPCA comments. The MPCA approved the FS with modifications on November 7, 2007.

The MPCA published a Proposed Plan Fact Sheet on February 19, 2008, and requested the public to comment on the recommended remedy for Operable Unit 4. The public comment period ended on March 21, 2008.

2.2 Contaminants of Concern and Cleanup Standards

Contaminants of concern at the Site include the following VOCs: 1,1-dichloroethane (DCA), benzene, toluene, trichloroethene, methyl ethyl ketone (MEK), trans-1,2-dichloroethene (DCE), and vinyl chloride, which are hazardous substances under MERLA. VOCs at the Site derive from waste paints and solvents.

In 1994, MDH enacted a HRL for vinyl chloride of 0.2 ug/L. A HRL is a promulgated rule that sets a health standard for vinyl chloride and represents a level of contamination in drinking water that MDH considers acceptable for daily human consumption over a lifetime. The HRLs are health-based criteria and are often used by the MPCA, as a regulatory agency, as the basis for decisions regarding the investigation and remediation of contaminated ground water. This HRL is the cleanup standard used by the MPCA for vinyl chloride for OU4. See the MPCA Remediation Program's table of drinking water criteria at <http://www.pca.state.mn.us/publications/risk-drinkingwatercriteria.xls>.

4.4.7 Alternative B4 - Installation of a municipal water system for homes with a well advisory

Alternative B4 would require the installation of a municipal water system. The most feasible scenario would be to connect homes with well advisories to the existing water line, which ends on the south side of Gilfillan Lake. This Alternative meets the threshold criteria, but would have short-term risks to the community during construction of the water system. In addition, this Alternative is not easy to implement as it would require a new or amended agreement between White Bear Township and North Oaks, City Engineer review and approval of a design, North Oaks Home Owner's Association (NOHOA) approvals for roadway and utility easements, design approval by MDH, North Oaks, NOHOA and White Bear Township, and individual agreements with property owners. This Alternative is the least cost-effective of the Scenario B alternatives, particularly if there are only a few residences with well advisories.

5.0 SELECTED RESPONSE ACTION ALTERNATIVE AND CONCEPTUAL DESIGN

Having evaluated the remedy alternatives presented in the FS, the MPCA has determined that Alternative 4.4.2 and 4.4.6, installation of a new residential well into a different/deeper aquifer at the homes with a well advisory in conjunction with long-term ground water monitoring best satisfies those criteria for selection as the remedial action at the Site. In addition, in the event that vinyl chloride or another Site-related VOC (See Section 2.2 above) exceeds its respective HRL in any of the Ski Lane Ravine monitoring wells, and is confirmed with a follow-up sample within 30 days, the MPCA has determined that Alternative A3, installation and operation of a pumpout system in the Ski Lane ravine area, should be implemented as a supplemental response action at the Site.

This selected remedy includes the remedy components described in Section 4.4.2 and 4.4.6. This Section also describes how the selected remedy satisfies other requirements that must be addressed under MERLA.

The MPCA has determined that implementation of the selected remedy is reasonable and necessary to protect the public health or welfare from actual or threatened releases of hazardous substances into the environment at the Site. The selected remedy must be implemented to meet the Response Action Objective (RAO) identified for that alternative. Prior to implementation of the selected remedial action, the Responsible Party must obtain MPCA approval of a final Remedial Design/Response Action Plan.

5.2 Remedial Action Elements

The selected remedial action shall include the following elements:

5.2.1 Installation of a New Residential Well into a Deeper Aquifer at the Homes with a Well Advisory

The St. Peter Sandstone is the primary source of drinking water in North Oaks and is the aquifer in North Oaks that is impacted by vinyl chloride contamination from the Site. The homes that receive well advisories will be provided with new wells in a deeper aquifer.

The Prairie du Chien aquifer is the next deeper aquifer below the St. Peter. Based on monitoring data from North Oaks, and specifically from the Gilfillan Lake area, the Prairie du Chien aquifer is not impacted by vinyl chloride contamination from the Site. Therefore, homes in Operable Unit 4 that receive well advisories will be provided with new Prairie du Chien aquifer wells. MDH-licensed well drillers will install these new wells approximately 100 feet deeper than the old St. Peter wells. During well installation, the drillers will take precautions to seal off the St. Peter from the Prairie du Chien aquifer, to assure that contamination does not spread from the St. Peter into the Prairie du Chien.

5.2.2. Long-Term Ground Water Monitoring

To help establish and confirm ground water contamination plume stability, additional ground water monitoring is required, including the following:

- Semi-annual sampling of thirty-three (33) residential wells located in Geographic Area 3 - west of Gilfillan Lake (See Figure 2 attached hereto and herein incorporated by reference;
- Annual sampling of twenty (20) residential wells located in Geographic Area 4 - north and west of Gilfillan Lake and fourteen (14) residential wells located in Geographic Area 5 - west of Gilfillan Lake (residential wells located along the shoreline of Gilfillan Lake, including wells along West Shore Road and Duck Pass);
- Biennial sampling of eleven (11) residential wells located in Geographic Area 4 - east and west of Gilfillan Lake and four (4) residential wells located in Geographic Area 5 - west of Gilfillan Lake;
- Annual sampling of the nine (9) off-Site monitoring wells and four (4) converted residential monitoring wells located in North Oaks;
- In addition, four to five new upper St. Peter Sandstone aquifer monitoring wells would be installed west of Gilfillan Lake as part of an expanded monitoring program; two of these wells would be installed in the Ski Lane Ravine and two to three wells would be installed at an angle under the west shore of Gilfillan Lake;
- A monitoring period of approximately twenty (20) years is planned; however, the MPCA will determine the appropriate scope and frequency of monitoring.

5.3 Other Considerations Under Minnesota Environmental Response and Liability Act

5.3.1 Long Term Assurance of Protectiveness

5.3.1.1 Long Term Monitoring

The remedy shall be implemented as set forth in the approved FS and in accordance with a long-term monitoring plan approved by the MPCA as part of the final RD/RA Plan. These plans shall meet all of the requirements set forth in the Response Action Objective for the selected remedy and other requirements set forth in this MDD Amendment.

5.3.1.2 Planned Use of the Property

MERLA provides that, in determining the standards to be achieved by response actions to protect public health and welfare and the environment from a release of hazardous substances, the MPCA must consider the planned use of the property where the release is located. The purpose of this provision of MERLA is to allow the MPCA to select cleanup standards that provide a level of protection that is compatible with the uses of the Site that can be reasonably foreseen. As set forth in this MDD Amendment, and based upon the factors that the MPCA is required to consider, the MPCA has determined that cleanup to 0.2 ug/L in ground water is appropriate at this Site and would provide protection of public health and welfare and the environment that is consistent with the current and planned residential use of the property.

6.0 ESTABLISHMENT OF RESPONSE ACTION OBJECTIVES AND CLEANUP LEVELS

The Response Action Objectives for Operable Unit 4 are to protect the public from exposure to ground water contamination, which exceeds the HRLs, and to protect residential wells from the release or threatened release of contaminated ground water, using reasonable and necessary response actions. An additional response action objective is to provide safe drinking water for the residents in Operable Unit 4 of North Oaks who have received drinking water advisories.

Since one or more of the above response actions are required in the event of an MDH well advisory and since the well advisory is precipitated by a HRL exceedance (singly or through additivity) in a residential well, the HRLs are therefore the criteria that dictate a response action. Thus, the HRLs for the site-related contaminants, including benzene, toluene, MEK, DCA, DCE, and vinyl chloride, are the appropriate cleanup/action levels for the Site, and are provided in Table 1, attached hereto and herein incorporated by reference. These cleanup levels apply to the quality of water in the new residential wells required by the remedial action. It is important to acknowledge that future HRL revisions may require additional response actions.

7.0 RESPONSIVENESS SUMMARY

Pursuant to Minn. Stat. § 115B.17, subd. 2b (2006), the MPCA issued a public notice on February 19, 2008 describing the recommended response action. The notice was sent to the Shoreview News paper for publication on February 19, 2008. The MPCA accepted comments regarding the selected response action until March 21, 2008.

On February 26, 2008, at the East Recreational Center in North Oaks, the MPCA held a public meeting to discuss the draft MDD Amendment. Approximately sixty-five (65) citizens attended the public meeting, including Senator Sandy Rummel, Representative Paul Gardner, the Mayor of North Oaks, members of the North Oaks City Council, and representatives for the Responsible Parties. Questions during the meeting focused primarily on the reasons for amending the 1993 MDD, and the two potential contingency remedies: municipal water and the Ski Lane Ravine pumpout system.

2. This MDD Amendment is incorporated in and made an integral part of the Consent Order and shall be implemented in accordance with an MPCA-approved Remedial Design/Response Action Plan and Amendments.

B. L. Moore
Brad Moore
Commissioner
Minnesota Pollution Control Agency

8/26/08
Date

AG: #2266214-v1

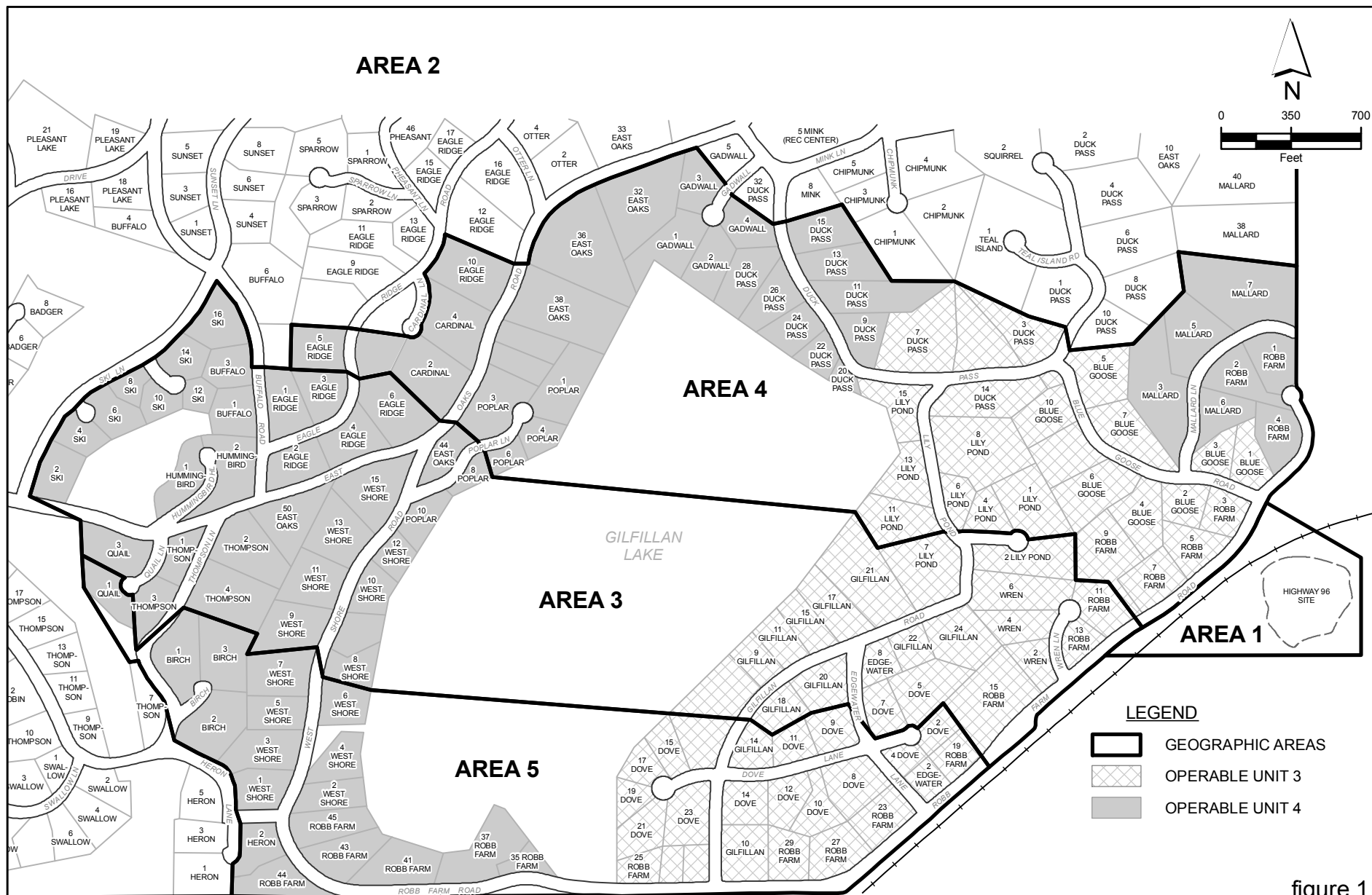


figure 1

GEOGRAPHIC AREAS AND OPERABLE UNITS (NORTH OAKS, MINNESOTA)

Highway 96 Landfill Site

TABLE 1

Highway 96 Dump Site Ground Water Cleanup Goals

<u>Volatile Organic Compound (VOC)</u>	<u>Cleanup Goal</u>	<u>Source</u>
1,1,2-Trichloroethene (TCE)	5 ug/l	Minnesota Department of Health, Health Risk Limit
Vinyl chloride	0.2 ug/l	“
trans-1,2-Dichloroethene (DCE)	100 ug/l	“
1,1-Dichloroethane (DCA)	70 ug/l	“
Benzene	5 ug/l	“
Toluene	1000 ug/l	“
Methyl Ethyl Ketone (MEK)	4000 ug/l	“

Appendix E

Historical Data Summary

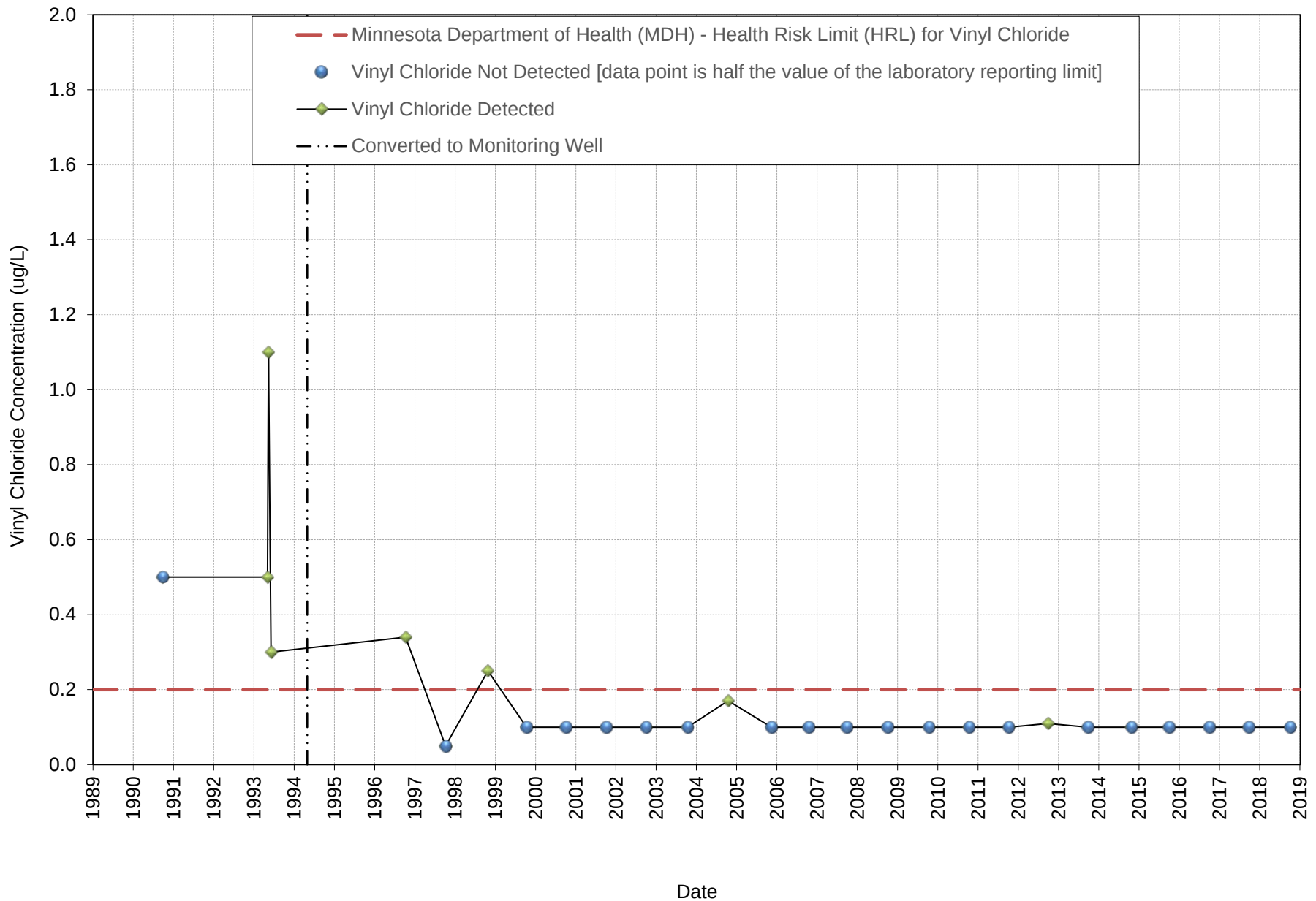
(Available at the MPCA)

Appendix F
Laboratory Analytical Reports and
Data Quality Assessment & Validation Memos
(Available at the MPCA)

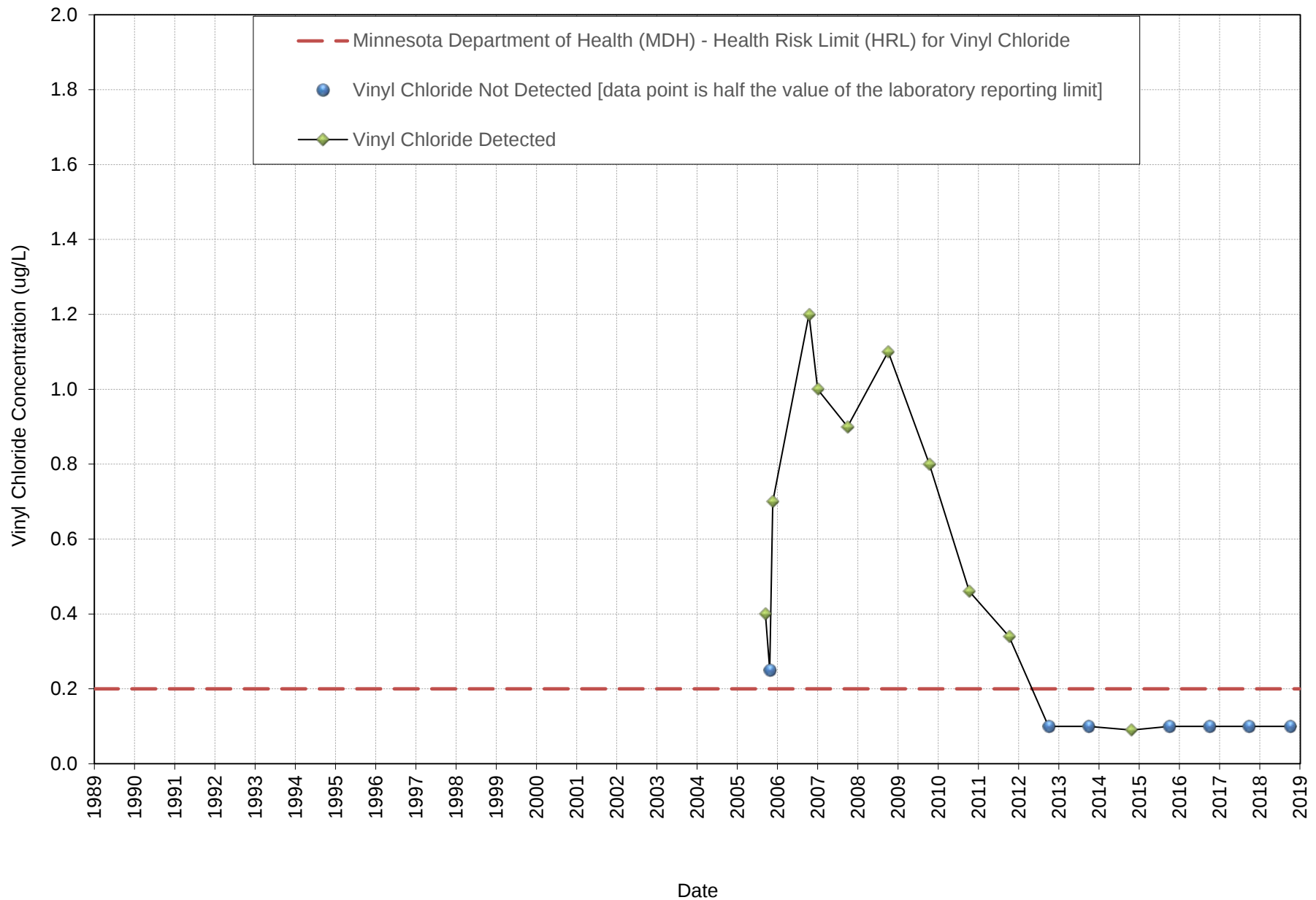
Appendix G

Graphs of Vinyl Chloride Detections (Off-Site Monitoring Well Locations and Residential Wells)

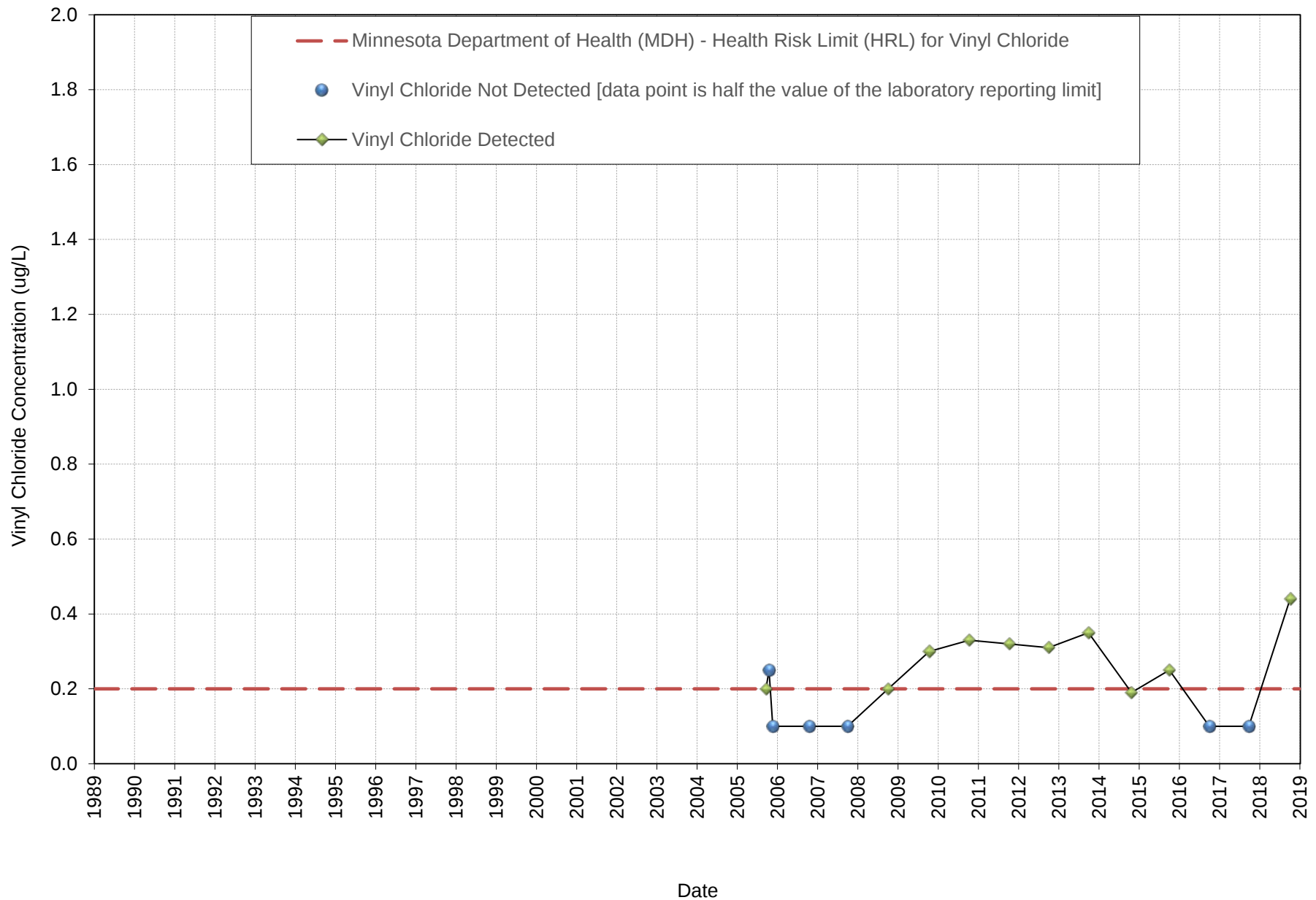
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1 Lily Pond Road
North Oaks, Minnesota



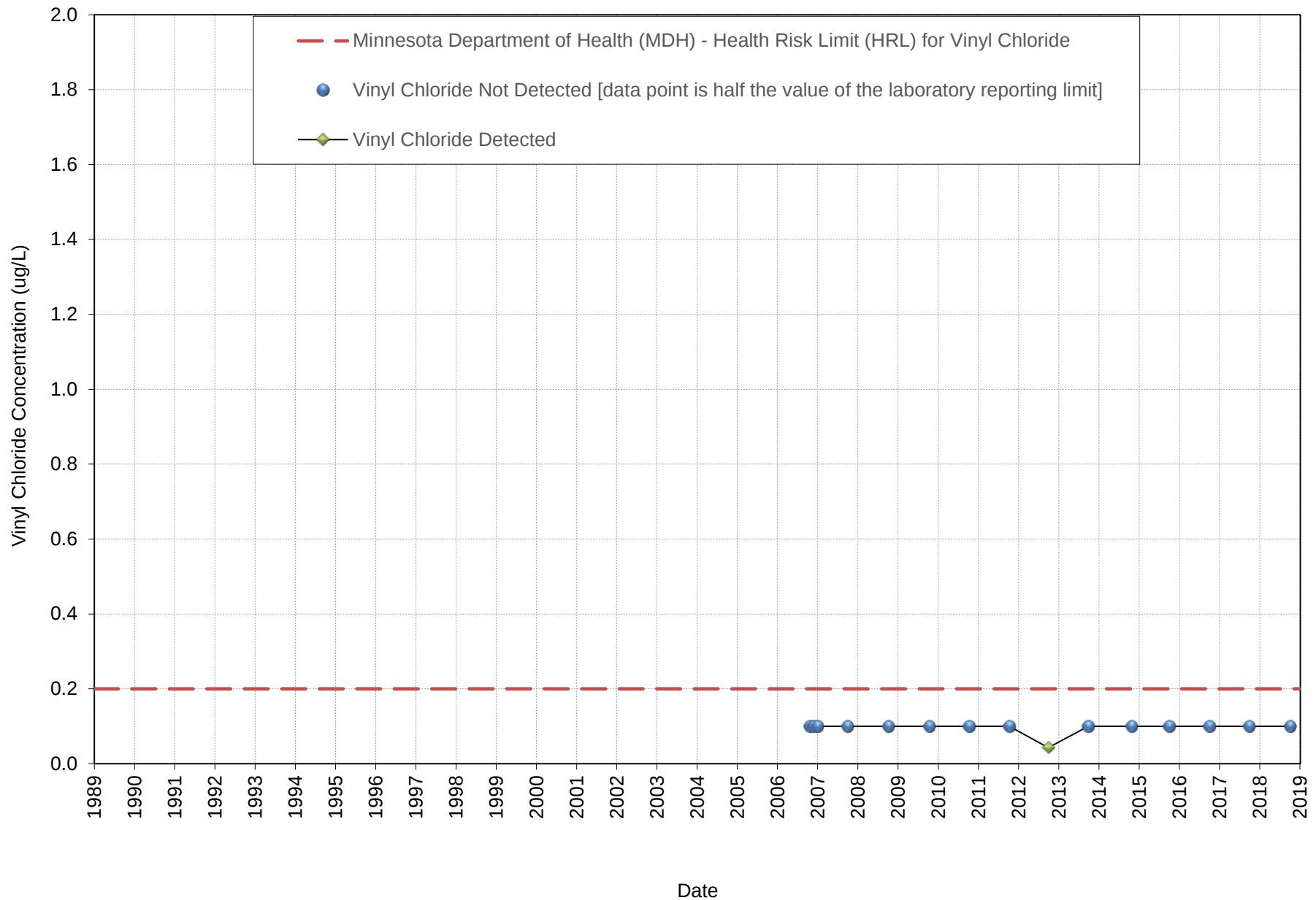
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North Oaks, Minnesota



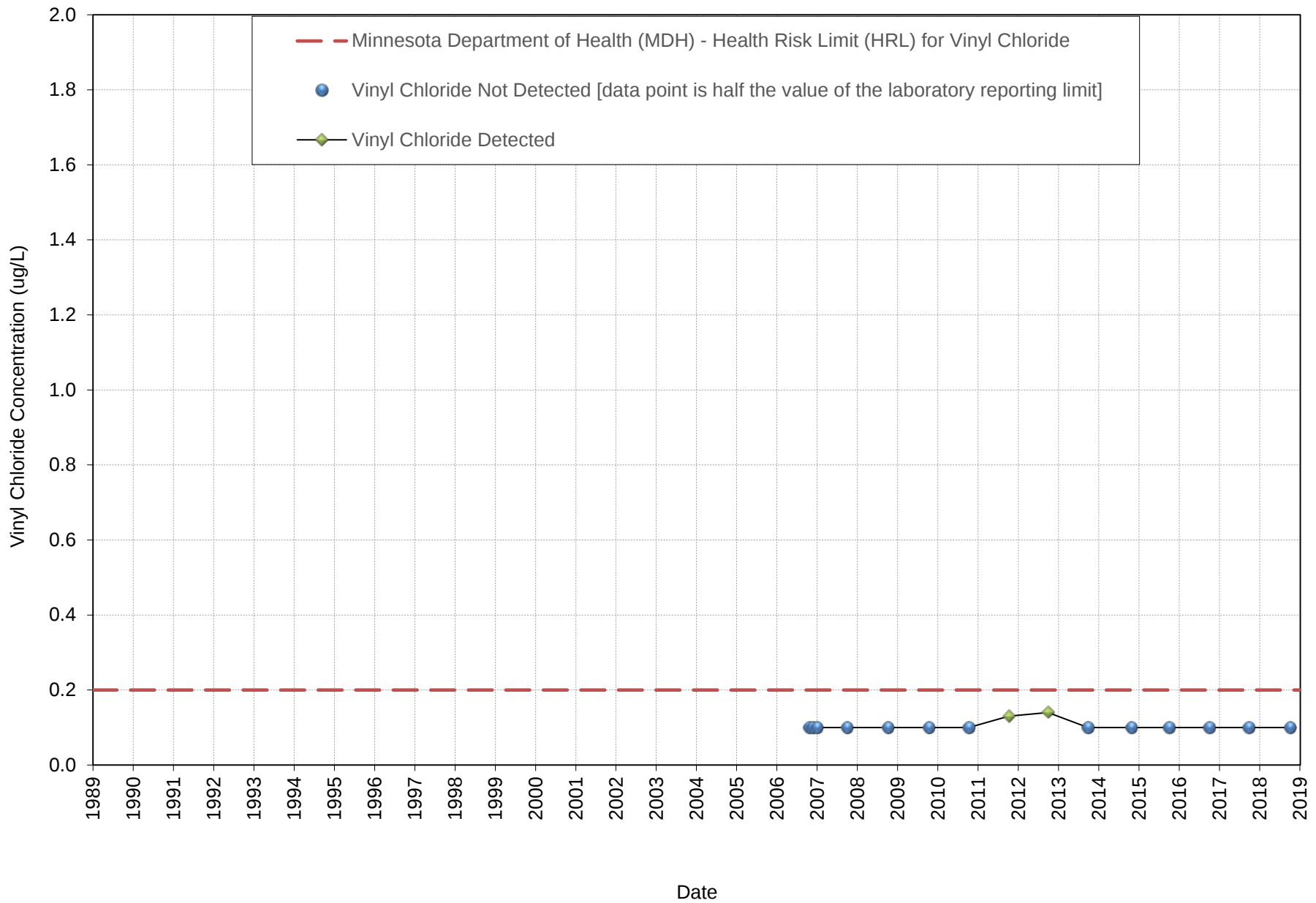
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MW17B
North Oaks, Minnesota**



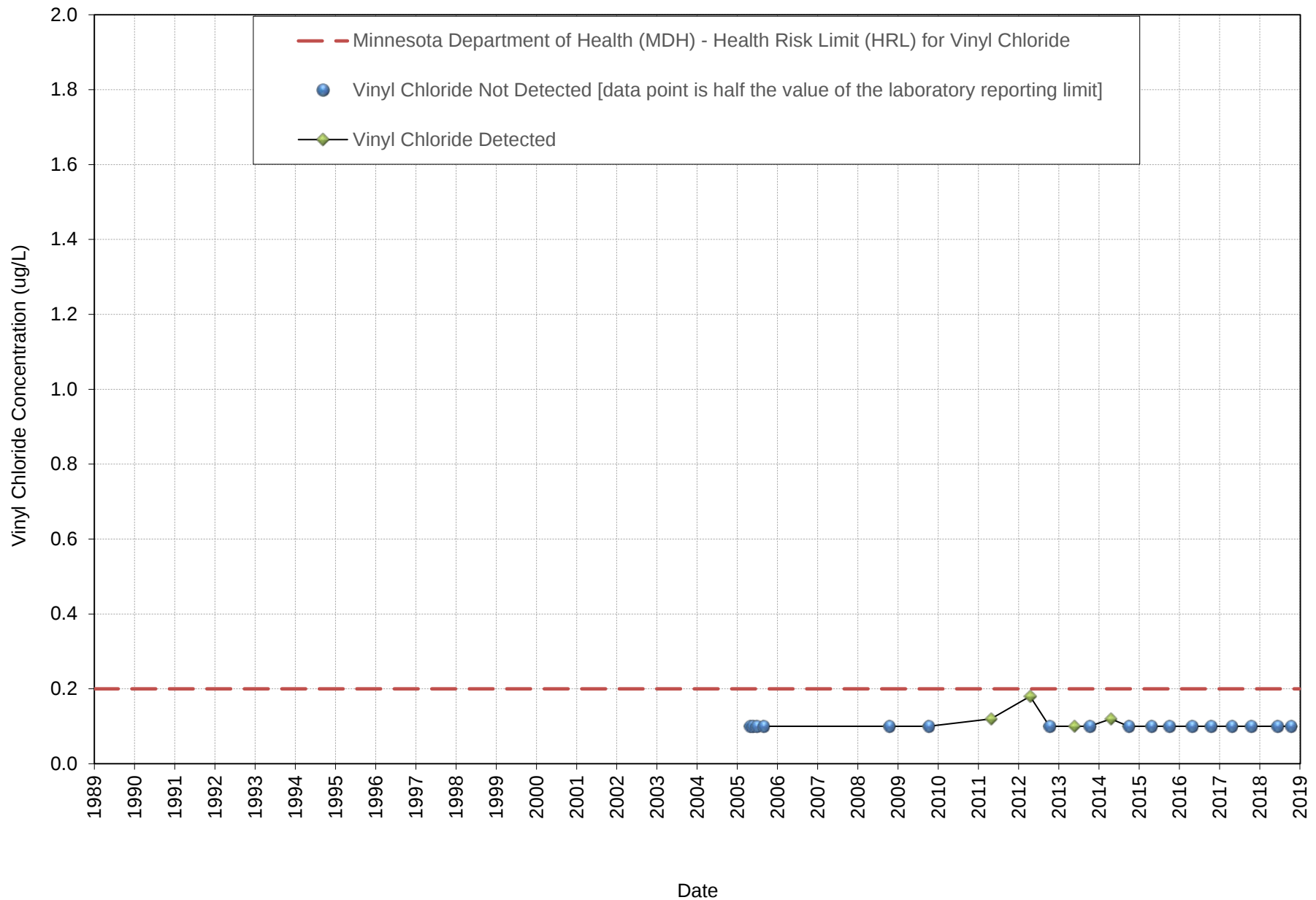
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North Oaks, Minnesota



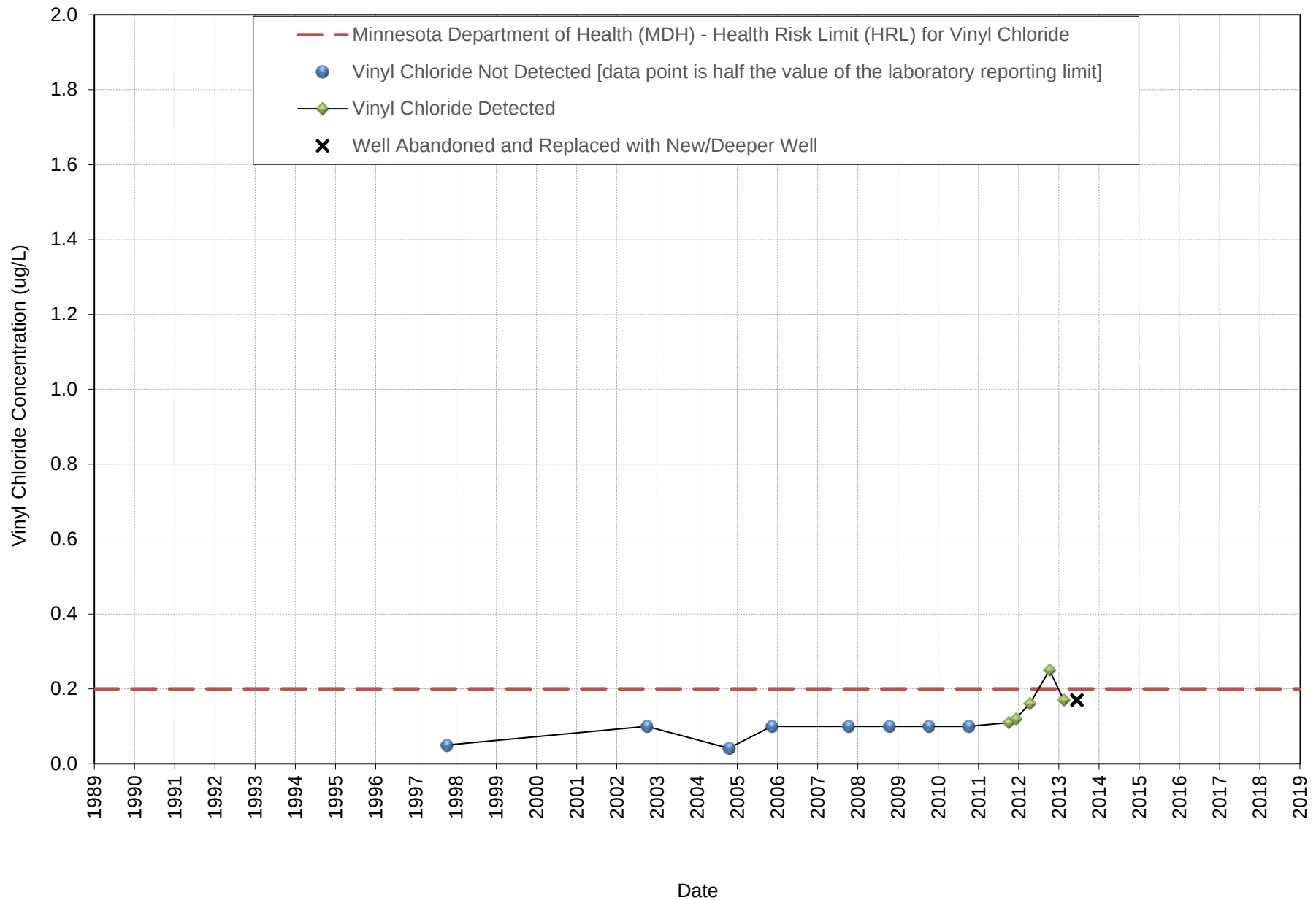
Historical Vinyl Chloride Concentrations
MW18B
North Oaks, Minnesota



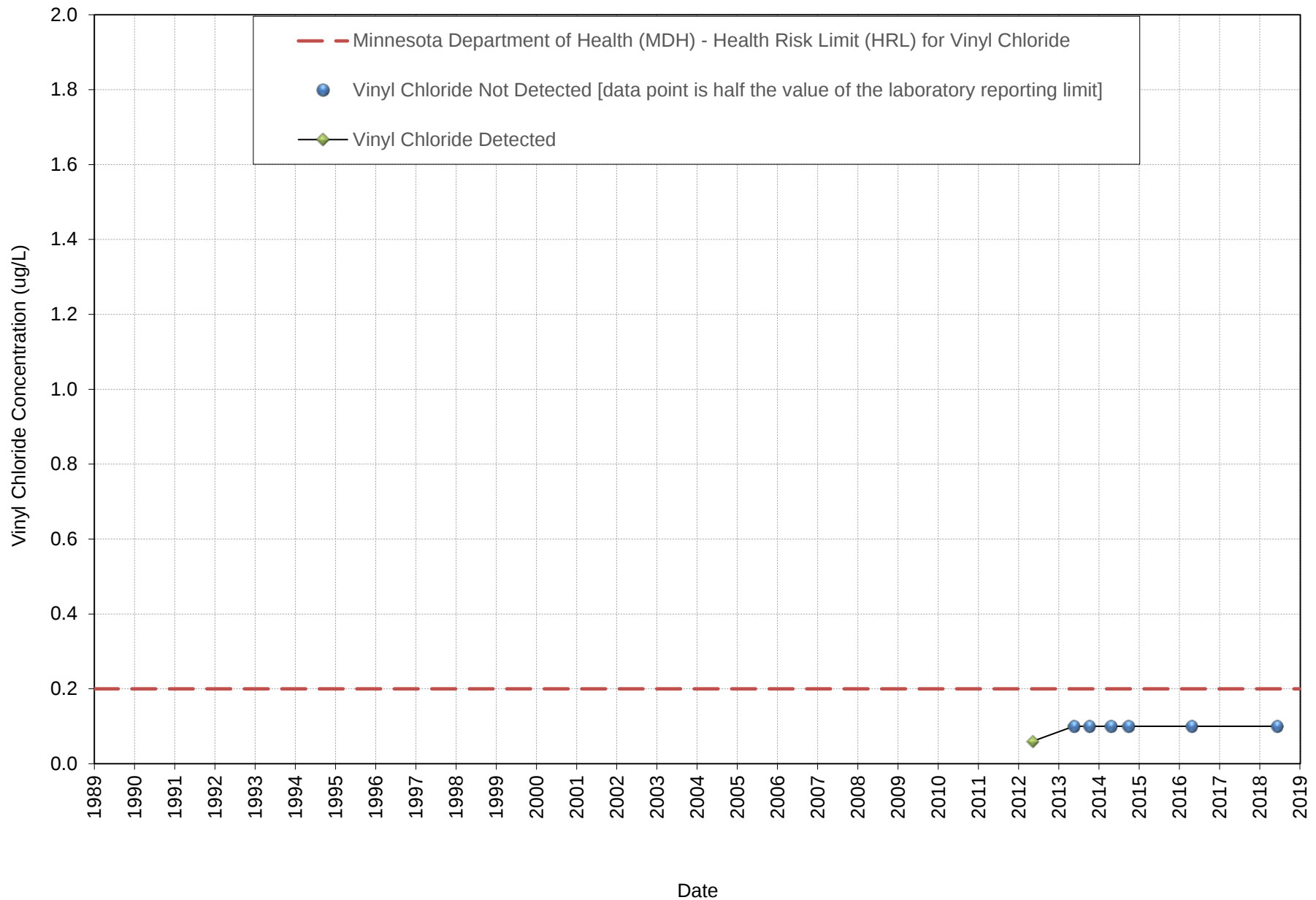
Historical Vinyl Chloride Concentrations
50 East Oaks Road
North Oaks, Minnesota



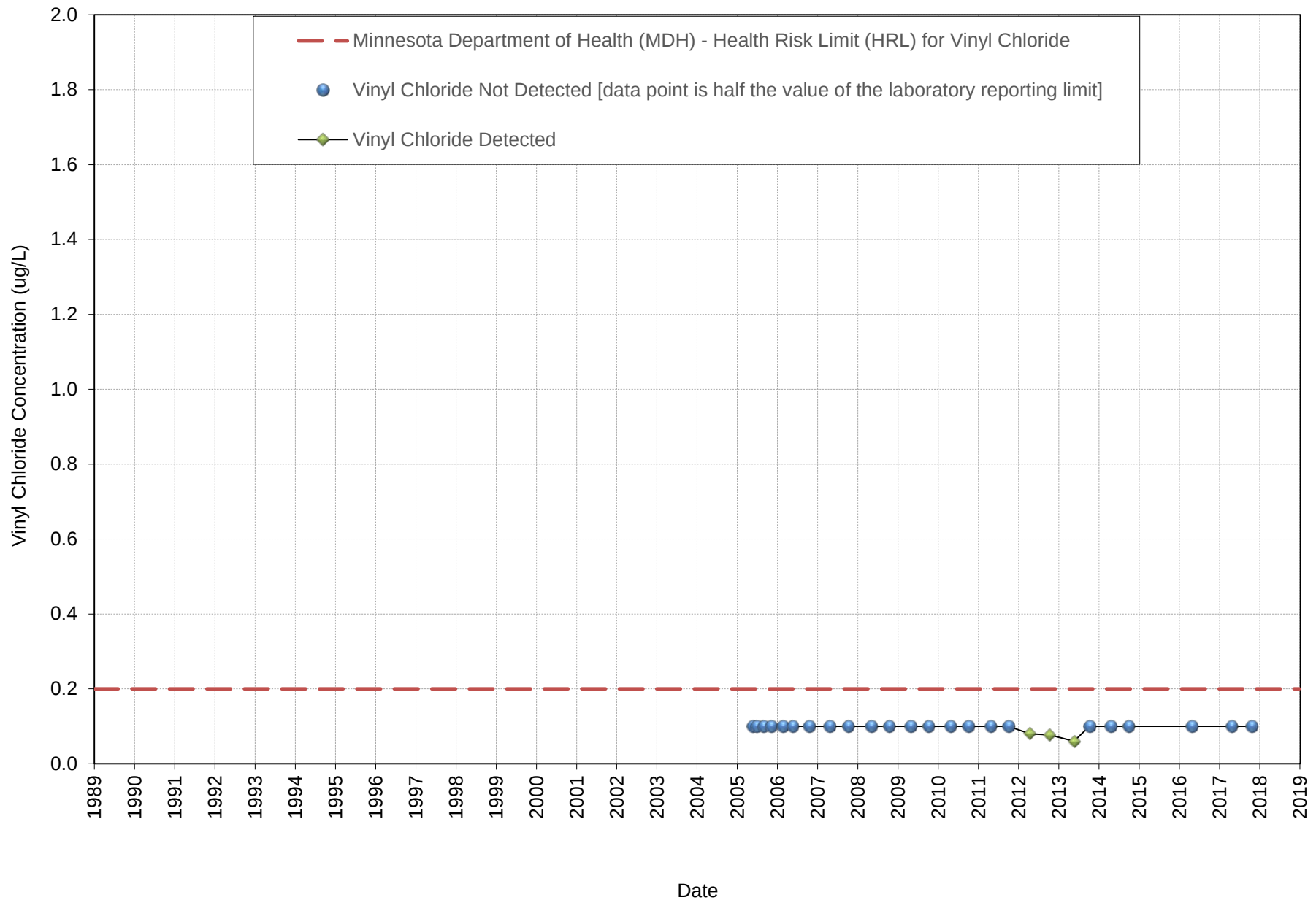
Historical Vinyl Chloride Concentrations 2 Heron Lane (Old Well) North Oaks, Minnesota



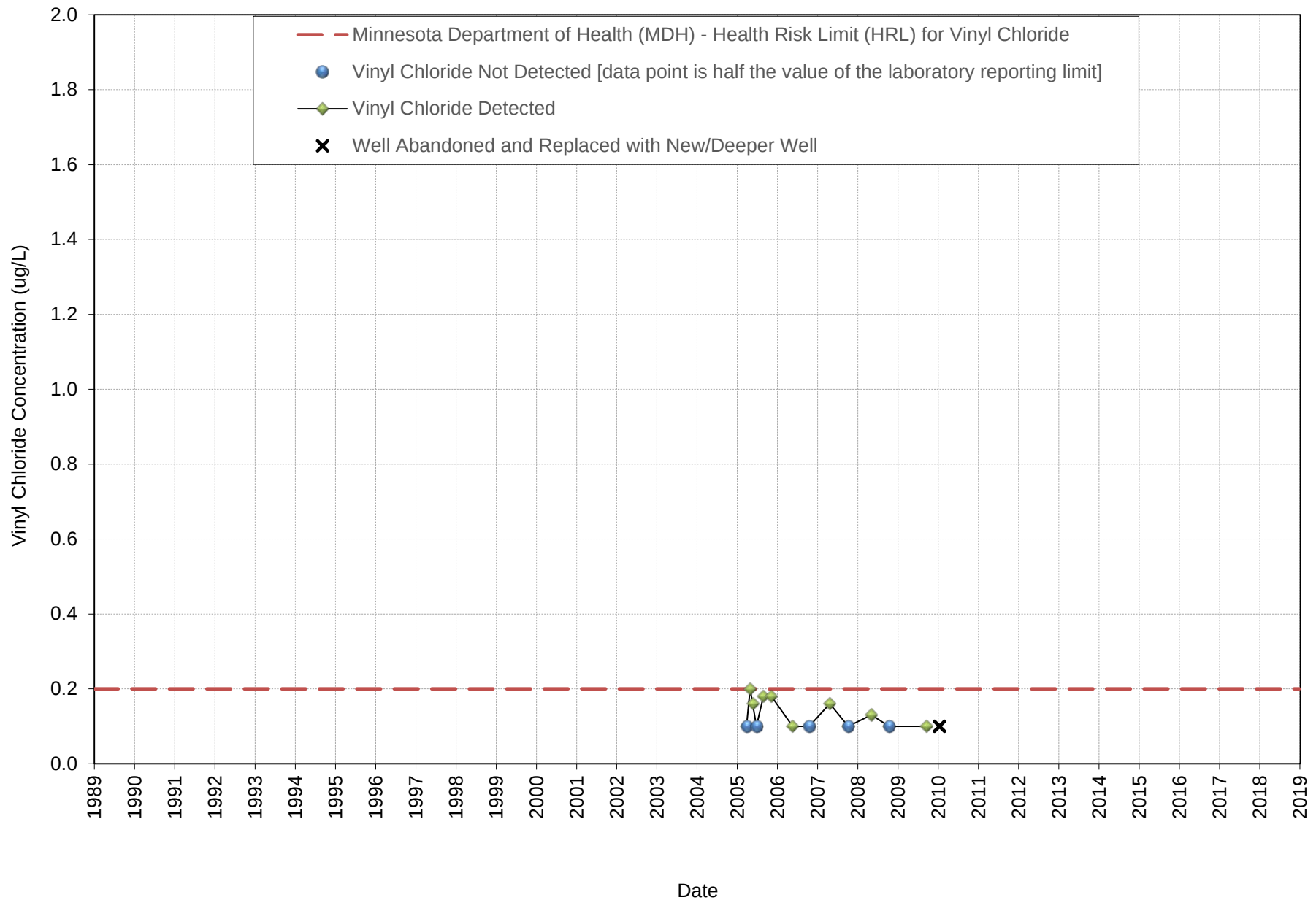
Historical Vinyl Chloride Concentrations
3 Heron Lane
North Oaks, Minnesota



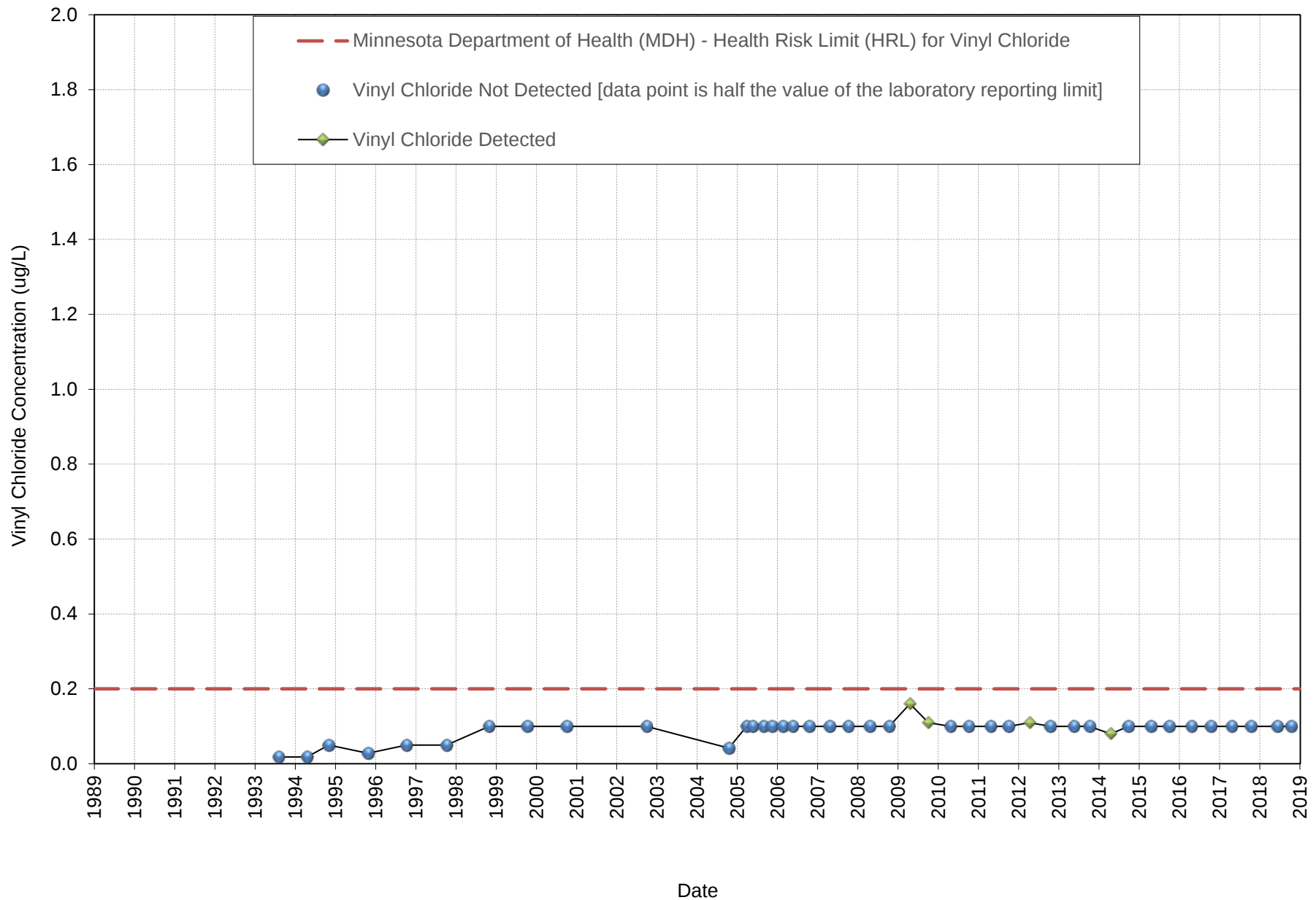
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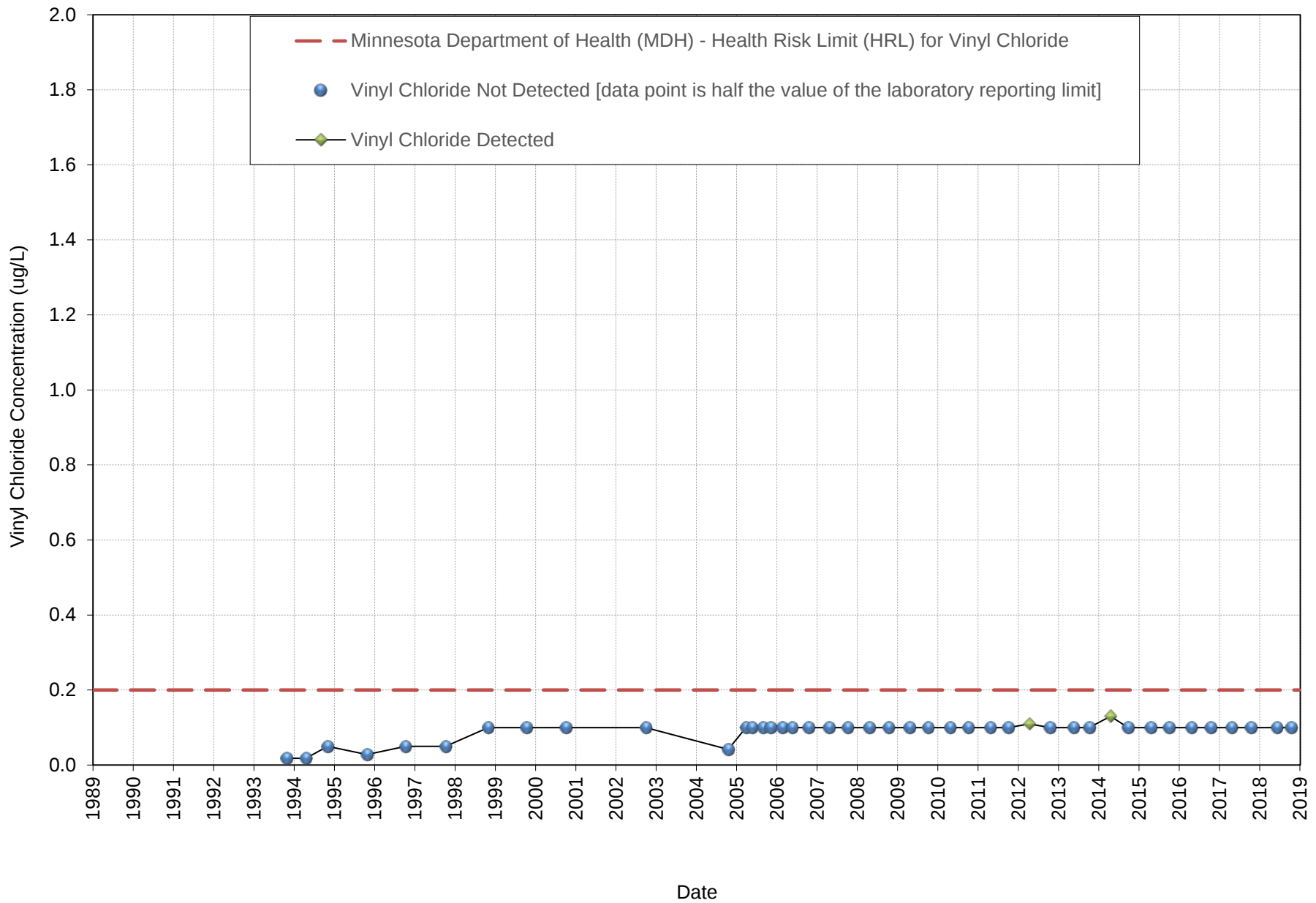
**Historical Vinyl Chloride Concentrations
2 Hummingbird Hill (Old Well)
North Oaks, Minnesota**



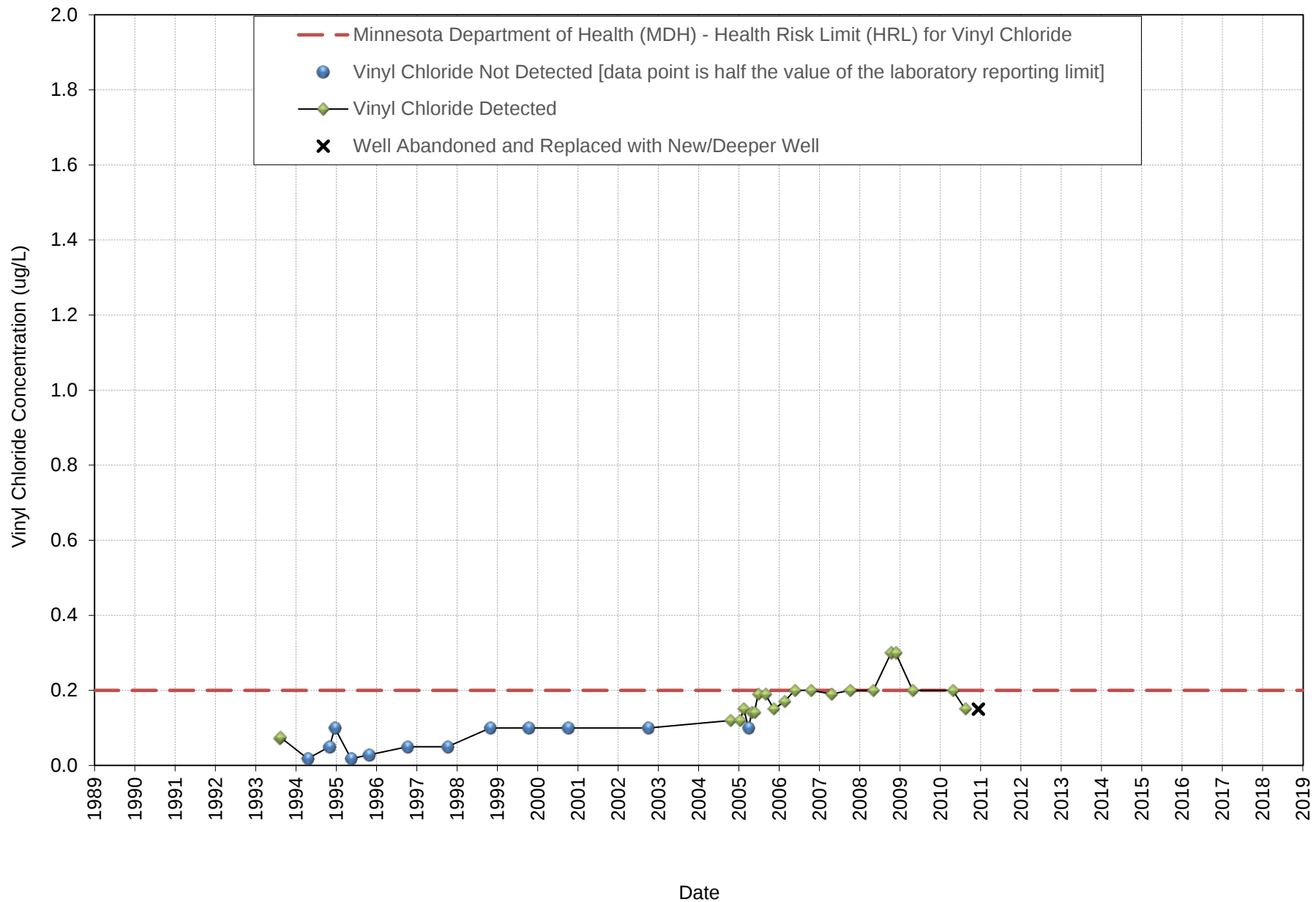
Historical Vinyl Chloride Concentrations
10 West Shore Road
North Oaks, Minnesota



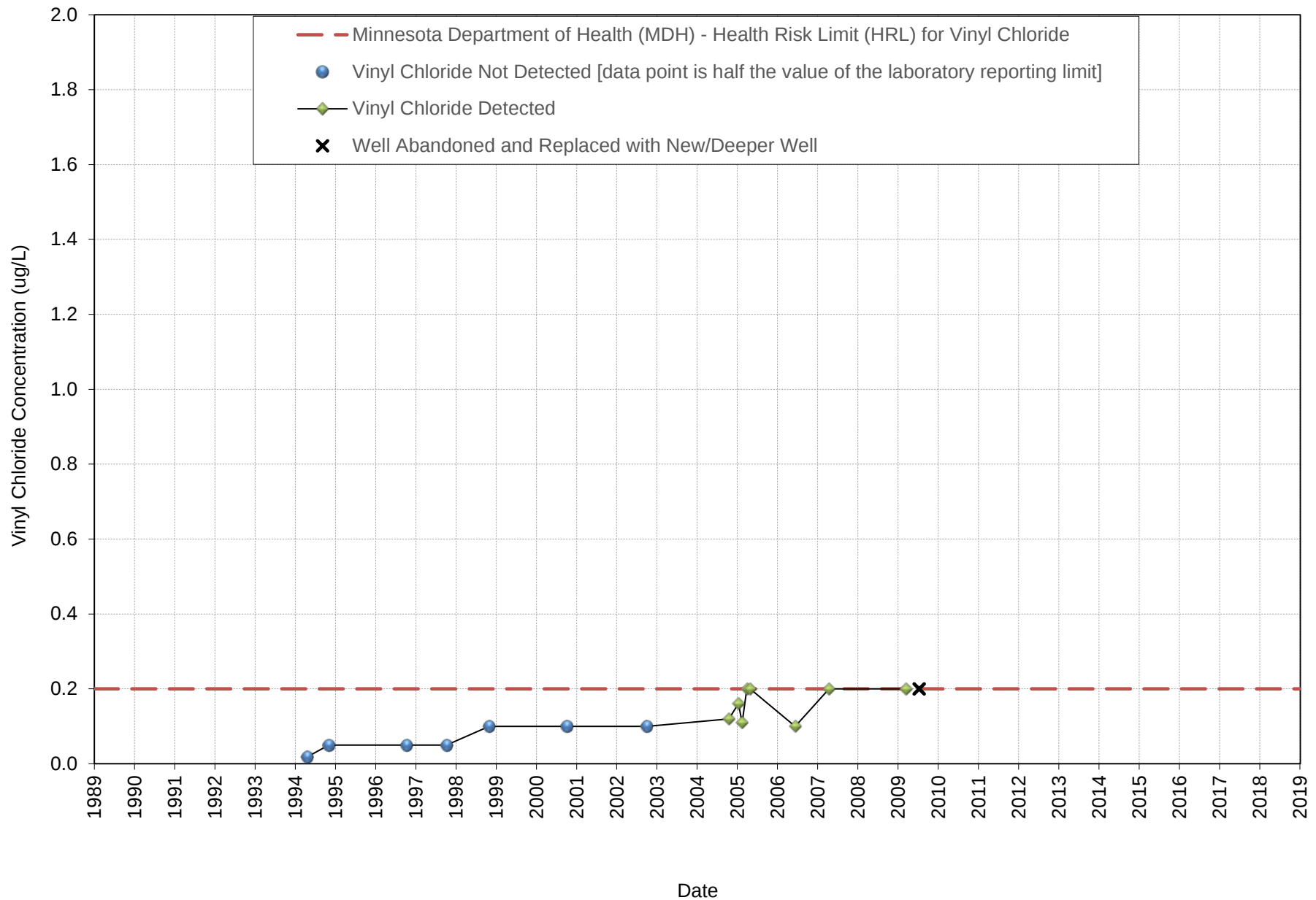
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11 West Shore Road
North Oaks, Minnesota**



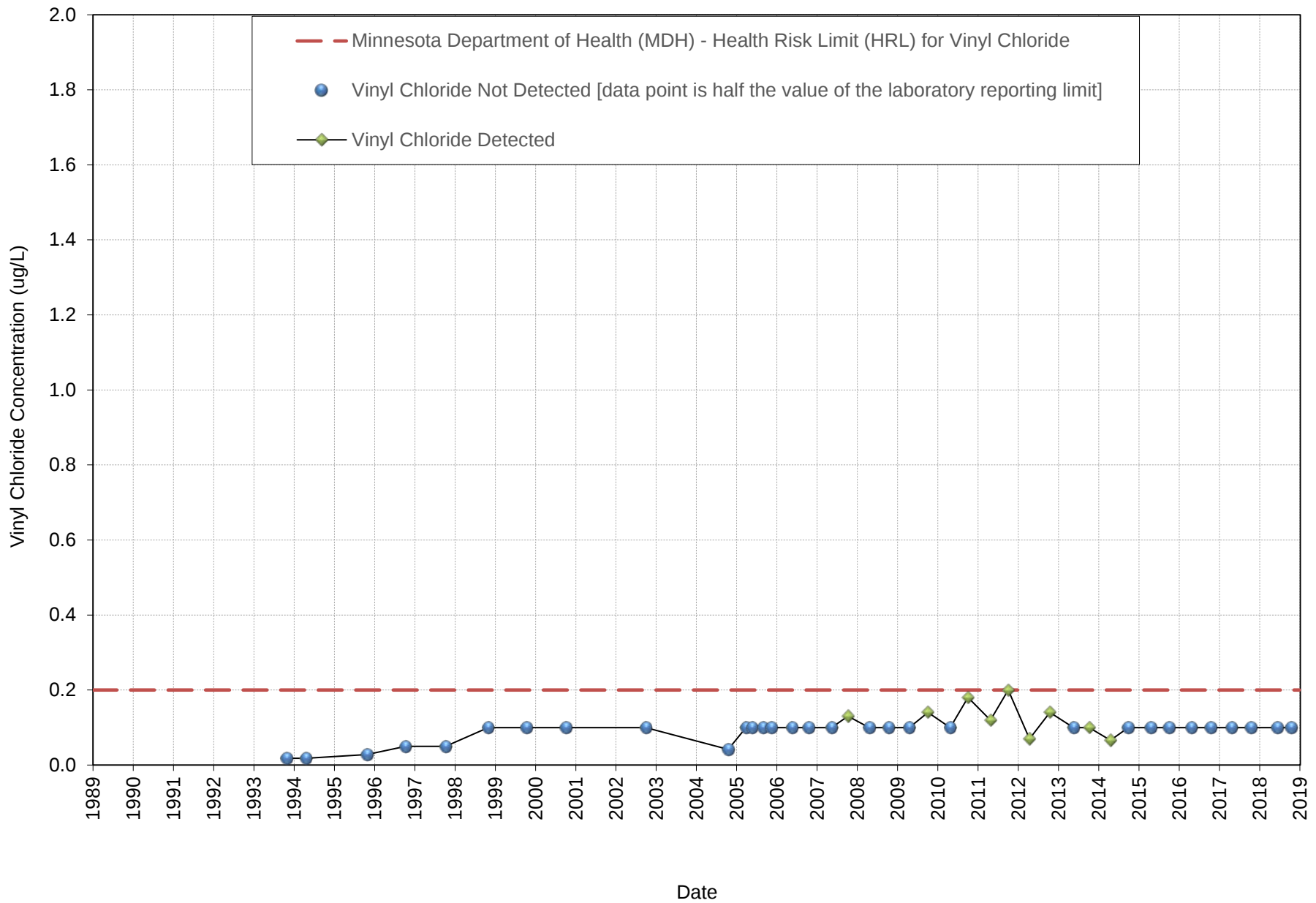
Historical Vinyl Chloride Concentrations 12 West Shore Road (Old Well) North Oaks, Minnesota



**Historical Vinyl Chloride Concentrations
13 West Shore Road (Old Well)
North Oaks, Minnesota**



**Historical Vinyl Chloride Concentrations
15 West Shore Road
North Oaks, Minnesota**





about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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